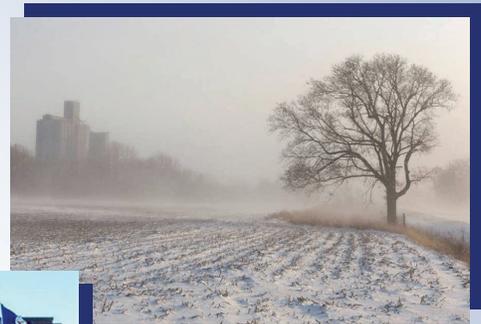
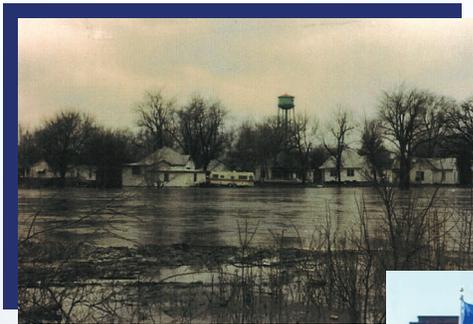


DOUGLAS COUNTY MULTI-JURISDICTIONAL ALL HAZARDS MITIGATION PLAN



PARTICIPANTS

ARCOLA, CITY OF
ARTHUR, VILLAGE OF
ATWOOD, VILLAGE OF
DOUGLAS COUNTY

GARRETT, VILLAGE OF
NEWMAN, CITY OF
TUSCOLA, CITY OF
VILLA GROVE, CITY OF

OCTOBER 2010

ACKNOWLEDGEMENTS

Words alone cannot fully convey the scope of the damages caused by natural hazard events. Through the efforts and support of Douglas Cottle, Scott Gower and Mary Gen and Lee Ann Frick this Plan has been enhanced with photographs. The Fricks were kind enough to sort through photographs, books and news articles at the Camargo Township Library in Villa Grove in search of damage information and photographs that could be used in this Plan. Douglas Cottle, a professional photographer who resides in Douglas County, selected a series of photographs from his collection and provided them for use within the Plan. He took the time to provide the location, date, and related information found with each of his photos. A special thanks is also extended to Rosemary Raeske at the Camargo Township Library in Villa Grove. She provided valuable assistance in locating information on historical flooding in Villa Grove.

**DOUGLAS COUNTY MULTI-JURISDICTIONAL
ALL HAZARDS MITIGATION PLAN**

DOUGLAS 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	1-3
2.0	PLANNING PROCESS	
2.1	Planning Committee.....	2-2
2.2	Public Involvement.....	2-5
2.3	Participation Opportunities for Interested Parties	2-7
2.4	Incorporation of Existing Planning Documents	2-7
3.0	RISK ASSESSMENT	
3.1	Severe Storms (Thunderstorms, Hail, Lightning & Heavy Rain).....	3-3
3.2	Tornadoes	3-13
3.3	Severe Winter Storms (Snow & Ice).....	3-25
3.4	Flood.....	3-33
3.5	Extreme Heat.....	3-48
3.6	Drought.....	3-54
3.7	Earthquake.....	3-62
3.8	Dam Failure.....	3-71
3.9	Man-Made Hazards	3-77
3.9.1	Hazardous Substances.....	3-77
3.9.1.1	Hazardous Waste Generation.....	3-78
3.9.1.2	Transportation	3-79
3.9.1.3	Disposal.....	3-82
3.9.1.4	Remediation	3-83
3.9.2	Hazardous Material Incidents	3-84
3.9.3	Nuclear Accidents	3-86
3.9.3.1	Clinton Nuclear Power Facility	3-86
3.9.3.2	Transportation of Spent Nuclear Fuel Rods by Railway	3-87
3.9.4	Terrorism.....	3-87

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..... 6-2

7.0 PLAN ADOPTION

7.1 Plan Adoption Process..... 7-1

8.0 REFERENCES..... 8-1

9.0 TABLES

Table 1 – Thunderstorm & High Wind Events Reported in Douglas County 9-1

Table 2 – Hail Events Reported in Douglas County 9-3

Table 3 – Lightning Events Reported in Douglas County 9-4

Table 4 – Tornadoes Reported in Douglas County 9-5

Table 5 – Snow and Ice Events Reported in Douglas County 9-6

Table 6 – Extreme Cold Events Reported in Douglas County 9-8

Table 7 – Flooding & Flash Flooding Events Reported in Douglas County 9-9

Table 8 – Extreme Heat Events Reported in Douglas County 9-11

APPENDICES

County Resolution Authorizing the Development of the Plan Appendix A

Planning Committee Meeting Sign-In Sheets..... Appendix B

Planning Committee Meeting Minutes Appendix C

Citizen Questionnaire..... Appendix D

Frequently Asked Questions Fact Sheet Appendix E

News Articles and a Listing of Print Media Outlets..... Appendix F

Public Forum – Planning Process Handout Appendix G

Public Forum – Plan Comment Sheet..... Appendix H

Hazard Mitigation Planning Letter Sent to Adjacent Counties Appendix I

Participating Municipalities Flood Insurance Rate Maps Appendix J

Plan Adoption Resolutions Appendix K

LIST OF FIGURES

Figure 1	Federal Disaster Declarations for Douglas County	1-1
Figure 2	Jurisdictions Represented in the Plan	1-2
Figure 3	Demographic Data by Participating Jurisdiction	1-3
Figure 4	Description of Planning Process	2-1
Figure 5	Planning Committee Member Attendance Record	2-3
Figure 6	Existing Planning Documents by Participating Jurisdictions	2-8
Figure 7	Wind Speed Conversions	3-3
Figure 8	Hail Size Descriptions	3-4
Figure 9	TORRO Hailstorm Intensity Scale	3-5
Figure 10	Douglas County Thunderstorm & High Wind Events by Month	3-7
Figure 11	Douglas County Thunderstorm & High Wind Events by Hour	3-7
Figure 12	Douglas County Hail Events by Month	3-7
Figure 13	Douglas County Hail Events by Hour	3-7
Figure 14	Verified Thunderstorm & High Wind Events and Hail Events by Participating Municipality	3-9
Figure 15	Severe Weather Crash Data for Douglas County	3-10
Figure 16	Fujita Tornado Measurement Scale	3-13
Figure 17	Enhanced Fujita Tornado Measurement Scale	3-14
Figure 18	Douglas County Tornadoes by Magnitude	3-15
Figure 19	Douglas County Tornadoes by Month	3-15
Figure 20	Douglas County Tornadoes by Hour	3-15
Figure 21	Tornado Touchdowns in Douglas County: 1957 – June 30, 2009	3-17
Figure 22	Verified Tornado Touchdowns by Participating Municipality	3-16
Figure 23	Potential Tornado Damage to Housing Units in Douglas County by Township	3-19
Figure 24	Estimated Number of Residential Housing Units Impacted by a Tornado	3-22
Figure 25	Estimated Potential Dollar Losses to Impacted Housing Units from a Tornado	3-23
Figure 26	Wind Chill Index Chart	3-26
Figure 27	Douglas County Snow and Ice Events by Month	3-28
Figure 28	Douglas County Snow and Ice Events by Hour	3-28
Figure 29	Severe Winter Weather Crash Data for Douglas County	3-30
Figure 30	Floodplain Illustration	3-34
Figure 31	Example of a Flood Insurance Rate Map (FIRM)	3-36
Figure 32	Douglas County Flooding & Flash Flooding Events by Month	3-39
Figure 33	Douglas County Flooding & Flash Flooding Events by Hour	3-39
Figure 34	Floodplain Areas in Unincorporated Douglas County	3-40
Figure 35	Bodies of Water Subject to Flooding	3-39
Figure 36	NFIP Participating Communities	3-41
Figure 37	Verified Flooding & Flash Flooding Events by Participating Municipalities	3-42
Figure 38	Repetitive Flood Loss Properties	3-44
Figure 39	Potential Dollar Losses to Vulnerable Residential Buildings from Flooding	3-46
Figure 40	Heat Index Chart	3-49
Figure 41	Relationship between Heat Index and Heat Disorders	3-50
Figure 42	Palmer Classification System	3-56
Figure 43	Palmer Drought Severity Index Map	3-56

LIST OF FIGURES CONTINUED...

Figure 44	U.S. Drought Monitor – Drought Severity Classifications.....	3-57
Figure 45	U.S. Drought Monitor Map	3-58
Figure 46	Crop Yield Reductions Due to Drought in Douglas County	3-60
Figure 47	Fault Illustration.....	3-62
Figure 48	Earthquake Magnitude Classes.....	3-64
Figure 49	Comparison of Richter Scale and Modified Mercalli Scale	3-65
Figure 50	Approximate Number of Earthquakes Recorded Annually	3-66
Figure 51	Potential Earthquake Impacts	3-69
Figure 52	Dam Hazard Classification System	3-72
Figure 53	Privately-Owned Classified Dams Located in Douglas County.....	3-73
Figure 54	Locations of Publicly and Privately-Owned Classified Dams	3-74
	in Douglas County	
Figure 55	Generators of Solid & Liquid Hazardous Waste in Douglas County - 2007.....	3-78
Figure 56	Generators of Hazardous Air Emissions in Douglas County – 2007	3-79
Figure 57	Roadway Accidents Involving Shipments of Hazardous Products	3-80
	in Douglas County: 2005 – 2009	
Figure 58	Railroad Accident Classification Categories.....	3-80
Figure 59	Railway Accidents/Incidents Involving Hazardous Substances: 2000 – 2009.....	3-81
Figure 60	SRP Sites Located in Douglas County	3-84
Figure 61	Hazardous Material Incidents in Douglas County: 2005 – 2009.....	3-85
Figure 62	Hazard Mitigation Goals.....	4-1
Figure 63	Mitigation Action Categorization.....	4-2
Figure 64	Mitigation Action Prioritization Methodology.....	4-3
Figure 65	Douglas County Hazard Mitigation Actions	4-5
Figure 66	Arcola Hazard Mitigation Actions.....	4-17
Figure 67	Arthur Hazard Mitigation Actions.....	4-19
Figure 68	Atwood Hazard Mitigation Actions.....	4-21
Figure 69	Garrett Hazard Mitigation Actions	4-22
Figure 70	Newman Hazard Mitigation Actions.....	4-23
Figure 71	Tuscola Hazard Mitigation Actions.....	4-25
Figure 72	Villa Grove Hazard Mitigation Actions	4-27
Figure 73	Multi-Jurisdiction Plan Adoption Dates	7-1

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



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 Douglas County. Since 1965, Douglas County has had six 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 Douglas County		
Declaration #	Year	Type of Natural Hazard(s) Event
860	1990	severe winter storm (ice storm; freezing rain; severe winds)
871	1990	severe storm (thunderstorms; severe winds; torrential rains) and flooding
1025	1994	severe storm (torrential rains; thunderstorms) and flash flooding
1112	1996	severe storm (torrential rains; severe winds)
1416	2002	severe storm (excessive rainfall) and flooding
1771	2008	severe storm and flooding

In addition, in the past decade alone, there have been over 61 severe storms (thunderstorms, high winds, hail, lightning strikes, heavy rain etc.), 14 flood events, 10 severe winter storms, five tornadoes, two extreme heat events and one 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 municipalities 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 provide 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 Douglas 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 Douglas County Board passed a resolution on September 17, 2008 authorizing the development of the Douglas 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 municipalities within Douglas County to participate. **Figure 2** identifies the jurisdictions that are represented in the Plan. The Douglas County Emergency Management Agency administered the Plan.

Figure 2 Jurisdictions Represented in the Plan	
City of Arcola	Village of Garrett
Village of Arthur	City of Newman
Village of Atwood	City of Tuscola
Douglas County	City of Villa Grove

1.2 DEMOGRAPHICS

Douglas County is located in central Illinois and covers approximately 417 square miles. The topography is generally flat to gently sloping. The County seat is located in Tuscola. Agriculture is the leading industry in the County. According to the 2007 Census of Agriculture, there were 657 farms in Douglas County occupying approximately 98% (261,513 acres) of the total acreage in the County. Manufacturing in the County is primarily located in Arcola, Arthur and Tuscola, where such items as brooms, automobile fuses, metal handles, caps and gowns, garage doors, cabinetry, countertops, specialized building materials and chemicals used in medicine and in labs are produced. These industries, along with small businesses providing goods and services, account for the employment of a high percentage of the labor force in the County.

Douglas County is well known for its Amish settlements. The first Amish immigrants arrived in the area in 1865 from Pennsylvania. There are approximately 4,000 Amish that live in and around Arthur today, making it the largest Amish community in Illinois and the 4th largest community in the United States. The Amish are primarily farmers; however, in recent years they have supplemented their farm income with small shops called “cottage industries” where they

make fine oak furniture, cabinets, harnesses, buggies as well as baked goods that have attracted tourists year round. It is estimated that there are approximately 150 cottage businesses in and around Arthur.

Figure 3 provides demographic data on each of the participating jurisdictions along with information on housing units and assessed values. The assessed values are only for residential structures (including farm homes). The assessed value of a residence in Douglas County is approximately one-third of the market value.

Figure 3 Demographic Data by Participating Jurisdiction						
Participating Jurisdiction	Population (2000)	Projected Population (2020)	Land Area (Sq. Miles)	Number of Housing Units (2000)	Housing Unit Density (Units per Sq. Mile)	Total Assessed Value of Housing Units
Arcola	2,652	3,125	1.4	1,078	770	\$38,617,869
Arthur	2,203	2,608	1.3	954	737	\$23,693,470
Atwood	1,290	1,527	0.6	575	575	\$6,369,357
Douglas County (unincorporated)	5,622	6,626	409.7	1,756	4	\$98,239,376
Garrett	198	235	0.2	76	76	\$702,495
Newman	956	1,128	0.6	456	456	\$7,787,122
Tuscola	4,448	5,239	2.1	2,015	960	\$69,066,672
Villa Grove	2,553	3,007	1.5	1,095	730	\$26,263,815

Sources: Cain, Rena. Douglas County Supervisor of Assessments. "Assessed Residential Values." Fax to Greg R. Michaud. February 4, 2010.
 Illinois Department of Commerce and Economic Opportunity, Census 2000 Data for Illinois, 2010.
 Illinois Department of Commerce and Economic Opportunity, Population Projects, Project Summary by County, 2010.
 U. S. Census Bureau, Geography, Census 2000 U.S. Gazetteer Files – Counties & Places, 2010.

1.3 LAND USE AND DEVELOPMENT TRENDS

Population growth and economic development are two major factors that trigger changes in land use. Douglas County is largely rural with a population that has remained fairly stable. Between 1900 and 2000, the population of Douglas County increased by approximately 4%, from 19,097 to 19,922. There were, however, periods when the overall population declined within the County. Between 1930 and 1970, the population dropped and remained below 19,000. Since 1980, the municipalities participating in the development of this Plan have experienced little or no population growth with one exception. Between 1980 and 2000, Tuscola experienced an increase of 14% as its population rose from 3,839 to 4,448.

The Department of Commerce and Economic Opportunity projected Douglas County’s population to increase by approximately 9% between 2000 and 2010. However, state and national economic woes and uncertainty regarding a major economic development project in the region likely prevented this projection from being realized.

FutureGen, a project to build a first-of-its-kind coal-fueled, near zero emissions power plant, was anticipated to trigger residential and economic development in Douglas County. This project was

to be located in adjacent Coles County, near Mattoon, in part because of favorable geologic conditions that would allow for the storage of carbon emissions underground. FutureGen was eagerly anticipated following an announcement by the U.S. Department of Energy that Mattoon had been selected as the site for this project. However, in August, 2010, an announcement that this project would be scaled back to include only carbon storage resulted in uncertainty as to whether the project will be constructed.

While there are no other large-scale economic development initiatives underway in the County, there are several small-scale economic development efforts planned for Tuscola and Arthur. In Tuscola, continued economic development is planned for the regional shopping and tourist complex in the vicinity of U.S. Route 36 and the I-57 interchange. Currently there is an outlet mall, a sit down Amish style family buffet restaurant plus related facilities including hotels, service stations and restaurants.

In and around Arthur, Amish “cottage industries” involving woodworking, cabinetry, and furniture are flourishing. These businesses are drawing in customers from outside the County who are attracted by the high quality of construction and relatively lower prices. These businesses are poised to survive difficult economic times because of their low overhead, quality products, and competitive prices.

Substantial changes in land use (from agricultural land to residential, commercial and industrial) are not anticipated within the County in the immediate future. Increases in residential and/or commercial/industrial development in the near future are in doubt, especially with the recent announcement regarding the FutureGen project.

2.0 PLANNING PROCESS

2.0 PLANNING PROCESS

The Douglas County Multi-Jurisdictional All Hazards Mitigation Plan (the Plan) was developed through the Douglas 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) 10 step planning process approach. **Figure 4** provides a brief description of the process utilized to prepare this Plan.

Figure 4 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. (This task incorporated two of FEMA’s steps: assessing the hazard and assessing the problem.) In addition, the top three 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. Any 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 municipalities for adoption. The Plan will be reviewed periodically and updated every five years. (This task incorporated two of FEMA’s steps: adopt the plan and implement, evaluate and revise the plan.)

The plan development was led at the staff level by Joseph Victor, the Douglas County Emergency Management Agency Director. 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 municipal 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 of two of 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 Douglas County Multi-Jurisdictional All Hazards Mitigation Planning Committee was formed. The Planning Committee included representatives from each participating jurisdictions, the general public as well as agriculture, business, education, emergency services (ambulance, fire and law enforcement), healthcare and GIS.



Figure 5 details the entities represented on the Planning Committee and the individuals who attended on their behalf. The Planning Committee was chaired by the Douglas County Emergency Management Agency.

Additional technical expertise was provided by 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, and the University of Illinois.

Two subcommittees were formed to help with the development of the risk assessment and the mitigation strategy. Members of the subcommittees were provided information in advance of the Planning Committee to obtain their input. Once their input was incorporated, the appropriate sections of the Plan were presented to the entire Planning Committee for discussion and comment. All communication with the subcommittees was handled via email and phone conferences.

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 Douglas County Multi-Jurisdictional All Hazards 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 5 Douglas County Multi-Jurisdictional All Hazards Mitigation Planning Committee Member Attendance Record						
Entity	Representative	10/8/2009	11/12/2009	2/11/2010	6/10/2010	9/23/2010
Ameren Illinois Utilities	Hagen, Jenifer	X		X	X	
Arcola	Wagoner, Bill	X	X		X	X
Arcola Schools	Chrostoski, Jean	X		X	X	
	Edwards, Lisa		X			
Arthur	Kingery, Ron	X	X		X	
	Perrine, Sue					X
Atwood	Wallace, Ron	X		X		
Cabot Corporation	Troike, Carl		X			
Douglas Co. - Assessor's Office	Cain, Rena	X			X	
Douglas Co. - Board	Munson, Don		X	X	X	X
Douglas Co. - Board	Bergeson, Randy		X			
Douglas Co. - Clerk & Recorder's Office	Ingram, Jim	X			X	
Douglas Co. - Clerk & Recorder's Office	Oakley, Maranna		X			
Douglas Co. - EMA	Ray, Chana	X	X	X	X	X
Douglas Co. - EMA	Victor, Joe	X	X	X	X	X
Douglas Co. - GIS	Goad, Jason	X	X	X	X	X
Douglas Co. - Highway Dept.	Crane, Jim	X	X	X		
Douglas Co. - Public Health Dept.	Minor, Amanda				X	
Douglas Co. - Sheriff's Office	Howard, Clint		X	X		
Douglas Co. Farm Bureau	Kinney, Kara	X	X	X	X	
Eastern Illini Electric	Wilson, Mike	X	X			
Garrett	Warner, Rocky				X	X
Lyondell/Equistar	Miller, Danny		X			
Masterbrand	London, Jeff				X	
	Price, Dave		X	X	X	X
	Wathen, Mark	X	X			
Newman	Fraser, Mark		X			
	Kibler, Dennis		X			
	Pollock, Judi	X			X	
Red Cross	Davis, Jamie	X	X	X		
Tuscola Economic Development, Inc.	Moody, Brian	X	X	X	X	X
Tuscola	Hoel, Drew	X	X	X	X	
Tuscola Schools	Burgess, Joe	X	X	X		
Villa Grove	Athey, Jacki	X	X	X		X
	Blaney, Thelma "Boots"	X	X	X		X

Planning Committee Meetings

The Planning Committee met five times between October 2009 and September 2010. **Figure 5** identifies the representatives present at each meeting. **Appendices B** and **C** contain copies of the sign-in sheets and meeting minutes for each meeting. The purpose of each meeting, including the topics discussed, is provided below.

First Planning Committee Meeting – October 8, 2009

The purpose of this meeting was to explain the planning process to the Planning Committee members and give them a brief overview on what a 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 municipalities were asked to complete the forms entitled “List of Documents Relevant to the All Hazard Mitigation Plan” and “Critical Facilities” and return it at the next meeting.



Second Planning Committee Meeting – November 12, 2009

At the second Planning Committee meeting the natural hazard risk assessment section was presented for review. 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 municipalities were asked to complete the form entitled “Natural Hazard Mitigation Plan Projects” and return it at the next meeting. Copies of the citizen questionnaire were also distributed.

Third Planning Committee Meeting – February 11, 2009

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.

Fourth Planning Committee Meeting – June 10, 2010

At the fourth meeting the sections of the Plan focusing on the man-made hazards risk assessment, vulnerability assessment, 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 – September 23, 2010

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 government offices of participating jurisdictions and through several local elementary and junior high schools. A copy of the questionnaire is contained in **Appendix D**.

A total of 474 questionnaires were completed and returned to the Planning Committee. Questionnaires were filled out by students, residents from unincorporated Douglas County as well as all of the participating municipalities. Slightly over three-quarters of the surveys were completed by students within the Douglas County school system. The questionnaires were reviewed and the results indicated the following:

- Respondents identified flooding as the most frequently experienced natural hazard in Douglas County, followed closely by severe storms and severe winter storms. In addition, extreme heat was often mentioned. There was a marked difference in response between the adults and students. While earthquakes occur less frequently than other hazards, the students often noted earthquakes in their responses.
- Electronic media (radio, television, internet, etc.) was identified as the most effective way to disseminate information about natural hazards. Radio was most favored by adult respondents, while television and the internet were preferred by the student respondents.
- Student respondents indicated that they did not feel as well prepared for a natural disaster as adult respondents.
- Fire departments, the extension service, schools and municipal offices were recognized as the most effective distributors of safety information regarding natural hazards.

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**.

County Website

Information was placed on the County’s website that outlined the planning process and described the various ways that residents could participate in the development of the Plan.

News Releases

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 F** contains a list of the newspapers that received the new releases and copies of the news articles that were printed.

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 community 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 September 23, 2010, 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 school activities. At the forum, residents could review the draft Plan; meet with representatives from the County, the participating municipalities 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 G and H** contain copies of these materials.

The public forum received television coverage from WCIA Channel 3, the local CBS affiliate, and WICD Channel 15, the local ABC affiliate. WCIA provided pre-forum coverage during their morning news broadcast on September 23rd. WICD attended the public forum and interviewed members of the general public, Mayor Blaney of Villa Grove, and Joe Victor, the Planning Committee Chairman and Douglas County Emergency Management Agency Director for their nightly news broadcast. **Appendix F** contains a copy of the story aired by WICD.

After the public forum, the draft Plan was made available for public review and comment at the Douglas County Emergency Management Agency’s website and office through October 8, 2010.

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 information about natural hazard events and the damages associated with those events.* Verifiable hazard event and damage information was obtained from participants and interested residents that presents a clearer assessment of the extent and magnitude of natural hazard events that impact the County. This information includes details about floods and lightning strikes not available from state and federal databases.
- *Encouraged intergovernmental cooperation among those jurisdictions involved in the planning process.* Participating jurisdictions acknowledged that complete mitigation of some hazards, such as flooding, will require intergovernmental cooperation. As an example, steps have been initiated that should help municipalities and townships work together to resolve drainage problems that cross jurisdictional boundaries.
- *Increased awareness of the hazard events that impact Douglas County.* Professional staff, elected officials, and interested residents contributed to the development of this Plan. This level of involvement is expected to result in prompt adoption of the Plan. Equally important is the increased awareness of the impacts that can result from hazard events which should help provide the support needed to implement mitigation projects and activities.

2.3 PARTICIPATION OPPORTUNITIES FOR INTERESTED PARTIES

Neighboring communities, agencies, businesses, academia, nonprofits and other interested parties were given several opportunities to participate in the planning process. Examples include: sending out letters to adjacent counties informing them of Douglas County's intention to prepare a natural hazard mitigation plan and extending an invitation to attend Planning Committee meetings (see **Appendix I** for a copy of the letter); directly inviting communities, agencies, businesses, etc to serve on the Planning Committee; and through the many public involvement activities listed previously.

2.4 INCORPORATION OF 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 6** summarizes the availability of existing planning documents by participating jurisdiction. These documents were reviewed and incorporated into the Plan whenever applicable.

Figure 6 Existing Planning Documents by Participating Jurisdictions								
Existing Planning Documents	Participating Jurisdictions							
	Arcola	Arthur	Atwood	Douglas County	Garrett	Newman	Tuscola	Villa Grove
Comprehensive Plan	X	X		X			X	X
Emergency Management Plan		X	X	X				
Land Use Plan			X				X	
Building Codes	X	X	X			X	X	X
Drainage Ordinances								
Historic Preservation Ordinance								
Subdivision Ordinance(s)	X	X	X	X			X	X
Zoning Ordinances	X	X	X			X	X	X
Existing Land Use Map		X	X	X			X	X
Infrastructure Map	X		X	X				X
Zoning Map	X	X	X			X	X	X
Flood Ordinance(s)	X	X	X	X	X	X	X	X
Flood Insurance Rate Maps		X	X	X	X	X	X	X
Repetitive Flood Loss List								
Elevation Certificates for Buildings							X	

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 Douglas 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 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 Douglas County as well as the buildings, critical facilities and infrastructure located within the County. Where applicable, the differences in vulnerability between participating jurisdictions are described.

It should be noted that the reported property damages in Douglas County may be lower than in most other Illinois counties because of the large Amish community. The Amish culture nurtures a community-wide sense of self sufficiency. Property damage to Amish buildings is repaired with little or no reliance on government or other funding sources from outside their community. Furthermore, repairs to storm damaged barns and homes occurs quickly with help from neighbors and friends who work virtually non-stop until repairs are completed, even through the replacement of entire structures. This work is often completed before storm damage assessments by state and federal officials are completed. Consequently, there are no documents that verify financial costs to repair or replace private property in the Amish community of Douglas County.

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 three Planning Committee meetings, the Planning Committee members discussed their experiences with natural and man-made hazard events and reviewed information about various natural 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)
- ❖ severe winter storms (snow & ice)
- ❖ tornadoes
- ❖ flood
- ❖ extreme heat
- ❖ drought
- ❖ earthquakes
- ❖ dam failures
- ❖ man-made hazards including:
 - hazardous substances (generation, transportation, disposal & remediation)
 - hazardous material incidents
 - nuclear accidents
 - terrorism

The subsequent sections provide detailed information on each of the selected natural and man-made 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 is broken into three parts: 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 Weather Service (NWS) defines a “severe storm” as any thunderstorm that produces one or more of the following elements:

- winds with gust of 50 knots (58 mph) or greater;
- hail that is at least 3/4 inch in diameter (penny 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. For the purposes of this report, tornadoes and flooding are categorized as separate hazards and are not discussed under severe storms.

Thunderstorms affect relatively small areas when compared to winter storms or hurricanes. The typical thunderstorm is approximately 15 miles in diameter and lasts an average of 30 minutes at a single location. They may occur singly, in clusters or in lines. Despite their size, all thunderstorms are dangerous and capable of threatening life and property. Thunderstorms can bring heavy rain, damaging winds, hail, lightning and tornadoes. 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 a term used to define any wind produced by a thunderstorm that is not associated with rotation. Straight-line winds are responsible for most thunderstorm wind damage. There are several types of straight-line winds including downdrafts, downbursts and microbursts. Straight-line wind speeds can exceed 87 knots (100 mph) 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 7** shows conversions from knots to miles per hour for various wind speeds.

Figure 7 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 and how is it formed?

Hail is precipitation in the form of spherical or irregular-shaped pellets of ice. It forms within a thunderstorm when strong rising currents of air (updrafts) carry raindrops into extremely cold areas of the atmosphere where freezing occurs. As the hail grows in size they become heavier and begin to fall. Depending on the strength of the updraft, the hail may be caught up and re-circulated through the storm clouds many times. Eventually the hail becomes too heavy to be supported by the thunderstorm’s updrafts and falls to the ground. The size of an individual hailstone depends on how many times it is drawn back up into the upper levels of the storm cloud before finally falling to the ground.

In the United States, hail annually causes more than \$1 billion in damage to property and crops. It damages buildings and homes by perforating holes in roofs and shingles, breaking windows and denting siding and damages automobiles by denting panels and breaking windows. Hail rarely causes any deaths; however, several dozen people are injured each year in the United States.

How are hail events measured?

The magnitude or severity 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 8** provides descriptions for various hail sizes.

<p align="center">Figure 8 Hail Size Descriptions</p>			
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, Storm Prediction Center, Converting Traditional Hail Size Descriptions Table.

Hail size can vary widely. Hailstones may be as small as ¼ inch in diameter (pea-sized) or, under extreme circumstances, as large as 4 ½ inches in diameter (softball-sized). Typically hail that is ¾ inch in diameter (penny-sized) or larger is considered severe.

Hail events 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 9** 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 9 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 typical used (i.e., whether roofing materials are predominately shingle, slate or concrete, etc.).

What is lightning?

Lightning, a component of all thunderstorms, is an electrical discharge that results from the buildup of charged ions. 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 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 80 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, NOAA's 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 or warnings for Douglas County depending on the weather conditions. The following provides a brief description of each type of alert.

- **Severe Thunderstorm Watch.** A severe thunderstorm watch is issued when conditions are favorable for a severe thunderstorm to develop in the next several hours. The watch will tell individuals when and where a severe thunderstorm is likely to occur.
- **Severe Thunderstorm Warning.** A severe thunderstorm warning is issued when severe weather (hail $\frac{3}{4}$ inch in diameter or greater and/or winds which equal or exceed 58 mph) has been reported by spotters or indicated by radar. Warnings indicate imminent danger to life and property for those who are in the path of the storm.

PROFILING THE HAZARD

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

Tables 1, 2, and 3 summarize the previous occurrences as well as the extent or magnitude of severe storms in Douglas County. The severe storm events are broken down into four categories: thunderstorm and high wind events, hail events, lightning events and heavy rain events. Severe Storms are the most frequently occurring natural hazard in Douglas County.

THUNDERSTORMS AND HIGH WINDS

The National Oceanic and Atmospheric Administration's Storm Events Database records show 64 reported occurrences of thunderstorms and high winds in Douglas County between 1980 and June 30, 2009. Of the 64 reported occurrences, 41 had wind speeds of 50 knots or greater. There were, however, 23 reported occurrences of thunderstorms and high winds where the wind speed was not recorded.

Thunderstorms with high winds have impacted every municipality within the County on multiple occasions. Figures 10 and 11 chart the reported occurrences of thunderstorm and high wind events by month and hour. Thirty-seven of the 64 events took place between May and July, making this the peak period for thunderstorms and high wind in Douglas County. Approximately 72% of all thunderstorm and high wind events occurred during the p.m. hours, with 35 events taking place between 5 p.m. and 11 p.m.



Half of a tree split and fell on a home in Tuscola during the June 18, 2009 thunderstorms.

Photo by Douglas Cottle

Figure 10
Douglas County Thunderstorm & High Wind
Events by Month – 1980 through June 30, 2009

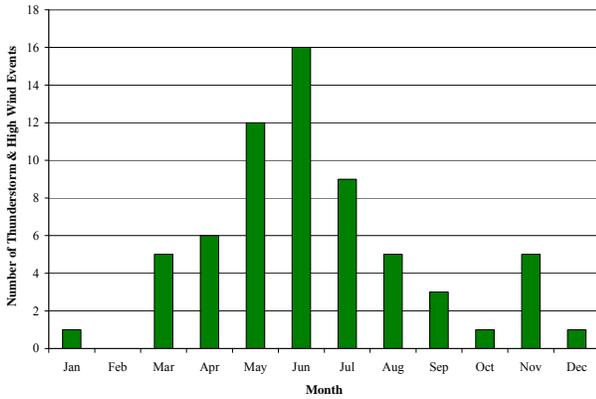
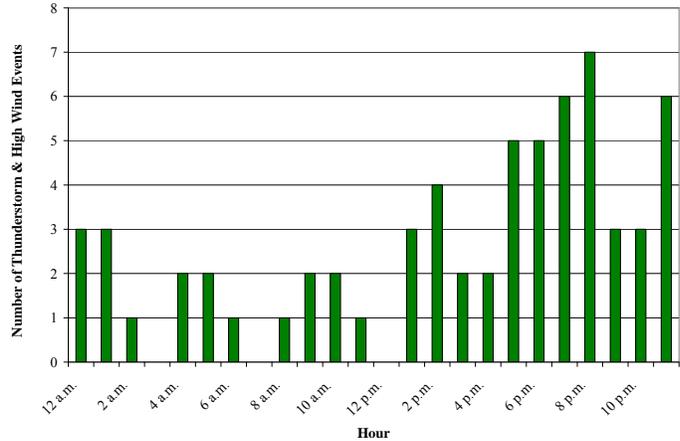


Figure 11
Douglas County Thunderstorm & High Wind
Events by Hour – 1980 through June 30, 2009



NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Douglas County, 2009.

HAIL

The Storm Events Database records show 34 reported occurrences of hail in Douglas County between 1974 and June 30, 2009. Of the 34 reported occurrences, 18 produced hailstones one inch or larger in diameter. The largest hail recorded in Douglas County measured 4.50 inches in diameter (softball size) and fell on April 7, 1998 in Arthur.

Figures 12 and 13 chart the reported occurrences of hail by month and hour. Twenty-four of the 34 events took place between April and June, making this the peak period for hail events in Douglas County. June is the peak month for both thunderstorms and high wind events and hail events. Approximately 85% of all hail events occurred during the p.m. hours, with 21 events taking place between 1 p.m. and 6 p.m.

Figure 12
Douglas County Hail Events by Month
1974 through June 30, 2009

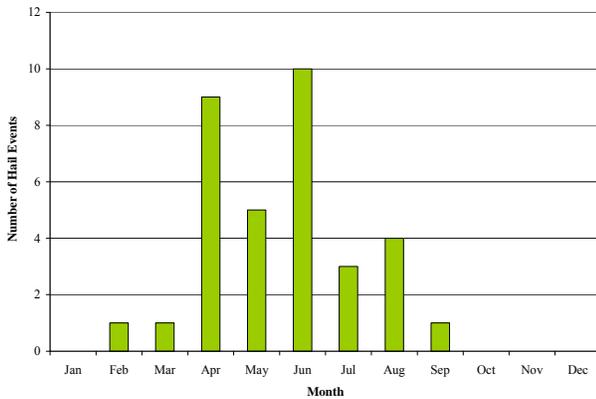
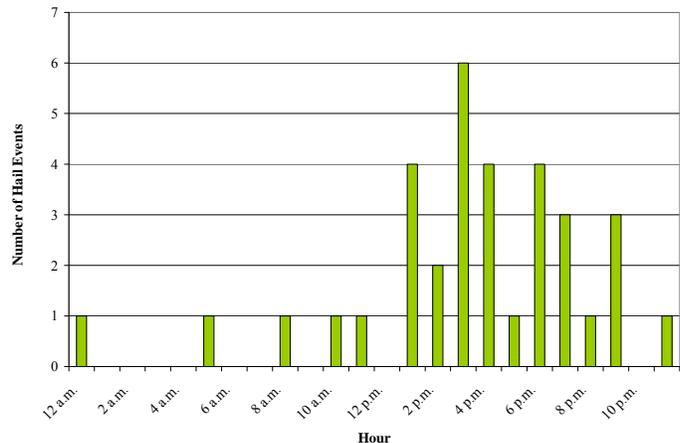


Figure 13
Douglas County Hail Events by Hour
1974 through June 30, 2009



NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Douglas County, 2009.

LIGHTNING

The Storm Events Database records show one reported occurrence of a lightning strike in Douglas County between January 1, 2009 and June 30, 2009. This event led to extensive property damage.

HEAVY RAIN

The Storm Events Database records do not list any heavy rain events in Douglas County.

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 *2007 Illinois Natural Hazard Mitigation Plan* prepared by the Illinois Emergency Management Agency (IEMA) classifies Douglas County's hazard rating for severe storms as "high". (IEMA's hazard rating system has five levels: low, guarded, elevated, high and severe.)

What is the probability of future severe storm events occurring?

Douglas County has had 64 verified occurrences of thunderstorms and high wind events between 1980 and June 30, 2009. With 64 occurrences over the past 30 years, Douglas County should expect to experience at least two thunderstorm and high wind events each year. There were 11 years over the last 30 years where multiple (three or more) thunderstorm and high wind events occurred. This indicates that the probability that multiple thunderstorm and high wind events may occur during any given year within Douglas County is 37%.

There have been 34 verified occurrences of hail between 1974 and June 30, 2009. With 34 occurrences over the past 34 years, the County should expect to experience at least one hail event each year. There were eight years over the last 34 years where two or more hail events occurred. This indicates that the probability that more than one hail event may occur during any given year within the County is 24%.

ASSESSING VULNERABILITY

Are the participating jurisdictions vulnerable to severe storms?

Yes. All of Douglas 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 through central and southern Illinois. Since 2000, Douglas County has experienced 41 severe storm events.

Of the participating municipalities, Tuscola has had substantially more recorded occurrences of thunderstorm and high wind events and hail events than any of the other municipalities. This difference may be due to the fact that Tuscola is the largest municipality in the County; thus, resulting in more



Damage sustained west of Hugo during the June 18, 2009 thunderstorms. A large tree fell on the Corvette pictured above as well as two trucks not shown.

Photo by Douglas Cottle

storm reports. **Figure 14** details the number of thunderstorm and high wind events and hail events by participating municipality.

Figure 14 Verified Thunderstorm & High Wind Events and Hail Events by Participating Municipality		
Participating Municipality	Number of Verified Thunderstorm & High Wind Events	Number of Verified Hail Events
Arcola	6	7
Arthur	9	6
Atwood	4	0
Garrett	5	1
Newman	4	5
Tuscola	17	8
Villa Grove	2	3

Source: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Douglas County, 2009.

This planning process has helped to raise awareness among Douglas County residents about natural hazards. As a result of raising awareness, reporting of severe storm events should improve. As the plan is updated, additional information may help to determine whether Tuscola is more vulnerable to severe storms because of frequency or whether the larger population in the municipality is more likely to report a severe storm.

What impacts resulted from the recorded severe storms?

Severe storms as a whole have caused an estimated \$721,000 in property damages and resulted in 11 injuries. The following provides a breakdown of impacts by category.

While severe summer storms frequently occur in Douglas County, the number of injuries and deaths is relatively low. However, there are no hospitals located within the County. As a result, the risk or vulnerability to public health and safety from severe storms is low to medium.

THUNDERSTORMS AND HIGH WINDS

The data provided by the Storm Events Database indicates that between 1980 and June 30, 2009, 17 thunderstorm & high wind events caused approximately \$671,000 in property damage. Damage information was either unavailable or none was recorded for the remaining 47 reported occurrences.

The Storm Events Database records report eleven injuries as a result of four separate incidents between 1980 and June 30, 2009. Detailed information is only available for two of the incidents in Douglas County. On April 8, 1999, several semis were blown over on I-57, injuring three people and on August 18, 2001, six people were injured by flying debris at a local festival in Atwood.

HAIL

Damage information was either unavailable or none was recorded for any of the reported occurrences. No injuries or deaths were reported either as the result of any of the hail events.

LIGHTNING

The data provided by the Storm Events Database indicate that between January 1, 2009 and June 30, 2009, one lightning event caused approximately \$50,000 in property damage. On June 18, 2009 lightning struck and started a fire at an auto repair shop in Tuscola. No injuries or deaths were reported either as the result of the event.

What other impacts can result from severe storms?

While only 11 injuries were reported by the Storm Events Database for the recorded severe storm events in Douglas County, severe storms do have the ability to impact health and safety. Severe storms have caused multiple injuries and death elsewhere in Illinois.

In Douglas County, vehicle accidents are the largest risk to health and safety from severe storms. 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 2004 and 2008 indicates that wet road surface conditions were present for 7.6% to 13.9% of all crashes recorded annually in Douglas 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 15** provides a breakdown by year of the number of crashes and corresponding injuries and deaths that occurred when treacherous road conditions caused by wet road surface conditions were present as well as the total number of crashes that occurred in the County for comparison.

Figure 15 Severe Weather Crash Data for Douglas County				
Year	Total # of Crashes	Presence of Wet Road Surface Conditions		
		# of Crashes	# of Injuries	# of Deaths
2004	408	54	23	1
2005	367	28	5	0
2006	346	39	7	0
2007	376	34	6	0
2008	366	51	15	0

Source: Illinois Department of Transportation, Illinois Crash Data, County Crash Summaries, Douglas County, 2004-2008.

Severe storms are unique in that they can pose several different health and safety hazards during a single event. Individuals who are outdoors during a severe storm are at risk of being struck by lightning, hit by flying debris and hailstones and if the conditions are just right, caught in flash flooding.

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

Yes. All existing buildings, infrastructure and critical facilities located in Douglas County and the participating jurisdictions 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.

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.



A lightning bolt strikes behind Cargill Inc. just west of Tuscola as storms roll through the region.

Photo by Douglas Cottle

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 gas-powered emergency generators to allow continued operation of critical facilities such as emergency shelters, drinking water facilities and towers, lift stations and communication towers.

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 Douglas 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.

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 Garrett do not. Infrastructure such as new communication and power lines also will continue to be vulnerable to severe storms. 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. There is very little that can be done to totally eliminate the vulnerability of new critical facilities.

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 17 of the 99 recorded events listing property damage numbers for severe storms, there is no way to accurately estimate future potential dollar losses. Since all structures within Douglas County are vulnerable to damage it is likely that there will be future dollar losses to severe storms.

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.

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. Tornadoes 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.

How are tornadoes rated?

Tornadoes are rated using the Fujita Scale, which measures the intensity of a tornado based on its wind speed and the damage sustained by structures and vegetation. The Fujita Scale identifies six different categories of tornadoes, F0 through F5. **Figure 16** gives a brief description of each category.

Figure 16 Fujita Tornado Measurement Scale		
Category (F-Scale #)	Intensity Phase / Wind Speed	Description
F0	Gale Tornado 40 – 72 mph	Light damage – some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; damage to sign boards
F1	Moderate Tornado 73 – 112 mph	Moderate damage – peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads
F2	Significant Tornado 113 – 157 mph	Considerable damage – roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated
F3	Severe Tornado 158 – 206 mph	Severe damage – roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; cars lifted off ground and thrown
F4	Devastating Tornado 207 – 260 mph	Devastating damage – well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated
F5	Incredible Tornado 261 – 318 mph	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: FEMA “State and Local Mitigation Planning How-To Guide: Understanding Your Risks”, August 2001.

On February 1, 2007 use of the original Fujita Scale was discontinued in favor of the Enhanced Fujita Scale. The Enhanced Fujita Scale continues to use the F0 through F5 categories, but is based on additional damage indicators and revised wind speeds. **Figure 17** depicts the Enhanced Fujita Scale. While the Enhanced Fujita Scale is currently in use, the historical data presented in this report is based on the original Fujita Scale.

Figure 17 Enhanced Fujita Tornado Measurement Scale	
Category (EF Scale #)	Wind Speed
EF0	65 – 85 mph
EF1	86 – 110 mph
EF2	111 – 135 mph
EF3	136 – 165 mph
EF4	166 – 200 mph
EF5	Over 200 mph

Source: NOAA, Storm Prediction Center, Online Tornado FAQ: Frequently Asked Questions about Tornadoes.

Are alerts issued for tornadoes?

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

- **Tornado Watch.** A tornado watch is issued when conditions are favorable for a tornado to develop in the next several hours. It does not mean that a tornado is imminent, just that individuals need to be alert and prepared.
- **Tornado Warning.** A tornado warning is issued when a tornado has been spotted or indicated by radar. Warnings indicate imminent danger to life and property for those who are in the path of the tornado. Individuals should see shelter immediately.

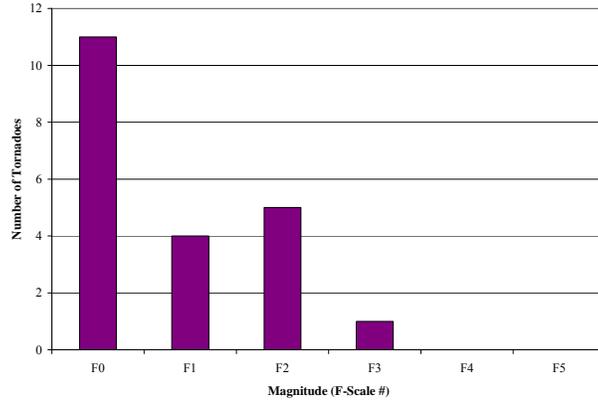
PROFILING THE HAZARD

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

Table 4 summarizes the previous occurrences as well as the extent or magnitude of tornado events recorded in Douglas County. The Storm Events Database records show 22 reported occurrences of tornadoes in Douglas County between 1957 and June 30, 2009. In comparison, Illinois has averaged 36 tornadoes annually since 1950. Tornadoes have occurred every decade in Douglas County since 1957.

Figure 18 charts the reported occurrences of tornadoes by magnitude. Of the 22 reported occurrences, one was classified as an F3 tornado, five were classified as F2 tornadoes, four were classified as F1 tornadoes, eleven were classified as F0 tornadoes and one was unclassified. These 22 reported tornadoes were produced by 16 weather events. There were two single weather events where two or more tornadoes were produced.

Figure 18
Douglas County Tornadoes by Magnitude
1957 through June 30, 2009



NOAA, NESDIS, National Climatic Data Center, Storm Events Database, Illinois, Montgomery County, 2009.

Figures 19 and 20 chart the reported occurrences of tornadoes by month and hour. Nineteen of the 22 events took place between March and June. This four-month period has the highest frequency of tornado occurrences not only in Douglas County but statewide as well. Approximately 82% of all tornadoes occurred during the p.m. hours, with 12 of the 22 events taking place between 5 p.m. and 9 p.m.

Figure 19
Douglas County Tornadoes by Month
1957 through June 30, 2009

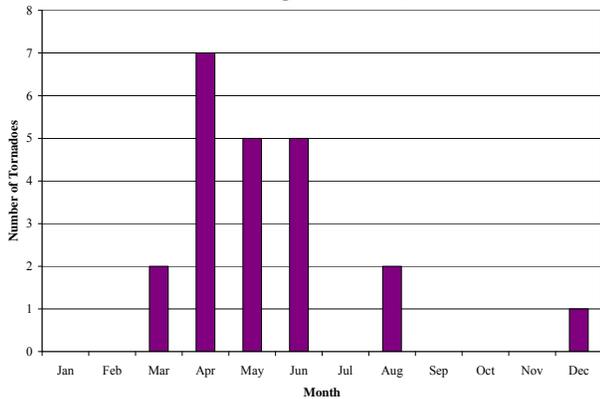
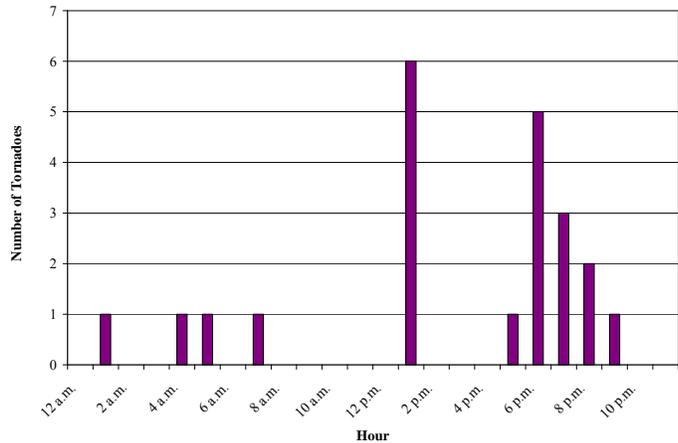


Figure 20
Douglas County Tornadoes by Hour
1957 through June 30, 2009



NOAA, NESDIS, National Climatic Data Center, Storm Events Database, Illinois, Douglas County, 2009.

The recorded tornadoes varied in length from the touchdown point to 18 miles long and in width from 10 yards to 1,600 yards wide. The average length of a tornado in Douglas County is 2.9 miles, the average width is 125 yards and the average damage pathway is 0.2 square miles. The longest and widest tornado recorded in Douglas County occurred on April 22, 1963. This F3 tornado, measuring 1,600 yards wide, touched down just east of Tuscola and traveled east for 18 miles before dissipating 2 ½ miles west of Hume in Edgar County. The damage pathway of this tornado covered approximately 16.4 square miles.

What locations are affected by tornadoes?

Tornadoes have the potential to affect the entire County. The 2007 Illinois Natural Hazard Mitigation Plan prepared by the Illinois Emergency Management Agency classifies Douglas County’s hazard rating for tornadoes as “elevated”.

All of the participating municipalities except Atwood have had reported occurrences of tornadoes in or near their locations. **Figure 21** shows the pathway each reported tornado took. Records indicate that most of these tornadoes moved from west to east 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.

What is the probability of future tornadoes occurring?

Douglas County has had 22 verified occurrences of tornadoes between 1957 and June 30, 2009. With 22 occurrences over the past 53 years, the probability or likelihood of a tornado hitting somewhere in Douglas County in any given year is 42%. There were four years over the last 53 years where more than one tornado occurred. This indicates that the probability that more than one tornado may occur during any given year within Douglas County is 8%.

ASSESSING VULNERABILITY

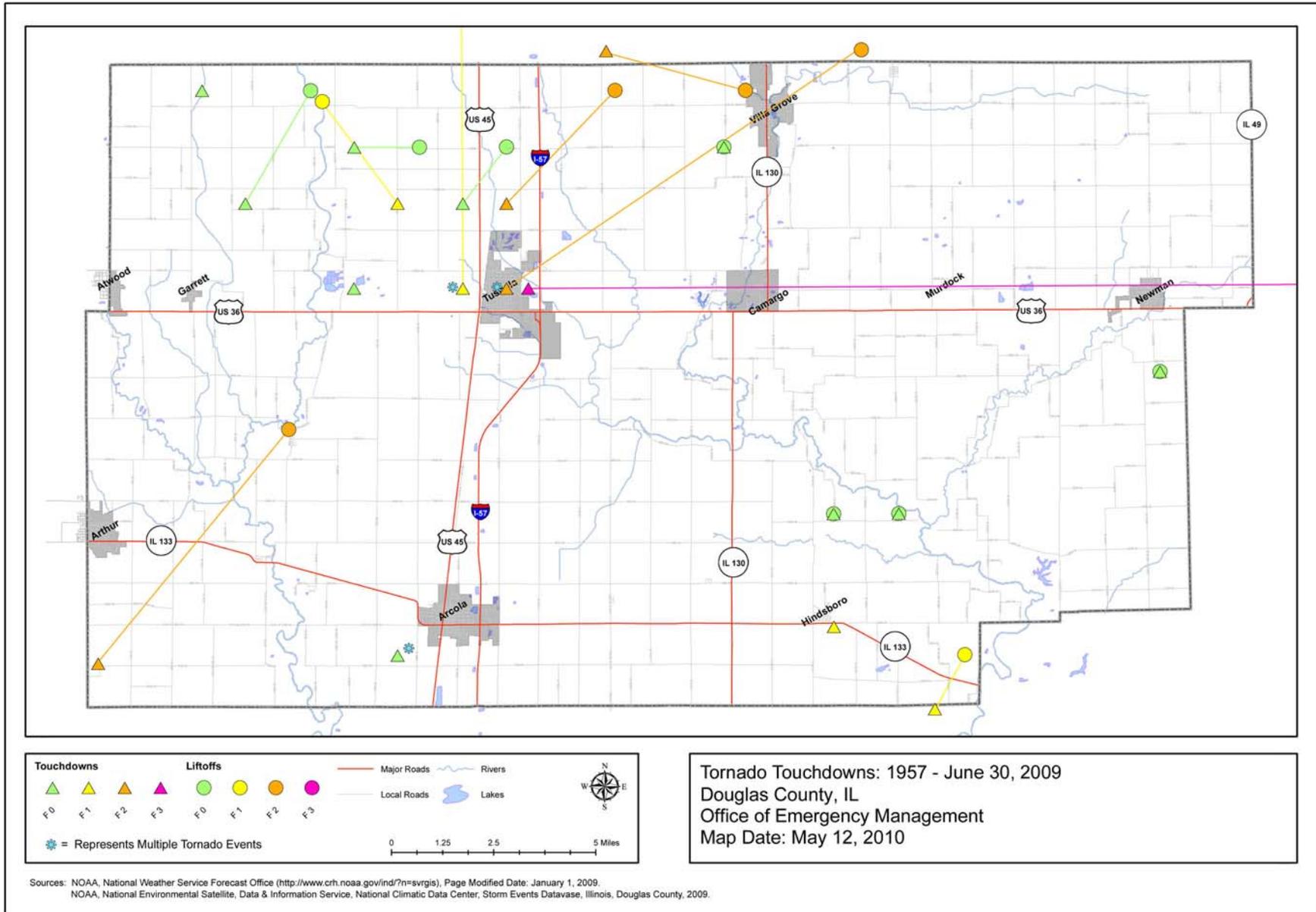
Are the participating jurisdictions vulnerable to tornadoes?

Yes. All of Douglas County is vulnerable to the dangers presented by tornadoes. Municipalities located in the northern portions of the County (Garrett, Tuscola and Villa Grove) have experienced more tornadoes and appear to be more vulnerable than those located in the southern portions of the County. **Figure 22** lists the verified tornadoes that have touched down in or near each participating municipality.

Figure 22 Verified Tornado Touchdowns by Participating Municipalities		
Participating Municipality	Number of Verified Tornadoes	Year Tornado Touchdown
Arcola	1	1994
Arthur	1	1998
Atwood	0	---
Garrett	2	1993, 2006
Newman	1	1998
Tuscola	11	1957, 1961, 1962, 1963, 1974 (2), 1980, 1990, 2004, 2006 (2)
Villa Grove	3	1974, 1990, 2006

Source: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Douglas County, 2009.

Figure 21
Tornado Touchdowns in Douglas County: 1957 – June 30, 2009



What impacts resulted from the recorded tornadoes?

The data provided by the Storm Events Database indicates that between 1957 and June 30, 2009, tornadoes caused approximately \$5,830,600 in property damage. Property damages for five of the occurrences totaled \$250,000 or more. There were, however, 11 occurrences where the amount of the property damage was unknown.

Thirty-three injuries were reported as a result of four separate incidents between 1957 and June 30, 2009. In comparison, Illinois averages approximately four tornado fatalities annually; however, this number varies widely from year to year. Detailed information was not available for any of the incidents in Douglas County.

While more injuries have been attributed to tornadoes in Douglas County than to all the other natural hazards combined, the numbers are still low. The recorded tornadoes have historically touched down in rural areas away from concentrated populations. However, there are no hospitals located within the County. As a result, the risk or vulnerability to public health and safety from severe storms 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.

What other impacts can result from tornadoes?

In addition causing damage to buildings and properties, tornadoes can damage infrastructure and critical facilities such as roads, bridges, railroad tracks, drinking water treatment plants, water towers, communication towers and antenna and 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 an extended period of time).

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

Yes. All existing buildings, infrastructure and critical facilities located in Douglas County and the participating jurisdictions are vulnerable to damage from tornadoes. Buildings, infrastructure and critical facilities located aboveground in the path of a tornado are the most vulnerable and usually suffer extensive damage, if not complete destruction. While some buildings adjacent to a tornado's path may remain standing with little or no damage, all are vulnerable to damage caused by 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. Several of the participating jurisdictions have indicated a need for tornado shelters.

As with severe storms, infrastructure and critical facilities tend to be just as vulnerable to tornadoes as buildings. 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.

A simple way to assess the vulnerability of buildings is to determine the average housing unit density within the County. This can be done by taking the number of housing units within the County (8,005) and dividing that number by the total land area of the County (417.4 square

miles). The result suggests that there is an average of 19 housing units per square mile in Douglas County. While this method provides an adequate assessment of the buildings that may be potentially damaged in a densely populated county, it does not provide a realistic assessment for more sparsely populated counties such as Douglas County.

In Douglas County, and many other downstate counties, differences in housing density must be considered when assessing the vulnerability of buildings to tornado damage. Approximately 79% of all housing units within Douglas County are located in four of the County’s nine townships (Arcola, Bourbon, Camargo and Tuscola). **Figure 23** provides a breakdown of housing units by township. Consequently, tornado damage to buildings, infrastructure and critical facilities in these more densely populated townships is likely to be greater than in the rest of Douglas County. In addition, over half of the mobile home units (which are more vulnerable to tornadoes) within the County are located in three of these four townships (Arcola, Camargo and Tuscola).

To more accurately assess building vulnerability in Douglas County, the average housing unit density for each township was calculated. **Figure 23** illustrates the substantial differences in housing unit density between the various townships in Douglas County. By comparing the average county housing unit density calculated above (19 housing units per square mile) to the township housing unit densities listed in **Figure 23**, the shortcomings of using a countywide average housing unit density for counties such as Douglas becomes apparent. For five of the nine townships, the average county housing unit density is greater (in some cases considerably) than the density numbers calculated for the townships. Furthermore, the average county housing unit density is considerably less than the housing unit densities calculated for the most populated townships.

Figure 23 Potential Tornado Damage to Housing Units in Douglas County by Township					
Township	Land Area (Sq. Miles)	Total Number of Housing Units (2000)	Number of Mobile Homes (2000)	Housing Unit Density (Units per Sq. Mile)	Number of Potentially Damaged Housing Units (Units per 0.2 Sq. Mile Area)
Arcola	53.8	1,285	103	24	5
Bourbon	43.1	1,198	49	28	6
Bowdre	48.1	293	39	6	1
Camargo	38.7	1,507	126	39	8
Garrett	52.4	591	80	11	2
Murdock	30.8	98	4	3	1
Newman	40.7	546	29	13	3
Sargent	47.1	145	3	3	1
Tuscola	62.7	2,342	151	37	7

Sources: Illinois Department of Commerce and Economic Opportunity, Census 2000 Data for Illinois.
U. S. Census Bureau, Geography, Census 2000 U.S. Gazetteer Files – County Subdivisions, 2010.

Since the housing unit density has been calculated for each township, it is relatively simple to provide an estimate of the number of housing unit that could potentially be damaged by a tornado in Douglas County. This can be done by taking the housing unit density for each

township and multiplying that by the land area impacted by a tornado. For this scenario a land area of 0.2 square miles was chosen, the average damage pathway recorded for a tornado in Douglas County. **Figure 23** provides a breakdown of the number of potentially damaged housing units by township.

It is important to note that the four townships with the greatest number of total housing units, the potential damage estimates would only be reached if 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.

While Douglas County does rank among the top 40 counties in Illinois in terms of tornado frequency, the presence of uniform building codes among most of the participating municipalities suggests that the overall risk or vulnerability to buildings, infrastructure and critical facilities from tornadoes would be medium. However, if 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 is relatively low. While the risk to the County is relatively 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 municipalities have building codes in place that will likely help lessen the vulnerability of new buildings and critical facilities to damage from tornadoes, the County does not. Infrastructure such as new communication and power lines also will continue to be vulnerable to tornadoes. 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 structures located within each participating municipality can be calculated if several assumptions are made. These assumptions represent a probable scenario based on the reported historical occurrences of tornadoes in Douglas 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 in Douglas County.

Step 1: Determining the Number of Impacted Housing Units

First, an estimate of the number of residential housing units impacted by a tornado needs to be calculated. In order to accomplish this, the size of the impacted area must be determined. While the worst tornado recorded in Douglas County could be used to estimate the area impacted; it is considered a statistical outlier. None of the other 21 recorded tornadoes came close to matching the length and width of the worst tornado. Since the differences were so great, it was decided that the area impacted should be based on an average of the tornadoes that have been recorded in Douglas County. The average area impacted by a tornado in Douglas County was calculated and

found to cover 0.2 square miles. This approach offers a reasonable alternative to using the worst tornado since the size and area impacted by the average of the recorded tornadoes is more likely to recur. In many cases damage estimates are ignored when the scenario is extreme or when the estimates appear to overstate the damages.

There are two ways in which the average area impacted by a tornado can be used to help determine the estimated number of impacted housing units. The first method involves overlaying the average tornado on a map of each municipality to determine whether the average impacted area would fall within the municipal limits. If the area impacted is less than the average because of the size and shape of the municipality, then additional calculations would be required to determine what portion of the average area would fall within the municipality. Once the portion within the municipality is calculated, then that area would be used to help estimate the number of impacted housing units. This method is more precise; however, it requires that future updates to the Plan use the exact same layouts of the average tornado for each municipality since changes may produce differences in the number of impacted housing units.

The second method assumes that the entire average impacted area would fall within the municipal limits; therefore, no additional calculations would be necessary in order to determine the number of impacted housing units. This method is quicker and easier and is more likely to produce consistent results when the Plan is updated. There is, however, a greater likelihood that the number of impacted housing units will be overestimated for those municipalities that occupy less than one square mile or have irregular shaped boundaries.

Both methods were applied to selected municipalities within Douglas 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.

Next, the issue of housing density must be examined. While the number of impacted housing units could be determined by overlaying the average impacted area on a municipality and then physically counting the number of housing units within the area, this approach is time consuming and will provide a different estimate depending on the layout of the average impacted area. A more practical approach is to use the average housing unit density to help calculate the number of impacted housing units. The use of this approach is appropriate, in part, because the housing unit densities within the municipalities in Douglas County do not substantially change between the center of the municipality and the edges. This is not true for all municipalities in Illinois, especially those in and around Chicago.

To determine the average housing unit density for a municipality, the number of housing units within the municipality is divided by the land area occupied by the municipality. **Figure 24** provides the average housing unit density for each participating municipality. Now that both the area impacted and average housing unit densities have been determined, the number of impacted residential buildings can be calculated. This is done by taking the average housing unit density for each participating municipality and multiplying that by the land area impacted (0.2 square miles). **Figure 24** provides a breakdown of the number of impacted housing units by municipality.

Figure 24 Estimated Number of Residential Housing Units Impacted by a Tornado				
Participating Jurisdiction	Land Area (Sq. Miles)	Number of Housing Units (2000)	Housing Unit Density (Units per Sq. Mile)	Housing Units Impacted (Units per 0.2 Sq. Miles)
Arcola	1.4	1,078	770	154
Arthur	1.3	954	737	147
Atwood	0.6	575	575	115
Garrett	0.2	76	76	76
Newman	0.6	456	456	91
Tuscola	2.1	2,015	960	192
Villa Grove	1.5	1,095	730	146

Sources: Illinois Department of Commerce and Economic Opportunity, Census 2000 Data for Illinois, 2010.
 U. S. Census Bureau, Geography, Census 2000 U.S. Gazetteer Files – Counties & Places, 2010.

Because the average tornado impacts a land area roughly the same size as Garrett, the assumption is made that all or virtually all of the housing units within Garrett would be impacted. This is not the case for Arcola, Arthur, Atwood, Newman, Tuscola and Villa Grove. All of these municipalities cover areas greater than 0.2 square miles.

Step 2: Determining Potential Dollar Losses to Impacted Housing Units

Once the number of impacted housing units has been determined, the potential dollar losses can be estimated. In order to determine the potential dollar losses, the average assessed value must first be determined for each municipality. The average assessed value for each municipality was calculated from the 2009 tax assessment information provided by the Douglas County Supervisor of Assessments. The average assessed value is important because it establishes the average market value which will be used to estimate the potential dollar losses. To determine the average market value for each municipality, the average assessed value for that jurisdiction is multiplied by three (the assessed value of a structure in Douglas County is approximately one-third of the market value). **Figure 25** provides the average assessed value and average market value for each participating municipality.

When comparing the average assessed value of a residential property in unincorporated Douglas County to the average assessed value of a residential property in any of the participating municipalities, there is a substantial difference. This difference is attributed to several factors including larger parcel sizes and the inclusion of outbuildings (i.e., sheds, barns, etc.) in the averaged assessed value. In addition, there has been a recent trend towards building new, larger residences in unincorporated areas of the County.

Next, the potential dollar loss estimates must be calculated for both the damage done to the housing unit and the contents. To determine the potential dollar losses to the housing units, start by taking the average market value and multiplying that by the percent damage. For the purposes of this scenario, it is assumed that the expected damage to the housing units is 100%; in

other words, the housing units are completely destroyed. While it is unlikely that each and every housing unit would sustain the maximum percent damage, this assumption represents the worst case for each jurisdiction.

<p style="text-align: center;">Figure 25 Estimated Potential Dollar Losses to Impacted Residential Housing Units from a Tornado</p>						
Participating Jurisdiction	Housing Units Impacted	Average Assessed Value	Average Market Value	Potential Dollar Losses		Total Potential Dollar Losses
				Housing Unit	Content	
Arcola	154	\$35,824	\$107,472	\$16,550,688	\$8,275,344	\$24,826,032
Arthur	147	\$24,836	\$74,508	\$10,952,676	\$5,476,338	\$16,429,014
Atwood	115	\$11,077	\$33,231	\$3,821,565	\$1,910,783	\$5,732,348
Garrett	76	\$9,243	\$27,729	\$2,107,404	\$1,053,702	\$3,161,106
Newman	91	\$17,077	\$51,231	\$4,662,021	\$2,331,011	\$6,993,032
Tuscola	192	\$34,276	\$102,828	\$19,742,976	\$9,871,488	\$29,614,464
Villa Grove	146	\$23,985	\$71,955	\$10,505,430	\$5,252,715	\$15,758,145
County*	4	\$55,945	\$167,835	\$671,340	\$335,670	\$1,007,010
County†	2	\$55,945	\$167,835	\$335,670	\$167,835	\$503,505

* Uses the generic average housing unit density (19 housing units per square mile)

† Uses the average housing unit density for the 5 least populated townships (8 housing units per square mile)

Source: Cain, Rena. Douglas County Supervisor of Assessments. "Assessed Residential Values." Fax to Greg R. Michaud. February 4, 2010.

The potential dollar losses to the content of the housing units must be estimated next. Based on FEMA guidance, it is assumed that the value of a residential housing unit's content is approximately 50% of its market value. Therefore, to determine the potential dollar losses to the content, start by taking half of the average market value and multiply by the percent damage. As with the potential dollar losses to structures, it is assumed that the expected damage to the content is 100% (the content is completely destroyed). Then multiply the average market value number by the number of impacted housing units to calculate the estimated content damage.

Finally, the total potential dollar losses may be calculated by adding together the potential dollar losses to the impacted housing units and the potential dollar losses to the content of the impacted housing units. **Figure 25** lists the total potential dollar losses by municipality.

To provide an estimate of potential dollar losses from tornadoes within the County, it becomes necessary to revisit the issue of average housing unit density discussed previously. If the generic average housing unit density of 19 housing units per square mile is used for the County and it is assumed that the tornado impacts a 0.2 square mile area, then the total number of housing units impacted would be four. However, as discussed earlier, the average housing unit density for the County does not take into consideration the differences in housing density in the County. If an average housing unit density is calculated for the five least populated townships (1,673 housing units divided by 219.1 square miles equals approximately eight housing units per square mile) and multiplied by the area impacted by the tornado (0.2 square miles), then the total number of

housing units impacted is reduced to two. This difference in housing units leads to a substantial 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 Douglas County would be expected to exceed \$3 million in any of the participating municipalities.

3.3 SEVERE WINTER STORMS (SNOW, ICE AND 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 blizzard conditions with blinding wind-driven snow, sleet and/or ice and extreme cold that lasts several days. The amount and extent 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. The following provides a brief description of each type.

- **Blizzards.** Blizzards are characterized by low temperatures and strong winds of at least 35 miles per hour. In addition to extreme temperatures and life-threatening wind chills, a blizzard is also characterized by falling or blowing snow that reduces visibility to ¼ mile or less for at least three hours. They are by far the most dangerous of all winter storms.
- **Heavy Snow Storms.** A heavy snow storm is any winter storm that produces six inches or more of snow within a 48 hour period or less.
- **Ice Storms.** Ice storms occur when precipitation (i.e., freezing rain, sleet, etc.) falls to the ground and freezes immediately on impact. Generally in Illinois an ice storm is considered severe if there is an accumulation of ¼ inch or more of freezing rain or ½ inch or more of sleet.

While severe winter storms are often accompanied by extreme cold (i.e., low temperatures and wind chills), the National Weather Service does not use it to implicitly define a severe winter storm. However, for the purposes of this report, extreme cold is discussed under severe winter storms since it has the ability to cause property damage, injuries and even death (whether or not it is accompanied by freezing rain, sleet or snow).

What is snow and how is it formed?

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 and how is it formed?

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 that is wedged between two masses of colder 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.

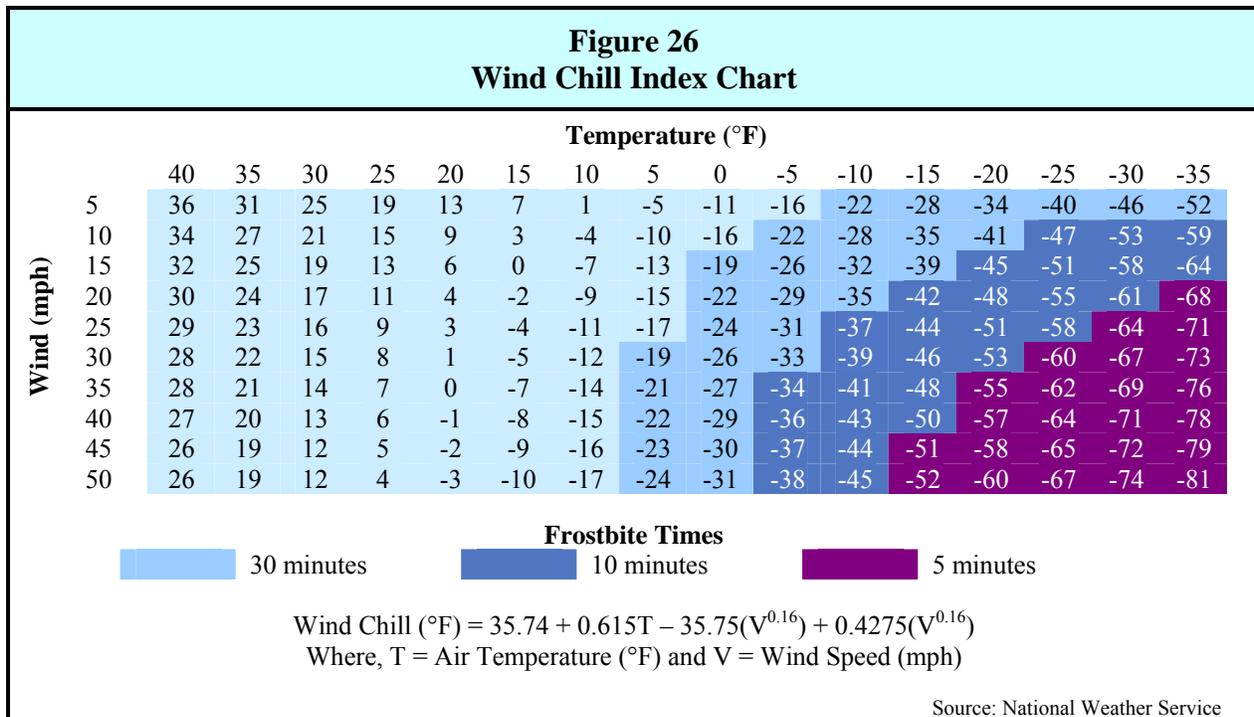
What is freezing rain and how is it formed?

Freezing rain is precipitation that falls in the form of rain, but freezes into a glaze upon contact with the ground or other hard surfaces. The rain is formed when snowflakes completely melt while falling through a layer of warmer air situated between two masses of colder air. The rain

drops do not have time to refreeze before they reach the ground because the layer of cold air just above the surface is thin. The rain drops do become supercooled as they pass through this layer of colder air and instantly refreeze upon contact with anything that is at or below 32°F (i.e., the ground, trees, power lines, etc.).

What is the Wind Chill Index?

The Wind Chill Index is a measure of the rate of heat loss from exposed skin caused by the combined effects of wind and cold. 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. Exposures to extreme wind chills can be life threatening. **Figure 26** shows the Wind Chill Index as it corresponds to various temperatures and wind speeds. As an example, if the air temperature is 5°F and the wind speed is 10 miles per hour, then the wind chill would be -10°F. As wind chills edge toward -19°F and below, there is an increased likelihood that continued 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 result when individuals are exposed to extreme temperatures and wind chills, in many cases, as a result of severe winter storms. The following describes 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. See 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 begins to lose heat faster than it can produce it. As a result, the body's temperature begins to fall. 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 Douglas County depending on the weather conditions. The following provides a brief description of each type of alert.

- **Winter Storm Watch.** A winter storm watch is issued when severe winter weather, such as a blizzard, heavy snow, sleet, ice and/or dangerous wind chills, is possible in an area within the next 24 to 48 hours.
- **Advisories.** Winter advisories are issued for lesser winter weather events that may cause significant inconvenience, especially to motorists, but do not pose an immediate threat of death, injury or significant property damage. The following advisories will be issued when an event is occurring, is imminent or has a high probability of occurring.
 - ❖ **Winter Weather Advisory.** A winter weather advisory is issued for an average snowfall of 3 to 6 inches, sleet accumulations of less than ½ inch, blowing snow, drifting snow or combination of winter precipitation which will produce hazardous conditions.
 - ❖ **Freezing Rain Advisory.** A freezing rain advisory is issued when light freezing rain will produce less than ¼ inch ice accumulation.
 - ❖ **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 events that can be life threatening. Individuals are advised to avoid traveling 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 greater than or equal to 35 mph are accompanied by falling and/or blowing 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 is expected to produce ¼ inch or more of ice accumulation.
 - ❖ **Winter Storm Warning.** A winter storm warning is issued when 6 inches or more of snow is expected, ½ inch or more of sleet accumulations are expected or a combination of heavy snow, sleet, icing and/or blowing snow is expected.
 - ❖ **Wind Chill Warning.** A wind chill warning is issued when wind chill values are expected to be -25°F or below.

If an event is expected to produce only one type of precipitation, say snow, then the warning or advisory will be specific: Heavy Snow Warning or Snow Advisory. If a mixture of precipitation types is expected, say snow and sleet, then the generic Winter Storm Warning or Winter Weather Advisory will be used.

PROFILING THE HAZARD

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

Table 5 and **6** summarize the previous occurrences as well as the extent or magnitude of severe winter storm events in Douglas County. The severe winter storm events are broken down into two categories: snow and ice events and extreme cold events.

SNOW AND ICE

The Storm Events Database records show 21 reported occurrences of severe snow and ice events in Douglas County between 1995 and June 30, 2009, making this one of the more frequently occurring hazards. Of the 21 reported occurrences, there were 15 severe snow events and six events that were a combination of severe freezing rain, ice, sleet and snow. Since 1995, at least one severe snow and/or ice event has occurred each year in Douglas County with the exception of 2001, 2003, 2004 & 2005. Anecdotal information shared by long-time residents suggests that severe snow and ice events have occurred with similar frequency between 1950 and 1994. In comparison, Illinois has averaged at least two snow events annually between 1900 and 2000 where six inches or more of snow falls within a 48 hour period.

Figures 27 and **28** chart the reported occurrences of severe snow and ice events by month and hour. Thirteen of the 21 events took place in December and January. Approximately 52% of all snow and ice events began during the a.m. hours.

Figure 27
Douglas County Snow and Ice Events by Month – 1995 through June 30, 2009

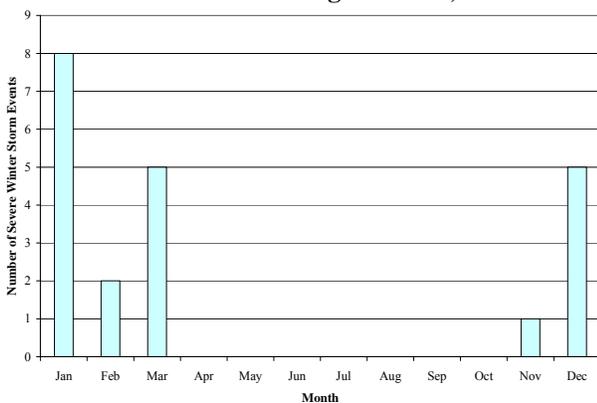
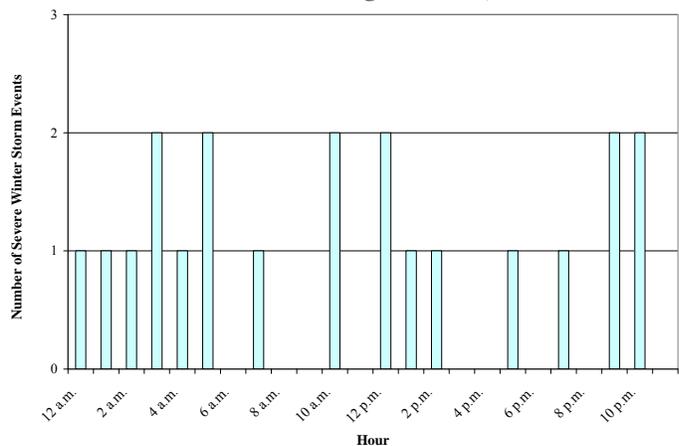


Figure 28
Douglas County Snow and Ice Events by Hour – 1995 through June 30, 2009



NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Douglas County, 2009.

According to the Midwestern Regional Climate Center, over the last 110 years the maximum one-day accumulation of snow recorded in Douglas County occurred on January 31, 1982 when 15 inches of snow fell.

EXTREME COLD

The Storm Events Database records indicate that of the 21 severe snow and ice events reported, four were accompanied by extreme cold (i.e., low temperatures and wind chills). In addition to these four events, the Storm Events Database records also reported three occurrences of extreme cold unaccompanied by snow and ice in Douglas County between 1996 and June 30, 2009. According to the Midwestern Regional Climate Center, the coldest temperature recorded in Douglas County over the last 110 years was -26°F on December 22, 1989.

What locations are affected by severe winter storms?

Severe winter storms affect the entire County. All communities in Douglas County have been affected by severe winter storms. The *2007 Illinois Natural Hazard Mitigation Plan* prepared by the Illinois Emergency Management Agency classifies Douglas County's hazard rating for severe winter storms as "Severe."

What is the probability of future severe winter storms occurring?

Douglas County has had 24 verified occurrences of severe winter storms between 1995 and June 30, 2009. With 24 occurrences over the past 15 ½ years, Douglas County may experience at least one to two severe winter storms each year.

ASSESSING VULNERABILITY

Are the participating jurisdictions vulnerable to severe winter storms?

Yes. All of Douglas County, including the participating jurisdictions, is vulnerable to the dangers presented by severe winter storms. Severe winter storms are among the most frequently occurring natural hazards in Illinois. There is one official warming center located in Douglas County at the Illinois Department of Human Services Office in Tuscola.

Douglas County has had at least one severe winter storm every year since 1995 with the exception of four years. During seven of these years, the County experienced multiple storm events. 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.



A severe winter storm with high winds causes falling snow to blow and obstruct the view of the Tuscola Grain Elevator.

Photo by Douglas Cottle

What impacts resulted from the recorded severe winter storms?

Damage information was either unavailable or none was recorded for any of the reported snow and ice and/or extreme cold events. 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.

No injuries or deaths were reported either as the result of any of the recorded snow and ice and/or extreme cold events in Douglas County. In comparison, Illinois averages six deaths per year as a result of severe winter storms.

While severe winter storms occur regularly in Douglas 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 a power outage, the risk to public health and safety from severe winter storms is relatively low.

What other impacts can result from severe winter storms?

While no injuries or deaths were reported by the Storm Events Database for the recorded severe winter storm events in Douglas County, severe winter storms do have the ability to impact health and safety.

In Douglas 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 2004 and 2008 indicates that treacherous road conditions caused by snow and ice were present for 2.3% to 18.4% of all crashes recorded annually in Douglas County. **Figure 29** 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 as well as the total number of crashes that occurred in the County for comparison.

Figure 29 Severe Winter Weather Crash Data for Douglas County				
Year	Total # of Crashes	Presence of Treacherous Road Conditions caused by Snow and Ice		
		# of Crashes	# of Injuries	# of Deaths
2004	408	45	11	0
2005	367	47	11	0
2006	346	8	4	0
2007	376	69	15	0
2008	366	61	4	0

Source: Illinois Department of Transportation, Illinois Crash Data, County Crash Summaries, Douglas County, 2004-2008.

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, especially to the elderly, including fractures and broken bones. 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 Douglas County and the participating jurisdictions 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 Douglas 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 communication and power lines often lead to disruptions in communication 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. 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.



Workers clear the parking lot at the Tanger Outlet Center in Tuscola after a significant snowfall.

Photo by Douglas Cottle

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, dug up 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 Douglas 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 municipalities 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 Garrett 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 Douglas 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.

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 no available recorded events listing property damage numbers for severe winter storms, there is no way to accurately estimate future potential dollar losses. Since all structures within Douglas County are vulnerable to damage it is likely that there will be future dollar losses to severe winter storms.

3.4 FLOOD

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 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.

What types of floods occur in Douglas County?

Floods can be classified under two categories: flash floods and general floods. Flash floods are generally produced when heavy localized precipitation falls over an area in a short amount of time. 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. There is generally very little, if any, warning associated with flash floods.

In Douglas County, general flooding can fall into two subcategories: river floods and area or overland floods. River floods are generally caused by a gradual increase in the water levels of a river or creek. These floods occur when winter or spring rains, coupled with melting snow, fill river basins with too much water too quickly or when torrential rains associated with tropical storms enter the area. Low lying areas near rivers, streams, lakes and reservoirs are susceptible to this type of flooding. Area or overland floods occur outside a defined stream or river and are generally the result of previous precipitation events that have left the ground saturated. Additional rainfall leads to surface runoff which causes ponding to occur in low-lying areas such as open fields. Area floods can also occur when a levee is breached.

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.

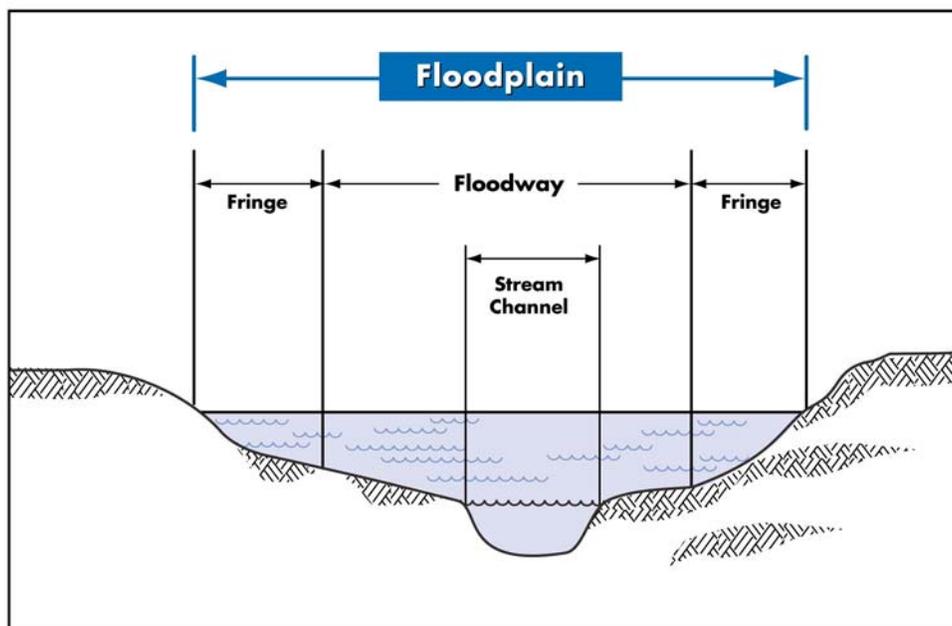
What is a floodplain?

There are several ways to define the term “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 floodplain is the land area that is subject to a 1% or greater chance of flooding in any given year. It is also known as the 100-year floodplain. This definition is utilized by the FEMA to administer the National Flood Insurance Program and by the State of Illinois to regulate construction activities within a floodplain. Regulating floodplains is important because when individuals build within a floodplain, property damage and even loss of life can occur. It is this second definition that is generally most familiar to people and the one that will be used when discussing floodplains from this point forward.

A regulatory floodplain is divided into two parts: the floodway and the flood fringe. **Figure 30** illustrates the various components of a regulatory floodplain.

Figure 30
Floodplain Illustration



Source: Illinois Department of Natural Resources, Office of Water Resources, "Floodplain Management in Illinois: Quick Guide", 2001.

The floodway is the channel of a river or other watercourse and the adjacent land area 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 floodwater downstream and is usually the area where water velocities and forces are the greatest. 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 regulatory floodplain, outside of the floodway, that is subject to shallow inundation and low velocity flows or standing water. 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. However, any development will require protection

from the floodwaters through the elevation of the buildings above the base flood or by flood-proofing buildings so that water can not enter the structures.

What is a base flood?

A base flood refers to any flood having a 1% chance of being equaled or exceeded in any given year. It is also known as the 100-year flood or the one percent chance flood. The base flood has been adopted by the National Flood Insurance Program as the basis for mapping, insurance rating and regulating new construction.

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. It is generally deeper than a 100-year flood and covers a greater amount of area; however, it is statistically less likely to occur.

What is the National Flood Insurance Program?

The National Flood Insurance Program (NFIP) is a federal program administered by FEMA enabling property owners in participating communities to purchase insurance protection against losses from flooding. It was established by the U.S. Congress 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. This approach did not reduce losses, nor did it discourage unwise development practices. In the face of mounting 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 (regulatory floodplain), then the government will make flood insurance available within the community as a financial protection against flood losses.

However, if a community chooses not to participate, then flood insurance under the NFIP will not be made available within that community. (Flood insurance can still be obtained through a private insurance broker, but the premiums are likely to be higher.) In addition, federal agencies would be prohibited from approving any financial assistance for acquisition or construction purposes within Special Flood Hazard Areas (42 U.S.C. 4106). For example, this would prohibit loans guaranteed by the Department of Veteran Affairs, insured by the Federal Housing Administration or secured by Rural Housing Services. Also, if a presidentially-declared disaster occurs as a result of flooding in a non-participating community, no federal financial assistance can be provided for the permanent repair or reconstruction of insurable buildings within Special Flood Hazard Areas.

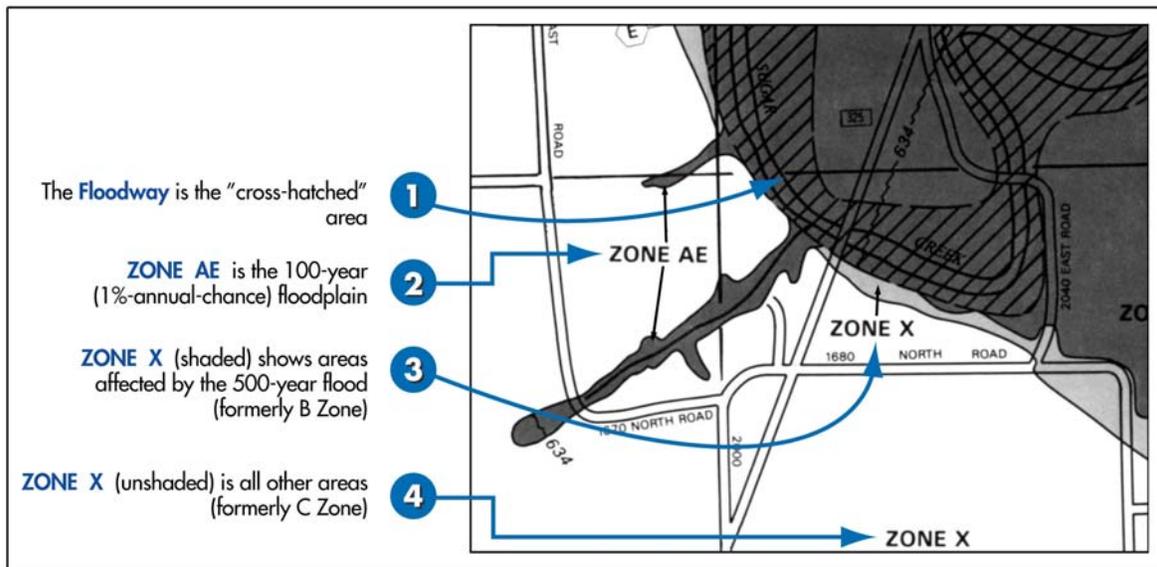
What is a Special Flood Hazard Area?

A Special Flood Hazard Area (SFHA) is the floodplain area that is subject to a 1% or greater chance of flooding in any given year. (This area is also referred to as a regulatory floodplain as discussed previously.) The term SFHA is most commonly used when referring to the Flood Insurance Rate Maps (FIRM) produced by FEMA. Special Flood Hazard Areas are delineated on the Flood Insurance Rate Maps and may be designated as Zones A, AO, AH, A1-30, AR, AE or A99.

What are Flood Insurance Rate Maps?

Flood Insurance Rate Maps (FIRMs) are maps that identify flood hazard areas as well as risk premium zones within 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 31** shows an example of a FIRM.

Figure 31
Example of a Flood Insurance Rate Map (FIRM)



Source: Illinois Department of Natural Resources, Office of Water Resources, "Floodplain Management in Illinois: Quick Guide", 2001.

A FIRM will generally show 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 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 a Special Flood Hazard Area (SFHA) or regulatory floodplain, is defined as the floodplain area that is subject to a 1% or greater 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 with 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. In communities that participate in the NFIP, structures located with Zone X (shaded) are not required to purchase flood insurance, but 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 at a low risk for flooding. In communities that participate in the NFIP, structures located with Zone X (unshaded) are not required to purchase flood insurance, but it is made available to all property owners and renters.

What is a Repetitive Loss Structure or Property?

The Federal Emergency Management Agency 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. 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 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. CRS discounts on flood insurance premiums range from 5% up to 45%. Those discounts provide an incentive for new flood mitigation, planning and preparedness 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 or warnings for Douglas County depending on the weather conditions. The following provides a brief description of each type of alert.

- **Flash Flood / Flood 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.
- **Urban and Small Stream Flood Advisory.** An urban and small stream flood advisory is issued when heavy rain will cause flooding of streets or low-lying places in urban areas, or if small rural or urban streams are expected to reach or exceed their banks. Advisories are only issued for flooding which is generally anticipated to cause an inconvenience but does not pose a threat to life and/or property.
- **Flash Flood / Flood Warning.** A flash flood or flood warning is issued when flooding is imminent or already occurring. Warnings indicate imminent danger to life and property for those who are in the area of the flooding.

PROFILING THE HAZARD

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

Table 7 summarizes the previous occurrences as well as the extent or magnitude of the flood events in Douglas County. The Storm Events Database and community records identified 23 flooding and flash flooding events in Douglas County between 1950 and June 30, 2009. Fourteen of the 23 events were caused by flash flooding.

Figures 32 and **33** chart the reported occurrences of flooding and flash flooding by month and hour. Eighteen of the 23 events took place between April and July, with six of the events occurring in June.

Approximately 53% of all the Storm Events Database recorded flooding and flash flooding events occurred during the p.m. hours.



Flooding on March 4, 1979 caused damage to homes and businesses in Villa Grove.

What locations are affected by floods?

While specific locations are affected by river flooding, the entire County can be affected by overland and flash flooding because of the relatively flat topography and seasonally high water table of the area. Approximately 8% of the area in Douglas County is designated as being within the regulatory floodplain and susceptible to river floods. A large portion of the flood-prone area

is in the unincorporated portion of the County, although several participating municipalities including Villa Grove, Arthur, Newman and Tuscola, are also susceptible to flooding because of their proximity to floodplains. Tuscola, Villa Grove and Arthur have experienced more flood events and flood damage than other participating municipalities, primarily because large portions of residential areas lie within the floodplains.

Figure 32
Douglas County Flooding & Flash Flooding Events by Month – 1950 through June 30, 2009

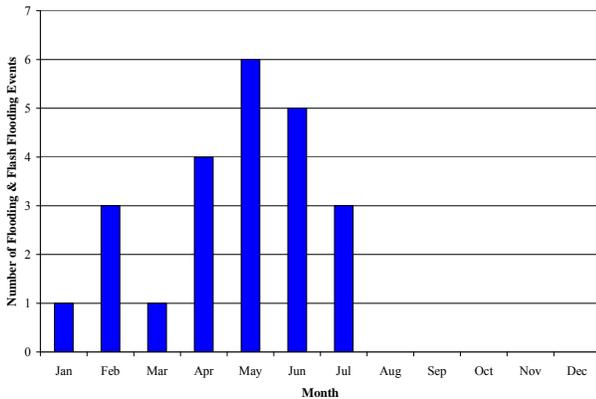
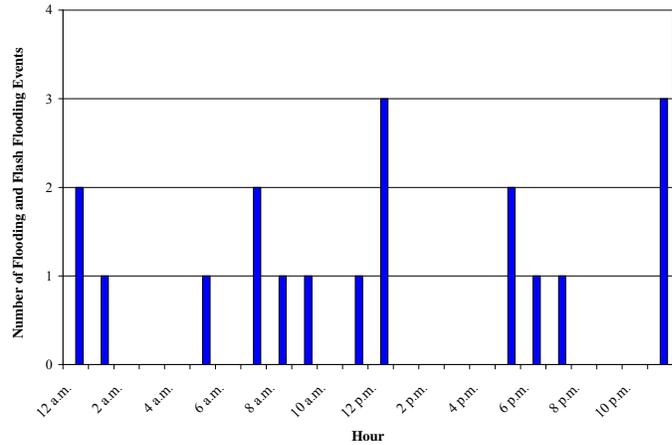


Figure 33
Douglas County Flooding & Flash Flooding Events by Hour – 1994 through June 30, 2009



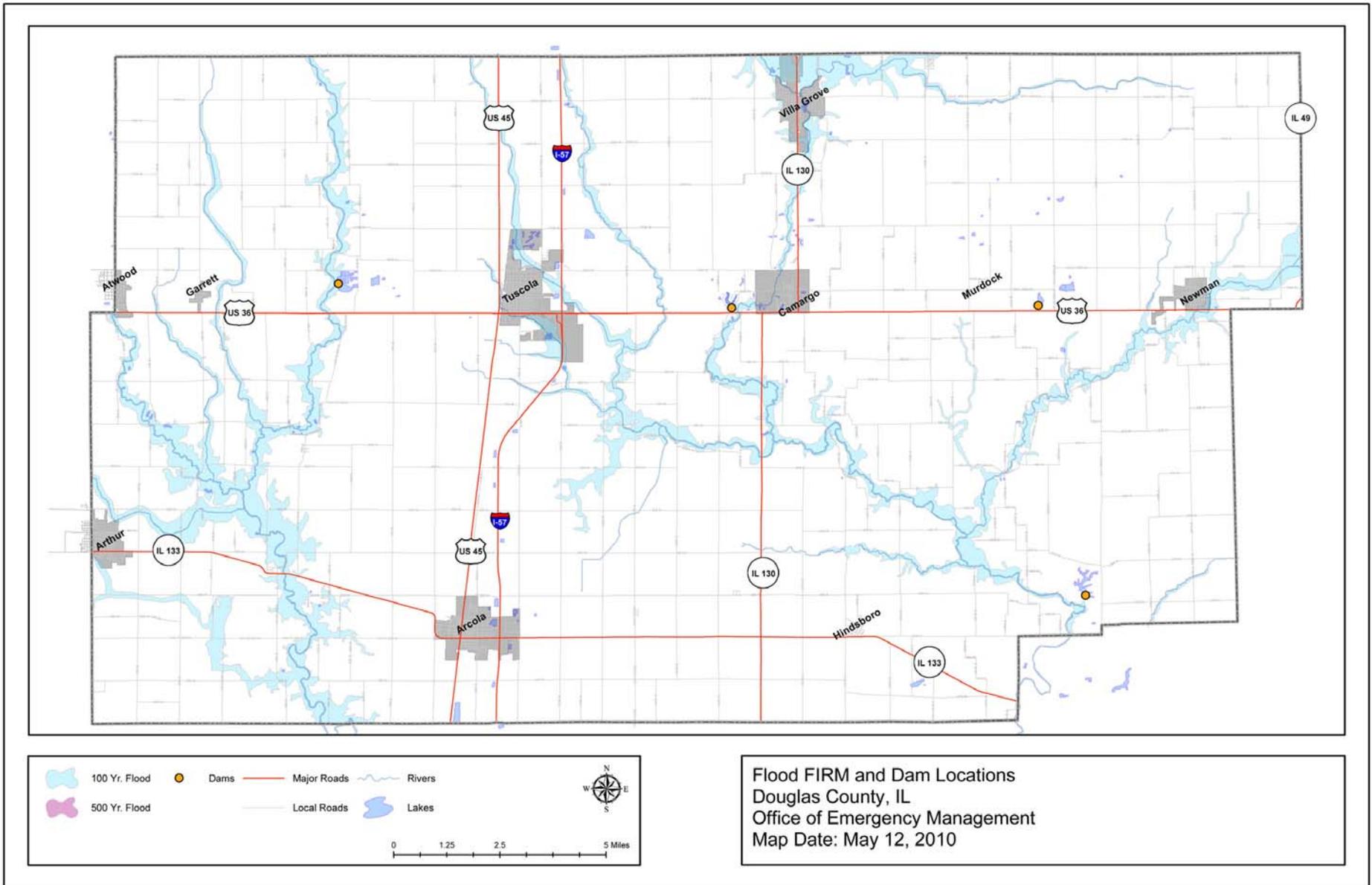
NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Douglas County, 2009.
City of Villa Grove, Illinois, Villa Grove Centennial Celebration 1903 – 2003, Centennial Committee, 2003.

Figure 34 shows the floodplains in unincorporated Douglas County. To review the Flood Insurance Rate Maps for the participating municipalities, see **Appendix J**. At the time of this report, the FIRMs for Douglas County were in the process of being updated. The new digital FIRMs or DFIRMs for the County were preliminary and had not been finalized.

Figure 35 identifies the bodies of water by participating municipality that have FEMA-designated Special Flood Hazard Areas and are known to cause flooding. The *2007 Illinois Natural Hazard Mitigation Plan* prepared by the Illinois Emergency Management Agency classifies Douglas County’s hazard rating for floods as “high.”

Figure 35 Bodies of Water Subject to Flooding	
Participating Jurisdiction	Water Bodies
Arcola	Prairie Lake
Arthur	A Creek, Kaskaskia River, West Fork
Atwood	Lake Fork Creek
Garrett	---
Newman	Brushy Fork
Tuscola	Hayes Branch, Scattering Fork, tributaries of the Embarras River
Villa Grove	Embarras River, Jordan Slough, West Ditch
Unincorporated Douglas County	A Creek, Bear Creek, Brushy Fork, Ditch #2, Dry Fork Creek, Embarras River, Hackett Branch, Hayes Branch, Hog Branch, Jordan Slough, Kaskaskia River, Lake Fork Creek, Pope Branch, Rolling’s Pond, Scattering Fork, Spring Lake, Walnut Point Lake, West Ditch, West Fork Creek,

Figure 34
Floodplain Areas in Unincorporated Douglas County



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

Yes. All of the participating jurisdictions take part in the NFIP. **Figure 36** provides additional information about each jurisdiction, including the date each participant joined the NFIP and the date of the most recently adopted floodplain zoning ordinance.

Figure 36 NFIP Participating Communities				
Participating Jurisdictions	Participation Date	FIRM Adoption Date	CRS Participation	Most Recently Adopted Floodplain Zoning Ordinance
Douglas County	5/17/1995	3/4/1985	No	2002
City of Arcola	1/17/1991	NA	No	1990
Village of Arthur	12/2/1988	12/2/1988	No	2000
Village of Atwood	5/25/1978	12/31/1982	No	2005
Village of Garrett	11/8/2007	1/1/1950	No	2007
City of Newman	4/8/2009	Adopted FHBM 11/29/1974	No	2009
City of Tuscola	4/1/1982	4/1/1982	No	2005
City of Villa Grove	2/1/1979	2/1/1979	No	2005

Sources: FEMA, National Flood Program, Community Status Book Report – Illinois, September 17, 2009. Osman, Paul. Local Floodplain Programs/NFIP Coordinator. Office of Water Resources. Illinois Department of Natural Resources. “Re: Floodplain Ordinances.” E-mail to Greg R. Michaud. June 29, 2010.

What is the probability of future flood events occurring?

Douglas County has had 23 verified occurrences of flooding between 1950 and June 30, 2009. With 23 occurrences over the past 59 ½ years, the probability or likelihood of a flood event occurring somewhere in Douglas County in any given year is 39%.

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. All of Douglas County, including the participating jurisdictions, is vulnerable to the dangers presented by flooding. Because of its flat topography, high seasonal water table and the presence of two major rivers and their associated watersheds, the County is susceptible to all forms 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.

Based on the information obtained from Storm Events Database and community records, a majority of the flooding experienced in the County is related to flash flooding. **Figure 37** details the number of flooding and flash flooding events by participating jurisdiction.

Figure 37 Verified Flooding & Flash Flooding Events by Participating Jurisdiction				
Participating Jurisdiction	Number of Verified Flood Events	Year of Flood Event	Number of Verified Flash Flood Events	Year of Flash Flood Event
Countywide	3	1994, 2002, 2008	6	1994, 1996, 1997, 2002, 2003, 2009
Arcola	1	2009	0	---
Arthur	0	---	2	2008 (2)
Atwood	0	---	0	---
Garrett	0	---	0	---
Newman	0	---	1	2008
Tuscola	0	---	5	2000, 2001, 2002, 2003, 2008
Villa Grove	4	1950, 1959, 1974, 1979	3	1996, 2002 (2)

Source: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Douglas County, 2009.
 City of Villa Grove, Illinois, Villa Grove Centennial Celebration 1903 – 2003, Centennial Committee, 2003.

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 discussed 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 sizeable increases in residential or commercial/industrial developments are expected within the next five years.

What impacts resulted from the recorded floods?

Of the 23 reported flooding and flash flooding events, damages were only recorded for four events. Damage information was either unavailable or none was recorded for the rest of the reported occurrences. On January 4, 1950 the Embarras River overflowed its banks in Villa Grove and caused approximately \$500,000 in property damage. Flood waters completely surrounded three area churches and approximately one-third of the homes in the city. The second event occurred on June 22 and 23, 1974 when the Embarras River again overflowed its banks in Villa Grove. The flood waters covered a quarter of the community and caused approximately \$300,000 in property damage. Extensive damage was done to the Community Building as a result of the flooding.



The Embarras River overflowed its banks on January 4, 1950 causing extensive damage in Villa Grove.

The third event began on April 11, 1994 and was included in Presidential Disaster Declaration 1025. Heavy rains caused flash flooding and flooding throughout the region that led to approximately \$50,000,000 in property damage. This total represented losses sustained by eight counties (including Douglas County). A breakdown by county for this total was not available although property damage totals for Villa Grove alone were estimated at \$1 million. According to the book *Villa Grove Centennial Celebration 1903 – 2003*, this event destroyed one mobile home, caused major damage to 10 homes, minor damage to 43 homes and affected 68 other homes in Villa Grove. In addition, floodwaters entered the city's water plant contaminating the drinking water supply.

The final event began on June 4, 2008 and was included in Presidential Disaster Declaration 1771. Several days of intense rain led to extensive flooding across Douglas County causing approximately \$510,000 in property damage. More than 100 homes and businesses sustained damage and many county roads were closed for more than a week. In comparison, Illinois has average an estimated \$257 million annually in property damage losses from flooding since 1983, making flooding the most economically-damaging natural hazard.



Heavy rainfall on June 7, 2008 flooded most of Main Street in Tuscola.

Photo by Douglas Cottle

The Storm Events Database has only one recorded report of injury resulting from a flood event. On April 19, 2002 a flash flood event washed a car off the road near the intersection of County Road 1350E and 1500N, a few miles west of Villa Grove. Two individuals were rescued from the car with one sustaining a broken arm. In comparison, Illinois averages four deaths per year from flooding.

Based on the fact that less than 8% of the area with the County lies within a floodplain and the number of injuries and deaths is very low, the risk or vulnerability to public health and safety from general flooding is relatively low. However, a majority of the recently recorded flood events were 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.

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. In recent years, individuals have drowned in nearby counties while crossing roads partially covered by moving water.

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 be 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.

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

Yes. Twelve repetitive flood loss properties are located within Douglas County. There are five single family dwellings located in Villa Grove and three single-family dwellings and four multiple family dwellings located in Tuscola. As discussed previously, FEMA defines a “repetitive loss structure” 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 38 identifies the type of repetitive flood loss structures/properties by participating jurisdiction and provides the total flood insurance claim payments for both content and structure damages. The exact location and/or addresses of the insured properties are not included in this Plan to protect the owners’ privacy. According to the FEMA, there have been 64 flood insurance claim payments totaling \$410,814.34 for the twelve repetitive flood loss structures/properties located in Douglas County.

Figure 38 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	
Tuscola	Single Family	8	\$53,218.23	\$16,843.10	\$70,061.33
Tuscola	Single Family	2	\$5,054.93	\$0	\$5,054.93
Tuscola	Single Family	2	\$3,070.78	\$2,384.40	\$5,455.18
Tuscola	Multiple Family	10	\$54,563.60	\$4,883.14	\$59,446.74
Tuscola	Multiple Family	11	\$44,775.96	\$0	\$44,775.96
Tuscola	Multiple Family	6	\$16,925.41	\$0	\$16,925.41
Tuscola	Multiple Family	8	\$43,741.96	\$0	\$43,741.96
Villa Grove	Single Family	3	\$34,989.06	\$3,314.11	\$38,303.17
Villa Grove	Single Family	2	\$5,047.55	\$0	\$5,047.55
Villa Grove	Single Family	7	\$79,177.70	\$19,957.12	\$99,134.82
Villa Grove	Single Family	3	\$9,517.72	\$0	\$9,517.72
Villa Grove	Single Family	2	\$13,349.57	\$0	\$13,349.57
Totals:		64	\$363,432.47	\$47,381.87	\$410,814.34

Source: Owen, Jared. Hazard Mitigation Planner. Illinois Emergency Management Agency. “Douglas County RL data.” E-mail to Greg R. Michaud. September 19, 2009.

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

Yes. While only 8% of the area in Douglas County is designated as being within the regulatory floodplain and susceptible to river floods, most of the County is vulnerable to flash floods. A majority of the buildings, infrastructure and critical facilities that may be impacted by flooding

are located outside of the regulatory floodplain. An accurate count of the number of buildings and critical facilities within the floodplain for each participating municipality could not be calculated at this time. When the preliminary Digital Flood Insurance Rate Maps (DFIRMs) are finalized for Douglas County, a precise count of buildings and critical facilities will be developed.

Structural damage, such as cracks forming in foundations, can 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. Infrastructure and critical facilities are also vulnerable to flooding. Roadways, culverts and bridges can be weakened by floodwaters and have been known to collapse under the weight of a vehicle. Buried power and communication lines are also vulnerable to flooding. Water can get into the lines and cause disruptions in power and communications.

Based on the fact that most of the County is vulnerable to flash flooding, a majority of the buildings, infrastructure and critical facilities that may be impacted are located outside of the regulatory floodplain and the amount of property damage previously reported; the vulnerability of buildings, infrastructure and critical facilities to flooding varies from medium to high.

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

Yes and No. All of the participating jurisdictions take part in the National Flood Insurance Program (NFIP) and have adopted floodplain ordinances. Enforcement of these ordinances provides protection to any new building, infrastructure or critical facility built within a flood-prone area.

While new buildings, infrastructure and critical facilities should be protected from normal flooding, they will still be vulnerable to flash flooding depending on the amount of precipitation that is received, the topography and land use changes.

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

Residential

As mentioned previously, Douglas County does not have electronic mapping of the buildings located within floodplain for the municipalities in the County. When the DFIRMs are finalized, an accurate count of the structures or buildings that are vulnerable to flooding should be developed. While a precise count of residential buildings vulnerable to flooding and drainage issues is not available for the participating municipalities, an estimate was developed using the preliminary DFIRMs. In addition, the County's GIS Coordinator was able to provide an estimate of the number of residential buildings within the floodplain for the unincorporated portions of Douglas County. **Figure 39** lists the estimated number of vulnerable buildings for each participating jurisdiction.

In order to begin calculating the total potential dollar losses to vulnerable residential buildings, the average assessed value must be determined. The average assessed value for each municipality was calculated from the 2009 tax assessment information provided by the Douglas County Supervisor of Assessments. The average assessed value was then multiplied by three to

determine the average market value (the assessed value of a structure in Douglas County is approximately one-third of the market value). The average market value was then used to calculate the damage or potential dollar loss to both the vulnerable housing units and their contents.

Figure 39
Potential Dollar Losses to Vulnerable Residential Buildings from Flooding

Participating Jurisdiction	Estimated Number of Vulnerable Residential Buildings	Average Assessed Value	Average Market Value	Potential Dollar Losses		Total Potential Dollar Losses
				Housing Unit	Content	
Arcola	0	\$35,824	\$107,472	\$0	\$0	\$0
Arthur	223	\$24,836	\$74,508	\$3,323,057	4,984,585	\$8,307,642
Atwood	6	\$11,077	\$33,231	\$39,877	\$59,816	\$99,693
Garrett	0	\$9,243	\$27,729	\$0	\$0	\$0
Newman	55	\$17,077	\$51,231	\$563,541	\$845,312	\$1,408,853
Tuscola	396	\$34,276	\$102,828	\$8,143,978	\$12,215,966	\$20,359,944
Villa Grove	428	\$23,985	\$71,955	\$6,159,348	\$9,239,022	\$15,398,370
Unincorporated Douglas County	514	\$55,945	\$167,835	\$17,253,438	\$25,880,157	\$43,133,595

Sources: "Douglas County Preliminary DFIRM Finder." Map. [Illinois Floodplain Maps](#). Illinois State Water Survey. August 3, 2010.
 Cain, Rena. Douglas County Supervisor of Assessments. "Assessed Residential Values." Fax to Greg R. Michaud. February 4, 2010.
 Goad, Jason. Douglas County GIS Coordinator. "RE: Comm Towers." E-mail to Andrea J. Bostwick. May 13, 2010.

When comparing the average assessed value of a residential property in unincorporated Douglas County to the average assessed value of a residential property in any of the participating municipalities, there is a substantial difference. This difference is attributed to several factors including larger parcel sizes and the inclusion of outbuildings (i.e., sheds, barns, etc.) in the averaged assessed value. In addition, there has been a recent trend towards building new, larger residences in unincorporated areas of the County.

To determine the potential dollar losses to the vulnerable housing units, start by taking the average market value and multiplying by the percent damage. For the purposes of this scenario, let's assume that the vulnerable residential buildings are one or two story homes with basements that are flooded with two feet of water. Based on FEMA guidance, the expected damage to these vulnerable housing units would be 20%. After calculating the adjusted average market value number, multiply it by the number of vulnerable housing units.

Next, calculate the potential dollar losses to the content of the vulnerable housing units. This is determined in the same manner as the potential dollar losses to the vulnerable housing units. Take the average market value and multiply by the percent damage. Using the same assumption as above, the FEMA guidance estimates that the expected damage to the content of the vulnerable housing units would be 30%. After determining the adjusted average market value number, multiply it by the number of vulnerable housing units.

Finally, the total potential dollar losses may be calculate by adding together the potential dollar losses to the vulnerable housing units and the potential dollar losses to the content of the vulnerable housing units. **Figure 39** provides an estimate of the total potential dollar losses by participating jurisdiction.

This assessment illustrates why potential residential dollar losses should be considered when participating jurisdictions are deciding which mitigation projects to pursue. Potential dollar losses caused by flooding to impacted residences within the participating municipalities would be expected to range from \$100,000 to \$20 million.

Infrastructure & Critical Facilities

Aside from the 92 vulnerable residential structures identified in Villa Grove, the drinking water facility has also experienced flooding issues. The potential dollar loss to relocate this facility is estimated at \$5 million. In Atwood, the wastewater treatment facility is located in the floodplain and has experienced flooding issues. Arthur’s wastewater treatment facility is also located in the floodplain and has experienced flooding issues as well. No other above-ground infrastructure or critical facilities within the municipalities were identified as being vulnerable to flooding.

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 several days to several weeks. In comparison, a heat wave is generally defined as a period of at least three consecutive days above 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 1,500 people die in the United States each year from extreme heat. This number is greater than the 30-year mean annual number of deaths due to tornadoes, hurricanes, floods and lightning combined. In an effort to raise the public's awareness of the hazards of extreme heat, the National Weather Service has devised the "Heat Index".

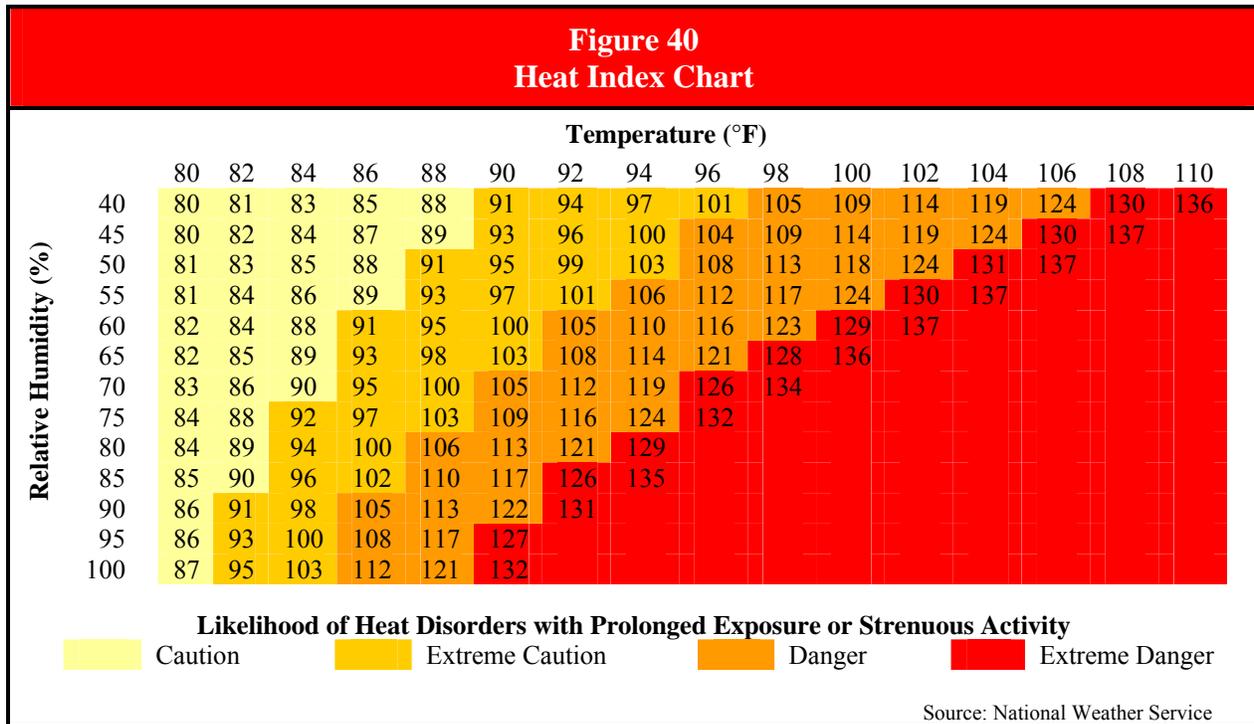
What is the Heat Index?

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 40** 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.

- **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 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 41 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 41 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” brochure.

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 Douglas County.

- **Excessive Heat Outlook.** An excessive heat outlook is issued when the potential exists for an excessive heat event to occur within the next three to seven days.
- **Excessive Heat Watch.** An excessive heat watch is issued when conditions are favorable for an excessive heat event to occur within the next 12 to 48 hours.
- **Excessive Heat Advisory.** An excessive heat advisory is issued when the heat index is expected to reach at least 100°F, and/or the air temperature is expected to reach at least 95°F.
- **Excessive Heat Warning.** An excessive heat warning is issued when the maximum heat index is expected to be at least 105°F and the minimum heat index is expected to be at least 75°F for two consecutive days.

PROFILING THE HAZARD

When have extreme heat events occurred previously? What is the extent of these extreme heat events?

Table 8 summarizes the previous occurrences as well as the extent or severity of extreme heat events in Douglas County. The Storm Events Database records show six reported extreme heat events in Douglas County between 1997 and June 30, 2009. All of the extreme heat events recorded occurred between June and August, with five of the six events either taking place or

beginning in July. Extreme heat events have lasted from two days to one week. There was one year, 1999, where two extreme heat events were recorded. According to the Midwestern Regional Climate Center, the highest temperature recorded in Douglas County over the last 110 years was 113°F on July 14, 1954.

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 *2007 Illinois Natural Hazard Mitigation Plan* classifies Douglas County’s hazard rating for extreme heat as “high.”

What is the probability of future extreme heat events occurring?

Douglas County has experienced six verified extreme heat events between 1997 and June 30, 2009. With six occurrences over the past 12 ½ years, the probability or likelihood that the County may experience an extreme heat event in any given year is 48%.

ASSESSING VULNERABILITY

Are the participating jurisdictions vulnerable to extreme heat?

Yes. All of Douglas County is vulnerable to extreme heat. Extreme heat events were recorded in six of the past 12 ½ years. There is one official cooling center located in Douglas County at the Illinois Department of Human Services Office in Tuscola.

What impacts resulted from the recorded extreme heat events?

Property and crop damage information was either unavailable or none was recorded for any of the reported occurrences. There were numerous reports of road buckling due to excessive heat during the July 26, 1997 to July 27, 1997 event and the June 26, 1998 to June 28, 1998 event; however the locations and the extent of the damages were not recorded.

Heat-related injuries were reported for two of the recorded extreme heat events; however, the data provided covered multiple counties and did not provide a number or breakdown by county. While heat-related injuries were only reported for two of the recorded extreme heat events, the heat indices were sufficiently high for all six 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.

While extreme heat events occur fairly regularly in Douglas County, no specific injuries or deaths have been reported. This does not mean, however, that none have 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. However, even if injuries and death due to extreme heat are under reported in Douglas County, the risk or vulnerability to public health and safety from extreme heat 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 early school dismissals and school closings. In addition, extreme heat events can lead to an increase in water usage and may result in municipalities imposing water use restrictions when water is obtained from lakes or rivers. In Douglas County, extreme heat should not impact municipal water supplies since there are none that 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 Douglas County and the participating jurisdictions are not vulnerable to extreme heat events. Unlike other natural hazards such as floods, earthquakes or tornadoes, extreme heat events in Douglas County typically do not cause damage to buildings, infrastructure or critical facilities. The true concern is for the health and safety of those living in the County.

While buildings are 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 Douglas 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 Douglas 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 with the County 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, especially vulnerable populations such as the elderly, infants, young children and those with medical conditions.

Unlike other counties within the region, Douglas 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 because air-conditioning units, fans and cooling centers are unavailable.

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, the National Oceanic and Atmospheric Administration 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 utilized one or both of these indices to identify previous drought events recorded in Douglas 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 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.

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 42** shows the classification system utilized by the Palmer Drought Severity Index.

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.

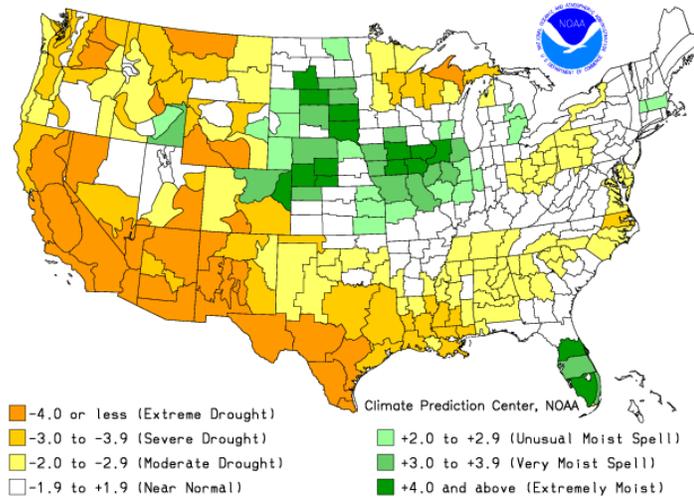
In addition to the monthly calculations, weekly PDSI values are now being calculated for the climate divisions during every growing season. NOAA’s Climate Prediction Center produces a weekly map that shows the climate divisions and their PDSI value by color. **Figure 43** shows an example of this map.

Figure 42 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, University of Nebraska – Lincoln, “What is Drought? – Drought Indices”, Dr. Michael J. Hayes, Climate Impacts Specialist, 2006.

**Figure 43
Palmer Drought Severity Index Map**

Drought Severity Index by Division
Weekly Value for Period Ending JUL 11, 2009
Long Term Palmer



Source: National Oceanic and Atmospheric Administration, Climate Prediction Center, Drought Monitoring.

U.S. Drought Monitor

A relatively new tool 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, the National Oceanic and Atmospheric Administration 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 44** provides a brief description of each category.

Figure 44 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 Integrated Drought Information System, U.S. Drought Portal, “Drought Monitor: State-of-the-Art Blend of Science and Subjectivity”, U.S. Drought Monitor, January 2008.

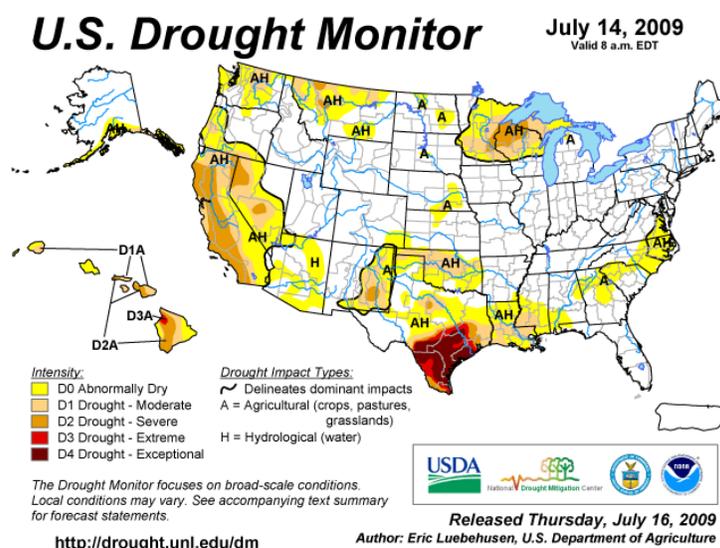
The drought intensity categories are based on five key indicators and numerous supplementary indicators. The five key indicators include the Palmer Drought Severity Index, Climate Prediction Center’s Soil Moisture Model (percentiles), United States Geological Survey Weekly Streamflow (percentiles), Standardized 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 indicators 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 45** 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 be locations with adequate water supplies in an area designated as D3 or D4.

Figure 45
U.S. Drought Monitor Map



Source: National Integrated Drought Information System, U.S. Drought Portal, U.S. Drought Monitor.

PROFILING THE HAZARD

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

The following summarizes the previous occurrences as well as the extent or severity of the drought events in Douglas County. Information obtained from the Storm Events Database and the Illinois Emergency Management Agency show two reported drought events in Douglas County between 1983 and 2008. Comprehensive damage information was either unavailable or none was recorded for either event. Also, no drought-related injuries or deaths were reported.

- In 1983, all 102 Illinois counties were proclaimed state disaster areas because of high temperatures and insufficient precipitation beginning in mid-June.
- In 1988, all of the counties in Illinois (including Douglas County) were impacted by drought conditions, although none of the counties were proclaimed state disaster areas.

Disaster relief payments exceeding \$382 million were paid to landowners and farmers as a result of this drought.

For each event lower than normal precipitation levels were recorded between April and June and unusually dry weather conditions persisted throughout the summer months.

Illinois State Water Survey records indicate that droughts also occurred in the region in 1931, 1934, 1936 and 1954; however, the extent to which Douglas County was impacted was unavailable.

What locations are affected by drought?

Drought events affect the entire County. All communities in Douglas County have been affected by drought. Droughts, like extreme heat and severe winter storms, tend to impact large areas, extending beyond county boundaries. The *2007 Illinois Natural Hazard Mitigation Plan* classifies Douglas County's hazard rating for drought as "guarded".

What is the probability of future drought events occurring?

Douglas County has experience two droughts between 1983 and June 30, 2009. With two occurrences over 26 ½ years, the probability or likelihood that Douglas County may experience a drought in any given year is 7.5%. However, if earlier recorded droughts are factored in, then the probability that Douglas County may experience a drought in any given year increases slightly to 7.6%.

ASSESSING VULNERABILITY

Are the participating jurisdictions vulnerable to drought?

Yes. All of Douglas County is vulnerable to drought. Neither the amount nor distribution of precipitation, soil types, topography, or water table conditions provides protection for any area within Douglas County

What impacts resulted from the recorded drought events?

Comprehensive damage information was either unavailable or none was reported for either of the recorded events. Disaster relief payment information was only available for one of the recorded events. Landowners and farmers in Illinois were paid in excess of \$382 million in disaster relief payments for the 1988 drought.

No injuries or deaths were reported as a result of any of the recorded drought events in Douglas 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 no drought-related impact information was provided for Douglas County, 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 leading industry in Douglas County. According to the 2007 Census of Agriculture, there were 657 farms in Douglas County occupying 261,513 acres. Farm land accounts for approximately 98% of all the land in Douglas County. Of the 261,513 acres of farm land, approximately 97% or 252,838 acres of this land was in crop production. Less than one percent of this land is irrigated. Crop sales accounted for \$126,701,000 in revenue while livestock sales accounted for \$7,249,000. A severe drought would have a 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 and 1988 droughts. **Figure 46** illustrates the reduction in yields seen for corn and soybeans during the two recorded drought events. Records obtained from the United States Department of Agriculture’s National Agricultural Statistics Service show that the 1983 drought resulted in corn yield reductions of 38% and soybean yield reductions of 22%. In 1983, 85 bushels per acre were harvested for corn and 32.5 bushels per acre for soybeans in contrast to 137 bushels per acres of corn and 41.5 bushels per acres of soybeans the previous year.

Figure 46 Crop Yield Reductions Due To Drought in Douglas County				
Year	Corn		Soybeans	
	Yield (bushel)	% Reduction from Previous Year	Yield (bushel)	% Reduction from Previous Year
1982	137	---	41.5	---
1983	85	38%	32.5	22%
1987	163	---	45	---
1988	89	45%	31	31%

Source: United States Department of Agriculture, National Agricultural Statistics Service, Quick Stats – Crops, Douglas County, Illinois

Corn yield reductions were nearly 45% and soybean yield reductions were nearly 31% as a result of the 1988 drought when only 89 bushels per acre of corn and 31 bushels per acre of soybeans were harvested in contrast to 163 bushels per acre of corn and 45 bushels per acre of soybeans harvested the previous year.

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 Douglas County, none of the participating municipalities rely on surface water sources for their drinking water supplies. All either obtain water from deep underground wells or purchase their water from another public water supply. As a result, they are less vulnerable 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. Low water levels can also adversely affect fishing and boating activities on lakes and ponds.

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

No. In general, existing buildings, infrastructure and critical facilities located in Douglas County and the participating jurisdictions 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.

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 damage caused to roadways. 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 with 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 yield 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 subsequent water conservation measures enacted will most likely impact businesses and industries that are water-dependent (i.e., car washes, landscapers etc.).

3.7 EARTHQUAKE

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.

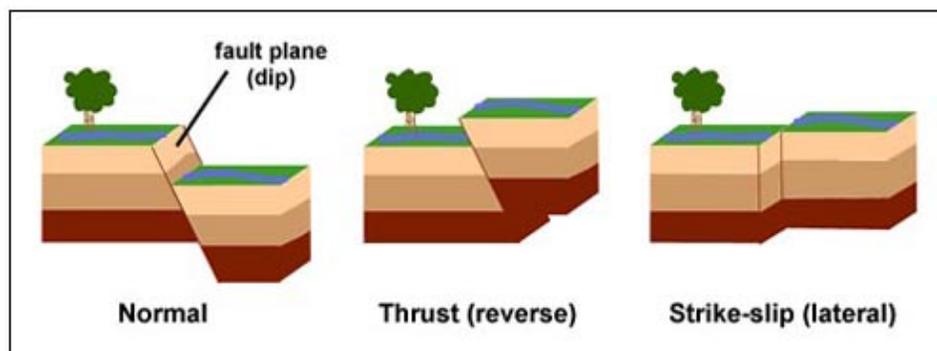
The destruction caused by an earthquake may range from light to catastrophic depending on a number of factors including the magnitude of the earthquake, the distance from the epicenter, the local geologic conditions as well as construction standards and time of day (i.e., rush hour). Earthquake damage 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.

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 47** provides an illustration of each type of fault.

Figure 47
Fault Illustration



Source: U. S. Geological Survey, Earthquake Hazards Program, "Visual Glossary – 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.

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 48** 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 48 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: U.S. Geological Survey, Earthquake Hazards Program, “What are the earthquake magnitude classes?” FAQ – Measuring Earthquakes.

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 49** 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.

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 Himalayas, the Mediterranean and out into the

Figure 49 Comparison of Richter Scale and Modified Mercalli Scale		
Richter Scale	Modified Mercalli Scale	Level of Damage
≤ 4.3	I-IV Instrumental to Moderate	No damage.
4.4 – 4.8	V Rather Strong	Damage negligible. Small, unstable objects displaced or upset; some dishes and glassware broken.
4.9 – 5.4	VI Strong	Damage slight. Windows, dishes, glassware broken. Furniture moved or overturned. Weak plaster and masonry cracked.
5.5 – 6.1	VII Very Strong	Damage slight-moderate in well-built structures; considerable in poorly-built structures. Furniture and weak chimneys broken. Masonry damaged. Loose bricks, tiles, plaster and stones will fall.
6.2 – 6.5	VIII Destructive	Structure damage considerable, particularly to poorly built structures. Chimneys, monuments, towers, elevated tanks may fail. Frame houses moved. Trees damaged. Cracks in wet ground and steep slopes.
6.6 – 6.9	IX Ruinous	Structural damage severe; some will collapse. General damage to foundations. Serious damage to reservoirs. Underground pipes broken. Conspicuous cracks in ground; liquefaction.
7.0 – 7.3	X Disastrous	Most masonry and frame structures/foundations destroyed. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes, embankments. Sand and mud shifting on beaches and flat land.
7.4 – 8.1	XI Very Disastrous	Few or no masonry structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Rails bent. Widespread earth slumps and landslides.
> 8.1	XII Catastrophic	Damage nearly total. Large rock masses displaced. Lines of sight and level distorted.

Source: FEMA for Kids: The Disaster Area – Intensity Scales, “Earthquakes – The Modified Mercalli Scale & The Richter Scale”.

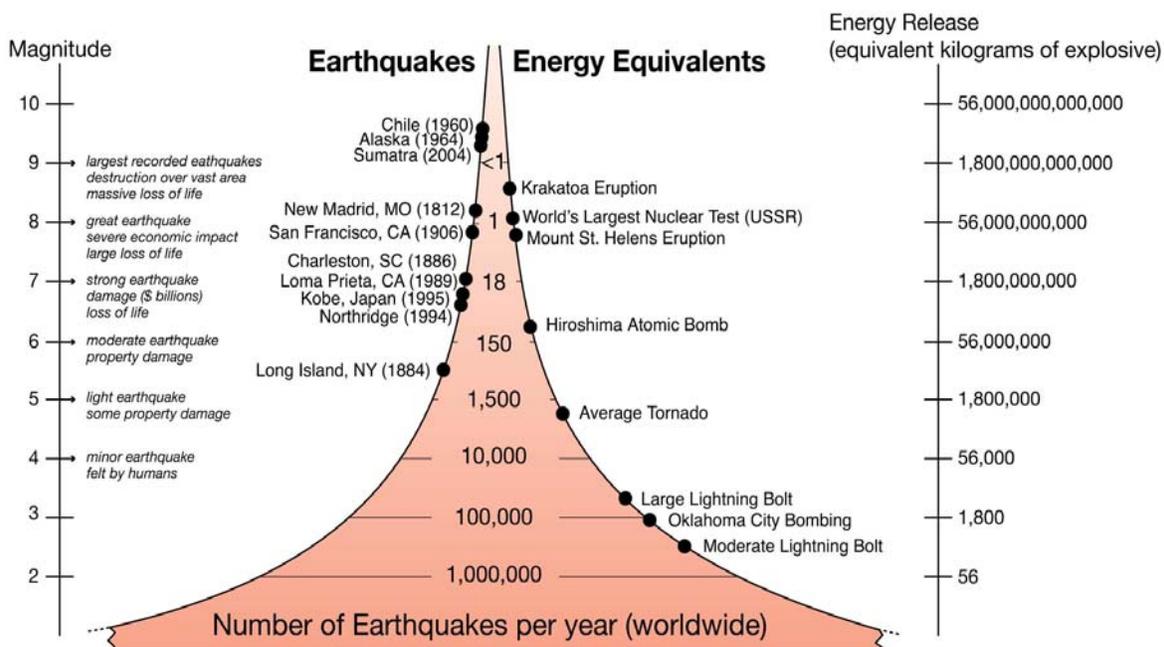
Atlantic. It accounts for about 17 percent of the world’s largest earthquakes, including those in Iran, Turkey and Pakistan. The third belt follows the submerged mid-Atlantic Ridge, the longest mountain range in the world, nearly splitting the entire Atlantic Ocean north to south.

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 50** 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 50
Approximate Number of Earthquakes Recorded Annually



Source: "How Often Do Earthquakes Occur?", Education and Outreach Series Guide No. 3, Incorporated Research Institutions for Seismology.

PROFILING THE HAZARD

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

The *Earthquakes of Illinois: 1795 – 2008 Map* prepared by the Illinois State Geological Survey indicates that one microquake originated in Douglas County sometime during the last 200 years although a date was not provided. This earthquake was small enough that it would not have caused any damage and probably was not felt by many people.

In more recent years, Douglas County has felt ground shaking caused by several earthquakes that have originated outside of the County. On April 18, 2008, a magnitude 5.2 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.

On June 10, 1987 another magnitude 5.2 earthquake was reported 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 5.3 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.

One of the most seismically active areas of the United States east of the Rockies occurs along the New Madrid seismic zone which lies within the central Mississippi Valley, extending from northeast Arkansas, through southeast Missouri, western Tennessee, western Kentucky and southern Illinois. Since 1974 more than 4,000 earthquakes have been recorded within this seismic zone, most of which were too small to be felt.

Two of the three largest earthquakes ever recorded within the continental United States took place along the New Madrid seismic zone in 1811 and 1812 with magnitudes of 8.1 and 8.0 respectively. These great earthquakes, centered near the town of New Madrid, Missouri, devastated 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. Houses throughout the region experienced varying degrees of damage, approximately 150,000 acres trees were snapped, split or uprooted and the town of New Madrid, Missouri was abandoned temporarily.

What locations are affected by earthquakes?

Earthquake events affect the entire County. Earthquakes, like drought and extreme heat, impact large areas, extending beyond county boundaries. Douglas County's proximity to two earthquake fault zones (the New Madrid and the Wabash Valley) makes all of it likely to be affected by a major earthquake. The *2007 Illinois Natural Hazard Mitigation Plan* classifies Douglas 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 Illinois State Geological Survey, 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 great 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 United States Geological Survey and the Center for Earthquake Research and Information 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 Douglas 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 Douglas 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 Douglas 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 on the Modified Mercalli Intensity Scale.

The infrequency of major earthquakes, coupled with relatively low magnitude/intensity past events, has led the public to perceive Douglas County is not vulnerable to damaging earthquakes. This perception has allowed the County and participating jurisdictions to develop largely without regard to earthquake safety.

What impacts resulted from the recorded earthquake events?

While residents of Douglas County 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 Douglas County felt those quakes; however historical records do not indicate the intensity or impacts that these quakes had on the County.

The risk or vulnerability to public health and safety from an earthquake is dependent on the intensity of the event. Since there are no known faults in Douglas 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 Douglas County residents will most likely originate from outside of 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/high.

What other impacts can result from earthquakes?

Earthquakes can impact human life, health and public safety. **Figure 51** details the potential impacts that may be experienced by the County should a magnitude 6.0 or greater earthquake occur in the region. If an earthquake similar to the 1811-1812 New Madrid earthquakes were to recur today, the effects would be devastating. The central Mississippi Valley is home to millions of people, including the populations of large cities, such as St. Louis and Memphis. There would be widespread loss of life and billions of dollars in property damage.

Figure 51 Potential Earthquake Impacts	
Direct	Indirect
<p><i>Buildings</i></p> <ul style="list-style-type: none"> • 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 <p><i>Transportation</i></p> <ul style="list-style-type: none"> • Damages to bridges (i.e., cracking of abutments, subsidence of piers/supports, etc.) • Cracks in the pavement of critical roadways • Increased traffic on I-55 (especially if the quake originates along the New Madrid fault) as residents move north 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 <p><i>Utilities</i></p> <ul style="list-style-type: none"> • 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 • Structural damage and disruption of service at the coal-fire power facility outside of Coffeen <p><i>Health</i></p> <ul style="list-style-type: none"> • Injuries/deaths due to falling debris and fires <p><i>Other</i></p> <ul style="list-style-type: none"> • Cracks in the earthen dams of the lakes and reservoirs within the County which could lead to dam failures 	<p><i>Health</i></p> <ul style="list-style-type: none"> • Emergency services (ambulance, fire, law enforcement) may be needed to provide aid in areas where damage was greater <p><i>Other</i></p> <ul style="list-style-type: none"> • Disruptions in land line telephone service throughout an entire region (i.e., southern Illinois) • Depending on the seasonal conditions present, more displacements may be expected as those who may have enough water and food supplies seek alternate shelter due to temperature extremes that make their current housing uninhabitable.

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

Yes. All existing buildings, infrastructure and critical facilities located in Douglas County and the participating jurisdictions 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.

Depending on the intensity of the earthquake, building damage in Douglas 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 four 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 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 high.

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

Yes. All future buildings, infrastructure and critical facilities located in Douglas County and the participating jurisdictions 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 Douglas County. Sufficient information was not available to make useful predictions regarding potential earthquake damage through the use of computer modeling. Since all structures within Douglas County are vulnerable to damage, it is likely that there will be future dollar losses from a strong earthquake.

3.8 DAM FAILURE

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 82,642 dams in the United States and Puerto Rico, with 1,463 dams located in Illinois. (The NID is maintained by the U.S. Army Corps of Engineers and is updated approximately every two years, with the last update occurring in 2007.) Ninety-five percent of the dams in Illinois 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. Dam failures can result from natural events such as earthquakes or landslides, human-induced events such as improper maintenance, or a combination of both. In the event of a dam failure, the people, property and infrastructure downstream could be subject to devastating damage.

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” failures and “sunny day” failures. A “flood” 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.

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 52** 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 52 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. Title 17: Conservation. Chapter I: Department of Natural Resources. Subchapter h: Water Resources. Part 3702: Construction and Maintenance of Dams. Section 3702.30 Applicability.

Are there any classified dams owned by any of the participating jurisdictions?

No. The only publicly-owned dam within Douglas County is the Walnut Point State Park Lake Dam which is owned by the Illinois Department of Natural Resources. This Class III earth dam was built in 1967 for recreation purposes.

Are there any privately-owned classified dams within Douglas County?

Yes. There are three privately-owned classified dams located within Douglas County. **Figure 53** provides a brief description of each dam.

Figure 53 Privately-Owned Classified Dams Located in Douglas County					
Name	Owner	Type	Purpose	Completion Date	Classification
Equistar Chemical Plant Lake Dam	Equistar Chemicals, LP	Earth	Fire Protection/Industrial Processes	1952	Class II
Zeigler/Murdock Slurry Pond 5 Dam	Zeigler Coal Company	Earth	Tailings	1984	Class II
Patterson Springs Lake Dam	Spring Lake Corp.	Earth	Recreation	1945	Class III

Sources: Illinois Department of Natural Resources, Office of Water Resources, Classified Dams in Douglas County, November 24, 2009.
 Miller, Danny. Equistar Chemicals, LP, A LyondellBasell Company. Telephone Interview with Greg Michaud regarding Equistar Chemical Plant Lake Dam. August 9, 2010.
 U.S. Army Corps of Engineers, National Inventory of Dams Interactive Report, Illinois, Douglas County, April 5, 2010.

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 Douglas County.

What locations are affected by dam failure?

Dam failures have the potential to affect unincorporated portions of Douglas County. If the Walnut Point State Park Lake Dam were to experience a dam failure, a small portion of northeastern Coles County may also be affected due to the dam's location near the southeastern border of the County. **Figure 54** shows the locations of the four publicly and privately-owned classified dams in Douglas County.

What is the probability of future dam failure events occurring?

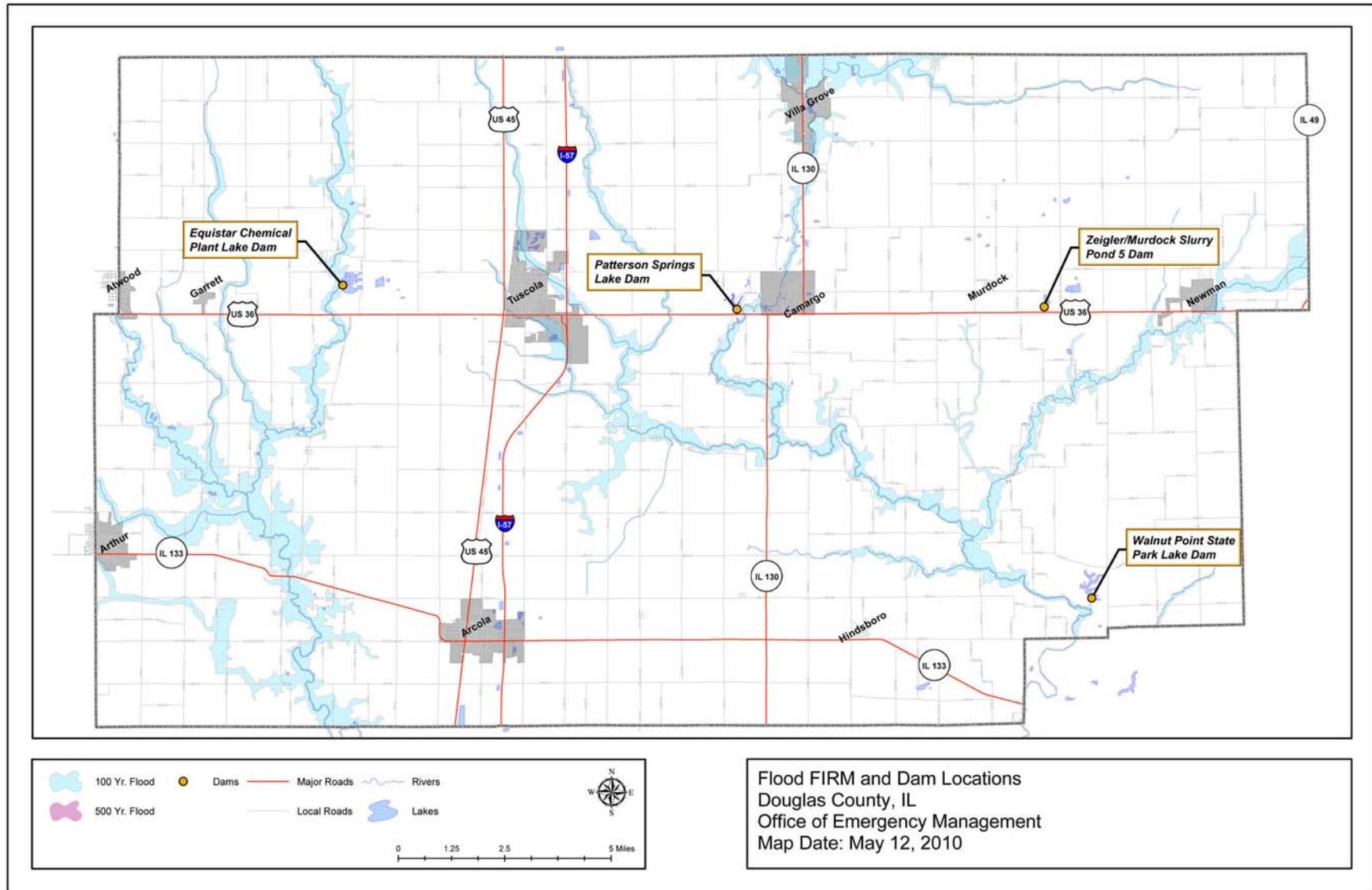
Since none of the dams have experienced a dam failure, it is difficult to specifically establish the probability of a future failure: however, it is estimated to be relatively low.

ASSESSING VULNERABILITY

Are the participating jurisdictions vulnerable to dam failures?

Yes and No. While portions of unincorporated Douglas County are vulnerable to the dangers presented by dam failures, none of the participating municipalities are vulnerable.

Figure 54
Locations of Publicly and Privately-Owned Classified Dams in Douglas County



Source: U.S. Army Corps of Engineers, National Inventory of Dams Interactive Report, Illinois, Douglas County, April 5, 2010.

What impacts resulted from the recorded dam failures?

Since there have been no recorded dam failures in Douglas County, there are no recorded impacts.

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 have their vehicles swept off the road and downstream. This is of particular concern since three of the dams are located just north of U.S. Route 36, the main east/west roadway through the County. Flooding of this roadway is also a major concern for emergency response personnel who would have to find alternative routes around any section of U.S. 36 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 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 be 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.

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 locations, size and classification of the dams located in Douglas County, the risk from a dam failure is low to medium.

Are existing buildings, infrastructure and critical facilities vulnerable to dam failures?

Yes. While Emergency Action Plans were not available for any of the classified dams, a visual inspection of the area surrounding these dams indicates that there are buildings, infrastructure and critical facilities that are vulnerable to dam failures. 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 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 critical facility.

In addition, to impacting structures, a dam failure has the ability to damage roads and utilities. This is a concern, especially since three of the dams are located just north of U.S. Route 36. 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 to buildings, infrastructure and critical facilities from a dam failure is relatively low since none of the dams would impact a great number of buildings.

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 one of the classified dams 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?

Since there have been no recorded dam failures in Douglas County, there is no information available on property damages. As a result, there is no way to accurately estimate future potential dollar losses to vulnerable structures from dam failures in Douglas County at this time.

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 Douglas County. The man-made hazards assessed in this Plan include:

- ❖ Hazardous Substances
- ❖ Hazardous Material Incidents
- ❖ Nuclear Accidents
- ❖ 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. There are two categories of hazardous substances described in this section: hazardous products and hazardous waste. For the purposes of this Plan, 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 defined as all other hazardous materials.

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.).

Since 1970, significant changes have occurred in regards to how hazardous substances are handled, stored, transported and disposed. Comprehensive regulations and improved safety and industrial hygiene practices have reduced the risks posed by hazardous substances. Based on the number of facilities in Douglas County that generate and use hazardous substances, the population size, transportation patterns, and land use, the probability of occurrence should remain relatively low compared to other counties in Illinois unless lapses in safety practices were to occur.

The following subsections identify the general pathways – generation, transportation, disposal and remediation – by which hazardous substances pose a risk to public health and the environment.

3.9.1.1 Hazardous Waste Generation

Douglas County has several sites that generate hazardous waste as a result of their operations according to the Illinois Environmental Protection Agency (IEPA). **Figure 55** identifies the hazardous waste generators located in Douglas County along with the type of hazardous waste generated (solid and/or liquid) and the amount.

Figure 55 Generators of Solid & Liquid Hazardous Waste in Douglas County – 2007		
Name	Hazardous Waste Generated	Amount Generated (Tonnage)
<i>Arthur</i>		
Carstin Brands	contaminated debris (rags, wood, etc.)	5.498
Masterbrand Cabinet Co.	paint, ink, lacquer or varnish fluid	70.919
<i>Tuscola</i>		
Cabot Corp.	caustic aqueous waste (pH > 12.5)	0.400
	contaminated debris (paper, rags, etc.)	122.670
	halogenated solvent mixture	0.025
	non-halogenated solvents	17.506
	mercury waste	0.025
	oil emulsion	0.600
	paint, ink, lacquer or varnish fluid	0.150
	sludges	1.750
	solid resins, plastics, polymerized organics	4.650
	spent acid	4.500
	still bottoms	0.425
	<i>Total:</i>	<i>152.701</i>
Equistar Chemicals LP – A LyondellBasell Company	concentrated acid	48.972
	liquid still bottoms	716.912
	paint or ink sludges	0.550
	<i>Total:</i>	<i>766.434</i>
TGC	organic solids	30.344
	other organic liquids	0.147
	paint, ink lacquer or varnish	0.160
	<i>Total:</i>	<i>30.651</i>
Tuscola Generating Facility	lead compounds	1.956
	mercury compounds	0.003
	<i>Total:</i>	<i>1.959</i>

Sources: Illinois Environmental Protection Agency, Bureau of Land, “Generators and Managers of Hazardous Waste in Illinois: 2007”, January 2009.

U.S. Environmental Protection Agency, TRI Explorer, Releases: Facility Report, Douglas County, Illinois, 2007.

In addition to the solid and liquid hazard wastes generated in Douglas County, there are also gaseous hazardous wastes that are generated and emitted into the atmosphere as a result of industrial processes and production activities. **Figure 56** identifies the hazardous air emissions generators located in Douglas County along with the type of hazardous emissions generated and the amount.

Figure 56 Generators of Hazardous Air Emissions in Douglas County – 2007		
Name	Hazardous Waste Generated	Amount Generated (Tonnage)
<i>Arthur</i>		
Carstin Brands	styrene	13.996
CHI Overhead Doors	Diisocyanates	0.125
<i>Tuscola</i>		
Cabot Corp.	chlorine	90.000
	hydrochloric acid	11.280
	<i>Total:</i>	<i>101.280</i>
Equistar Chemicals LP – A LyondellBasell Company	acetaldehyde	0.005
	ethylene	33.729
	methanol	1.882
	<i>Total:</i>	<i>35.616</i>
Tuscola Generating Facility	hydrochloric acid	137.000
	hydrogen fluoride	12.600
	lead compounds	0.069
	mercury compounds	0.009
	sulfuric acid	102.003
<i>Total:</i>	<i>251.681</i>	

Source: U.S. Environmental Protection Agency, TRI Explorer, Releases: Facility Report, Douglas County, Illinois, 2007.

On-site generation of hazardous waste at permitted sites in Douglas County has not presented ongoing problems for adjacent property owners. The facilities identified in this section are in compliance with state and federal environmental regulations and have no unresolved violations.

3.9.1.2 Transportation

Roadways

Interstate 57 and US Route 36 are major highways that carry traffic north, south, east and west throughout Douglas County and connect with Chicago and other larger population centers. 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 Douglas County from 2005 through 2009 were obtained from the IEPA and the Illinois Emergency Management Agency. There were four recorded accidents during this time period, all involving product. **Figure 57** provides information on these accidents.

Figure 57 Roadway Accidents involving Shipment of Hazardous Products in Douglas County: 2005 – 2009		
Date	Location	Hazardous Product Released
3/18/2005	US 36 & CR 1500 – Camargo	anhydrous ammonia
4/26/2005	I-57 – Tuscola	diesel fuel
5/20/2007	US 36 – Garrett	magnesium sulfate
8/1/2009	I-57 – Arcola	battery acid

Sources: Illinois Environmental Protection Agency, Office of Emergency Response, “FOIA Request for Douglas County HazMat Incidents between 2005 and 2009”, April 19, 2010.
 Illinois Emergency Management Agency, Freedom of Information Act, Hazardous Materials Incident Reports, Douglas County, 2005-2009.

Railways

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 58**.

Figure 58 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) from railroad equipment occurred, however no railroad derailment was involved

Source: Illinois Commerce Commission, “2009 Annual Report on Accidents/Incidents Involving Hazardous Materials on Railroads in Illinois”, April 2010.

Since 2000, there have been two Category C railway accidents involving hazardous substances in Douglas County, both occurring in Villa Grove. On June 29, 2004 vapors escaped from a tanker car carrying approximately 24,000 gallons of a flammable liquid due to loose manway bolts. Then on June 13, 2006 15 gallons of diesel fuel were released from an engine due to a loose bracket. In comparison, ICC records indicate that since 2000 the annual number of railway accidents in Illinois involving hazardous substances has ranged between 35 and 113. **Figure 59** provides a breakdown of the railway accidents that have occurred in Douglas County as well as Illinois.

Illinois’ rail system is the country’s second largest, with the Chicago and East St. Louis terminals being two of the nation’s busiest. 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 (AAR) estimates that approximately six percent of all rail traffic in the United States involves the movement of hazardous substances.

Figure 59 Railway Accidents/Incidents Involving Hazardous Substances: 2000 – 2009					
Year	Category	Accident/Incident Location			
		Illinois	Douglas County	Cook & Collar Counties	Downstate Illinois
2000	A	5	0	4	1
	B	6	0	1	5
	C	68	0	32	36
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	1	30	27
2005	A	11	0	2	9
	B	8	0	3	5
	C	57	0	29	28
2006	A	6	0	1	5
	B	12	0	6	6
	C	95	1	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

Sources: Illinois Commerce Commission, "2000-2009 Annual Reports on Accidents/Incidents Involving Hazardous Materials on Railroads in Illinois."

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 Douglas County, there are multiple pipelines carrying energy gases and petroleum liquids as well as several pipelines that carry liquid and gas products for industrial processes. There have been no recent pipeline incidents in Douglas County involving the release of any substances, liquid or gas.

However, 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.

3.9.1.3 Disposal

Solid Waste

Waste disposal has caused surface water and ground water contamination in Illinois and across the Nation. While recycling activity has increased during the past two decades, the majority of solid waste (waste generated in households) is disposed of in landfills. The 22nd Annual Landfill Capacity Report prepared by the IEPA indicates that Douglas County residents generated approximately 22,000 tons of solid waste during 2008. Of the approximately 22,000 tons, no more than 1 ton was recycled.

According to the Landfill Capacity Report, there are no landfills currently operating in Douglas County. The Multi County Landfill near Villa Grove operated in the latter half of the twentieth century is closed. Impacts to surface and ground water from solid waste disposal should not occur, unless a leak happens at a closed landfill.

Since there are no active landfills in Douglas County, all of the household solid waste generated is transported out of the County for disposal. There are currently eight landfills that serve the 19 county East-Central Region of Illinois that includes Douglas County. None of the eight landfills are close enough to Douglas County to pose a threat to County residents. At the present rate that solid waste is being generated, the IEPA estimates that there is sufficient capacity to meet waste disposal needs of this region for the next 30 years.

Hazardous Waste

There are currently no off-site hazardous waste disposal facilities located in Douglas County. The solid and liquid hazardous waste identified in **Figure 55** is either disposed of or stored at facilities outside of Douglas County.

However, one of the larger on-site hazardous waste disposal operations in Illinois is located in Douglas County. Cabot Corp., just west of Tuscola, operates an Underground Injection Well on-site where they dispose of hazardous waste generated as a result of their industrial processes. In 2007, the most recent reporting year available, they disposed of 457,952.752 tons of hazardous

waste via their Underground Injection Well. Records indicate that there are presently no violations at this on-site facility.

While not located in the County, another Underground Injection Well is being proposed as part of the FutureGen Project in Coles County, just to the south. The FutureGen Industrial Alliance has submitted an application for an Underground Injection Control permit from the IEPA. This permit application seeks approval to inject carbon dioxide into one or two injection wells located in a deep geological formation, the Mt. Simon Sandstone.

A public hearing had been scheduled for September 15, 2010, with the public comment period extending to October 15, 2010. A decision on this permit application will occur sometime after the close of the public comment period. The tonnage to be disposed of has yet to be determined. Notice was received on August 30, 2010 that the hearing and comment period had been cancelled. The status of the proposed Underground Injection Well is uncertain.

3.9.1.4 Remediation

Hazardous waste remediation in Illinois is primarily handled through two programs: the federal Superfund Program and the Illinois 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.

As mentioned previously, significant changes have occurred with how hazardous wastes are handled, stored, transported and disposed. Subsequently, the number of locations in Douglas County that may require remediation in the future should also be lower than the number of sites that have needed remediation during the past 30 years.

Superfund (CERCLA) Program

Since the advent of the national Superfund Program in 1981, there have been *no Superfund sites in Douglas County* among the 51 sites found in Illinois.

Illinois Site Remediation Program (non-Superfund)

Sites that do not qualify for the federal Superfund Program, but that pose a risk to public health and the environment because hazardous waste is present, are regulated through the Illinois Site Remediation Program (SRP). Since the mid-1980s, remediation activities have been conducted and monitored at these sites. When inspections and sampling results indicate that remediation objectives have been achieved, the IEPA issues a “No Further Remediation” 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.

Of the nearly 4,000 SRP sites found in Illinois, there are only eleven in Douglas County. According to the IEPA’s Remedial Project Management Section, no further remediation is required at any of these sites. **Figure 60** lists these eleven sites by the municipality they are in or near.

Figure 60 SRP Sites Located in Douglas County	
Municipality	Number of SRP Sites
Arcola	1
Arthur	1
Bourbon	1
Camargo	1
Newman	2
Tuscola	4
Villa Grove	1

Sources: Illinois Environmental Protection Agency, Site Remediation Program Database, Douglas County, June 6, 2010.
 Illinois Environmental Protection Agency, Site Response Action Program Database, Douglas County, June 6, 2010.

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 Douglas County there are 70 cases involving remediation of leaks and contaminated soil*** through this Program.

Thirty-nine sites have received “No Further Remediation” letters from the IEPA. Most 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. Only three sites have received a “high priority classification” but do not have a “No Further Remediation” letter.

3.9.2 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 61** provides information on the HazMat incidents recorded in Douglas County.

Between 2005 and 2009, there were 32 HazMat incidents recorded in Douglas County. Of the 32 incidents, only four involved roadway accidents where hazardous substances were being shipped. Many of the incidents recorded in Douglas County are similar to those reported in other rural counties in that they commonly involve agricultural chemical, fuel and oil. In 2009, eight HazMat incidents were recorded in Douglas County. In comparison, 1,162 incidents were recorded during that same time period for the entire state. A majority of these incidents occurred in Cook and the collar counties.

Figure 61 HazMat Incidents in Douglas County: 2005 – 2009		
Date	Location	Hazardous Substances Released
1/5/2005	Tuscola	ether , gasoline
2/15/2005	Arcola	gasoline
3/18/2005	Camargo	anhydrous ammonia*
4/26/2005	Tuscola	diesel fuel*
10/24/2005	Tuscola	diesel fuel
6/9/2006	Atwood	diesel fuel
6/20/2006	Tuscola	leachate, hydrochloric acid
7/28/2006	Villa Grove	gasoline
7/29/2006	Tuscola	hydraulic fluid
9/6/2006	Tuscola	hydrochloric acid
9/24/2006	Tuscola	hydrochloric acid
1/18/2007	Tuscola	ethyl ether, ethylene
1/20/2007	Tuscola	gasoline
2/1/2007	Tuscola	gasoline, diesel fuel
2/22/2007	Tuscola	leachate
5/20/2007	Garrett	magnesium sulfate*
8/7/2007	Villa Grove	oil
8/14/2007	Tuscola	leachate
8/31/2007	Villa Grove	diesel fuel
2/7/2008	Tuscola	leachate
4/21/2008	Tuscola	leachate
8/5/2008	Tuscola	hydrochloric acid
11/13/2008	Tuscola	ethyl ether
12/28/2008	Arcola	unknown substance (caused fire)
6/19/2009	Villa Grove	petroleum
6/26/2009	Tuscola	oil
8/1/2009	Arcola	battery acid*
8/24/2009	Tuscola	diesel fuel
9/9/2009	Newman	gasoline
10/15/2009	Arthur	gasoline
10/28/2009	Tuscola	diesel fuel
11/17/2009	Tuscola	leachate

* Incident involved the shipment of a hazardous substance. For a detailed discussion on transportation of hazardous substances, see Section 3.9.1 – Transportation.

Sources: Illinois Environmental Protection Agency, Office of Emergency Response, “FOIA Request for Douglas County HazMat Incidents between 2005 and 2009”, April 19, 2010.
Illinois Emergency Management Agency, Freedom of Information Act, Hazardous Materials Incident Reports, Douglas County, 2005-2009.

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 Douglas County, two injuries requiring hospitalization were reported as the result of separate HazMat incidents between 2005 and 2009. In addition, on December 28, 2008 a trailer park in

Arcola was evacuated as a precautionary measure after a fire occurred on an adjacent property involving an unknown substance. None of the recorded incidents caused severe, widespread damages.

Based on the recorded incidents, Douglas County experienced an average of six HazMat incidents annually. Based on the use of hazardous substances in agribusiness, the number of facilities that handle hazardous substances within the County, and the transportation of hazardous substances via roadways, pipeline and railways, HazMat incidents are likely to continue taking place. Although these incidents should not be 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.

3.9.3 Nuclear Accidents

The term “nuclear accident” is used in this Plan to refer to the release of significant levels of radioactive material or exposure of the general public to radiation. This section does not address the intentional or malicious release of radioactive materials as a result of a terrorism activity. Exposure to dangerous levels of radiation can have varying health effects on people and animals. Impacts range from minor health issues to fatal illnesses. In Douglas County, exposure to radioactive material/radiation from a nuclear accident could occur:

- via the Clinton Nuclear Power Facility located in DeWitt County or
- as spent nuclear fuel rods are being transported by railway through the County.

There have been no nuclear accidents, and therefore no injuries or damages, associated with either the Clinton Nuclear Power Facility or the transportation of spent nuclear fuel rods through Douglas County.

3.9.3.1 Clinton Nuclear Power Facility

Commercial nuclear facilities constructed in the United States should withstand most natural hazards such as tornadoes and severe storms that frequently occur in Illinois. Nonetheless, the Illinois Emergency Management Agency has developed a Radiological Emergency Response Plan in cooperation with other state and local governments that outlines the steps that would need to be taken in the event that an accidental release occurs at a nuclear facility. The consequences associated with a release at any nuclear power facility would depend on the nature of the accident and the prevailing weather conditions. An Emergency Planning Zone (EPZ) around each nuclear facility is assessed to estimate potential damages to the public and critical infrastructure. EPZ's typically include a 10-mile Critical Risk Zone and a 50-mile Ingestion Pathway Zone. Ingestion refers to radiation that might enter a person's body.

No part of Douglas County is located within the Critical Risk Zone of the Clinton Nuclear Power Facility. Even if the Critical Risk Zone were to be extended to 30 miles, no municipality in Douglas County would be within this zone. The northwest corner of the Douglas County line is, however, 28.3 miles from the Clinton Facility. As a result, a portion of the 50-mile Ingestion

Pathway Zone would cross the Douglas County line. All of the municipalities participating in this planning process, with the exception of Newman, are located within this Ingestion Pathways Zone.

The Clinton Nuclear Power Facility, which began service in 1987, has not had any incidents that have impacted Douglas County. The probability of an incident causing off-site impacts appears low.

3.9.3.2 Transportation of Spent Nuclear Fuel Rods by Railway

The protocol for moving spent nuclear fuel rods from nuclear power plants requires that the train be stopped and inspected before moving through Illinois and that it be escorted as it moves through the State. Inspection of the track ahead of the train is also required to reduce the risk of derailment.

While movement of nuclear material has been minimal as the Nation grapples with the issue of developing national or regional repositories, more rail movement is anticipated eventually. According to the Illinois Commerce Commission, there has never been a railway transportation accident resulting in the release of radioactive material; however, widespread concern remains regarding its safe transportation.

3.9.4 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 aimed 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 Terrorism¹. 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 numerous injuries.

¹ The National Consortium for the Study of Terrorism and Responses to Terrorism (START) is based at the University of Maryland and is a U.S. Department of Homeland Security Center of Excellence. The Consortium works to understand the origin, dynamics, and consequences of terrorism.

In Douglas County, an act of domestic terrorism occurred on January 9, 1996, when two juveniles attempted to destroy business records at the Douglas County Courthouse. A Molotov cocktail was thrown through a courthouse window to ignite a fire. Approximately \$337,000 in damages occurred from the fire.

A more recent event occurred in nearby Sangamon County on September 24, 2009, when an attempt to blow-up the Federal Courthouse in Springfield was thwarted by the Federal Bureau of Investigation (FBI). In this event, a single individual from Macon County sought like-minded individuals to carry out his anger at the federal government.

It is impossible to predict with any reasonable degree of accuracy how many terrorism events might be expected to occur in Douglas County or elsewhere in Illinois. 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 and man-made 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 and man-made 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 and man-made 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 October 8, 2009 meeting. Members were asked to review the list before the next meeting and consider whether any changes needed to be made or if additional goals should be included. At the Planning Committee’s November 12, 2009 meeting, the group discussed the preliminary list of hazard mitigation goals and approved them with no changes or additions. **Figure 62** identifies the eight hazard mitigation goals approved by the Planning Committee.

Figure 62 Hazard Mitigation Goals	
Goal 1	Educate people about the (natural and man-made) hazards 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 rivers 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 for the County and all of the participating municipalities were asked to pay special attention to identifying mitigation actions that ensure their continued compliance with the National Flood Insurance Program.

The compiled lists were reviewed to assure the appropriateness and suitability of each mitigation action. 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 63** identifies each category and provides a brief description.

Figure 63 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 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(s) is 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 64** identifies and describes the four-tiered prioritization method adopted by the Committee. The method 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 64			
Mitigation Action Prioritization Methodology			
		Hazard	
		Most Significant Hazard (M) <small>(i.e., severe storms, tornadoes, severe winter storms, floods)</small>	Less Significant Hazard (L) <small>(i.e., extreme heat, drought, earthquakes, dam failures)</small>
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 previously, 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 eliminate or reduce 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 65 through **72** summarize the results of the mitigation strategy. The mitigation actions identified by the County and each participating municipality are ordered by prioritization category.

**Figure 65
Douglas 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				
Douglas County – General												
HM	Build separate storm shelter structure with space for records storage to serve the Douglas County Courthouse.	F, SS, T	SP	Eliminates	Small	2, 3, 5, 8	Yes	NA	Douglas County	3 years	75% Federal 25% Local	Medium/High
HL	Retrofit the Douglas County Courthouse against seismic damage.	EQ	SP	Eliminates	Small	2, 3, 5, 8	NA	Yes	Douglas County	3 years	75% Federal 25% Local	Medium/High
HL	Retrofit the Douglas County Jail against seismic damage.	EQ	SP	Eliminates	Small	2, 3, 5	NA	Yes	Douglas County	3 years	75% Federal 25% Local	Medium/High
HM	Purchase emergency backup generator for the Douglas County Courthouse.	EQ, F, SS, SWS, T	MP	Eliminates	Small	2, 3, 5, 8	NA	Yes	Douglas County	2 years	TBD	Low/High
Douglas County EMA												
HM	Construct Emergency Operation Center.	DF, EH, EQ, F, SS, SWS, T	SP	Reduces	Large	2, 3, 5	Yes	NA	Douglas County EMA	3 years	75% Federal 25% Local	High/High
HM	Add weather warning component from National Weather Service to Douglas County Code Red automated emergency notification system.	DF, EH, F, SS, SWS, T	MP	Reduces	Large	2	NA	NA	Douglas County EMA	1 year	TBD	Medium/High
LM	Review and present for adoption the revised Flood Insurance Rate Maps when they become available.*	F	RA	Reduces	Small	6, 7	Yes	Yes	Douglas County EMA	TBD	County	Low/Medium
LM	Make the most recent Flood Insurance Rate Maps available at the County Clerk/Recorder's office to assist the public in considering where to construct new buildings and make County Officials aware of these maps and issues related to construction in a floodplain.*	F	RA	Reduces	Small	1, 6, 7	Yes	Yes	Douglas County EMA	TBD	County	Low/Medium

* 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 65
Douglas County Hazard Mitigation Actions Continued...**

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				
Douglas County EMA Continued...												
LM	Make information materials available to the public about the National Flood Insurance Program's voluntary Community Rating System.*	F	PP	Reduces	Small	1, 6, 7	Yes	Yes	Douglas County EMA	TBD	County	Low/Medium
Douglas County Highway Department												
HM	Obtain new high resolution orthographic photography of the entire County to include LIDAR Topographic (1 foot contour) DEM for flood analysis.	F	MP	Reduces	Large	2, 3, 5, 7	Yes	Yes	Douglas County Highway Department	TBD	TBD	Medium/High
HM	Upon obtaining new high resolution orthographic photograph, perform floodway delineation analysis of all the waterways, streams and rivers in the County. This study would determine which bridges/drainage structures need to be replaced to lower flooding impact; identify streams for dredging operations; and enable EMA officials to plan and prepare for future flooding events.	F	S	Reduces	Large	2, 3, 5, 7	Yes	Yes	Douglas County Highway Department	TBD	75% Federal 25% Local	Medium/High
HM	Replace structure 021-4512 (Bourbon Township/north side of Chesterville) to increase capacity.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Douglas County Highway Department	TBD	TBD	High/High
HM	Remove existing railroad trestle on abandoned rail line (north side of Chesterville) to eliminate debris bottleneck on Kaskaskia River.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Douglas County Highway Department	TBD	TBD	High/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 65
Douglas County Hazard Mitigation Actions Continued...**

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				
Douglas County Highway Department Continued...												
HM	Replace existing inadequate drainage structures on 550E and 300 N in Bourbon Township to greatly reduce flood impacts on this highly developed rural area.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Douglas County Highway Department	TBD	TBD	Medium/High
LM	Conduct drainage study to determine the required drainage capacity needed for all drainage structures along the Canadian National rail line. The current structures are grossly undersized and create significant flooding issues on public roadways and private property.	F, SS, SWS	S	Reduces	Large	2, 3, 5	Yes	Yes	Douglas County Highway Department	TBD	TBD	Medium/High
HM	Replace all undersized drainage structures along the Canadian National rail line.	F, SS, SWS	SP	Reduces	Large	2, 3, 5	Yes	Yes	Douglas County Highway Department	TBD	TBD	Medium/High
HM	Reconstruct CR 100 N from 340 E to 425 E to raise roadway out of the 100 year floodplain. This roadway services several residents and is closed during almost every flooding event, regardless of magnitude.	F, SS, SWS	SP	Eliminates	Medium	2, 3, 5	NA	Yes	Douglas County Highway Department	TBD	TBD	High/High
HM	Replace structure 021-4704 (Bowdre Township) to meet current design standards and provide additional flow capacity.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Douglas County Highway Department	TBD	TBD	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

**Figure 65
Douglas County Hazard Mitigation Actions Continued...**

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				
Douglas County Highway Department Continued...												
HM	Roadway Reconstruction & Bridge Replacement: Reconstruct 750 N (Sargent Township) from structure 021-4801 to approximately 2275 E to raise roadway out of the 100 year floodplain and replace structure 021-4801 to meet current design standards and provide additional flow capacity. This roadway services several residents and is closed during almost every flooding event, regardless of magnitude.	F, SS, SWS	SP	Eliminates	Medium	2, 3, 5	NA	Yes	Douglas County Highway Department	TBD	TBD	High/High
HM	Drainage Improvement/Drainage Structure Replacement: Replace existing box culvert on CH-9 (Arcola Township) with a structure that has adequate drainage capacity. Install a new storm sewer system and construct a drainage ditch that would allow for flood events to drain in an acceptable manner. This area is prone to flooding that impacts public roadways and private property.	F, SS, SWS	SP	Reduces	Large	2, 3, 5	Yes	Yes	Douglas County Highway Department	TBD	TBD	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

Figure 65

Douglas County Hazard Mitigation Actions Continued...

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				
Douglas County Highway Department Continued...												
HM	Drainage Improvement/Drainage Structure Replacement: Replace existing box culvert on CH-12 & 300 N (Bourbon Township) with a structure that has adequate drainage capacity. Install a new storm sewer system and construct a drainage ditch that would allow for flood events to drain in an acceptable manner. This area is prone to flooding that impacts public roadways and private property.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Douglas County Highway Department	TBD	TBD	High/High
Arcola Township Highway Department												
LM	Conduct hydraulic study to determine the cause of the recurring drainage problems in Arcola Township.	F, SS, SWS	S	Reduces	Small	2, 3, 5	Yes	Yes	Douglas County Highway Department / Arcola Township	Ongoing	TBD	Medium/High
HM	Select, design and construct the appropriate drainage remedy to alleviate recurring drainage problems in Arcola Township.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Douglas County Highway Department / Arcola Township	Ongoing	TBD	Medium/High
HM	Clean out brush and debris from creeks in Arcola Township.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Douglas County Highway Department / Arcola Township	Ongoing	Township	Low/High
HM	Clean out brush and debris from water ways, drainage ditches, swales and culverts in Arcola Township.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Douglas County Highway Department / Arcola Township	Ongoing	Township	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 65
Douglas County Hazard Mitigation Actions Continued...**

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				
Bourbon Township Highway Department												
LM	Conduct hydraulic study to determine the cause of the recurring drainage problems in Bourbon Township.	F, SS, SWS	S	Reduces	Small	2, 3, 5	Yes	Yes	Douglas County Highway Department / Bourbon Township	Ongoing	TBD	Medium/High
HM	Select, design and construct the appropriate drainage remedy to alleviate recurring drainage problems in Bourbon Township.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Douglas County Highway Department / Bourbon Township	Ongoing	TBD	Medium/High
HM	Clean out brush and debris from rivers and creeks in Bourbon Township.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Douglas County Highway Department / Bourbon Township	Ongoing	Township	Low/High
HM	Clean out brush and debris from water ways, drainage ditches, swales and culverts in Bourbon Township.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Douglas County Highway Department / Bourbon Township	Ongoing	Township	Low/High
Bowdre Township Highway Department												
LM	Conduct hydraulic study to determine the cause of the recurring drainage problems in Bowdre Township.	F, SS, SWS	S	Reduces	Small	2, 3, 5	Yes	Yes	Douglas County Highway Department / Bowdre Township	Ongoing	TBD	Medium/High
HM	Select, design and construct the appropriate drainage remedy to alleviate recurring drainage problems in Bowdre Township.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Douglas County Highway Department / Bowdre Township	Ongoing	TBD	Medium/High
HM	Clean out brush and debris from rivers and creeks in Bowdre Township.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Douglas County Highway Department / Bowdre Township	Ongoing	Township	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 65
Douglas County Hazard Mitigation Actions Continued...**

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				
Bowdre Township Highway Department Continued...												
HM	Clean out brush and debris from water ways, drainage ditches, swales and culverts in Bowdre Township.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Douglas County Highway Department / Bowdre Township	Ongoing	Township	Low/High
Camargo Township Highway Department												
LM	Conduct hydraulic study to determine the cause of the recurring drainage problems in Camargo Township.	F, SS, SWS	S	Reduces	Medium	2, 3, 5	Yes	Yes	Douglas County Highway Department / Camargo Township	Ongoing	TBD	Medium/High
HM	Select, design and construct the appropriate drainage remedy to alleviate recurring drainage problems in Camargo Township.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Douglas County Highway Department / Camargo Township	Ongoing	TBD	Medium/High
HM	Tile along 1450 N in Camargo Township to alleviate drainage problems.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Douglas County Highway Department / Camargo Township	TBD	TBD	Medium/High
HM	Upsize culvert lines at Lakewood Ct. in Camargo Township to increase capacity.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Douglas County Highway Department / Camargo Township	TBD	TBD	Medium/High
HM	Replace existing culvert with a box culvert below Patterson Dam in Camargo Township to increase capacity.	F, SS, SWS	SP	Eliminates	Medium	2, 3, 5	Yes	Yes	Douglas County Highway Department / Camargo Township	TBD	TBD	Medium/High
HM	Replace existing culvert with a box culvert at 1000 N in Camargo Township to increase capacity.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Douglas County Highway Department / Camargo Township	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 65
Douglas County Hazard Mitigation Actions Continued...**

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				
Camargo Township Highway Department Continued...												
HM	Resurface Villa Grove/Hays Road in Camargo Township to provide an alternate route out of the area during flooding.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Douglas County Highway Department / Camargo Township	TBD	TBD	Medium/High
HM	Resurface 1700 E in Camargo Township to provide an alternate route out of the area during flooding.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Douglas County Highway Department / Camargo Township	TBD	TBD	Medium/High
HM	Clean out brush and debris from creeks in Camargo Township.	F, SS, SWS	MP	Reduces	Medium	2, 3, 5	Yes	Yes	Douglas County Highway Department / Camargo Township	Ongoing	Township	Low/High
HM	Clean out brush and debris from water ways, drainage ditches, swales and culverts in Camargo Township.	F, SS, SWS	MP	Reduces	Medium	2, 3, 5	Yes	Yes	Douglas County Highway Department / Camargo Township	Ongoing	Township	Low/High
Garrett Township Highway Department												
LM	Conduct hydraulic study to determine the cause of the recurring drainage problems in Garrett Township.	F, SS, SWS	S	Reduces	Small	2, 3, 5	Yes	Yes	Douglas County Highway Department / Garrett Township	Ongoing	TBD	Medium/High
HM	Select, design and construct the appropriate drainage remedy to alleviate recurring drainage problems in Garrett Township.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Douglas County Highway Department / Garrett Township	Ongoing	TBD	Medium/High
HM	Clean out brush and debris from rivers and creeks in Garrett Township.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Douglas County Highway Department / Garrett Township	Ongoing	Township	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 65
Douglas County Hazard Mitigation Actions Continued...**

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				
Garrett Township Highway Department Continued...												
HM	Clean out brush and debris from water ways, drainage ditches, swales and culverts in Garrett Township.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Douglas County Highway Department / Garrett Township	Ongoing	Township	Low/High
Murdock Township Highway Department												
LM	Conduct hydraulic study to determine the cause of the recurring drainage problems in Murdock Township.	F, SS, SWS	S	Reduces	Small	2, 3, 5	Yes	Yes	Douglas County Highway Department / Murdock Township	Ongoing	TBD	Medium/High
HM	Select, design and construct the appropriate drainage remedy to alleviate recurring drainage problems in Murdock Township.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Douglas County Highway Department / Murdock Township	Ongoing	TBD	Medium/High
HM	Clean out brush and debris from rivers and creeks in Murdock Township.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Douglas County Highway Department / Murdock Township	Ongoing	Township	Low/High
HM	Clean out brush and debris from water ways, drainage ditches, swales and culverts in Murdock Township.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Douglas County Highway Department / Murdock Township	Ongoing	Township	Low/High
Newman Township Highway Department												
HM	Replace undersized culverts at 1150 N in Newman Township to increase capacity.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Douglas County Highway Department / Newman Township	TBD	TBD	Medium/High
HM	Tile 1150 N in Newman Township to drain water that ponds on the roadway.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Douglas County Highway Department / Newman Township	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 65
Douglas County Hazard Mitigation Actions Continued...**

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				
Newman Township Highway Department Continued...												
LM	Conduct hydraulic study to determine the cause of recurring drainage problems within Newman Township.	F, SS, SWS	S	Reduces	Medium	2, 3, 5	Yes	Yes	Douglas County Highway Department / Newman Township	Ongoing	TBD	Medium/High
HM	Select, design and construct the appropriate drainage remedy to alleviate recurring drainage problems within Newman Township.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Douglas County Highway Department / Newman Township	Ongoing	TBD	Medium/High
HM	Replace/resize existing box culvert at 1425 N in Newman Township to increase capacity and reduce roadway flooding.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Douglas County Highway Department / Newman Township	TBD	TBD	Medium/High
HM	Clean out water ways downstream from 1425 N in Newman Township to reduce roadway flooding.	F, SS, SWS	MP	Reduces	Medium	2, 3, 5	Yes	Yes	Douglas County Highway Department / Newman Township	Ongoing	Township	Low/High
Sargent Township Highway Department												
LM	Conduct hydraulic study to determine the cause of the recurring drainage problems in Sargent Township.	F, SS, SWS	S	Reduces	Small	2, 3, 5	Yes	Yes	Douglas County Highway Department / Sargent Township	Ongoing	TBD	Medium/High
HM	Select, design and construct the appropriate drainage remedy to alleviate recurring drainage problems in Sargent Township.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Douglas County Highway Department / Sargent Township	Ongoing	TBD	Medium/High
HM	Clean out brush and debris from creeks in Sargent Township.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Douglas County Highway Department / Sargent Township	Ongoing	Township	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 65
Douglas County Hazard Mitigation Actions Continued...**

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				
Sargent Township Highway Department Continued...												
HM	Clean out brush and debris from water ways, drainage ditches, swales and culverts in Sargent Township.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Douglas County Highway Department / Sargent Township	Ongoing	Township	Low/High
Tuscola Township Highway Department												
LM	Conduct hydraulic study to determine the cause of recurring drainage problems in Tuscola Township.	F, SS, SWS	S	Reduces	Large	2, 3, 5	Yes	Yes	Douglas County Highway Department / Tuscola Township	Ongoing	TBD	Medium/High
HM	Select, design and construct the appropriate drainage remedy to alleviate recurring drainage problems in Tuscola Township.	F, SS, SWS	SP	Reduces	Large	2, 3, 5	Yes	Yes	Douglas County Highway Department / Tuscola Township	Ongoing	TBD	Medium/High
HM	Construct catch basins to drain trapped water in Tuscola Township.	F, SS, SWS	SP	Reduces	Large	2, 3, 5	Yes	Yes	Douglas County Highway Department / Tuscola Township	TBD	TBD	Medium/High
HM	Reshape and vegetate water ways in Tuscola township to reduce sedimentation and provide erosion control.	F, SS, SWS	MP	Reduces	Large	2, 3, 5	Yes	Yes	Douglas County Highway Department / Tuscola Township	TBD	TBD	Medium/High
HM	Improve curb and gutter in Hillcrest Subdivision and add additional catch basins to improve drainage in Tuscola Township.	F, SS, SWS	SP	Eliminates	Large	2, 3, 5	Yes	Yes	Douglas County Highway Department / Tuscola Township	TBD	TBD	Medium/High
HM	Replace undersized storm tile to alleviate flooding in the North Prairie Acres Subdivision in Tuscola Township.	F, SS, SWS	SP	Eliminates	Large	2, 3, 5	Yes	Yes	Douglas County Highway Department / Tuscola Township	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 65
Douglas County Hazard Mitigation Actions Continued...**

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				
Tuscola Township Highway Department Continued...												
HM	Clean out brush and debris from drainage ditches, swales and culverts in Tuscola Township.	F, SS, SWS	MP	Reduces	Large	2, 3, 5	Yes	Yes	Douglas County Highway Department / Tuscola Township	Ongoing	Township	Low/High
HM	Clean out brush and debris from creeks in Tuscola Township.	F, SS, SWS	MP	Reduces	Large	2, 3, 5	Yes	Yes	Douglas County Highway Department / Tuscola Township	Ongoing	Township	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 66
Arcola 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 hydraulic study of the "Industrial Park" area, including the area between I-57 and Egyptian Trail Road north of Illinois Route 133.	F, SS, SWS	S	Reduces	Small	2, 3, 4, 5	Yes	Yes	City	TBD	75% Federal 25% Local	Medium/High
LM	Conduct hydraulic study of the area north of Front Street between Elm and Locust Streets.	F, SS, SWS	S	Reduces	Small	2, 3, 4, 5	Yes	Yes	City	TBD	75% Federal 25% Local	Medium/High
HM	Replacement of Main Street storm sewer and the network of arteries that feed into this site.	F, SS, SWS	SP	Reduces	Large	2, 3, 5	NA	Yes	City	TBD	75% Federal 25% Local	High/High
HM	Install additional weather sirens on the north and south sides of Arcola within the city limits.	T, SS	MP	Reduces	Large	2, 3, 5	NA	NA	City	TBD	TBD	Medium/High
HM	Install an emergency backup generator at the Arcola Center to serve as an emergency shelter location in the aftermath of a hazard event.	EQ, F, SS, SWS, T	MP	Eliminates	Large	2, 3, 5	NA	Yes	City	TBD	75% Federal 25% Local	Low/High
HM	Install an emergency backup generator at Arcola City Hall to provide emergency power for the Arcola Police Department, City Hall and Arcola Fire Station No. 1.	EQ, F, SS, SWS, T	MP	Eliminates	Large	2, 3, 5	NA	Yes	City	TBD	75% Federal 25% Local	Low/High
HM	Install an emergency backup generator at the Arcola Water Treatment Plant.	EQ, F, SS, SWS, T	MP	Eliminates	Large	2, 3, 5	NA	Yes	City	TBD	75% Federal 25% Local	Low/High
HM	Expand storm sewer network for the Arcola Avenue area south of Illinois Route 133.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	City	TBD	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

**Figure 66
Arcola Hazard Mitigation Actions Continued...**

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	Bury electric utility service lines to limit service disruptions during natural hazard events.	SS, SWS, T	MP	Reduces	Large	2, 3, 5	Yes	Yes	City	TBD	TBD	Medium/High
LM	Upgrade culvert at Illinois Route 133 and Egyptian Trail Road to provide increased flow for storm runoff.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	City	TBD	75% Federal 25% Local	Low/Medium
LM	Replace drainage district tile on the northeast side of Arcola.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	City	TBD	TBD	Medium/Medium
LM	Clean out brush and debris from drainage swales and culverts flowing adjacent to and under US Route 45 and the Illinois Central Railroad (now Canadian National) right of way.	F, SS, SWS	MP	Reduces	Medium	2, 3, 5	Yes	Yes	City	TBD	TBD	Low/High
LM	Review and present for adoption the revised Flood Insurance Rate Maps when they become available.*	F	RA	Reduces	Large	6, 7	Yes	Yes	City	TBD	City	Low/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 and make City Officials aware of these maps and issues related to construction in a floodplain.*	F	RA	Reduces	Large	1, 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	Large	1, 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 e	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 67
Arthur 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 new Palmer Street bridge to alleviate flooding issues.	F, SS	SP	Reduces	Large	2, 3, 5, 6	Yes	Yes	Village Board	6 months	75% Federal 25% Local	High/High
HM	Replace storm sewer lines at Illinois Street between the 700 and 800 blocks.	F, SS, SWS	SP	Reduces	Large	2, 3, 5	NA	Yes	Village Board	6 months	75% Federal 25% Local	Medium/Medium
HM	Replace storm sewer lines in Parkview addition.	F, SS, SWS	SP	Reduces	Large	2, 3, 5	NA	Yes	Village Board	6 months	75% Federal 25% Local	Medium/Medium
HM	Replace storm sewer lines at Cedar Lane and Columbia.	F, SS, SWS	SP	Reduces	Large	2, 3, 5	NA	Yes	Village Board	6 months	75% Federal 25% Local	Medium/Medium
HM	Replace storm sewer lines at Orchard and Columbia.	F, SS, SWS	SP	Reduces	Large	2, 3, 5	NA	Yes	Village Board	6 months	75% Federal 25% Local	Medium/Medium
HM	Replace storm sewer lines at Forest Lane and Columbia.	F, SS, SWS	SP	Reduces	Large	2, 3, 5	NA	Yes	Village Board	6 months	75% Federal 25% Local	Medium/Medium
HM	Purchase emergency backup generator to assist in pumping flood waters out of the village offices.	F, SS	MP	Eliminates	Large	2, 3, 5	NA	Yes	Village Board	6 month	TBD	Low/High
HM	Establish emergency response center at fire station.	DF, EH, EQ, F, SS, SWS, T	MP	Reduces	Large	2	NA	NA	Village Board	2 years	Village	Low/High
HM	Replace Poplar Street sewer main.	F, SS	SP	Eliminates	Small	2, 3, 5	NA	Yes	Village Board	TBD	75% Federal 25% Local	Medium/Medium
HM	Conduct maintenance/clean out Morning Side sewer main.	F, SS	MP	Reduces	Small	2, 3, 5	NA	Yes	Village Board	TBD	Village	Low/High
HM	Conduct maintenance/clean out Arthur Nursing Home sewer main.	F, SS	MP	Reduces	Small	2, 3, 5	NA	Yes	Village Board	TBD	Village	Low/High
HM	Construct new retention pond near Union Pacific railroad bridge.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Village Board	2 years	75% Federal 25% Local	High/High
HM	Construct new retention pond on northwest side of town.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Village Board	4 years	75% Federal 25% Local	High/High
HM	Purchase emergency backup generator to power village drinking water wells during power outages.	EQ, F, SS, SWS, T	MP	Eliminates	Large	2, 3, 5	NA	Yes	Village Board	1 year	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 67
Arthur Hazard Mitigation Actions Continued...**

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	Purchase motorized boat to access drinking water well housings during flooding events.	F, SS	MP	Reduces	Large	2, 3, 5	NA	Yes	Village Board	1 year	TBD	Low/Medium
LM	Secure agreement with West Prairie Corp. Water Supply to provide backup drinking water supply when disruptions occur at the Arthur Public Water Supply.	DR, F	RA	Reduces	Large	2, 3, 5	NA	NA	Village Board	1 year	Village Board	Low/High
HM	Construct service line from West Prairie Corp. Water Supply to the Arthur Public Water Supply to provide a backup drinking water supply for Arthur.	DR, F	SP	Eliminates	Large	2, 3, 5	NA	Yes	Village Board	1 year	75% Federal 25% Local	Medium/High
LM	Review and present for adoption the revised Flood Insurance Rate Maps when they become available.*	F	RA	Reduces	Large	6, 7	Yes	Yes	Village Board	TBD	Village Board	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 and make Village Officials aware of these maps and issues related to construction in a floodplain.*	F	RA	Reduces	Large	1, 6, 7	Yes	Yes	Village Board	TBD	Village Board	Low/High
LM	Make information materials available to the public about the National Flood Insurance Program's voluntary Community Rating System.*	F	PP	Reduces	Large	1, 6, 7	Yes	Yes	Village Board	TBD	Village Board	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 68
Atwood 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 storm sewer study.	F, SS, SWS	S	Reduces	Large	2, 3, 5	Yes	Yes	Village Board	2 years	75% Federal 25% Local	Medium/High
HM	Update storm sewer system.	F, SS, SWS	SP	Reduces	Large	2, 3, 5	Yes	Yes	Village Board	2 years	75% Federal 25% Local	High/High
HM	Replace storm warning sirens.	SS, T	MP	Reduces	Large	2, 3, 5	NA	NA	Village Board	TBD	TBD	Medium/High
LM	Review and present for adoption the revised Flood Insurance Rate Maps when they become available.*	F	RA	Reduces	Large	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 and make Village Officials aware of these maps and issues related to construction in a floodplain.*	F	RA	Reduces	Large	1, 6, 7	Yes	Yes	Village Board	TBD	Village	Low/High
LM	Make information materials available to the public about the National Flood Insurance Program's voluntary Community Rating System.*	F	PP	Reduces	Large	1, 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 69
Garrett 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 and repaint fire hydrants and water shut off lines to increase visibility.	EQ, F, SS, SWS, T	MP	Reduces	Large	2, 3, 5	Yes	Yes	Village Board	Ongoing	Village	Low/High
HM	Remove mud, gravel and debris from inside and around storm catch basins.	F, SS, SWS	MP	Reduces	Large	2, 3, 5	Yes	Yes	Village Board	Ongoing	Village	Low/High
HM	Purchase pump(s) for removal of water.	F, SS, SWS	MP	Reduces	Large	2, 3, 5	Yes	Yes	Village Board	1-2 years	TBD	Low/High
LM	Review and present for adoption the revised Flood Insurance Rate Maps when they become available.*	F	RA	Reduces	Large	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 and make Village Officials aware of these maps and issues related to construction in a floodplain.*	F	RA	Reduces	Large	1, 6, 7	Yes	Yes	Village Board	TBD	Village	Low/High
LM	Make information materials available to the public about the National Flood Insurance Program's voluntary Community Rating System.*	F	PP	Reduces	Large	1, 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 70
Newman 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.	SS, T	MP	Reduces	Large	2, 3, 5	NA	NA	City	1-2 years	TBD	Medium/High
HM	Expand/Relocate City Hall to incorporate a tornado safe shelter/records storage.	T	SP	Reduces	Small	2, 3, 5	NA	NA	City	1-3 years	75% Federal 25% Local	High/Medium
LM	Conduct drainage study of Brushy Fork.	F, SS, SWS	S	Reduces	Small	2, 3, 5	Yes	Yes	City	1-3 years	75% Federal 25% Local	Medium/High
HM	Upgrade storm sewers.	F, SS, SWS	SP	Reduces	Large	2, 3, 5	Yes	Yes	City	1-3 years	75% Federal 25% Local	High/High
LM	Conduct preliminary engineering study for new wastewater treatment plant.	F, SS	S	Reduces	Large	2, 3, 5	Yes	Yes	City	3-5 years	75% Federal 25% Local	Medium/High
LM	Conduct public awareness effort regarding the need for a new wastewater treatment plant.	F, SS	PI	Reduces	Large	1, 2	NA	NA	City	TBD	City	Low/High
LM	Design new wastewater treatment plant.	F, SS	S	Reduces	Large	2, 3, 5	Yes	Yes	City	TBD	75% Federal 25% Local	Medium/High
HM	Construct new wastewater treatment plant.	F, SS	SP	Reduces	Large	2, 3, 5	Yes	Yes	City	TBD	75% Federal 25% Local	High/High
HM	Purchase emergency backup generator for sewer plant.	EQ, F, SS, SWS, T	MP	Eliminates	Large	2, 3, 5	NA	Yes	City	3-5 years	75% Federal 25% Local	Low/High
LM	Adopt new building codes to improve building safety.	EQ, SS, SWS, T	RA	Reduces	Medium	2, 3, 4, 7	Yes	Yes	City	1-2 years	City	Low/High
HM	Make public aware of severe weather alert options (i.e., NOAA weather radios, Douglas County Code Red, etc.).	EH, F, SS, SWS, T	PI	Reduces	Large	1, 2	NA	NA	City	1-2 years	75% Federal 25% Local	Low/High
HM	Create volunteer program to assist elderly/disabled during a natural hazard event.	EH, EQ, F, SS, SWS, T	PI	Reduces	Small	1, 2	NA	NA	City	1-2 years	City	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 70
Newman Hazard Mitigation Actions Continued...**

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 retention pond and pumping station at old high school property to help with drainage issues.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	NA	NA	City	TBD	75% Federal 25% Local	High/Medium
LM	Review and present for adoption the revised Flood Insurance Rate Maps when they become available.*	F	RA	Reduces	Large	6, 7	Yes	Yes	City	TBD	City	Low/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 and make City Officials aware of these maps and issues related to construction in a floodplain.*	F	RA	Reduces	Large	1, 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	Large	1, 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 71
Tuscola 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	Reshape Scattering Forks to mitigate flooding.	F, SS, SWS	MP	Reduces	Medium	2, 3, 4, 5, 6	Yes	Yes	City	5-8 year	IEPA 80% City 20%	High/High
HM	Reshape Hayes Branch to Mitigate flooding.	F, SS, SWS	MP	Reduces	Medium	2, 3, 4, 5, 6	Yes	Yes	City	TBD	IEPA 80% City 20%	High/High
LM	Construct pedestrian bridge over Hayes Branch.	F	SP	Reduces	Small	2	NA	NA	City	2 years	IDOT 80% City 20%	Medium/Medium
HM	Establish an Emergency Operation Center	DF, EQ, EH, F, SS, SWS, T	MP	Reduces	Large	2, 3, 5	NA	NA	City	TBD	TBD	Low/High
LM	Conduct comprehensive drainage study.	F, SS, SWS	S	Reduces	Large	2, 3, 4, 5	Yes	Yes	City	10-15 yrs.	75% Federal 25% Local	Medium/High
LM	Update zoning/building codes.	EQ, SS, SWS, T	RA	Reduces	Medium	2, 3, 4, 7	Yes	Yes	City	TBD	City	Low/High
HM	Upgrade storm sewer system, including relining as needed.	F, SS, SWS	SP	Reduces	Large	2, 3, 5	Yes	Yes	City	TBD	75% Federal 25% Local	High/High
HM	Continue to participate/support the County Code Red notification system.	EH, F, SS, SWS, T	MP	Reduces	Large	2	NA	NA	City	Ongoing	TBD	Low/High
HM	Construct storm shelter at Ervin Park.	SS, T	SP	Eliminates	Small	2	NA	NA	City	TBD	75% Federal 25% Local	Medium/High
HM	Purchase emergency backup generator for primary lift station at south sewer plant.	EQ, F, SS, SWS, T	MP	Eliminates	Large	2, 3, 5	NA	Yes	City	TBD	75% Federal 25% Local	Low/High
LM	Review and present for adoption the revised Flood Insurance Rate Maps when they become available.*	F	RA	Reduces	Large	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 71
Tuscola Hazard Mitigation Actions Continued...**

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 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 and make City Officials aware of these maps and issues related to construction in a floodplain.*	F	RA	Reduces	Large	1, 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	Large	1, 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 72
Villa Grove 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 construct the appropriate drainage remedy to alleviate recurring drainage problems on the east side of the city.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Village Council	2-3 years	75% Federal 25% Local	Medium/High
HM	Demolish existing community building located in the floodway. The building has flooded repeatedly, causing structural damage and mold growth and is uninhabitable in its present condition.	F, SS, SWS	PP	Eliminates	Small	2, 6	NA	Yes	Village Council	1-2 years	75% Federal 25% Local	Medium/High
HM	Acquire residential properties in flood-prone areas and remove any existing structures.	F, SS, SWS	PP	Eliminates	Small	2, 6	NA	Yes	Village Council	1-2 years	75% Federal 25% Local	High/High
LM	Develop local resource checklists to increase public awareness of the services available following a natural hazard event.	EH, EQ, F, SS, SWS, T	PI	Reduces	Large	1, 2	NA	NA	Village Council	1 year	Village	Low/High
HM	Purchase new storm siren.	SS, T	MP	Reduces	Large	2, 3, 5	NA	NA	Village Council	3 years	TBD	Medium/High
LM	Purchase lightning warning signs for parks.	SS	MP	Reduces	Small	1, 2	NA	NA	Village Council	2 years	Village	Low/Medium
HM	Construct new community building with earthquake-resistant shelter for bad weather (including extreme heat & cold).	EH, EQ, F, SS, SWS, T	SP	Reduces	Medium	2	Yes	NA	Village Council	3-5 years	75% Federal 25% Local	High/High
LM	Conduct mock natural disaster drills to provide community officials with hands-on experience in dealing with different disaster scenarios.	EQ, F, SS, SWS, T	PI	Reduces	Large	1, 2	NA	NA	Village Council	3-5 years	Village	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 72
Villa Grove Hazard Mitigation Actions Continued...**

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 erosion control study of the Embarras River through the city.	F, SS, SWS	S	Reduces	Large	2, 3, 5	Yes	Yes	Village Council	2-5 years	75% Federal 25% Local	Medium/High
HM	Identify and implement the appropriate erosion control remedy to alleviate recurring drainage problems associated with the Embarras River.	F, SS, SWS	SP	Reduces	Large	2, 3, 5	Yes	Yes	Village Council	2-5 years	75% Federal 25% Local	Medium/High
LM	Conduct drainage study to determine the cause of recurring drainage problems on the west side of the city.	F, SS, SWS	S	Reduces	Medium	2, 3, 5	Yes	Yes	Village Council	10 years	75% Federal 25% Local	Medium/High
HM	Select, design and construct the appropriate drainage remedy to alleviate recurring drainage problems on the west side of the city.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Village Council	10 years	75% Federal 25% Local	Medium/High
HM	Move drinking water facility out of floodway.	F	PP	Eliminates	Large	2, 3, 5, 6	Yes	Yes	Village Council	8-10 years	75% Federal 25% Local	High/High
LM	Purchase boat for use by emergency personnel during flooding events.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Village Council	4-5 years	Village	Low/High
LM	Conduct study of Front Street bridge to determine the best option for replacing the structure. This bridge is located on the main route into the city and has been damaged by repetitive flooding.	F, SS, SWS	S	Reduces	Large	2, 3, 5	Yes	Yes	Village Council	5-7 years	75% Federal 25% Local	Medium/High
HM	Design and construct the appropriate structure to replace the flood-damaged Front Street bridge.	F, SS, SWS	SP	Reduces	Large	2, 3, 5	Yes	Yes	Village Council	5-7 years	75% Federal 25% Local	High/High
LM	Review and present for adoption the revised Flood Insurance Rate Maps when they become available.*	F	RA	Reduces	Large	6, 7	Yes	Yes	Village Council	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 72
Villa Grove Hazard Mitigation Actions Continued...**

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 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 and make City Officials aware of these maps and issues related to construction in a floodplain.*	F	RA	Reduces	Large	1, 6, 7	Yes	Yes	Village Council	TBD	Village	Low/High
LM	Make information materials available to the public about the National Flood Insurance Program's voluntary Community Rating System.*	F	PP	Reduces	Large	1, 6, 7	Yes	Yes	Village Council	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

5.0 RECOMMENDATIONS

5.0 RECOMMENDATIONS

The following recommendations came about as a result of the planning process. They should be reviewed periodically as the Plan is evaluated and updated to determine if appropriate actions should be taken.

SEVERE STORMS/SEVERE WINTER STORMS

Severe storms and severe winter storms frequently cause utility disruptions throughout Douglas County. Installing gas powered back-up generators and burying power lines will reduce the negative impacts caused by power disruptions. While not considered a long-term solution, tree trimming is a less expensive approach that helps maintain power during storms.

FLOODING

Countywide:

- The Flood Insurance Rate Maps (FIRM) for Douglas County have been revised and awaiting final approval by FEMA. Once the new digitized FIRM maps have been approved, those jurisdictions who participate in the National Flood Insurance Program will need to adopt the revised maps and most likely update their floodplain ordinance.
- When the digitized versions of the new Flood Insurance Rate Maps are made available, the County should procure them for use in GIS mapping applications.
- Special Flood Hazard Areas exist in Arthur, Tuscola, and Villa Grove as well as many areas of unincorporated Douglas County. Development should be restricted in Special Flood Hazard Areas. Open spaces should be preserved and stormwater best management practices should be followed to protect current and future residents from flooding problems.
- Numerous roadway improvements identified in every township may help to reduce transportation hazards (i.e., flooded roadways, etc.) created by excessive precipitation.

Arthur:

- Develop an intergovernmental agreement with adjacent jurisdictions to better manage drainage in a manner that will alleviate problems within the municipality without creating problems in the rural areas.

Tuscola:

- According to a survey of Tuscola residents conducted as part of the preparation of the Tuscola Comprehensive Municipal Plan in 2000, stormwater drainage was identified as the second highest community concern with regards to public facilities. Storm and sanitary sewer needs should be monitored periodically in conjunction with economic development along I-57 and US 36 to assure that there will be sufficient capacity to meet residential and business growth.
- Since there is still undeveloped land located in the floodplain in Tuscola, the City should encourage developers to use stormwater best management practices that will maintain

sufficient portions of the floodplain for water storage in order to avoid causing flooding and drainage problems for existing as well as new residents. All development in the floodplain should comply with required mitigation and flood proofing in addition to being properly permitted by the Illinois Department of Natural Resources.

Villa Grove:

- With approximately one-fourth of Villa Grove (including critical facilities) located in floodplain, the highest priority should be given to flood mitigation projects.

<i>GENERAL</i>

Emergency Operations Center

An improved emergency operations facility that has sufficient space and is less vulnerable to severe storms should be a high priority. The Douglas County Emergency Management Agency (EMA) is superbly directed and staffed. The EMA is knowledgeable and well organized. They provide effective service and operate at a high level of efficiency. This is a superior resource; however, this resource is limited by an insufficient facility.

Developing and Disseminating Information

Public information materials should be prepared that build on the feedback provided through the Citizen Questionnaire. These materials should be disseminated through the electronic media (radio, television and internet) in addition to the printed materials made available through the schools and other government offices. Risk communication principles should be followed to develop materials that will help residents take protective actions prior to natural hazard events.

HazMat Support

The quantity of industrial and agricultural chemicals generated and transported through Douglas County exceeds the typical quantities found in most rural Illinois counties. First responders to an accident involving chemicals need continued support so that they are properly equipped and trained to handle this kind of emergency. Safety equipment must continually be checked and replaced as necessary to assure that responders are not exposed to unreasonable risk due to compromised equipment.

6.0 PLAN MAINTENANCE

6.0 PLAN MAINTENANCE

This section outlines the Federal Emergency Management Agency (FEMA) requirements for maintaining and updating the Plan. 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 will help to ensure that the Plan remains an effective and relevant document. Provided below is detailed discussion of the plan maintenance approach.

6.1 MONITORING, EVALUATING & UPDATING THE PLAN

Establishing a method and schedule for monitoring, evaluating and updating the Plan allows the participating jurisdictions to review the plan, the planning process and the results of the implemented mitigation actions and make changes as necessary.

6.1.1 Monitoring and Evaluating the Plan

The Plan will be monitored and evaluated by the Plan Maintenance Subcommittee on a semi-annual basis. The Plan Maintenance Subcommittee will include key members of the Planning Committee (i.e., representatives from each of the participating County entities as well as representatives from each of the participating municipalities). The Subcommittee will be chaired by the Douglas County Emergency Management Agency. 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 entities for their review and use in the plan update.

The Douglas County Emergency Management Agency will be responsible for monitoring the status of mitigation actions identified in the Plan. It will be the responsibility of each participating government entity to provide the Emergency Management Agency with a semi-annual progress report detailing the status of their identified mitigation actions at the Subcommittee meetings.

The Plan Maintenance Subcommittee will also evaluate the Plan on a semi-annual basis to determine the effectiveness of both the planning process and the mitigation actions implemented and to assess whether any changes need to be made. As part of the evaluation, 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 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 government entities 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 government entity adopts the Plan. This ensures that all the participating government entities 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 semi-annual monitoring and evaluation meetings. In addition, any non-participating municipality that wishes to participate may be added during the update. These entities will be responsible for providing all of the information needed to be integrated into the Plan. A public meeting will be held to present the updated Plan to the public for review and comment. The comments received at public meeting will be reviewed and incorporated into the updated Plan.

The Subcommittee will then present the updated Plan to the participating government entities for approval. Once the Subcommittee has received approval from all of the participating entities, it will submit the updated Plan to the Illinois Emergency Management Agency and FEMA for review. After FEMA has approved the updated Plan, each of the participating government entities will again be required to formally adopt the Plan.

6.2 INCORPORATING THE MITIGATION STRATEGY INTO EXISTING PLANNING MECHANISMS

As part of the planning process, the Planning Committee identified current plans, programs, policies/ordinances and maps that will supplement or help support mitigation planning efforts. **Figure 6** identifies the existing planning mechanism available by jurisdiction. It will be the responsibility of each participating government entity 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 municipalities 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 Douglas County Emergency Management Agency website and office. Individuals will be encouraged to provide feedback and submit comments for the Plan update to the Emergency Management Agency.

The comments received will be compiled and presented at the semi-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 meeting 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 formal adoption of the approved Plan by each participating jurisdiction. Each entity 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 each of the participating jurisdictions could formally adopt the Plan, the County had to submit it to the Illinois Emergency Management Agency (IEMA) and the Federal Emergency Management Agency (FEMA) for their review and approval. After receiving IEMA and FEMA approval, Douglas County forwarded the Plan to each participating jurisdiction for formal adoption. Signed copies of these resolutions are located in **Appendix K**. **Figure 73** identifies the participating jurisdictions and the date each formally adopted the Plan.

Figure 73 Multi-Jurisdictional Plan Adoption Dates	
Participating Jurisdiction	Adoption Date
Arcola	
Arthur	
Atwood	
Douglas County	
Garrett	
Newman	
Tuscola	
Villa Grove	

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.
2. Federal Emergency Management Agency. “Illinois.” Declared Disasters and Emergencies – Disaster Database Search. 1965 – 2009. <<http://www.fema.gov/femaNews/disasterSearch.do?action=Reset>>.

1.2 Demographics

1. Arthur Area Association of Commerce. Arthur-Amish Country Visitor Center: FAQ. 13 August 2010 <<http://www.amishcountryillinois.com/faq.htm>>.
2. Arthur, Illinois. Brief History of the Village of Arthur. 13 August 2010 <http://www.arthur-il.gov/index.asp?Type=B_LOC&SEC={788562D9-9B14-4EFD-B0BF-ED6B8340B2E3}>.
3. Cain, Rena. Douglas County Supervisor of Assessments. “Assessed Residential Values.” Fax to Greg R. Michaud. 4 February 2010.
4. Illinois Department of Commerce and Economic Opportunity. Census 2000 Data for Illinois. 16 June 2010 <http://www.ildceo.net/dceo/Bureaus/Facts_Figures/Illinois_Census_Data/2000_Census_Data.htm>.
5. Illinois Department of Commerce and Economic Opportunity. “Projection Summary by County.” Facts & Figures: Population Projections. 16 June 2010 <http://www2.illinoisbiz.biz/popProj/reference/Projections_County_Summary.xls>
6. United States Census Bureau. Geography. “Counties.” Census 2000 U.S. Gazetteer Files. 17 June 2010 <<http://www.census.gov/geo/www/gazetteer/places2k.html>>.
7. United States Census Bureau. Geography. “Places.” Census 2000 U.S. Gazetteer Files. 17 June 2010 <<http://www.census.gov/geo/www/gazetteer/places2k.html>>.
8. United States Department of Agriculture. National Agricultural Statistics Service. “County Profile: Douglas County, Illinois.” 2007 Census of Agriculture. 16 June 2010 <http://www.agcensus.usda.gov/Publications/2007/Online_Highlights/County_Profiles/Illinois/cp17041.pdf>.
9. United States Department of Agriculture. Natural Resources Conservation Service. Soil Survey of Douglas County, Illinois. 2006. 16 June 2010 <http://soildatamart.nrcs.usda.gov/Manuscripts/IL041/0/Douglas_IL.pdf>.

2.0 PLANNING PROCESS

1. Federal Emergency Management Agency. Local Multi-Hazard Mitigation Planning Guidance. 1 July 2008.

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.
3. Illinois Emergency Management Agency. 2007 Illinois Natural Hazard Mitigation Plan. October 2007. 5 June 2009 <http://www.state.il.us/iema/planning/Documents/Plan_IllMitigationPlan.pdf>.
4. National Oceanic and Atmospheric Administration. National Environmental Satellite, Data, and Information Service. National Climate Data Center. “Douglas County, Illinois.” Storm Events Database. 1950 – June 30, 2009. <<http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms>>.
5. United States Census Bureau. Geography. “County Subdivisions.” Census 2000 U.S. Gazetteer Files. 7 July 2010 <<http://www.census.gov/geo/www/gazetteer/places2k.html>>.

3.1 Severe Storms (Thunderstorms, Hail, Lightning & Heavy Rain)

1. Illinois Department of Transportation. Division of Traffic Safety. “County Crash Summaries: Douglas County.” Illinois Crash Data. 21 June 2010 <<http://www.dot.state.il.us/trafficsafety/summaries.html>>.
2. National Oceanic and Atmospheric Administration. National Severe Storms Laboratory. Frequently Asked Questions About Thunderstorms... 13 August 2009 <http://www.nssl.noaa.gov/faq/faq_tst.php>.
3. National Oceanic and Atmospheric Administration. National Severe Storms Laboratory. “Damage and Impacts.” A Severe Weather Primer: Questions and Answers about Lightning. 17 June 2009 <http://www.nssl.noaa.gov/primer/lightning/ltg_damage.html>.
4. National Oceanic and Atmospheric Administration. National Severe Storms Laboratory. “Damaging Winds Basics.” A Severe Weather Primer: Questions and Answers about Damaging Winds. 17 June 2009 <http://www.nssl.noaa.gov/primer/wind/wind_basics.html>.
5. National Oceanic and Atmospheric Administration. National Severe Storms Laboratory. “Frequently Asked Questions About Hail.” A Severe Weather Primer: Questions and Answers about Hail. 4 June 2009 <http://www.nssl.noaa.gov/primer/hail/hail_faq.shtml>.
6. National Oceanic and Atmospheric Administration. National Severe Storms Laboratory. “Thunderstorm Basics.” A Severe Weather Primer: Questions and Answers about Thunderstorms. 12 August 2009 <http://www.nssl.noaa.gov/primer/tstorm/tst_basics.html>.
7. National Oceanic and Atmospheric Administration. National Severe Storms Laboratory. “Understanding Damages and Impacts.” A Severe Weather Primer:

- Questions and Answers about Hail. 13 August 2009 <http://www.nssl.noaa.gov/primer/hail/hail_damage.html>.
8. National Oceanic and Atmospheric Administration. NOAAWatch – NOAA’s All Hazard Monitor. Severe Weather. 10 June 2009 <<http://www.noaawatch.gov/themes/severe.php>>.
 9. National Oceanic and Atmospheric Administration. Southern Region Headquarters. “Beaufort Wind Scale.” JetStream – Online School for Weather. 10 March 2010 <http://www.srh.noaa.gov/jetstream/ocean/beaufort_max.htm#beaufort>.
 10. National Oceanic and Atmospheric Administration. Storm Prediction Center. Converting Traditional Hail Size Descriptions. Table. 4 June 2009 <<http://www.spc.noaa.gov/misc/tables/hailsizes.htm>>.
 11. National Oceanic and Atmospheric Administration. Storm Prediction Center. “How does the National Weather Service (NWS) define a severe thunderstorm?” Frequently Asked Questions (FAQ). Updated 16 July 2008. 4 June 2009 <<http://www.spc.ncep.noaa.gov/faq/>>.
 12. National Weather Service. “Beaufort Scale.” National Weather Service Glossary. 10 March 2010 <<http://www.nws.noaa.gov/glossary/index.php?letter=b>>.
 13. National Weather Service. “Hail.” National Weather Service Glossary. 12 August 2009 <<http://www.nws.noaa.gov/glossary/index.php?letter=h>>.
 14. National Weather Service. “Knot.” National Weather Service Glossary. 12 August 2009 <<http://www.nws.noaa.gov/glossary/index.php?letter=k>>.
 15. National Weather Service. Forecast Office – Central Illinois. Severe Weather Preparedness. 11 March 2010 <www.crh.noaa.gov/ilx/severe/svr-prep.php>.
 16. National Weather Service. Forecast Office – Twin Cities, Minnesota. Thunderstorms, Hail, Wind and Lightning. 13 August 2009 <<http://www.crh.noaa.gov/mpx/?n=swawpns1>>.
 17. The Tornado and Storm Research Organisation. Hail Scale. 26 January 2010 <<http://www.torro.org.uk/site/hscale.php>>.
 18. World Meteorological Organization. Publication No. 306 – Manual on Codes. Volume I.1 – Part A. Section E: Beaufort Scale of Wind. 10 March 2010 <www.wmo.int/pages/prog/www/WMOCodes/Manual/Volume-I-selection/Sel11.pdf>.

3.2 Tornadoes

1. Federal Emergency Management Agency. “Fujita Tornado Measurement Scale.” State and Local Mitigation Planning How-To Guide: Understanding Your Risks – Identifying Hazards and Estimating Losses. FEMA 386-2. August 2001. 21 May 2009 <http://www.state.il.us/iema/planning/Documents/Plan_FEMA_HTG2.pdf>.
2. National Oceanic and Atmospheric Administration. National Environmental Satellite, Data, and Information Service. National Climate Data Center. The Enhanced Fujita Tornado Scale. 12 August 2009 <<http://www.ncdc.noaa.gov/oa/satellite/satellitesey/educational/fujita.html>>.

3. National Oceanic and Atmospheric Administration. National Severe Storms Laboratory. “Understanding Damage and Impacts.” A Severe Weather Primer: Questions and Answers about Tornadoes. 12 August 2009 <http://www.nssl.noaa.gov/primer/tornado/tor_damage.html>.
4. National Oceanic and Atmospheric Administration. NOAAWatch – NOAA’s All Hazard Monitor. Severe Weather. 10 June 2009 <<http://www.noaawatch.gov/themes/severe.php>>.
5. National Oceanic and Atmospheric Administration. Storm Prediction Center. The Online Tornado FAQ: Frequently Asked Questions about Tornadoes. By Roger Edwards. 10 June 2009 <<http://www.spc.noaa.gov/faq/tornado/>>.
6. National Weather Service. Forecast Office – Central Illinois. Severe Weather Preparedness. 11 March 2010 <www.crh.noaa.gov/ilx/severe/svr-prep.php>.

3.3 Severe Winter Storms (Snow & Ice)

1. American Red Cross. Why Talk about Winter Storms? 11 August 2009 <<http://www.redcross.org/www-files/Documents/pdf/Preparedness/AreYouReady/WinterStorm.pdf>>.
2. Centers for Disease Control and Prevention. Winter Weather FAQs. 3 December 2004. 22 June 2009 <<http://www.bt.cdc.gov/disasters/winter/faq.asp>>.
3. Illinois Department of Transportation. Division of Traffic Safety. “County Crash Summaries: Douglas County.” Illinois Crash Data. 21 June 2010 <<http://www.dot.state.il.us/trafficsafety/summaries.html>>.
4. Illinois Emergency Management Agency. “Severe Winter Storms.” 2007 Illinois Natural Hazard Mitigation Plan. October 2007. Page III-82. 5 June 2009 <http://www.state.il.us/iema/planning/Documents/Plan_IllMitigationPlan.pdf>.
5. Illinois Emergency Management Agency. Winter Storms. 4 June 2009 <<http://www.state.il.us/iema/planning/HazardInfo.asp#Winter>>.
6. Illinois State Climatologist Office. Glossary of Winter Terms. 11 August 2009 <<http://www.isws.illinois.edu/atmos/statecli/Winter/glossary.htm>>.
7. Midwestern Regional Climate Center. “Historical Climate Data: Snowfall Summary – Station: 118684 Tuscola, IL.” Climate Summaries Database. 27 July 2010 <http://mcc.sws.uiuc.edu/climate_midwest/historical/snow/il/118684_ssum.html>.
8. Midwestern Regional Climate Center. “Historical Climate Data: Temperate Summary – Station: 118684 Tuscola, IL.” Climate Summaries Database. 27 July 2010 <http://mcc.sws.uiuc.edu/climate_midwest/historical/temp/il/118684_tsum.html>.
9. National Oceanic and Atmospheric Administration. National Severe Storms Laboratory. “Winter Weather Basics” A Severe Weather Primer: Questions and Answers about Winter Weather. 23 June 2009 <http://www.nssl.noaa.gov/primer/winter/ww_basics.html>.

10. National Oceanic and Atmospheric Administration. NOAAWatch – NOAA’s All Hazard Monitor. Winter Weather. 5 June 2009 <<http://www.noaawatch.gov/themes/winter.php>>.
11. National Weather Service. “Freezing Rain.” National Weather Service Glossary. 11 August 2009 <<http://www.nws.noaa.gov/glossary/index.php?letter=r>>.
12. National Weather Service. “Sleet.” National Weather Service Glossary. 11 August 2009 <<http://www.nws.noaa.gov/glossary/index.php?letter=s>>.
13. National Weather Service. “Snow.” National Weather Service Glossary. 11 August 2009 <<http://www.nws.noaa.gov/glossary/index.php?letter=s>>.
14. National Weather Service. Forecast Office – Central Illinois. Winter Weather Definitions. 11 March 2010 <<http://www.crh.noaa.gov/images/ilx/pdf/winter%20wx%20defn.pdf>>.
15. National Weather Service. Forecast Office – Omaha/Valley, Nebraska. Frostbite and Hypothermia. 22 June 2009 <<http://www.crh.noaa.gov/oax/safety/frostbite.php>>.
16. National Weather Service. Forecast Office – St. Louis, Missouri. “Wind Chill.” Missouri Winter Weather Awareness Day. 19 November 2008. 11 August 2009 <<http://www.crh.noaa.gov/lx/?n=winterday> or http://www.crh.noaa.gov/Image/lx/wcm/Winter2008/Wind_Chill.pdf>.
17. National Weather Service. Office of Climate, Water and Weather Services. All About Winter Storms. 4 June 2009 <<http://www.nws.noaa.gov/om/brochures/wintstm.htm>>.
18. National Weather Service. Office of Climate, Water and Weather Services. NWS Windchill Chart. Chart. 1 November 2001. 22 June 2009 <<http://www.nws.noaa.gov/om/windchill/>>.
19. National Weather Service. Office of Climate, Water and Weather Services. Windchill Terms and Definitions. 22 June 2009 <<http://www.weather.gov/om/windchill/windchillglossary.shtml>>.

3.4 Flood

1. “Douglas County Preliminary DFIRM Finder.” Map. Illinois Floodplain Maps. Illinois State Water Survey. 3 August 2010 <<http://www.illinoisfloodmaps.org/firms/?county=douglas>>.
2. Federal Emergency Management Agency. Answers to Questions About the NFIP: Introduction to the NFIP. May 2006. 30 June 2009 <<http://www.fema.gov/business/nfip/intnfip.shtm>>.
3. Federal Emergency Management Agency. National Flood Program. Community Status Book Report: Illinois. 25 November 2009 <<http://www.fema.gov/cis/IL.pdf>>.
4. Federal Emergency Management Agency. Definitions of FEMA Flood Zone Designations. 9 July 2009 <<http://msc.fema.gov/webapp/wcs/stores/servlet/info?storeId=10001&catalogId=10001&langId=-1&content=floodZones&title=FEMA Flood Zone Designations>>.

5. Federal Emergency Management Agency. Disaster Information: Flood. 11 June 2009 <<http://www.fema.gov/hazard/flood/index.shtm>>.
6. Federal Emergency Management Agency. Flood Insurance Rate Maps (FIRMs). 8 July 2009 <<http://www.fema.gov/hazard/map/firm.shtm>>.
7. Federal Emergency Management Agency. Flood Insurance Rate Map Tutorial. 8 July 2009 <http://www.fema.gov/media/fhm/firm/ot_firm.htm>.
8. Federal Emergency Management Agency. Flood Zones: NFIP Policy Index. 9 July 2009 <http://www.fema.gov/plan/prevent/floodplain/nfipkeywords/flood_zones.shtm>.
9. Federal Emergency Management Agency. Risk Management Series: Design Guide for Improving Critical Facility Safety from Flooding and High Winds – Providing Protection to People and Buildings. FEMA 543. January 2007. 7 August 2009 <<http://www.fema.gov/library/viewRecord.do?id=2441>>.
10. Federal Emergency Management Agency. National Flood Insurance Program. “Community Rating System (CRS).” Glossary. 19 October 2009 <http://www.floodsmart.gov/floodsmart/pages/glossary_A-I.jsp>.
11. Federal Emergency Management Agency. National Flood Insurance Program. “Flood.” Glossary. 10 June 2009 <http://www.floodsmart.gov/floodsmart/pages/glossary_A-I.jsp>.
12. Federal Emergency Management Agency. National Flood Insurance Program. “Flood Zones.” Frequently Asked Questions. 1 July 2009 <http://www.floodsmart.gov/floodsmart/pages/faqs_flood.jsp>.
13. Federal Emergency Management Agency. National Flood Insurance Program. Talking Points: Repetitive Loss. March 2007. 22 January 2010 <<http://www.floodsmart.gov/toolkits/flood/downloads/TPsRepetitiveLoss-OT2007.pdf>>.
14. Federal Emergency Management Agency. National Flood Insurance Program. Flood Insurance Library. “Repetitive Loss Structure.” Definitions. 22 January 2010 <<http://www.fema.gov/business/nfip/19def2.shtm>>.
15. Goad, Jason. Douglas County GIS Coordinator. “RE: Comm Towers.” Email to Andrea J. Bostwick. 13 May 2010.
16. Harris County Flood Control District – Harris County, Texas. Flood Insurance Rate Maps. 1 July 2009 <<http://www.hcfcd.org/firms.html>>.
17. Illinois Administrative Code. Title 17: Conservation. Chapter I: Department of Natural Resources. Subchapter h: Water Resources. Part 3706: Regulation of Construction within Flood Plains. 1 July 2009 <<http://dnr.state.il.us/OWR/resman/Downloads/3706RULE.pdf>>.
18. Illinois Department of Natural Resources. Office of Water Resources. 100-Year Floodplain in Illinois. Map. 6 August 2009. 17 May 2010 <<http://dnr.state.il.us/owr/images/GIS/floodzone09.pdf>>.

19. Illinois Department of Natural Resources. Office of Water Resources. Quick Guide to Floodplain Management in Illinois. 2001. 1 July 2009 <<http://www.dnr.state.il.us/owr/resman/Downloads/IL%20FPM%20Quick%20Guide.pdf>>.
20. Louisiana State University – Louisiana Sea Grant Law & Policy Program. Louisiana State University Agriculture Center. Glossary of Frequently Used FEMA/NFIP Terms-Acronyms. 1 July 2009 <http://www.laseagrant.org/pdfs/FEMA_Glossary.pdf>.
21. National Oceanic and Atmospheric Administration. National Severe Storms Laboratory. “Flood Basics.” A Severe Weather Primer: Questions and Answers about Floods. 10 June 2009 <http://www.nssl.noaa.gov/primer/flood/fld_basics.html>.
22. National Oceanic and Atmospheric Administration. National Severe Storms Laboratory. “Understanding Damage and Impacts.” A Severe Weather Primer: Questions and Answers about Floods. 30 June 2009 <http://www.nssl.noaa.gov/primer/flood/fld_damage.html>.
23. National Oceanic and Atmospheric Administration. NOAAWatch – NOAA’s All Hazard Monitor. Severe Weather. 30 June 2009 <<http://www.noaawatch.gov/themes/severe.php>>.
24. National Weather Service. Forecast Office – Birmingham, Alabama. “Flood Types.” Alabama Severe Weather Awareness Week Booklet. February 2009. 10 June 2009 <http://www.srh.noaa.gov/bmx/aware/swaw_2009/pdfs/Pg13_Flood_Types.pdf>.
25. National Weather Service. Forecast Office – Central Illinois. Severe Weather Preparedness. 11 March 2010 <www.crh.noaa.gov/ilx/severe/svr-prep.php>.
26. National Weather Service. Lower Mississippi River Forecast Center. “Types of Flooding.” Flood Safety. 10 June 2009 <<http://www.srh.noaa.gov/lmrfc/?n=floodsafety-lmrfc#types>>.
27. Ohio Department of Natural Resources. Division of Water. Floodplain Management. About the Floodplain Program. 1 July 2009 <<http://www.dnr.state.oh.us/water/tabid/3506/Default.aspx>>.
28. Osman, Paul. Local Floodplain Programs/NFIP Coordinator. Office of Water Resources. Illinois Department of Natural Resources. “Re: Floodplain Ordinances.” E-mail to Greg R. Michaud. 29 June 2010.
29. Owen, Jared. Hazard Mitigation Planner. Illinois Emergency Management Agency. “Douglas County RL data.” E-mail to Greg R. Michaud. 19 September 2009.
30. Villa Grove Centennial Committee. Villa Grove Centennial Celebration 1903 - 2003. Villa Grove, Illinois: 2003.

3.5 Extreme Heat

1. Federal Emergency Management Agency. Are You Ready? Extreme Heat. 11 June 2009 <<http://www.fema.gov/areyouready/heat.shtm>>.
2. Federal Emergency Management Agency. Background: Extreme Heat. 10 August 2009 <<http://www.fema.gov/hazard/heat/background.shtm>>.

3. National Oceanic and Atmospheric Administration. Heat Wave: A Major Summer Killer. Brochure. 5 June 2009 <<http://www.nws.noaa.gov/om/brochures/heatwave.pdf>>.
4. National Oceanic and Atmospheric Administration. NOAAWatch – NOAA’s All Hazard Monitor. Excessive Heat. 5 June 2009 <<http://www.noaawatch.gov/themes/heat.php>>.
5. National Weather Service. Forecast Office – Central Illinois. Summertime Heat and Humidity. 11 March 2010 <www.crh.noaa.gov/ilx/heat.php>.
6. National Weather Service. Forecast Office – Paducah, Kentucky. Public Information Statement: First Heat Wave of the Summer Ending Today. 26 June 2009. 10 August 2009 <http://www.crh.noaa.gov/news/display_cmsstory.php?wfo=pah&storyid=28987&source=2>.
7. National Weather Service. Office of Climate, Water and Weather Services. NOAA’s National Weather Service Heat Index. 11 August 2009 <<http://www.weather.gov/om/heat/index.shtml>>.
8. North Carolina Cooperative Extension. Heat Stress Disorders. 11 June 2009 <<http://www.ces.ncsu.edu/disaster/factsheets/pdf/heatstress.pdf>>.
9. Midwestern Regional Climate Center. “Illinois Temperature Extremes – Station: 118684 Tuscola.” Annual Temperature Extremes for the Continental United States Database. 4 August 2010 <http://mcc.sws.uiuc.edu/climate_midwest/extremes/il.extremetemps.txt>.

3.6 Drought

1. 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. 5 November 2009 <<http://www.isws.illinois.edu/pubdoc/RR/ISWSRR-121.pdf>>.
2. National Integrated Drought Information System. U.S. Drought Portal. “Drought Monitor: State-of-the-Art Blend of Science and Subjectivity.” U.S. Drought Monitor. 2 January 2008. 14 July 2009 <http://www.drought.gov/portal/server.pt/gateway/PTARGS_0_2_693_208_0_43/http%3B/drought.unl.edu/dm/classify.htm>.
3. National Integrated Drought Information System. U.S. Drought Portal. “Drought Monitors: U.S. Drought Monitor.” Drought Indicators. 14 July 2009 <http://www.drought.gov/portal/server.pt/community/drought_indicators/223/drought_monitors/261>.
4. National Integrated Drought Information System. U.S. Drought Portal. U.S. Drought Monitor. Map. 16 July 2009. 16 July 2009 <http://www.drought.gov/portal/server.pt/community/drought_indicators/us_drought_monitor>.
5. National Oceanic and Atmospheric Administration. National Environmental Satellite, Data, and Information Service. National Climate Data Center. Climate of 2009 – June: U.S. Palmer Drought Indices. 8 July 2009. 14 July 2009 <<http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/palmer.html>>.

6. National Oceanic and Atmospheric Administration. NOAAWatch – NOAA’s All Hazard Monitor. Droughts. 5 June 2009 <<http://www.noaawatch.gov/themes/droughts.php>>.
7. National Weather Service. National Centers for Environmental Prediction. Climate Prediction Center. Current Palmer Drought Severity Index Map by Climate Divisions. Map. 11 July 2009. 14 July 2009 <http://www.cpc.ncep.noaa.gov/products/monitoring_and_data/drought.shtml>.
8. National Weather Service. National Centers for Environmental Prediction. Climate Prediction Center. Palmer Drought Severity & Crop Moisture Indices Explanation. 14 July 2009 <http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/cdus/palmer_drought/wpdanote.shtml>.
9. United States Department of Agriculture. National Agricultural Statistics Service. “U.S. & All State County Data – Crops: Douglas County, Illinois.” Quick Stats Database. 16 June 2010 <http://www.nass.usda.gov/Data_and_Statistics/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. 16 June 2010 <http://www.agcensus.usda.gov/Publications/2007/Full_Report/Volume_1,_Chapter_2_County_Level/Illinois/st17_2_001_001.pdf>.
11. United States Department of Agriculture. National Agricultural Statistics Service. “Table 2. Market Value of Agricultural Products Sold Including Direct Sales: 2007 and 2002.” 2007 Census of Agriculture. Volume 1, Chapter 2. 16 June 2010 <http://www.agcensus.usda.gov/Publications/2007/Full_Report/Volume_1,_Chapter_2_County_Level/Illinois/st17_2_002_002.pdf>.
12. University of Nebraska, Lincoln. National Drought Mitigation Center. “Drought Indices.” What is Drought? By Dr. Michael J. Hayes. 2006. 14 July 2009 <<http://drought.unl.edu/whatis/indices.htm>>.

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. Federal Emergency Management Agency. FEMA for Kids. “Earthquakes – The Modified Mercalli Scale & The Richter Scale.” The Disaster Area: Intensity Scales. 22 July 2009 <<http://www.fema.gov/kids/intense.htm>>.
3. Illinois State Geological Survey. Earthquakes in Illinois: 1795 – 2008. Map. 31 August 2009 <<http://www.isgs.illinois.edu/research/earthquake-hazards/pdf-files/earthquakes-thru-08.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. Illinois State Geological Survey. “Earthquake Occurrence in Illinois.” Earthquake Facts. 1995-3. 11 May 2010 <<http://www.isgs.illinois.edu/research/earthquake-hazards/pdf-files/qk-fct-occur.pdf>>.
6. Illinois State Geological Survey. “Wabash Valley Earthquakes: A Dozen Moderate Quakes in a Century.” Earthquake Facts. 1996-1. 31 August 2009 <<http://www.isgs.illinois.edu/research/earthquake-hazards/pdf-files/eq-fct-wabash.pdf>>.
7. Incorporated Research Institutions for Seismology. Global Seismographic Network. 20 August 2009 <<http://www.iris.edu/hq/programs/gsn>>.
8. Incorporated Research Institutions for Seismology. “How Often Do Earthquakes Occur?” Education and Outreach Series – Educational One-Pagers. 4 August 2009 <http://www.iris.washington.edu/hq/files/publications/brochures_onepaggers/doc/no3.pdf>.
9. Missouri State Emergency Management Agency. Projected Earthquake Intensities Map. 31 August 2009 <<http://sema.dps.mo.gov/EQ%20Map.pdf>>.
10. St. Louis University. Department Earth and Atmospheric Sciences. Earthquake Center. “Introduction to the New Madrid Seismic Zone.” Central U.S. Earthquake History. 4 September 2009 <http://www.eas.slu.edu/Earthquake_Center/SEISMICITY/NewMadridGeneral.html>.
11. University of Memphis. Center for Earthquake Research and Information. “Mag 5.2 Earthquake Near Bellmont IL.” Recent Earthquakes in the Central U.S. 31 August 2009 <http://www.ceri.memphis.edu/mag5-2_041808/index.html>.
12. University of Memphis. Center for Earthquake Research and Information. “June 10, 1987 New Madrid Earthquake Catalog Search.” Data Searches – CERi Catalog. 4 September 2009 <http://folkworm.ceri.memphis.edu/catalogs/scratch/cat_s_4627>.
13. University of Nevada, Reno. Nevada Seismological Lab. Earthquake Effects in Kobe, Japan. 5 August 2009 <<http://www.seismo.unr.edu/ftp/pub/louie/class/100/effects-kobe.html>>.
14. U. S. Geological Survey. Earthquakes – General Interest Publication. By Kay M. Shedlock and Louis C. Pakiser. 1995. 22 July 2009 <<http://pubs.usgs.gov/gip/earthq1/index.html>>.
15. U. S. Geological Survey. Earthquake Hazards Program. “1987 06 10 – Near Olney, Illinois – 5.1.” Historic United States Earthquakes. 3 September 2009 <http://earthquake.usgs.gov/regional/states/events/1987_06_10.php>.
16. U. S. Geological Survey. Earthquake Hazards Program. Earthquake Hazard in the Heartland of the Homeland. By Joan Gomberg and Eugene Schweig. January 2007. 31 August 2009 <http://pubs.usgs.gov/fs/2006/3125/pdf/FS06-3125_508.pdf>.
17. U. S. Geological Survey. Earthquake Hazards Program. Earthquake Hazard in the New Madrid Seismic Zone Remains a Concern. August 2009. 31 August 2009 <<http://pubs.usgs.gov/fs/2009/3071/pdf/FS09-3071.pdf>>.

18. U. S. Geological Survey. Earthquake Hazards Program. “fault.” Visual Glossary. 22 July 2009 <<http://earthquake.usgs.gov/learning/glossary.php?termID=67>>.
19. U. S. Geological Survey. Earthquake Hazards Program. Largest Earthquakes in the United States. 31 August 2009 <http://earthquake.usgs.gov/regional/states/10_largest_us.php>.
20. U.S. Geological Survey. Earthquake Hazards Program. “Magnitude 5.4 Illinois April 18, 2008.” Historic Earthquakes. 3 September 2009 <<http://earthquake.usgs.gov/eqcenter/eqinthenews/2008/us2008qza6/>>.
21. U. S. Geological Survey. Earthquake Hazards Program. Magnitude/Intensity Comparison. 20 August 2009 <http://earthquake.usgs.gov/learning/topics/mag_vs_int.php>.
22. U. S. Geological Survey. Earthquake Hazards Program. The Modified Mercalli Intensity Scale. 21 July 2009 <<http://earthquake.usgs.gov/learning/topics/mercalli.php>>.
23. U. S. Geological Survey. Earthquake Hazards Program. The Science of Earthquakes. By Lisa Wald. 22 July 2009 <<http://earthquake.usgs.gov/learning/kids/eqscience.php>>.
24. U. S. Geological Survey. Earthquake Hazards Program. The Severity of an Earthquake. 21 July 2009 <<http://pubs.usgs.gov/gip/earthq4/severitygip.html>>.
25. U. S. Geological Survey. Earthquake Hazards Program. “What are the different magnitude scales, and why are there so many?” FAQs – Measuring Earthquakes. 21 July 2009 <<http://earthquake.usgs.gov/learning/faq/?faqID=112>>.
26. U. S. Geological Survey. Earthquake Hazards Program. “What are the earthquake magnitude classes?” FAQs – Measuring Earthquakes. 21 August 2009 <<http://earthquake.usgs.gov/learning/faq/?faqID=24>>.
27. U. S. Geological Survey. Earthquake Hazards Program. “What is the biggest earthquake in the United States?” FAQs – Historic Earthquakes and Earthquake Statistics. 21 August 2009 <<http://earthquake.usgs.gov/learning/faq/?faqID=65>>.
28. U. S. Geological Survey. Earthquake Hazards Program. “What is a fault and what are the different types?” FAQs – Earthquakes, Faults, Plate Tectonics, Earth Structure. 22 July 2009 <<http://earthquake.usgs.gov/learning/faq/?faqID=55>>.
29. U. S. Geological Survey. Earthquake Hazards Program. “Where do earthquakes occur?” FAQs – Historic Earthquakes and Earthquake Statistics. 29 July 2009 <<http://earthquake.usgs.gov/learning/faq/?categoryID=11&faqID=95>>.
30. U. S. Geological Survey. Uncovering Hidden Hazards in the Mississippi Valley. By Thomas G. Hildenbrand, et al. 1996. 31 August 2009 <<http://quake.wr.usgs.gov/prepare/factsheets/HiddenHaz/>>.

3.8 Dam Failure

1. Diedrichsen, Mike. Illinois Department of Natural Resources. Office of Water Resources. “Classified Dams in Douglas County.” Fax to Greg Michaud. 24 November 2009.

2. Federal Emergency Management Agency. Federal Guidelines for Dam Safety: Hazard Potential Classification System for Dams. April 2004. 16 October 2009 <<http://www.fema.gov/library/viewRecord.do?id=1830&fromSearch=fromsearch>>.
3. Federal Emergency Management Agency. Multi Hazard Identification and Risk Assessment: A Cornerstone of the National Mitigation Strategy. 1997. 29 September 2009 <<http://www.fema.gov/library/viewRecord.do?id=2214>>.
4. Federal Emergency Management Agency. Risk Prioritization Tools for Dams: Users Manual. By URS Group, Inc. 3 March 2008. 29 September 2009 <<http://www.fema.gov/library/viewRecord.do?id=3296>>.
5. 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. 29 September 2009 <<http://www.ilga.gov/commission/jcar/admincode/017/017037020000300R.html>>.
6. Miller, Danny. Equistar Chemical, LP, A LyondellBasell Company. Telephone Interview with Greg Michaud regarding Equistar Chemical Plant Lake Dam. 9 August, 2010.
7. U.S. Army Corps of Engineers. National Dam Safety Program. National Inventory of Dams (NID). PowerPoint Presentation. By Rebecca Ragon, Project Manager. 8 & 11 June 2009. 2 October 2009 <https://rsgis.crrel.usace.army.mil/apex/NID.downloadFile?InFileName=NID_Overview_June09WebMeetings.ppt>.
8. U.S. Army Corps of Engineers. National Inventory of Dams. Illinois. 29 September 2009 <https://rsgis.crrel.usace.army.mil/apex/f?p=397:3:2704821753674310::NO::P3_STATES:IL>.
9. U.S. Army Corps of Engineers. National Inventory of Dams. Introduction. 2 October 2009 <<https://rsgis.crrel.usace.army.mil/apex/f?p=397:1:4263121257641321::NO>>.
10. U.S. Army Corps of Engineers. National Inventory of Dams Interactive Report. Illinois. Douglas County. Database. 5 April 2010 <<https://rsgis.crrel.usace.army.mil/apex/f?p=397:4:1990638456352844::NO>>.

3.9 Man-Made Hazards

1. 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/Results.aspx?t=17>>.
2. 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/Results.aspx?t=17>>.
3. 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/Results.aspx?t=17>>.

4. 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/Results.aspx?t=17>>.
5. 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/Results.aspx?t=17>>.
6. 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/Results.aspx?t=17>>.
7. 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/Results.aspx?t=17>>.
8. Illinois Commerce Commission. Transportation Division. Railroad Safety Section. 2000 Annual Report on Accidents/Incidents Involving Hazardous Materials on Railroads in Illinois. 2001. 17 May 2010 <<http://www.icc.illinois.gov/reports/Results.aspx?t=17>>.
9. 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>>.
10. 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>>.
11. Illinois Emergency Management Agency. Freedom of Information Act. Hazardous Materials Incident Reports. Douglas County: 2005 – 2009. Database. 26 August 2010 <<http://tier2.iema.state.il.us/FOIAHazmatSearch/>>.
12. Illinois Environmental Protection Agency. Leaking Underground Storage Tank Incident Tracking. Douglas County. Database. 13 August 2010 <<http://epadata.epa.state.il.us/land/ust/>>.
13. Illinois Environmental Protection Agency. Site Remediation Program. Douglas County. Database. 6 June 2010 <<http://epadata.epa.state.il.us/land/srp/>>.
14. Illinois Environmental Protection Agency. Site Response Action Program. Douglas County. Database. 6 June 2010 <<http://epadata.epa.state.il.us/land/ssu/>>.
15. Illinois Environmental Protection Agency. Bureau of Land. Generators and Managers of Hazardous Waste in Illinois: 2007 – Types and Tons of Wastes Generated, Stored, Treated and Disposed. January 2009. 12 August 2010 <<http://www.epa.state.il.us/land/hazardous-waste/reports/2007/report.pdf>>.
16. Illinois Environmental Protection Agency. Bureau of Land. Nonhazardous Solid Waste Management and Landfill Capacity in Illinois: 2008. December 2009. 13 August 2010 <<http://www.epa.state.il.us/land/landfill-capacity/2008/report.pdf>>.

17. National Consortium for the Study of Terrorism and Responses to Terrorism. Global Terrorism Database. Database. 13 August 2010 <<http://www.start.umd.edu/gtd/>>.
18. START: National Consortium for the Study of Terrorism and Responses to Terrorism Home Page. 2007. University of Maryland. 13 August 2010 <<http://www.start.umd.edu/start/>>.
19. U.S. Environmental Protection Agency. Superfund. NPL Site Status Information. Final National Priorities List (NPL) Sites – by State. Illinois. Database. 13 August 2010 <<http://www.epa.gov/superfund/sites/npl/status.htm>>.
20. U.S. Environmental Protection Agency. Superfund. NPL Site Status Information. Proposed National Priorities List (NPL) Sites – by State. Illinois. Database. 13 August 2010 <<http://www.epa.gov/superfund/sites/npl/status.htm>>.
21. U.S. Environmental Protection Agency. Toxic Release Inventory (TRI) Program. TRI Explorer. Releases: Facility Report. Douglas County, Illinois – 2007. Database. 1 September 2010 <http://www.epa.gov/cgi-bin/broker?view=COFA&trilib=TRIQ1&sort=_VIEW_&sort_fmt=1&state=17&county=17041&chemical=_ALL_&industry=ALL&year=2007&tab_rpt=1&fld=RELLBY&fld=TSFDSP&_service=oiaa&_program=xp_tri.sasmacr.tristart.macros>.
22. Wright, Carolyn. Illinois Environmental Protection Agency, Office of Emergency Response FOIA Coordinator. “FOIA Request for Douglas County HazMat Incidents between 2005 and 2009.” Documentation provided to Greg R. Michaud. 19 April 2010.

4.0 MITIGATION STRATEGY

1. Federal Emergency Management Agency. Developing the Mitigation Plan: Identifying Mitigation Actions and Implementation Strategies. FEMA 386-3. April 2003.

6.0 PLAN MAINTENANCE

1. Federal Emergency Management Agency. Bringing the Plan to Life: Implementing the Hazard Mitigation Plan. FEMA 386-4. August 2003.

9.0 TABLES

**Table 1
Thunderstorm & High Wind Events Reported in Douglas County
1980 through June 30, 2009**

Date	Time	Location	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage
6/15/1980	1:30 a.m.	Villa Grove	0 kts	0	0	\$0	\$0
9/19/1986	11:15 p.m.	Arthur	57 kts	0	0	\$0	\$0
6/17/1992	6:30 p.m.	Tuscola	0 kts	0	0	\$0	\$0
7/2/1992	5:15 p.m.	Tuscola	0 kts	0	0	\$0	\$0
9/9/1992	7:27 p.m.	Arcola	0 kts	0	0	\$0	\$0
4/26/1994	8:45 p.m.	Garrett	0 kts	1	0	\$0	\$0
6/20/1995	6:45 p.m.	Tuscola	0 kts	0	0	\$0	\$0
1/18/1996	11:40 a.m.	Atwood	0 kts	0	0	\$0	\$0
3/25/1996	4:00 a.m.	Countywide	0 kts*	0	0	\$0	\$0
5/3/1996	10:00 p.m.	Bourbon Township	0 kts	0	0	\$0	\$0
9/8/1996	2:35 p.m.	Garrett	0 kts	0	0	\$25,000	\$0
4/6/1997	9:15 a.m.	Countywide	56 kts*	0	0	\$0	\$0
4/30/1997	2:00 p.m.	Countywide	61 kts*	0	0	\$0	\$0
6/12/1997	6:00 p.m.	Newman	0 kts	0	0	\$0	\$0
4/13/1998	8:32 p.m.	Arthur	0 kts	0	0	\$0	\$0
5/19/1998	7:21 p.m.	Garrett	0 kts	0	0	\$5,000	\$0
6/29/1998	4:55 p.m.	Countywide	52 kts	1	0	\$0	\$0
7/20/1998	9:58 a.m.	Tuscola	0 kts	0	0	\$0	\$0
11/10/1998	4:30 a.m.	Countywide	57 kts*	0	0	\$0	\$0
11/10/1998	6:40 a.m.	Hugo	0 kts	0	0	\$0	\$0
4/8/1999	10:05 p.m.	Arcola	0 kts	3	0	\$0	\$0
6/1/1999	7:46 p.m.	Arthur	0 kts	0	0	\$0	\$0
8/12/1999	9:24 p.m.	Tuscola	0 kts	0	0	\$10,000	\$0
6/14/2000	1:11 p.m.	Arcola	0 kts	0	0	\$0	\$0
6/20/2000	9:28 p.m.	Newman	0 kts	0	0	\$0	\$0
6/23/2000	7:01 p.m.	Newman	0 kts	0	0	\$0	\$0
8/2/2000	7:38 p.m.	Bourbon Township	0 kts	0	0	\$0	\$0
8/26/2000	8:30 p.m.	Atwood	0 kts	0	0	\$1,000	\$0
6/19/2001	5:20 p.m.	Camargo	50 kts	0	0	\$0	\$0
7/4/2001	10:26 p.m.	Tuscola	50 kts	0	0	\$0	\$0
7/23/2001	6:10 p.m.	Tuscola	50 kts	0	0	\$0	\$0
8/18/2001	2:30 p.m.	Atwood	50 kts	6	0	\$0	\$0
10/24/2001	1:20 p.m.	Countywide	55 kts	0	0	\$300,000	\$0

* Denotes High Wind Event.

Table 1 Continued...
Thunderstorm & High Wind Events Reported in Douglas County
1980 through June 30, 2009

Date	Time	Location	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage
3/9/2002	2:00 a.m.	Countywide	76 kts*	0	0	\$0	\$0
5/9/2002	1:30 a.m.	Garrett	50 kts	0	0	\$0	\$0
5/6/2003	8:25 p.m.	Arthur	55 kts	0	0	\$0	\$0
5/10/2003	8:45 a.m.	Arcola	50 kts	0	0	\$0	\$0
5/12/2004	5:30 p.m.	Arthur	52 kts	0	0	\$0	\$0
5/23/2004	7:20 p.m.	Arthur	50 kts	0	0	\$0	\$0
5/25/2004	12:42 a.m.	Countywide	50 kts	0	0	\$0	\$0
5/30/2004	4:30 p.m.	Hindsboro	50 kts	0	0	\$0	\$0
7/13/2004	3:50 p.m.	Countywide	50 kts	0	0	\$0	\$0
7/22/2004	1:30 p.m.	Tuscola	50 kts	0	0	\$0	\$0
11/24/2004	3:00 p.m.	Countywide	52 kts*	0	0	\$0	\$0
3/30/2005	8:05 p.m.	Arthur	55 kts	0	0	\$0	\$0
3/30/2005	8:05 p.m.	Atwood	65 kts	0	0	\$70,000	\$0
3/30/2005	8:10 p.m.	Tuscola	50 kts	0	0	\$0	\$0
7/4/2005	2:00 p.m.	Arcola	50 kts	0	0	\$0	\$0
8/19/2005	1:50 a.m.	Tuscola	52 kts	0	0	\$0	\$0
11/5/2005	11:25 p.m.	Tuscola	52 kts	0	0	\$0	\$0
11/5/2005	11:30 p.m.	Villa Grove	50 kts	0	0	\$0	\$0
4/2/2006	5:58 p.m.	Garrett	60 kts	0	0	\$0	\$0
6/21/2007	11:35 p.m.	Arthur	50 kts	0	0	\$0	\$0
12/23/2007	12:48 a.m.	Countywide	52 kts*	0	0	\$8,000	\$0
6/13/2008	10:00 a.m.	Arthur	61 kts	0	0	\$25,000	\$0
6/13/2008	10:14 a.m.	Tuscola	52 kts	0	0	\$15,000	\$0
7/8/2008	5:05 p.m.	Tuscola	61 kts	0	0	\$2,000	\$0
7/21/2008	9:30 p.m.	Tuscola	52 kts	0	0	\$30,000	\$0
5/13/2009	11:10 p.m.	Tuscola	52 kts	0	0	\$40,000	\$0
5/13/2009	11:15 p.m.	Camargo	52 kts	0	0	\$10,000	\$0
5/14/2009	12:08 a.m.	Newman	52 kts	0	0	\$20,000	\$0
6/18/2009	5:35 a.m.	Arthur	61 kts	0	0	\$40,000	\$0
6/18/2009	5:40 a.m.	Tuscola	61 kts	0	0	\$40,000	\$0
6/19/2009	6:12 p.m.	Tuscola	52 kts	0	0	\$30,000	\$0
Totals:				11	0	\$671,000	\$0

* Denotes High Wind Event.

Source: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Douglas County, 2009.

**Table 2
Hail Events Reported in Douglas County
1974 through June 30, 2009**

Date	Time	Location	Magnitude (Diameter)	Injuries	Death	Property Damage	Crop Damage
6/14/1974	3:30 p.m.	Arcola	0.75 in.	0	0	\$0	\$0
4/10/1981	4:43 p.m.	Newman	2.75 in.	0	0	\$0	\$0
5/1/1983	3:16 p.m.	Tuscola	1.00 in.	0	0	\$0	\$0
7/4/1985	11:55 p.m.	Hindsboro	2.75 in.	0	0	\$0	\$0
5/25/1989	3:45 p.m.	Camargo	2.00 in.	0	0	\$0	\$0
7/9/1992	1:15 p.m.	Arcola	1.75 in.	0	0	\$0	\$0
7/30/1992	12:38 a.m.	Arcola	0.75 in.	0	0	\$0	\$0
4/19/1996	3:25 p.m.	Arcola	0.75 in.	0	0	\$0	\$0
4/19/1996	3:47 p.m.	Newman	2.00 in.	0	0	\$0	\$0
5/28/1996	1:00 p.m.	Villa Grove	1.50 in.	0	0	\$0	\$0
8/24/1997	7:36 p.m.	Arcola	1.00 in.	0	0	\$0	\$0
4/7/1998	6:05 p.m.	Arthur	4.50 in.	0	0	\$0	\$0
4/7/1998	6:25 p.m.	Arthur	1.75 in.	0	0	\$0	\$0
5/19/1998	7:40 p.m.	Arcola	1.75 in.	0	0	\$0	\$0
4/10/1999	8:56 p.m.	Garrett	0.75 in.	0	0	\$0	\$0
6/23/2000	6:59 p.m.	Newman	1.75 in.	0	0	\$0	\$0
8/2/2000	4:20 p.m.	Villa Grove	0.75 in.	0	0	\$0	\$0
8/26/2000	9:00 p.m.	Arthur	1.00 in.	0	0	\$0	\$0
8/26/2000	9:30 p.m.	Arthur	1.75 in.	0	0	\$0	\$0
4/12/2002	2:42 p.m.	Tuscola	0.75 in.	0	0	\$0	\$0
4/4/2003	6:00 p.m.	Arthur	1.00 in.	0	0	\$0	\$0
5/10/2003	8:17 a.m.	Tuscola	0.75 in.	0	0	\$0	\$0
3/11/2006	9:00 p.m.	Tuscola	0.75 in.	0	0	\$0	\$0
6/19/2006	3:48 p.m.	Tuscola	1.00 in.	0	0	\$0	\$0
6/19/2006	4:00 p.m.	Camargo	1.00 in.	0	0	\$0	\$0
4/3/2007	11:20 a.m.	Arcola	0.75 in.	0	0	\$0	\$0
2/5/2008	7:15 p.m.	Newman	0.88 in.	0	0	\$0	\$0
6/13/2008	10:14 a.m.	Tuscola	0.88 in.	0	0	\$0	\$0
6/21/2008	1:20 p.m.	Newman	0.88 in.	0	0	\$0	\$0
6/22/2008	2:32 p.m.	Villa Grove	0.88 in.	0	0	\$0	\$0
9/8/2008	1:02 p.m.	Arthur	0.88 in.	0	0	\$0	\$0
6/8/2009	4:45 p.m.	Tuscola	1.00 in.	0	0	\$0	\$0
6/8/2009	5:15 p.m.	Hindsboro	0.88 in.	0	0	\$0	\$0
6/18/2009	5:40 a.m.	Tuscola	1.00 in.	0	0	\$0	\$0
Totals:				0	0	\$0	\$0

Source: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Douglas County, 2009.

Table 3
Lightning Events Reported in Douglas County
January 1, 2009 through June 30, 2009

Date	Time	Location	Injuries	Death	Property Damage	Crop Damage
6/18/2009	5:40 a.m.	Tuscola	0	0	\$50,000	\$0
Totals:			1	0	\$50,000	\$0

Source: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Douglas County, 2009.

**Table 4
Tornadoes Reported in Douglas County
1957 through June 30, 2009**

Date	Time	Location	Magnitude (Fujita Scale)	Injuries	Deaths	Property Damage
6/12/1957	8:00 p.m.	Tuscola	F0	0	0	\$300
3/6/1961	4:15 a.m.	Tuscola	F2	2	0	\$250,000
3/11/1962	6:15 p.m.	Tuscola	NA	0	0	\$300
4/22/1963	6:30 p.m.	Tuscola	F3	20	0	\$25,000
12/15/1971	5:29 a.m.	Hindsboro*	F1	0	0	\$250,000
6/6/1974	5:25 p.m.	Tuscola* Villa Grove*	F2	0	0	\$2,500
8/10/1974	7:00 p.m.	Tuscola	F1	0	0	\$2,500
6/1/1980	7:00 a.m.	Tuscola	F2	7	0	\$2,500,000
6/2/1987	1:50 p.m.	Hindsboro	F1	0	0	\$250,000
5/15/1990	7:43 p.m.	Tuscola*	F0	0	0	\$0
6/20/1990	1:05 a.m.	Villa Grove	F2	0	0	\$2,500,000
8/16/1993	9:04 p.m.	Garrett*	F0	0	0	\$0
4/26/1994	8:30 p.m.	Arcola*	F0	0	0	\$0
4/7/1998	6:11 p.m.	Arthur*	F2	4	0	\$0
4/7/1998	6:42 p.m.	Hindsboro*	F0	0	0	\$0
4/7/1998	6:58 p.m.	Hindsboro*	F0	0	0	\$0
4/7/1998	7:04 p.m.	Newman*	F0	0	0	\$0
4/20/2004	1:00 p.m.	Tuscola*	F1	0	0	\$50,000
5/31/2006	1:34 p.m.	Tuscola*	F0	0	0	\$0
5/31/2006	1:39 p.m.	Tuscola*	F0	0	0	\$0
5/31/2006	1:39 p.m.	Garrett*	F0	0	0	\$0
5/31/2006	1:41 p.m.	Villa Grove*	F0	0	0	\$0
Totals:				33	0	\$5,830,600

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

Sources: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Douglas County, 2009.

**Table 5
Snow and Ice Events Reported in Douglas County
1995 through June 30, 2009**

Date	Time	Event (Magnitude)	Injuries	Death	Property Damage
12/8/1995	7:00 a.m.	Winter Storm 1" – 5" snow; blowing & drifting snow; very low wind chills	0	0	\$0
12/18/1995 thru 12/19/1995	7:00 p.m.	Winter Storm 6" snow; blowing & drifting snow	0	0	\$0
1/2/1996 thru 1/3/1996	2:00 a.m.	Winter Storm 8" snow; gusty winds creating near whiteout conditions	0	0	\$0
1/4/1996	3:00 a.m.	Winter Storm 2" – 7" snow	0	0	\$0
1/18/1996 thru 1/19/1996	10:00 a.m.	Winter Storm rain, ice, snow & very low wind chills	0	0	\$0
3/19/1996 thru 3/19/1996	12:00 a.m.	Winter Storm 11" snow; blowing & drifting snow	0	0	\$0
11/25/1996	10:00 a.m.	Winter Storm rain, freezing rain, sleet, significant icing, snow & strong winds	0	0	\$0
1/8/1997 thru 1/9/1997	9:00 p.m.	Heavy Snow 3" – 11" snow	0	0	\$0
1/15/1997 thru 1/17/1997	3:00 a.m.	Winter Storm 4" – 6" snow; strong winds; low temperatures & very low wind chills	0	0	\$0
1/26/1997 thru 1/26/1997	5:00 a.m.	Winter Storm 2" – 9" snow	0	0	\$0
3/8/1998 thru 3/9/1998	10:00 p.m.	Winter Storm rain, 2" snow & gusty winds	0	0	\$0
1/1/1999 thru 1/3/1999	12:00 p.m.	Heavy Snow 6" snow; gusty winds; very low wind chills	0	0	\$0

Table 5 Continued...
Snow and Ice Events Reported in Douglas County
1995 through June 30, 2009

Date	Time	Event (Magnitude)	Injuries	Death	Property Damage
3/11/2000	4:00 a.m.	Heavy Snow 6" – 10" snow; blowing & drifting snow	0	0	\$0
12/13/2000	5:00 p.m.	Winter Storm freezing rain; sleet; 6" – 8" snow	0	0	\$0
2/26/2002	1:00 a.m.	Heavy Snow light rain & sleet; 5.5" – 7" snow; blowing & drifting snow	0	0	\$0
3/25/2002 thru 3/26/2002	9:00 p.m.	Winter Storm ¼" to ½" freezing rain; 4" – 7" snow; blowing & drifting snow	0	0	\$0
12/24/2002 thru 12/25/2002	12:00 p.m.	Heavy Snow 6" – 8" snow	0	0	\$0
3/21/2006	5:50 a.m.	Winter Storm 6" – 10" snow; gusty winds	0	0	\$0
2/12/2007 thru 2/13/2007	10:00 p.m.	Winter Storm 7" – 9" snow; strong wind creating blizzard conditions	0	0	\$0
12/15/2007 thru 12/16/2007	1:00 p.m.	Heavy Snow 6" – 10" snow	0	0	\$0
1/31/2008	2:00 p.m.	Heavy Snow 6" snow	0	0	\$0
Totals:			0	0	\$0

Source: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Douglas County, 2009.

**Table 6
Extreme Cold Events Reported in Douglas County
1996 through June 30, 2009**

Date	Time	Event (Magnitude)	Injuries	Death	Property Damage
2/2/1996 thru 2/4/1996	---	Extreme Cold record low temperatures	0	0	\$0
1/5/1999	---	Extreme Cold record low temperatures	0	0	\$0
1/15/2009 thru 1/16/2009	---	Extreme Cold low temperatures (-20°F) & very low wind chills (-35°F to -40°F)	0	0	\$0
Totals:			0	0	\$0

Source: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Douglas County, 2009.

**Table 7
Flooding & Flash Flooding Events Reported in Douglas County
1950 through June 30, 2009**

Date	Time	Location	Type	Magnitude (inches)	Injuries	Death	Property Damage
1/4/1950	NA	Villa Grove	Flood	NA	0	0	\$500,000
2/10/1959	NA	Villa Grove	Flood	NA	0	0	\$0
6/22/1974 thru 6/23/1974	NA	Villa Grove	Flood	NA	0	0	\$300,000
3/4/1979	NA	Villa Grove	Flood	NA	0	0	\$0
4/11/1994 thru 4/12/1994	5:00 p.m.	countywide	Flash Flood	1.40" – 5.28"	0	0	\$50,000,000*
4/12/1994 thru 4/21/1994	12:00 p.m.	countywide	Flood	1" in addition to runoff from previous day's storm	0	0	
5/8/1996	12:15 p.m.	countywide	Flash Flood	4"	0	0	\$0
5/10/1996	11:30 a.m.	Villa Grove	Flash Flood	4"	0	0	\$0
6/12/1997	5:00 p.m.	countywide	Flash Flood	4" – 6"	0	0	\$0
7/11/2000	12:00 a.m.	Tuscola	Flash Flood	2"	0	0	\$0
7/9/2001	1:55 a.m.	Tuscola	Flash Flood	NA	0	0	\$0
4/19/2002 thru 4/20/2002	7:37 p.m.	Villa Grove	Flash Flood	6"	1	0	\$0
4/21/2002	7:05 a.m.	Tuscola Villa Grove Camargo	Flash Flood	NA	0	0	\$0
5/12/2002	5:30 a.m.	countywide	Flash Flood	4" – 5"	0	0	\$0
5/12/2002 thru 5/13/2002	9:00 a.m.	countywide	Flood	runoff from previous day's storm	0	0	\$0
5/10/2003	8:15 a.m.	Tuscola	Flash Flood	NA	0	0	\$0
7/9/2003 thru 7/10/2003	11:34 p.m.	countywide	Flash Flood	NA	0	0	\$0

* The property damage total of \$50,000,000 for the flash flooding & flooding events represents losses sustained in eight counties (including Douglas County). A breakdown by county was not available.

Table 7 Continued...
Flooding & Flash Flooding Events Reported in Douglas County
1950 through June 30, 2009

Date	Time	Location	Type	Magnitude (inches)	Injuries	Death	Property Damage
2/5/2008	6:25 p.m.	Arthur Tuscola	Flash Flood	NA	0	0	\$0
6/3/2008	7:15 a.m.	Newman	Flash Flood	NA	0	0	\$0
6/3/2008 thru 6/4/2008	11:30 p.m.	Arthur Chesterville	Flash Flood	NA	0	0	\$0
6/4/2008 thru 6/18/2008	11:00 p.m.	Countywide	Flood	8" – 9"	0	0	\$510,000
2/11/2009	12:00 p.m.	Arcola	Flood	2" – 4"	0	0	\$0
5/14/2009	12:30 a.m.	countywide	Flash Flood	3" – 4"	0	0	\$0
Totals					1	0	\$51,310,000*

* The property damage total of \$50,000,000 for the flash flooding & flooding events represents losses sustained in eight counties (including Douglas County). A breakdown by county was not available.

Sources: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Douglas County, 2009.
 City of Villa Grove, Illinois, Villa Grove Centennial Celebration 1903 – 2003, Centennial Committee, 2003.

Table 8
Extreme Heat Events Reported in Douglas County
1997 through June 30, 2009

Date	Temperature (°F)	Heat Index (°F)	Impacts (Severity)
7/26/1997 thru 7/27/1997	upper 90s to 100°F	105°F – 115°F	heat-related injuries*; roads buckling
6/26/1998 thru 6/28/1998	middle and upper 90s	105°F – 110°F	heat-related injuries*; roads buckling
7/20/1999 thru 7/26/1999	lower to middle 90s	105°F – 110°F	
7/28/1999 thru 7/31/1999	lower to middle 90s	105°F – 110°F	
7/22/2005 thru 7/25/2005	middle 90s to 100°F	105°F – 115°F	
7/30/2006 thru 8/2/2006	middle 90s to 100°F	105°F – 110°F	

* The heat-related injuries reported occurred over 35 counties (including Douglas County). The number of injuries and a breakdown by county were not available.

Source: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Douglas County, 2009.

08-R- 16

RESOLUTION

**RESOLUTION FOR PURSUIT OF THE PREPARATION OF AN ALL HAZARD
MITIGATION PLAN**

WHEREAS; Douglas 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

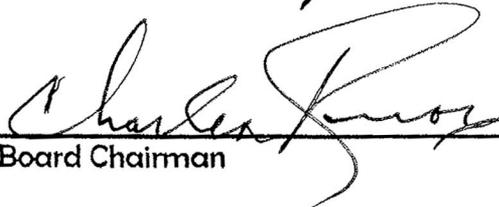
WHEREAS; Douglas County, Illinois must prepare an All Hazard Mitigation Plan before money can be released for projects; and

WHEREAS; this plan will include a listing of potential projects that can help reduce the damages caused by these storms; and

WHEREAS; Douglas 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 DOUGLAS COUNTY BOARD does Hereby pass this resolution to pursue the preparation of an All Hazard Mitigation Plan.

Passed this 17th day of September 2008



County Board Chairman

ATTEST: 

County Clerk and Recorder

Attendance Sheet
Douglas County Multi-Jurisdictional
All Hazards Mitigation Planning Committee
October 8, 2009

Signature	Organization/Entity
1. <i>[Handwritten Signature]</i>	<i>Arlwood Village</i>
2. <i>Mike Wilson</i>	<i>Eastern Illini Electric Co-op</i>
3. <i>[Handwritten Signature]</i>	<i>ICMA</i>
4. <i>Joseph A. [Handwritten]</i>	<i>Douglas Co</i>
5. <i>JASON GORD</i>	<i>Douglas Co</i>
6. <i>MARY GONFRICK</i>	<i>" " CERTS</i>
7. <i>Lee Ann Frick</i>	<i>" " CERTS</i>
8. <i>NOEL Frick</i>	<i>" " CERTS</i>
9. <i>Luigi Michael</i>	<i>Johnson, DEPT of Quisenberry</i>
10. <i>Andrea Bestwick</i>	<i>JDC</i>
11. <i>Bill Weber</i>	<i>Arcola</i>
12. <i>Chara Ray</i>	<i>EMA</i>
13. <i>Mark Watten</i>	<i>MBCI</i>
14. <i>Jean Christoski</i>	<i>Arcola CASD #1386</i>
15. <i>Ron Kingery</i>	<i>Arthur, IL</i>
16. <i>Thelma "Bots" Baney</i>	<i>Villa Grove</i>
17. <i>[Handwritten Signature]</i>	<i>Douglas County Highway</i>
18. <i>[Handwritten Signature]</i>	<i>Tascola CHSD #301</i>
19. <i>[Handwritten Signature]</i>	<i>Douglas County Clerk</i>
20. <i>Judi Villan</i>	<i>Mayor of Thomas</i>
21. <i>Jamie Davis</i>	<i>American Red Cross</i>
22. <i>[Handwritten Signature]</i>	<i>CITY OF VILLA GROVE</i>
23. <i>Rena Carr</i>	<i>Douglas County Supervisor of Assessments</i>
24. <i>Kara Kinney</i>	<i>Douglas County Farm Bureau</i>

Attendance Sheet
Douglas County Multi-Jurisdictional
All Hazards Mitigation Planning Committee
October 8, 2009

	<u>Signature</u>	<u>Organization/Entity</u>
25.	<i>Jennifer L. Hagen</i>	<i>Ameren IL Utilities</i>
26.	<i>Drew Hoel</i>	<i>City of Tuscola</i>
27.	<i>Jared Owen</i>	<i>IEMA</i>
28.	<i>JRIAN MOODY</i>	<i>TEDI - DOUGLAS CO FIRE/TUSCOLA</i>
29.		
30.		
31.		
32.		
33.		
34.		
35.		
36.		
37.		
38.		
39.		
40.		
41.		
42.		
43.		
44.		
45.		
46.		
47.		
48.		

Attendance Sheet
Douglas County Multi-Jurisdictional
All Hazards Mitigation Planning Committee
November 12, 2009

Signature	Organization/Entity
1. Ronald Kingery	Village of Proctor
2. Dawn Miller	LYONDELL BASELL
3. Maranna Oakley for Jim Ingram	Douglas County Clerk
4. Mike Wilson	Eastern Illini Electric Co-op
5. Mark Wathen	MBCI
6. Dan Price	MBCI
7. Dennis Kibler	CITY OF NEWMAN
8. Clint Howard	Douglas Co S.O.
9. Jamie Davis	American Red Cross
10. MARK FRASER	CITY OF NEWMAN
11. Jaggi Ostry	CITY OF VILVA GROVE
12. [Signature]	Douglas County
13. Julia Edwards	Arcola School Dist.
14. Boots Blaney	Villa Grove
15. RANDY BENEFAN	COUNTY BOARD
16. Kara Kinney	Douglas County Farm Bureau
17. Jason Good	Douglas County
18. Don Munson	Douglas County Bd
19. Drew Abel	City of Tuscola
20. Carl Troike	Carot
21. JOE BURGESS	Tuscola CHSD # 301
22. BRIAN MOODY	TUSCOLA ECONOMIC DEVELOPMENT
23. Bill Wagner	City of Arcola
24. [Signature]	Douglas Co EMA
GREG MICHAUD	JDQ
Charan Ray	Do Co EMA
Andrea Bostwick	JDQ

Attendance Sheet
Douglas County Multi-Jurisdictional
All Hazards Mitigation Planning Committee
February 11, 2010

Name (Please Print)	Organization/Entity
1. <i>Cham Ray</i>	EMA
2. <i>Don Sablance</i>	Assoc President
3. <i>Joe Victor</i>	EMA Director
4. <i>Dan Brice</i>	MBCI
5. <i>Dwaine Judd</i>	Edgar County ESDA
6. <i>Jenifer Hagen</i>	Ameren
7. <i>Jim Crane</i>	Douglas County
8. <i>Jamie Davis</i>	Am Red Cross
9. <i>Bouts Blaney</i>	City of Villa Grove
10. <i>Sara Crowl</i>	Douglas County
11. <i>Jenni Atkins</i>	CITY OF VILLA GROVE
12. <i>Clint Howard</i>	Douglas Co. S.O.
13. <i>Drew Abel</i>	City of Tuscola
14. <i>BRIAN Moor</i>	TEDI
15. <i>Jean Chrostoski</i>	Arcola CUSD #306
16. <i>Kara Kinney</i>	Farm Bureau
17. <i>Joe Bugan</i>	Tuscola CUSD #301
18. <i>Don Munson</i>	Douglas Co. Brand
19. <i>Andrea Bostwick</i>	AKQ
20. <i>Shylo Michael</i>	JKQ
21.	
22.	
23.	
24.	

Attendance Sheet
Douglas County Multi-Jurisdictional
All Hazards Mitigation Planning Committee
June 10, 2010

Name (Please Print)	Organization/Entity
1. Rocky WARNER	VILLAGE OF GARRETT
2. Joseph A. Victor	Douglas EMA
3. Ron Kingery	Village of Arthur
4. GREG R. MICHAUD	JOHNSON, DEPP & QUISENBERRY
5. Chana Ray	Douglas EMA
6. Teague Chrostoski	Arcola CUSD # 306
7. Don Munson	Arcola County Board
8. Kara Kinney	Douglas County Farm Bureau
9. Judd Fallock	Mayor City of New Market
10. Rena Cain	Way Co. Superior Assessments
11. Jeni Hagen	Ameren
12. Jason Broad	Douglas County
13. Brian Moody	Tuscola Economic Dev. / TFD
14. Drew Hoel	City of Tuscola
15. Dave Quice	Manufacturing Cabinets
16. Jeff London	" "
17. JIM INGRAM	DOUGLAS COUNTY CLERK
18. Bill Wagner	City of Arcola
19. AMANDA MINOR	DC Health
20. Andrea Bestwick	Johnson, Depp & Quisenberry
21.	
22.	
23.	
24.	

Attendance Sheet
Douglas County Multi-Jurisdictional
All Hazards Mitigation Planning Committee
September 23, 2010

Name (Please Print)	Organization/Entity
1. Joseph Victor	Douglas Co.
2. Bill Legare	City of Arcola
3. MARY Gen FRICK	Villagrove (Res.)
4. Noel K FRICK	Villagrove (Res.)
5. Lee Ann Frick	Villa Grove Res
6. Sue Perrine	Village of Arthur
7. Chana Ray	Douglas County EMA
8. Dan Quick	MBEI
9. JACKI ATHEY	CITY OF VILLA GROVE
10. BRIAN MOON	CITY OF TASCOLA
11. Jason Good	Douglas County
12.	
13.	
14.	
15.	
16.	
17.	
18.	
19.	
20.	
21.	
22.	
23.	
24.	

Attendance Sheet
Douglas County Multi-Jurisdictional
All Hazards Mitigation Planning Committee
September 23, 2010

<u>Name (Please Print)</u>	<u>Organization/Entity</u>
1. <i>Jacky Warren</i>	<i>Village of Garrett</i>
2. <i>David Munson</i>	<i>Douglas Co Bd</i>
3. <i>Helma Blaney</i>	<i>Village of Villa Grove</i>
4. <i>Paul Green</i>	<i>VILLA GROVE</i>
5. <i>Andrea Bostwick</i>	<i>JDD</i>
6. <i>GREG MICHAUD</i>	<i>JDDP</i>
7.	
8.	
9.	
10.	
11.	
12.	
13.	
14.	
15.	
16.	
17.	
18.	
19.	
20.	
21.	
22.	
23.	
24.	

**Douglas County Multi-Jurisdictional
All Hazards Mitigation Planning Committee Meeting**

**October 8, 2009
Douglas County Agricultural Center
900 S. Washington, Tuscola
10:00 a.m.**

Meeting Minutes

Committee Members

Ameren Utilities
American Red Cross
Arcola, Village of
Arcola Community School District #306
Arthur, Village of
Atwood, Village of
Douglas County
 County Clerk
 Emergency Management Agency
 Farm Bureau
 Highway Department
 Supervisor of Assessments
Eastern Illinois Electric Co-Op
IL Emergency Management Agency
Johnson, Depp & Quisenberry
MasterBrand Cabinets
Newman, Village of
Public Representatives
 Community Emergency Response Team
Tuscola Economic Development Inc.
Tuscola, Village of
Villa Grove, Village of

Welcome and Introductions

Joe Victor, Chairman of the Douglas County Multi-Jurisdictional All Hazards Mitigation Planning Committee, welcomed attendees. After describing how Douglas County selected a consultant to help prepare the All Hazard Mitigation Plan (the Plan), Joe asked the Committee members to introduce themselves by providing their name and who they represent.

Binders and handout materials were distributed to each member.

What Is A Natural Hazard Mitigation Plan and Why Should We Prepare It?

Jared Owen, Hazard Mitigation Planner for the Illinois Emergency Management Agency (IEMA), provided a power point presentation. He began his presentation by defining mitigation as an ongoing effort to lessen the impact disasters have on people and property from natural and man-made disasters. Natural Hazard Mitigation Plans are required by the Federal Emergency Management Agency (FEMA) for counties and municipalities to become eligible for grant monies for projects that will help reduce damages caused by storms and other natural hazards. He noted that during the 1990s' over \$25 billion was spent responding to damages caused by natural disasters.

Highlights of his presentation include:

For every dollar spent on mitigation planning in Illinois, three dollars in savings from responding to storm damages has been realized.

Mitigation projects are not all high dollar projects. Mitigation activities can include low cost public information efforts.

Since 1993, over 3,500 flood damaged homes have been purchased by IEMA.

Illinois leads the nation in floodplain enforcement. Less than 1% of flood damage claims are for new construction in Illinois.

Developing a Natural Hazard Mitigation Plan that is approved by IEMA and FEMA will make Douglas County and all participating municipalities eligible for funds to finance mitigation projects and activities. In response to a question, he noted that grant applications for mitigation projects and activities can be prepared before the Plan is completed.

The Mitigation Plan that will be prepared by the Douglas County Mitigation Committee should

- 1) determine the natural risks to be addressed,
- 2) analyze ways to mitigate these risks, and
- 3) prioritize the mitigation projects and activities that are included in the Plan.

Jared stressed that the Committee should use this planning process to brainstorm potential mitigation projects and activities. While the costs and benefits of each mitigation project and activity should be considered, the planning process should primarily focus on how to prevent problems.

He also emphasized that this planning process should not be viewed as a competition. There will be different ways to categorize the various projects and activities included in the Plan, but the municipalities are not competing with the County or each other for mitigation funding.

The Planning Process

Greg Michaud, from Johnson, Depp & Quisenberry (an environmental and engineering consulting firm) commended the Committee members for committing their time to help prevent damages to life and property for the current and future residents of Douglas County by participating in this process.

The purpose of the Committee meetings is to develop a Plan that can be adopted by the County and each participating municipality. Specific activities for the Committee meetings include:

- | | |
|-----------------------------------|---|
| 1 st Committee meeting | Orientation to the Planning Process
Establish Risk Assessment Subcommittee |
| 2 nd Committee meeting | Discuss the Risk Assessment
Develop the Mission Statement
Establish Goals for the Plan
Committee returns the Critical Facilities List and the List of Documents Relevant to the All Hazard Mitigation Plan |
| 3 rd Committee meeting | Discuss Mitigation Projects and Activities
Develop a Mitigation Strategy |
| 4 th Committee meeting | Review and Discuss the Draft Plan |
| 5 th Committee meeting | Present the Revised Plan for public review |

Natural hazards identified in the Plan include severe storms, flooding, tornados, severe winter storms, drought, extreme heat and earthquakes. Douglas County has chosen to include man-made hazards, and the type of man-made hazards evaluated will be discussed at the next Committee meeting.

Andrea Bostwick, JDQ, distributed the Critical Facilities form for each municipality and the County to complete and return at the next meeting. Andrea also distributed the List of Documents Relevant to the All Hazard Mitigation Plan. This list includes Land Use Plan, Flood Ordinances, and related documents. Copies of these documents should be sent to Andrea or Greg so that these documents can be evaluated and described in the Plan.

Greg described how the plan is reviewed and adopted. JDQ will prepare the draft Plan for review by the Committee. Comments by the Committee will be used to revise the draft Plan. The revised Plan will be presented for public comment at a public forum which is the 5th Committee meeting. This public forum may be conducted either as a public hearing or a public meeting depending on County requirements or preferences. Comments from the public will be used to further revise the Plan. Following IEMA/FEMA review, further revisions to the Plan will be made as needed.

The County and each participating municipality will have the opportunity to formally adopt the Plan by resolution. After the County and each participating municipality adopts the Plan, they will become eligible for funding to implement the mitigation projects and activities identified in the Plan. Copies of each resolution will be appended to the Plan. The Plan will be monitored annually and updated every five years.

In response to several questions, Greg noted:

- All mitigation projects and activities for which federal funding will be sought, must be included in the Plan.
- Mitigation projects can be added to the Plan after it is adopted.
- FEMA will not penalize a municipality or county for not implementing any project or activity. Even if funding appears doubtful, it is better to include a project or activity in the Plan.
- Any communities already involved in mitigation planning should bring the results of their work to the Mitigation Committee so that others are aware of these projects. For example, if one community is considering a project that may have an adverse impact on someone else, members of the Mitigation Committee can work together to determine a better way to solve the problem in a manner that won't create a problem for others.

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. He pointed out that a mayor who wants to participate may not be able to attend because of other obligations; however, a substitute representative can be designated to participate in the Committee meetings.

Mission Statement

In the packet of materials distributed by Andrea there is a draft Mission Statement and examples of typical goals that can be found in these types of Plans. The draft Mission Statement can be changed.

Committee members were asked to review this Statement and submit their comments to Greg or Andrea via e-mail or bring their comments to the next committee meeting.

What Happens Next?

Greg told Committee members that risk assessment, goal setting, and the mission statement would be the main topics of the next committee meeting. Andrea and Greg are trained

environmental risk assessors who will lead the risk assessment. Anyone interested in serving as a volunteer on the Risk Assessment subcommittee should contact Joe Victor, Andrea or Greg.

The second meeting of the Committee was set for:

Thursday, November 12

10 a.m.

Douglas County Agricultural Center

Public Comment

Public notice of this committee meeting clearly invited public attendance. Three members of the general public attended this meeting. They expressed their appreciation at being allowed to attend the Committee meetings.

With no further comments or question, the meeting was adjourned.

**Douglas County Multi-Jurisdictional
All Hazards Mitigation Planning Committee Meeting**

**November 12, 2009
Douglas County Agricultural Center
900 S. Washington, Tuscola
10:00 a.m.**

Meeting Minutes

Committee Members

American Red Cross
Arcola, City of
Arcola Community School District #306
Arthur, Village of
Cabot Corp.
Douglas County
 County Board
 County Clerk
 Emergency Management Agency
 Farm Bureau
 Highway Department
 Sheriff's Office
 Supervisor of Assessments
Eastern Illinois Electric Co-Op
Johnson, Depp & Quisenberry
Lyondell Basell
MasterBrand Cabinets
Newman, City of
Tuscola Economic Development Inc.
Tuscola Community School District #301
Tuscola, City of
Villa Grove, City of

Welcome and Introductions

Joe Victor, Chairman of the Douglas County Multi-Jurisdictional All Hazards Mitigation Planning Committee, welcomed attendees. He noted that the Committee members have the knowledge of and experience with emergency matters to help put together a Plan that will best meet the needs of Douglas County. He commended the members for taking time out of their schedules to be at this meeting.

Handout materials were distributed to each member prior to the start of the meeting.

Review of Meeting Minutes

Chairman Victor asked if there were any changes to the meeting minutes for the inaugural committee meeting on October 8. No changes were suggested. Consequently the meeting minutes were approved.

Mission Statement

At the previous committee meeting, members were asked to evaluate a draft mission statement and bring their comments and suggestions to this meeting. Greg Michaud, Johnson, Depp & Quisenberry, asked if there were any changes or discussion about the mission statement. Hearing none, the mission statement will be followed by the committee to develop this Plan.

Risk Assessment

Andrea Bostwick and Greg Michaud, risk assessment specialists with Johnson, Depp & Quisenberry, worked with the Risk Assessment Subcommittee to prepare the natural hazards profile and frequency of occurrence materials for the Committee to review. The Risk Assessment Subcommittee consisted of Jacki Athey, Jason Goad, Joe Victor and Chana Ray.

Greg began the presentation by asking members to share a brief recollection of a storm event that was memorable to them. Many members shared stories about different types of storms including ice storms, floods, tornadoes, and snow storms. Greg mentioned key aspects about each storm event that Committee Members may want to consider when they choose potential mitigation projects.

Following this discussion, Greg asked each member to respond in writing to three questions.

1. What is the most frequently occurring type of storm they remember in the area they live?
2. What is the most damaging type of storm in the area they live?
3. What kind of man-made hazard should be considered for inclusion in the Plan?

Answers to these questions will be used to help prepare the Plan.

Andrea and Greg researched storm events using information from the National Weather Service and other sources to provide the risk analysis handed out to each member. Greg provided the following overview:

- Douglas County has had over 164 storm events.
- Property damages cumulatively total at least \$6.5 million dollars.
- At least 46 injuries have occurred, but no deaths were reported.

Severe storms including thunderstorms, tornadoes and hail storm are the most frequently occurring natural hazard. There have been at least 60 thunderstorms and high wind events since 1980, and approximately 30 hail storms since 1974. Twenty-one tornadoes have been verified in Douglas County since 1957. While there are data gaps, it is apparent that Douglas County can expect to see an average of 4 major severe storms of this type per year.

Flood events number nineteen since 1994. Property damages from floods are more difficult to verify because the dollar amounts reported to the National Weather Service tend to cover multiple counties. In addition, the closed nature and self-responsibility characteristics within the Amish communities add to the under-reporting of flood damage and other damages caused by natural hazards in Douglas County.

Severe winter storms number twenty-four since 1995. Severe winter storms include heavy snow, ice, and blizzard conditions.

Extreme Heat events have occurred six times since 1997, and during the last 30 years two droughts—1983 and 1988—have hit Douglas County.

Andrea and Greg emphasized the need to carefully review this information and they encouraged Committee members to provide verifiable information to help fill data gaps for the years when no records were found and to add to any information already confirmed.

Before the vulnerability assessment can be completed, Committee members were asked to complete the **Critical Facilities form**. All of the participating government entities provided their completed forms along with the List of Documents Relevant to the All Hazard Mitigation Plan.

The Committee was asked whether they wanted earthquakes and dams included in their Plan. No reported breaches of dams have been found for Douglas County, and only one dam appears to be public-owned. Jim Crane noted that if this public-owned dam failed, adverse travel for emergency services and residents would occur for one community. Several other members also discussed the value of including information on hazards that are less likely to occur. Through this discussion a consensus emerged that the Douglas County Plan should include information on dams and earthquakes.

Goals

Eight goals had been distributed at the previous meeting for the Committee's consideration. The Committee found these goals acceptable and will consider whether any community specific goals need to be added.

What Happens Next?

Greg announced that the purpose of the next committee meeting is to bring ideas for **mitigation projects**. These mitigation projects should be approved by the municipal or county entity and submitted to the Committee on the mitigation project list distributed at today's meeting. Committee members agreed that it would take more than one month to assemble these lists and obtain local approval.

Committee members also received a handout that lists examples of mitigation projects for the County and municipalities. He emphasizes that long-term permanent solutions should be considered when proposing mitigation actions. Since all participating jurisdictions are involved with the National Flood Insurance Program, mitigation activities described in the hand-out material should be included in all of the participant's lists to help ensure continued compliance.

Greg explained that a **project prioritization method** is required by FEMA. Developing this method is more manageable as a small committee. He asked for candidates to serve on this subcommittee.

Citizen surveys are being distributed to each member of this Committee. In addition to completing this survey, participating jurisdictions are asked if they would be willing to make the survey available at the city clerk's office for residents to complete. Electronic copies of this survey are also available.

The second meeting of the Committee was set for:

Thursday, February 11

10 a.m.

Douglas County Agricultural Center

Public Comment

Public notice of this committee meeting clearly invited public attendance; however, no members other than Committee members attended.

With no further comments or question, the meeting was adjourned.

**Douglas County Multi-Jurisdictional
All Hazards Mitigation Planning Committee Meeting**

**February 11, 2010
Douglas County Agricultural Center
900 S. Washington, Tuscola
10:00 a.m.**

Meeting Minutes

Committee Members

Ameren
American Red Cross
Arcola Community School District #306
Atwood, Village of
Douglas County
 County Board
 Emergency Management Agency
 Farm Bureau
 Highway Department
 Sheriff's Office
Johnson, Depp & Quisenberry
MasterBrand Cabinets
Tuscola, City of
Tuscola Community School District #301
Tuscola Economic Development Inc.
Villa Grove, City of

General Public
 Edgar County ESDA

Welcome and Introductions

Joe Victor, Chairman of the Douglas County Multi-Jurisdictional All Hazards Mitigation Planning Committee, welcomed attendees.

Handout materials were distributed to each member prior to the start of the meeting.

Review of Meeting Minutes

Chairman Victor asked if there were any changes to the meeting minutes for the committee meeting on November 12. No changes were suggested.

Critical Facilities and Vulnerability Assessment

After summarizing the highlights from the Committee's previous meeting, Greg Michaud, JDQ, noted that the Committee is on schedule in accomplishing the objectives for each meeting. He commended the Committee for getting all of the Critical Facilities lists submitted. With this information the Vulnerability Assessment can commence.

Greg began the presentation by asking members to describe incidents where their critical facilities had been damaged by natural hazards or man-made hazards.

All of the participating municipalities and Douglas County have experienced damage to critical facilities. Even though Arcola is the only participating municipality not located in a floodplain, critical facilities in Arcola have been impacted by floodwaters.

Some of the critical facilities damaged include:

- An example of domestic terrorism occurred with the fire bombing of the Douglas County Courthouse in 1980.
- Repeated lightning strikes of the Douglas County Sheriff's Office resulting in over \$25,000 in damages in 2009.
- Frequent flooding in Tuscola which makes the High School and Middle School inaccessible to students.
- Repeated flooding impacts on the public drinking water and wastewater treatment facilities in Villa Grove
- The Newman Township Road Commission Building in Newman was flooded twice and received hail damage during a 2 month period in 2007.
- An Arcola school took on water from a heavy rain which caused a backflow problem in the sewer system in 2007.
- The snowstorm in 2010 that resulted in closure of the Douglas County Courthouse for nearly two days and disrupted jury hearings.
- Recurring drainage problems following large thunderstorms in Atwood where water ponds on the north side of Route 36 near the wastewater treatment facility. Proper water drainage under this road might eliminate drainage problems.

Greg encouraged Committee members to submit other examples that can be used in the Plan.

Mitigation Projects

At the previous Committee meeting, Mitigation Project forms were distributed. Participants were asked to use these forms to submit their lists of Mitigation projects.

Each government entity should have at least one mitigation project. Three administrative activities must be included for each entity to remain in compliance with the National Flood Insurance Program.

These lists must be completed before the Plan can be submitted to IEMA/FEMA for review.

Project Prioritization Method

Greg described a proposed Project Prioritization method. This method categorizes mitigation projects and activities based on two factors: 1) the degree to which damages are reduced or eliminated and 2) whether the hazard is considered more or less significant. With the first factor we need to ask ourselves, “Would the proposed mitigation project or activity eliminate or significantly reduce damages or does it merely have the potential to reduce damages?”

The second factor is based primarily on frequency that the event occurs. For example, in Douglas County severe storms, floods, and tornados occur more frequently and cause more damages than severe heat and dam failures. Consequently, severe storms, floods and tornados might be considered more significant hazards than extreme heat and dam failures

The Committee agreed to adopt this project prioritization methodology.

Andrea Bostwick, JDQ, showed how the Mitigation Projects will be evaluated and entered into the Plan. Using a large sized chart mounted on the wall, she entered information using a storm shelter project as an example since this is a frequently submitted project encountered in other Plans. Andrea demonstrated how this project would be evaluated according to the goals, degree of mitigation, prioritization method, population impacted, cost/benefit, and other requirements listed in each column. Each of the items listed in the columns were described so that the Committee members could determine how their projects and activities will appear.

She noted that each project and activity submitted by the participating municipalities and county would be segregated on this chart so that they would be easy to find. She encouraged participants to look at the list submitted by other members. Projects submitted by another member can be duplicated on your list. In addition, projects that may be in the initial phases of study should also be included on your lists.

What Happens Next?

Completed citizen surveys were submitted to Andrea and Greg for tabulation. The results will be presented at the next Committee meeting.

Committee members felt that they could submit their lists of Mitigation Projects by the beginning of April. Consequently, meeting dates were discussed for June.

The fourth meeting of the Committee was set for:

Thursday, June 10

10 a.m.

Douglas County Agricultural Center

Public Comment

Public notice of this committee meeting clearly invited public attendance. One member of the general public attended and he did not have any questions. With no further comments or question, Joe Victor adjourned the meeting.

**Douglas County Multi-Jurisdictional
All Hazards Mitigation Planning Committee Meeting**

**June 10, 2010
Douglas County Agricultural Center
900 S. Washington, Tuscola
10:00 a.m.**

Meeting Minutes

Committee Members

Ameren
Arcola, City of
Arcola Community School District #306
Arthur, Village of
Douglas County
 Assessments
 Clerk
 County Board
 Emergency Management Agency
 Farm Bureau
 Highway Department
 Public Health Department
Garrett, Village of
Johnson, Depp & Quisenberry
MasterBrand Cabinets
Newman, City of
Tuscola, City of
Tuscola Economic Development Inc.

Welcome and Introductions

Joe Victor, Chairman of the Douglas County Multi-Jurisdictional All Hazards Mitigation Planning Committee, welcomed attendees.

Handout materials were distributed to each member prior to the start of the meeting.

Review of Meeting Minutes

Chairman Victor asked if there were any changes to the meeting minutes for the committee meeting on February 11. No changes were suggested.

Mitigation Projects & Mitigation Action Tables

After summarizing the final steps that need to be accomplished in order to fulfill the Committee's mission, Greg Michaud, JDQ, noted that the Committee is on schedule in accomplishing the objectives for each meeting. He commended the Committee for getting their Mitigation Projects lists submitted.

Andrea Bostwick distributed the "Action Plan" which describes each mitigation project and activity along with:

- Hazards to be mitigated
- Goals
- Type of mitigation activity
- Effects on new and existing buildings
- Prioritization of each project and activity
- Responsible entity, timeframe, and preliminary cost-benefit estimate

Committee members were asked to carefully review each mitigation project and provide any clarifications and additions before the next meeting.

Property tax assessment figures were provided by Rena Cain from the County Assessment office. This information will be used finish the vulnerability assessment.

Since this Plan is a "living document" participating jurisdictions will be able to add projects and activities annually following the Plan's adoption. Douglas County and each participating municipality must adopt the Plan by resolution to become eligible for state/federal mitigation funding.

Bill Munson raised a question about sustaining the plan as committee members retire. As committee members are replaced on the county and municipal level, their replacements may not be aware of or put forth the effort needed to maintain the Plan. This is an issue that all participants are asked to carefully consider. While Joe Victor commented that this responsibility begins with him, other participants will need to cooperate for the annual reviews and five-year updates to the Plan.

Risk/Vulnerability Assessment

The Committee previously reviewed the risk assessment of natural hazards. Property tax assessment figures were provided by Rena Cain from the County Assessment office. This information will be used finish the vulnerability assessment.

Today Greg provided a summary of the following man-made hazards: hazardous waste generation, transportation (roads, rails and pipelines), disposal, remediation, nuclear accidents, and terrorism.

Prominent points made during this presentation include:

- Four major generators of hazardous substances are located in Douglas County but none of these generators have unresolved violations with how they generate, handle, or store these substances.
- Over the past 5 years, Douglas County has experienced 8 hazmat accidents on its roads.
- Two rail incidents resulted in the release of hazardous substances over the past 10 years. While there have been more rail incidents with hazardous substances in Macon and Champaign counties, none of these incidents impacted Douglas County.
- No pipeline releases of petroleum products and gases have occurred during the past 20 years.
- All solid household waste is disposed outside of the County. The Multi County Landfill, located in Douglas County, is closed. No other landfills currently operate within Douglas County.
- There are no Superfund sites in Douglas County. Eleven other sites in Douglas County where hazardous waste posed problems were handled through the Site Remediation Program administered by the Illinois Environmental Protection Agency. All eleven sites have been remediated.
- No municipality in the County would be considered at high risk from an accident at the Clinton Nuclear Power facility. However, a portion of the County's crops and livestock could be at risk depending on the amount of radiation released, wind direction, and other factors.

What Happens Next?

The fifth meeting of the Committee will be conducted as a public forum. At this meeting stations (tables) will be set up for County and participating municipal representatives. This meeting is scheduled for:

Thursday, September 23
5-7 p.m.
Douglas County Agricultural Center

This forum will be conducted in the open-house style to encourage public input. Unlike conventional public meetings, the general public can come and go at any time during the forum. The draft plan will be available so that residents can review any portion of the plan and make comments in the time they need.

Public Comment

Public notice of this committee meeting clearly invited public attendance. With no members of the general public in attendance and no further questions, Joe Victor adjourned the meeting.

Questionnaire
Douglas County All Hazard Mitigation Plan

You can help protect lives and property from storm damage in Douglas County by taking a few moments to complete this questionnaire.

1. Please indicate where you live in Douglas County:

- Unincorporated area of Douglas County
- Arcola
- Arthur
- Atwood
- Camargo
- Garrett
- Hindsboro
- Newman
- Tuscola
- Villa Grove
- Other (please specify): _____

2. In approximately the past 10 years, have you or someone in your household experienced a natural disaster within Douglas County such as severe storms, tornadoes, extreme heat, winter storms, flood, earthquake, drought or other natural disaster?

- Yes
- No

2a. If you answered yes to question #2, which of the following types of natural hazards have you or someone in your household experienced? (Please check all that apply.)

- Severe Weather
- Floods
- Winter Storms
- Extreme Heat
- Tornadoes
- Earthquakes
- Drought
- Other (please specify): _____

Questionnaire
Douglas County All Hazard Mitigation Plan

3. Using the scale below, please check how prepared you feel for natural hazards likely to occur within Douglas County.

- Not at all prepared.
- Somewhat prepared.
- Adequately prepared.
- Well prepared.
- Very well prepared.

4. What steps have you or someone in your household taken to prepare for a natural disaster? (Please check all that apply.)

- Food
- Water
- Flashlight
- Batteries
- Battery-powered radio
- Medical supplies (First Aid Kit)
- Practiced a fire escape plan
- Received First Aid/CPR training
- Fire extinguisher
- Discussed utility shutoffs
- Other (please specify): _____

5. 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.

Douglas County Multi-Jurisdictional All Hazards Mitigation Planning Committee

Frequently Asked Questions

1) What is the Douglas County All Hazard Mitigation Plan?

The Douglas 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 Douglas 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 Douglas 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) What happens after the Plan is developed?

The Plan will be presented to Douglas County and each participating municipality for formal adoption by resolution. After the Plan is adopted, work can begin on those mitigation projects and activities identified in the Plan.

More information can be obtained by contacting:

Joseph A. Victor
Douglas County Emergency Management Agency Director
200 S. Prairie
Tuscola, Illinois 61953
Tel: (217) 253-9538

County To Work On All Hazard Mitigation Plan

Douglas County will begin preparing a countywide plan that will identify activities and projects to reduce the damages caused by natural hazards such as tornadoes, floods, snowstorms, thunderstorms and ice storms.

This plan will also evaluate manmade hazards. The plan is called an All Hazard Mitigation Plan and will be funded through a grant from the Federal Emergency Management

Agency.

"Developing this plan will help us be better prepared before storms hit as well as making us eligible for federal funding to construct projects that can reduce damages on our communities and families. Douglas County is highly vulnerable to flood damage. Since 1981, Douglas County has been federally declared as a flood disaster on five occasions," said Joe Victor, Douglas County EMA director.

This mitigation plan will focus on prevention, not responses to disaster. Thus, it does not duplicate or replace any emergency response plans already developed.

"Mitigation" means taking steps to prevent or reduce damages from storms on people and property. Any county or community that has a hazard mitigation plan that is compliant with the Disaster Mitigation Act of 2000 is eligible for hazard mitigation grant money from FEMA.

A Douglas 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 that 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 this team will be held Thursday, October 8, beginning at 10

a.m. It will be conducted at the Douglas County Agricultural Center, 900 S. Washington St. in Tuscola.

The committee will meet periodically through the next several months to develop a draft plan. Douglas County residents are welcome to attend every meeting.

"An ongoing dialogue between local government and agriculture, business, education, emergency management, health and utility representatives, along with other interested residents will be developed," said Victor. "Through this dialogue the plan will be developed with constant input from the public."

After the plan is drafted, more opportunity for public review and comment will be provided through public forums, the Douglas County website and other methods.

Other specific opportunities for public input will be available. For further information on participation opportunities and information about Douglas County's All Hazard Mitigation Plan, visit douglascountyil.com or call Victor at 253-9538.

Countywide Natural Hazard Plan

Douglas County will begin preparing a countywide plan that will identify activities and projects to reduce the damages caused by natural hazards such as tornadoes, floods, snow storms, thunderstorms, and ice storms. This plan will also evaluate man-made hazards. The plan is called an All Hazard Mitigation Plan and will be funded through a grant from the Federal Emergency Management Agency (FEMA).

“Developing this plan will help us be better prepared before storms hit as well as making us eligible for federal funding to construct projects that can reduce damages on our communities and families. Douglas County is highly vulnerable to flood damage. Since 1981, Douglas County has been Federally declared as a flood disaster on five occasions,” said Joe Victor, Douglas County EMA Director.

This mitigation plan will focus on prevention not responses to disaster, thus it does not duplicate or replace any emergency response plans already developed. “Mitigation” means taking steps to prevent or reduce damages from storms on people and property. Any county or community that has a hazard mitigation plan that is compliant with the Disaster Mitigation Act of 2000 is eligible for hazard mitigation grant money from FEMA.

A Douglas 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 that

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 this team will be held Thurs., October 8 beginning at 10 a.m. This meeting will be conducted at the Douglas County Agricultural Center at 900 S. Washington St. in Tuscola. The committee will meet periodically through the next several months to develop a draft plan. Douglas County residents are welcome to attend every meeting.

“An ongoing dialogue between local government and agriculture, business, education, emergency management, health, and utility representatives, along with other interested residents will be developed. Through this dialogue the plan will be developed with constant input from the public,” added Victor.

After the plan is drafted, more opportunity for public review and comment will be provided through public forums, the Douglas County website, and other methods.

Other specific opportunities for public input will be available.

For further information on participation opportunities and information about Douglas County’s All Hazard Mitigation Plan visit douglascountylil.com or call Joe Victor, (217) 253-9538.

Damage control subject of public meeting

Representatives from Douglas County and local municipalities will meet Thursday, November 12 at the Douglas County Agricultural Center at 10 a.m. to continue working on a plan to reduce damage from natural and man-made disasters. This group, called the Douglas County Hazard Mitigation Committee, will meet at various times through spring to prepare this plan. The committee meetings are open to the public.

"This meeting will focus on weather-based data from the National Weather Service and state and national climatology reports over the past 50

years. By identifying those areas most vulnerable to damage from natural disasters in our county, we can better develop a strategy to reduce damages caused by these events," said Joe Victor, Douglas County EMA director.

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 kinds of projects and activities that might be included in Douglas County's plan.

While the plan is being developed, the public will

have multiple opportunities to provide input. At least four Mitigation Committee meetings will be conducted and these meetings are open to the public. Interested persons who are unable to attend these meetings can submit questions and comments to the committee members or directly to the Douglas County Emergency Management Agency.

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 at public meetings held by the county and at each of the participating municipalities.

Once the state and federal emergency management agencies approve it, Douglas County and the participating municipalities can adopt the plan, making them eligible for hazard mitigation funds.

Information about the plan and how the public can comment can also be found on the Douglas County Web site.

Muscola Journal 11/11/09

Plan to Reduce Storm Damages Moves Forward

Newman
Independant
11/12/09

Representatives from Douglas county and local municipalities will meet Thursday, November 12 at the Douglas County Agricultural Center at 10:00 a.m. to continue working on a plan to reduce damage from natural and man-made disasters. This group, called the Douglas County Hazard Mitigation Committee, will meet at various times through spring to prepare this Plan. The Committee meetings are open to the public.

"This meeting will focus on weather based data from the National Weather service and state and national climatologic reports over the past 50 years. By identifying those areas most vulnerable to damage from natural disasters in our county, we can better develop a strategy to reduce damages caused by these events," said Joe Victor, Douglas County EMA Director.

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 might be included in Douglas County's Plan.

While the Plan is being developed, the public will have multiple opportunities to provide input. At least four Mitigation Committee meetings will be conducted and these meetings are open to the public. Interested persons who are unable to attend these meetings can submit questions and comments to the Committee members or directly to the

Douglas County Emergency Management Agency. 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 at public meetings held by the County and at each of the participating municipalities.

Once the state and federal emergency management agencies approve it, Douglas County and the participating municipalities can adopt the Plan making them eligible for hazard mitigation funds.

Information about the plan and how the public can comment can also be found on the Douglas County web site.

Reducing storm damage focus of public meeting scheduled next week

Tuscola Journal
February 3, 2010

Representatives from Douglas County and local municipalities will meet Thursday, February 11 at the Douglas County Agricultural Center at 10 a.m. to continue working on a plan to reduce damages from storms and natural disasters. This group, led by the Douglas County All-Hazard Mitigation Committee, is holding its third meeting to prepare this plan. The committee meetings are open to the public.

"We have gathered storm damage information to help identify our vulnerabilities across the county. During the next few months, the participating municipalities and various county departments will identify specific projects to prevent damages caused by these storms. In addition

to storms, we will look at natural and manmade disasters too," said Joe Victor, county Emergency Management Agency director.

Building storm shelters, resolving drainage problems, 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 materials and conducting drainage studies are examples of other activities that might also be included in the All Hazard Mitigation Plan.

While the plan is being developed, the public will have multiple opportunities to provide input. In addition to attending meetings of the

Committee, citizen surveys, the County Web site, and the municipal offices of participating communities provide ways for residents to become involved. Interested persons can submit questions and comments to the Committee members or directly to the Douglas County Emergency Management Agency. A draft plan will be prepared for public review and comment before it is submitted to the Illinois Emergency Management Agency and the Federal Emergency Management Agency.

Once the state and federal emergency management agencies approve it, Douglas County and the participating municipalities can adopt the Plan making them eligible for hazard mitigation funds.

Preventing Harm to Public Health and Property

Representatives from Douglas County and local municipalities will meet Thursday, February 11 at the Douglas County Agricultural Center at 10:00 a.m. to continue working on a plan to reduce damages from storms and natural disasters. This group, called the Douglas County All Hazard Mitigation Committee, is holding its third meeting to prepare this plan. The Committee meetings are open to the public.

"We have gathered storm event information to help identify our vulnerabilities across the county. During the next few months, the participating municipalities and various county departments will identify specific projects to prevent damages caused by these storms. In addition to storms we will look at natural and man-made disasters too," said Joe Victor, County Emergency Management Agency Director.

Building storm shelters, resolving drainage problems, 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 materials and conducting drainage studies are examples of other activities that might also be included in the All Hazard Mitigation Plan.

grandmother. Nickey was a member of the Brocton Christian Church and the Oakland Christian Church, the Order of the Eastern Star for over 50 years, and the Brocton American Legion Auxiliary. She enjoyed spending time with her family, and playing cards.

A memorial fund is being established for The Oaks Manor in Oakland, which

While the Plan is being developed, the public will have multiple opportunities to provide input. In addition to attending meetings of the Committee, citizen surveys, the County Web site, and the municipal offices of participating communities provide ways to residents to become involved. Interested persons can submit questions and comments to the Committee members or directly to the Douglas County Emergency Management Agency. A draft plan will be prepared for public review and comment before it is submitted to the Illinois Emergency Management Agency and the Federal Emergency Management Agency.

Once the state and federal emergency management agencies approve it, Douglas County and the participating municipalities can adopt the Plan making them eligible for hazard mitigation funds.

Hazard Mitigation Committee Making Plans For Douglas Co.

Villa Grove News
February 4, 2010

Representatives from Douglas County and local municipalities will meet Thursday, Feb. 11 at the Douglas County Agricultural Center at 10 a.m. to continue working on a plan to reduce damages from storms and natural disasters. This group, called the Douglas County All Hazard Mitigation Committee, is holding its third meeting to prepare this plan. The Committee meetings are open to the public.

"We have gathered storm event information to help identify our vulnerabilities across the County. During the next few months, the participating municipalities and various County departments will identify specific projects to prevent damages caused by these storms. In addition to storms we will look at natural and man-made disasters too," said Joe Victor, County Emergency Management Agency Director.

Building storm shelters, resolving drainage problems, 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 materials and conducting drainage studies are examples of other activities that might also be included in the All Hazard Mitigation Plan.

While the plan is being developed, the public will have multiple opportunities to provide input. In addition to attending meetings of the committee, citizen surveys, the county web site, and the municipal offices of participating communities provide ways for residents to become involved. Interested persons can submit questions and comments to the committee members or directly to the Douglas County Emergency Management Agency. A draft plan will be prepared for public review and comment before it is submitted to the Illinois Emergency Management Agency and the Federal Emergency Management Agency.

Once the state and federal emergency management agencies approve it, Douglas County and the participating municipalities can adopt the plan

making them eligible for hazard mitigation funds.

Local Committee Continues Disaster Plan Preparations

Arcola Record
February 4, 2010

■ Next Meeting Scheduled For February 11

Representatives from Thursday, February 11, at a.m. to continue working on a plan to reduce damages from storms and natural disasters.

Douglas County and local the Douglas County municipalities will meet Agricultural Center at 10

Representatives from Thursday, February 11, at a.m. to continue working on a plan to reduce damages from storms and natural disasters.

While the plan is being developed, the public will have multiple opportunities to provide input. In addition to attending meetings of the committee, citizen surveys, the county web site, and the municipal offices of participating communities provide ways for residents to become involved.

Interested persons can submit questions and comments to the committee members or directly to the Douglas County Emergency Management Agency. A draft plan will be prepared for public review and comment before it is submitted to the Illinois Emergency Management Agency and the Federal Emergency Management Agency.

Once the state and federal emergency management agencies approve it, Douglas County and the participating municipalities can adopt the plan, making them eligible for hazard mitigation funds.

This group, called the Douglas County All Hazard Mitigation Committee, is holding its third meeting to prepare this plan. The committee meetings are open to the public.

"We have gathered storm event information to help identify our vulnerabilities across the county," said Joe Victor, county Emergency Management Agency director. "During the next few months, the participating municipalities and various county departments will identify specific projects to prevent damages caused by these storms. In addition to storms, we will look at natural and manmade disasters too."

Building storm shelters, resolving drainage problems, 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 materials and conducting drainage studies are examples of other activities that might also be included in the All Hazard Mitigation Plan.

Mitigation planning brings to light

By Colleen Lehmann

Disasters are nothing new for local Emergency Management Agency (EMA) personnel Joe Victor and Chana Ray, but even they were surprised by some of the data compiled by Springfield consulting firm JDQ in the quest for an all-hazards mitigation plan to entice future funding sources in the event of severe weather.

"There are some alarming numbers out there. We were surprised to see the number of dollars in damages and the deaths in Douglas County as a result of severe weather. It's really kind of amazing to look at the whole picture and see how hard-hit this area has been in recent years," said Victor.

Cases in point: Since 1990, Douglas County has had 24 tornadoes, resulting in \$5.8 million of damage (average property damage per event--\$321,166) and 33 injuries. In the same timeframe, Douglas County has experienced 19 floods, resulting in over \$100.5 million in damages, two injuries and two deaths. And with 7.9 percent of Douglas County currently in a floodplain, those events are likely to continue occurring.

There have been six presidential disaster declarations for Douglas County since 1990--March 6, 1990 for an ice storm, freezing rains and severe winds; June, 20 1990 for thunderstorms, severe

winds, tornado, torrential rains and flooding; April 26, 1994 for torrential rains, thunderstorm and flash flooding; May 6, 1996 for severe storms, torrential rains and severe winds; May 21, 2002 for severe storms, tornado, flooding and excessive rainfall; and June 24, 2008 for severe storms and flooding.

The mitigation planning process began about a year and a half ago, as communities across the state were scrambling for disaster relief dollars in the wake of severe flooding.

"Having received state aid, which ultimately came through federal sources, it was strongly urged that having a formal mitigation plan in place for the county would help with the continued awarding of disaster relief in the future. They are just trying to protect their investment--having communities take a good hard look at what contributing factors they may be able to identify and deal with to lessen the severity of weather-related disasters. And while preparedness is something taken for granted, you just can't do that," Victor explained.

Douglas County agreed to enter into a contract with the firm, and is paying 20 percent--\$8,770--of the \$43,850 contract cost. The bulk of the cost, 80 percent, is being paid for with federal grant monies.

Toll of severe weather on county

"Yes, it will mean taking properties off the tax rolls, but it's also properties that continually sustain flooding damage that cost the owners and the government money to repair. It's not a perfect solution, but it's a necessary one so we don't keep repeating this scenario over and over," Victor explained.

Severe weather always an issue for county residents

Anyone living in Central Illinois knows severe weather is an ever-present possibility, be it thunderstorms and flooding in the spring, flooding or drought in the summer, and ice and snow in the winter. Keeping abreast of those conditions is crucial in keeping damages and injuries to a minimum.

Victor noted that signing up for CodeRED is still one of the best and easiest ways to be notified of an impending emergency.

"We are fortunate to have this option in place within the county, and all you have to do is make sure your phone number is registered within our system. Then you'll automatically receive a phone call in the event of, say, a tornado that's been sighted, school closings due to severe weather, flooding situations, whenever officials choose to activate the calling system."

Currently, the communities of Tuscola, Arcola, Atwood and Newman, the Tuscola school district, the county, and Cabot all contribute to pay the \$5,000 annual cost to have and maintain the CodeRed emergency calling system. For five Douglas County com-

munities--Camargo, Murdock, Chesterville, Bourbon and Garrett--it is the only warning system available to residents. You can sign up for CodeRED by going online to www.douglascountyil.com, clicking on the CodeRED link on the right-hand side, and following the directions. Or call Victor's office at 253-4808 and talk to Victor or Ray. And starting with this edition and continuing for several weeks, The Tuscola Journal will be publishing severe weather facts and information, as prepared by the Illinois Emergency Management Agency, to keep you informed on how to deal with Central Illinois weather situations.

Projects to reduce storm damages

How can vital services be maintained for Douglas County residents when flooding occurs? What steps can be taken to prevent injuries and deaths from major storms and other hazards? These and other questions will be discussed when the Douglas County Natural Hazard Mitigation Planning Committee meets at 10 a.m. on June 10 at the Douglas County Agricultural Building.

This committee has been conducting working meetings open to the public since October 2009, to prepare a plan that will identify projects and activities to protect Douglas 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.

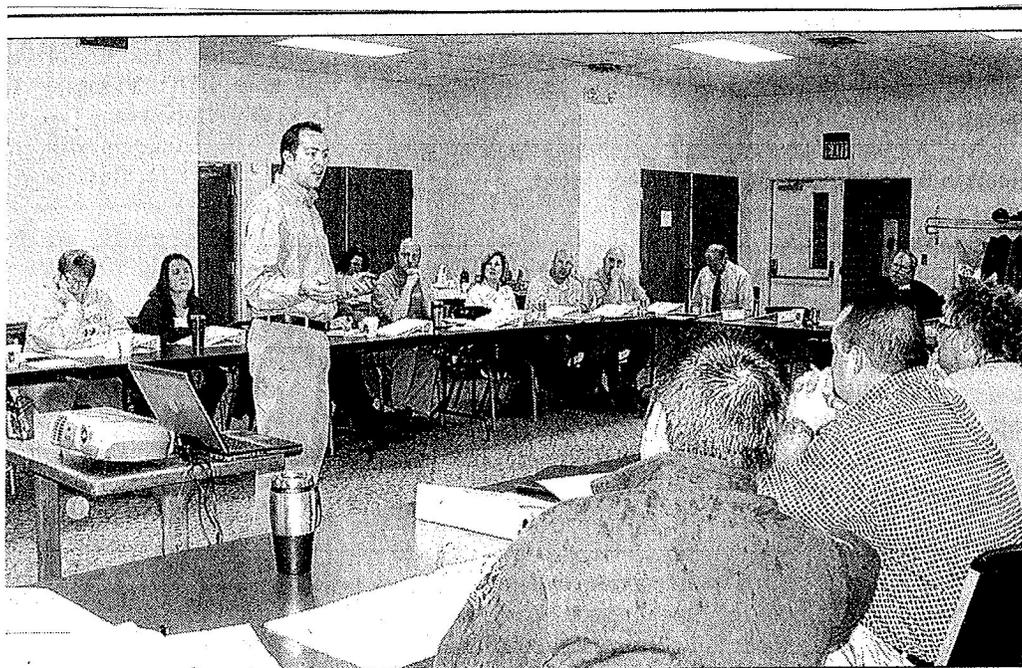
"Other emergency plans are directed at responding after a storm or natural disaster hits. This is the first time in Douglas County that we are looking at actions that can reduce or eliminate damages caused by specific types of storms and other natural disasters," said Joe Victor, the county's Emergency Management Agency director.

Arcola, Arthur, Atwood, Newman, Tuscola, and Villa

Grove are participating in this planning process. Participating municipalities and various county departments have been identifying the kinds of mitigation projects that should be included in the plan.

Interested persons can submit questions and comments to the committee members or directly to the Douglas County Emergency Management Agency by contacting Chana Ray or Joe Victor (253-9538). Information about the planning process is available via the Douglas County Web site and at municipal offices of participating municipalities.

*Tuscola
Journal
6/3/2010*



Jared Owen, hazard mitigation planner for the Illinois Emergency Management Agency, speaks to the Douglas County All Hazards Mitigation Planning Committee about the planning process.

County Hazard Mitigation Planning Committee Slates June 10 Meeting

Arcola Record
June 3, 2010

How can vital services be maintained for Douglas County residents when flooding occurs? What steps can be taken to prevent injuries and deaths from major storms and other hazards?

These and other questions will be discussed when the Douglas County Natural Hazard Mitigation Planning Committee meets at 10 a.m. June 10 at the Douglas County Agricultural Building.

This committee has been conducting working meetings open to the public since October 2009 to prepare a plan that will identify projects and activities to protect Douglas 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.

"Other emergency plans are directed at responding after a storm or natural disaster

hits," said Joe Victor, county Emergency Management Agency director. "This is the first time in Douglas County that we are looking at actions that can reduce or eliminate damages caused by specific types of storms and other natural disasters."

Arcola, Arthur, Atwood, Newman, Tuscola and Villa Grove are participating in this planning process. Participating municipalities and various county departments have been identifying the kinds of mitigation projects that should be included in the plan.

Interested persons can submit questions and comments to the committee members or directly to the Douglas County Emergency Management Agency by contacting Chana Ray or Joe Victor at 253-9538.

Information about the planning process is available via the Douglas County website and at municipal offices of participating municipalities.

Projects To Reduce Damages From Storms

Newman Independent
June 3, 2010

How can vital services be maintained for Douglas County residents when flooding occurs? What steps can be taken to prevent injuries and deaths from major storms and other hazards? These and other questions will be discussed when the Douglas County Natural Hazard Mitigation Planning Committee meets at 10:00 am on June 10 at the Douglas County Agricultural Building.

This committee has been conducting working meetings open to the public since October, 2009, to prepare a plan that will identify projects and activities to protect Douglas 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.

"Other emergency plans are directed at responding after a storm or natural disaster hits. This is the first time in

Douglas county that we are looking at actions that can reduce or eliminate damages caused by specific types of storms and other natural disasters," according to Joe Victor, County Emergency Management Agency Director.

Arcola, Arthur, Atwood, Newman, Tuscola, and Villa Grove are participating in this planning process. Participating municipalities and various County departments have been identifying the kinds of mitigation projects that should be included in the Plan.

Interested persons can submit questions and comments to the Committee members or directly to the Douglas County Emergency Management Agency by contacting Chana Ray or Joe Victor at 253-9538. Information about the planning process is available via the Douglas County website and at municipal offices or participating municipalities.

Newman Independent
9/15/2010

Public Forum on Plan to Reduce Storm Damages

A plan to reduce harm to Douglas County residents and property from major storms and other hazards will be presented for public comment on September 23 at the Douglas County Agricultural Building on 900 S. Washington Street in Tuscola. This public forum will be conducted in an open-house format so that residents can come and go at their convenience anytime between 5 and 7 pm. Members of the Douglas County Natural Hazard Mitigation Planning Committee will be available to answer questions.

"We have received public input to develop this plan since we began meeting last year and conducting workshops open to the public. This input has included information about storm events, property damages, and potential projects that could reduce harm to people and property," according to Joe Victor, Committee Chairman.

Arcola, Arthur, Atwood, Garrett,

Newman, Tuscola and Villa Grove are participating in the planning process. The municipalities and various county departments have been indentifying the kinds of projects that should be included in the plan.

For interested persons who are unable to attend this public forum, questions and comments can be submitted to the Douglas County Emergency Management Agency until October 7. A copy of the plan is available for viewing at the Douglas County Emergency Management Agency website at: <http://www.douglascountyil.com/coronerallhazardmit.html>

Following the public forum, 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.

"After state and federal approval is obtained, the plan must be adopted by

Public forum on storm damage

A plan to reduce harm to Douglas County residents and property from major storms and other hazards will be presented for public comment on Thursday, September 23 at the Douglas County Agricultural Building, 900 South Washington Street in Tuscola. This public forum will be conducted in an open-house format so that residents can come and go at their convenience anytime between 5 and 7 p.m. Members of the Douglas County Natural Hazard Mitigation Planning Committee will be available to answer questions.

"We have received public input to develop this plan since we began meeting last year and conducting workshops open to the public. This input has included informa-

tion about storm events, property damages, and potential projects that could reduce harm to people and property," according to Joe Victor, committee chairman.

Arcola, Arthur, Atwood, Garrett, Newman, Tuscola and Villa Grove are participating in the planning process. These municipalities and various county departments have been identifying the kinds of projects that should be included in the plan.

For interested persons who are unable to attend this public forum, questions and comments can be submitted to the Douglas County Emergency Management Agency until October 7. A copy of the plan is available for viewing at the Douglas County Emergency Management Agency

website at <http://www.douglascounty.il.com/coronerallhazardmit.html>.

Following this public forum, 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.

"After state and federal approval is obtained, the plan must be adopted by each participating municipality and the county to become eligible for federal funds," added Victor, who is also director of Douglas County Emergency Management Agency.

This plan, unlike all other emergency plans, is aimed at identifying action that can be taken before a natural disaster occurs.

Tuscola Journal 9/15/2010

[Home / News](#)*Journal Gazette & Times-Courier (Mattoon, IL)*

Plan to reduce harm from natural disasters in Douglas County to be presented Sept. 23

- [Story](#)
- [Discussion](#)

Plan to reduce harm from natural disasters in Douglas County to be presented Sept. 23

Staff Report JG-TC.com | Posted: Monday, September 13, 2010 6:00 am | (0) Comments

Font Size:

[Default font size](#)

[Larger font size](#)

• [1 retweet](#)

• [Recommend](#) Be the first of your friends to recommend this.

TUSCOLA - A plan to reduce harm to Douglas County residents and property from major storms and other hazards will be presented for public comment on Sept. 23 at the Douglas County Agricultural Building on 900 S. Washington Street in Tuscola. This public forum will be conducted in an open-house format so that residents can come and go at their convenience anytime between 5 and 7 p.m. Members of the Douglas County Natural Hazard Mitigation Planning Committee will be available to answer questions.

"We have received public input to develop this plan since we began meeting last year and conducting workshops open to the public. This input has included information about storm events, property damages, and potential projects that could reduce harm to people and property," according to Joe Victor, Committee Chairman.

Arcola, Arthur, Atwood, Garrett, Newman, Tuscola and Villa Grove are participating in the planning process. These municipalities and various County departments have been identifying the kinds of projects that should be included in the plan.

For interested persons who are unable to attend this public forum, questions and comments can be submitted to the Douglas County Emergency Management Agency until Oct. 7. A copy of the plan is available for viewing at the Douglas County Emergency Management Agency website at: <http://www.douglascountyil.com/coronerahasardmit.html>

Following this public forum, 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.

"After state and federal approval is obtained, the plan must be adopted by each participating municipality and the county to become eligible for federal funds," added Joe Victor, Director, Douglas County Emergency Management Agency.

This plan, unlike all other emergency plans, is aimed at identifying action that can be taken before a natural disaster occurs.

Copyright 2010 JG-TC.com. All rights reserved. This material may not be published, broadcast, rewritten or redistributed.

Posted in News, Local on *Monday, September 13, 2010 6:00 am*

Share This Story

Print Email ShareThis

Other Stories

- Second bank robber suspect ends local chase at high speed
- Unemployment declines in August in 8-county region
- Wind energy
- Sims' creation part of HOPE fundraiser
- Board unanimously picks Love to lead Camp New Hope as director
- FutureGen companies name new CEO
- Lake Island tract suits to go forward
- Marching band takes honors in competition

Sponsored Links

County Sheriff Records?

Lookup Free County Sheriff Arrest Records On Anyone. Official Service.
GovArrestRecords.com

Douglas County New Jobs

Douglas County Is Hiring Today. \$9-\$97/Hour. Immediate Hires Only.
DouglasCounty.LocalJobsFind.net

Oregon Realtors - Lane & Douglas County

Directory of Realtors, builders and lenders in Lane/Douglas Counties.
www.oip.net

Ads by Yahoo!



JUDGE JUDY

Weekdays at 4pm



HOME NEWS WEATHER SPORTS COMMUNITY CONTESTS ENTERTAINMENT STATION INFO MOBILE Search Site GO

Go Mobile: Text Alerts | Check out our NEW iPhone and Android apps! | Watch ABC Newschannel 15 Live @ m.wicd15.com

WATCH VIDEO

- ABC 15 TOP STORIES
- BE THE PARENT
- CRUISIN' ILLINOIS
- GOLDEN APPLE AWARD
- ILLINOIS CENTRAL TV
- IN THE GARDEN
- IN THE KITCHEN
- MAKING THE GRADE
- PET OF THE WEEK
- PHOTO SHARE 15
- SUNRISE ON THE FARM

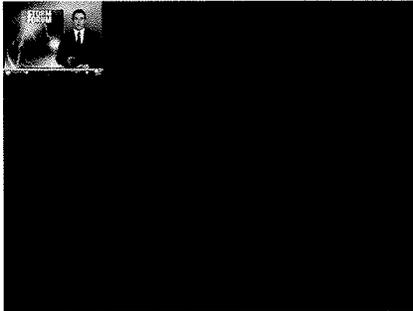
READ

- ABC 15 ON THE GO
- BLAGOJEVICH TRIAL
- BUSINESS NEWS
- CONSUMER NEWS
- GET THIS
- ILLINOIS NEWS
- INTERNATIONAL NEWS
- NATIONAL NEWS
- NEWS TIPS
- PUMP PATROL
- RECIPES
- SCHOOL CLOSINGS
- SCIENCE & TECH NEWS
- TODAY IN HISTORY
- WEB WATCH

ADVERTISEMENT



WICD ABC NEWSCHANNEL 15 TOP STORIES VIDEO



1 Like 2 Share

Tuscola- Douglas County officials say they have a plan to reduce severe weather damage, and other hazards in their towns. But now the next step is presenting these problems to federal officials so the county becomes eligible for federal disaster money.

Obviously you can't stop mother nature from running its course, but you can reduce its impact through effective planning. All counties are eligible for federal money through The Disaster Mitigation Act of 2000 that provides governments money to cut down on property damage resulting from natural, and man-made hazards.

A familiar sight in Douglas County after severe storms leave a lasting mark. Heavy rains flood the streets, and roads barricaded to clean up the mess. With state budgets tighter than ever, a severe storm can potentially cost taxpayers money.

"I think you're going to find that there are going to be more competitive situations out there and we all need to prepare for that," said Joe Victor, the hazard committee chairman.

"We had already a grant that was from FEMA for our community building which we wanted to tear down and the money was there and we had already been approved and the state put a halt on it," said Villa Grove Mayor Boots Blaney.

It's these situations that prompted officials to go back to the drawing board and come up with a plan to prepare for severe weather even before it hits.

"It allows the federal government to look at our plan and see if we identify these circumstances in our mitigation workshops and if we have plans to correct it to see that it doesn't happen again," said Victor.

The money would be used with these natural and man made disasters including severe storms, tornadoes, flooding, even terrorism.

"I hope it can go all the way and everything gets done really fast," said Villa Grove resident, MaryGen Frick.

Whether that means fixing infrastructure, or buying out homes that sit on a flood plain and getting rid of them. The money would fund projects that wouldn't otherwise be financially possible.

Since 1965, Douglas County experienced 14 floods events, five tornadoes and even one earthquake. Since that time, the county was declared a disaster area six times.

The public is welcome to the next open forum discussion on October 8th to give their input on what they'd like to see go into the plan.

Slight changes will be made after that meeting, then the plan will be presented to FEMA and IEMA officials by October 18th.

Reported by: Bret Buganski

Thursday, September 23 2010, 10:14 PM CDT

WICD ABC NEWSCHANNEL 15 ILLINOIS NEWS

McLean County board member arrested
Associated Press Writer

VIDEO LIST

- Fun Art Activity for Kids on Sunrise
- Douglas County Prevents Storm Damage
- Matton Police Looking For Serial Burglar
- Anhydrous Ammonia Theft
- Absentee Voting Starts Thursday
- Harvest Ahead of Schedule
- Identity Theft Victim Trying to Rebuild Life
- School Board Approves Teachers' Contract
- Illinois Teen Unemployment Up
- 25th Anniversary Of Farm Aid
- Top State Republican Stops In Urbana
- More People Are Using Food Stamps
- New Controversy Over Carrington Settlement

69°



FORECAST

FRIDAY: Early Morning Showers Clearing, Cooler this Afternoon High 77

FRIDAY NIGHT: Clear Skies Much ...

More

ADVERTISEMENT

Get great deals from local businesses on your phone or computer.

Visit mobideals.info



BUSINESS NEWS

Stocks surge strongly

NEW YORK (AP) -- Stock prices are on the rise again, as a September rally roars on.

More

CONSUMER INFO

Bugs in baby formula? Parents worried about recall

Worried parents are bombarding drugmaker Abbott Laboratories with phone calls about millions of containers of infant formula recalled because they might contain parts of beetles. ...

More

SCIENCE/TECH NEWS

IN THE NEWS: FACEBOOK OUTAGE

NEW YORK (AP) -- Facebook says it's back to normal after a technical glitch forced it offline yesterday afternoon.

More

GET THIS

COMEDY RECORD

PORTLAND, Maine (AP) -- It's something to laugh at.

More

DOUGLAS COUNTY NEWSPAPERS

Arcola Record Herald (once weekly)
118 E. Main Street
Arcola, IL 61910
(217) 268-4950

Arthur Graphic-Clarion (once weekly)
113 E. Illinois St.
Arthur, IL 61911
(217) 543-2151

Newman Independent (once weekly)
P.O. Box 417
Newman, IL 61942
(217) 837-2414

Tuscola Journal (once weekly)
115 W. Sale
Tuscola, IL 61953
(217) 253-5086

Villa Grove News (once weekly)
5 S. Main Street
Villa Grove, IL 61956
(217) 832-4201

DOUGLAS COUNTY MULTI-JURISDICTIONAL ALL HAZARDS MITIGATION PLAN

PUBLIC FORUM – OPEN HOUSE

SEPTEMBER 23, 2010

DOUGLAS COUNTY AGRICULTURAL CENTER

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 the residents of Douglas County. Since 1965, Douglas County has had six federally-declared disasters. In addition, in the past decade alone, there have been over 61 severe storms (thunderstorms, high winds, hail, lightning strikes, heavy rain etc.), 14 flood events, 10 severe winter storms, five tornadoes, two extreme heat events and one 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 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, 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 Douglas County Multi-Jurisdiction All Hazards Mitigation Plan?

Recognizing the benefits that could be gained from preparing an all hazards mitigation plan, the Douglas County Board passed a resolution on September 17, 2008 authorizing the development of the Douglas County Multi-Jurisdictional All Hazards Mitigation Plan. The County then invited all the municipalities within Douglas County to participate. The following municipalities chose to participate in the Plan's development:

- | | | |
|----------|-----------|---------------|
| ❖ Arcola | ❖ Garrett | ❖ Tuscola |
| ❖ Arthur | ❖ Newman | ❖ Villa Grove |
| ❖ Atwood | | |

How was the Plan developed?

The Douglas County Multi-Jurisdictional All Hazards Mitigation Plan was developed through the Douglas County Multi-Jurisdictional All Hazards Mitigation Planning Committee. The Planning Committee included representatives from each participating jurisdictions, the general public as well as agriculture, business, education, emergency services (ambulance, fire and law enforcement), healthcare and GIS. The Planning Committee met five times between October, 2009 and September, 2010.

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)
- ❖ severe winter storms (snow & ice)
- ❖ tornadoes
- ❖ flood
- ❖ extreme heat
- ❖ drought
- ❖ earthquakes
- ❖ dam failures
- ❖ man-made hazards including:
 - hazardous substances (generation, transportation, disposal & remediation)
 - hazardous material incidents
 - nuclear accidents
 - 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 list 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 hazard would have on the health and safety of the residents of Douglas 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 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.

Place
Stamp
Here

Joseph A. Victor
Douglas County Emergency Management Agency
200 S. Prairie Street
Tuscola, IL 61953



Douglas County EMA
Joseph A. Victor, EMA Director
Chana L. Ray, Administrative Assistant
200 South Prairie Tuscola, IL 61953
Phone: (217) 253-9538 Fax: (217) 253-5235

To: Champaign County EMA ()
Coles County EMA ()
Edgar County EMA ()
Moultrie County ()
Piatt County EMA ()
Vermilion County EMA ()

From: Joe Victor, Douglas County EMA Director

Subject: Hazard Mitigation Planning

Date: January 14, 2010

The purpose of this memorandum is to let you know that Douglas County is preparing a countywide All Hazards Mitigation Plan. We are preparing this plan to meet the Federal Emergency Management Agency's (FEMA) prerequisite for hazard mitigation funds.

Johnson, Depp & Quisenberry, and environmental and engineering consulting firm experienced in preparing these plans, is leading our planning process.

The Douglas County All Hazards Mitigation Planning Committee has been formed to work on the Plan. The next meeting of the Committee will be:

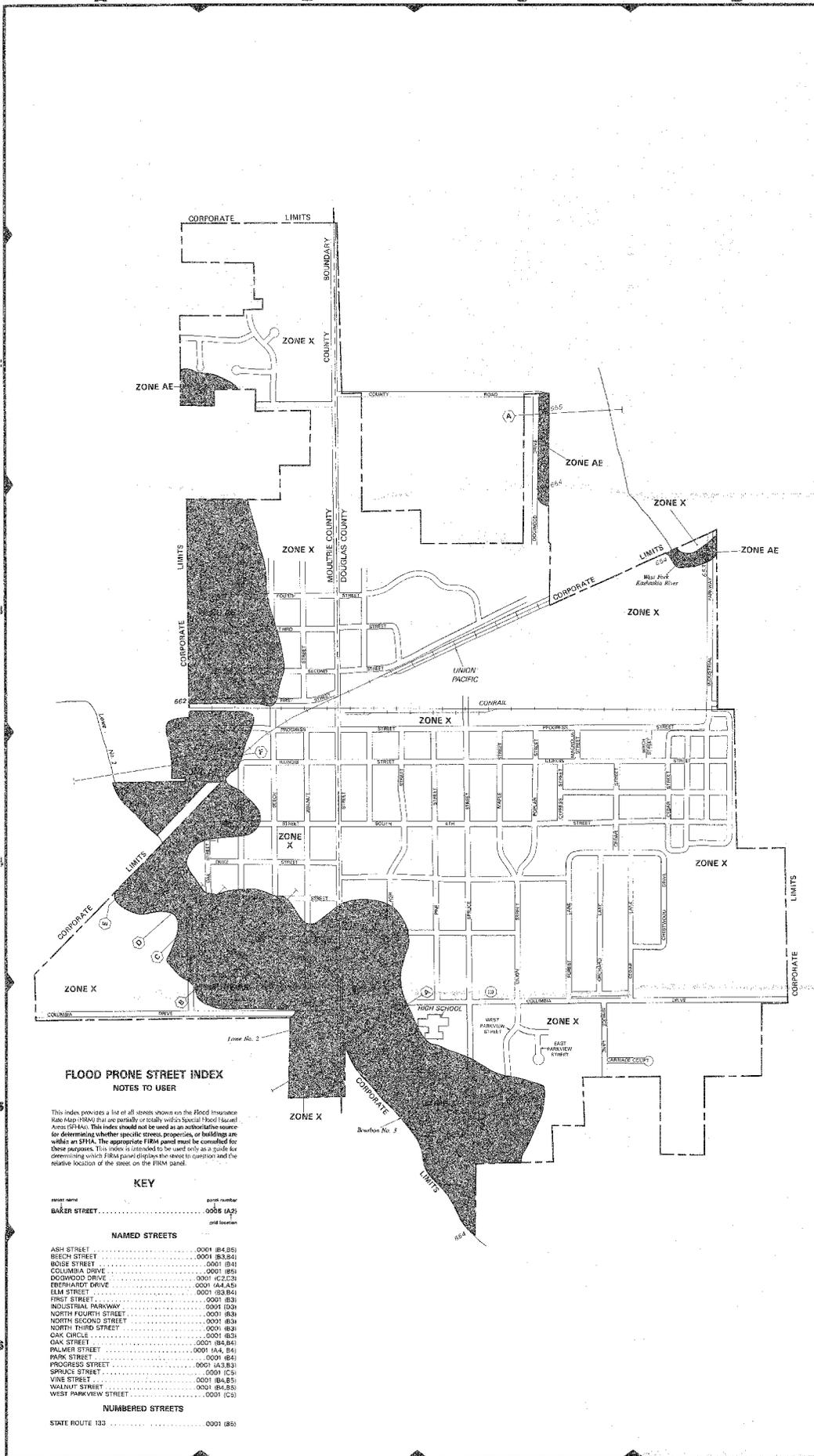
Thursday, February 11

Douglas County Agricultural Center
900 S. Washington Street (south of the intersection of Washington and Route 36)
Tuscola, IL
10 a.m.

The Committee meetings are open to the public and you are welcome to attend.

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

**“Preparedness, when Properly Pursued, is a WAY OF
LIFE
NOT a Sudden, Spectacular Program.”**



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

- ZONE A** No base flood elevations determined.
- ZONE AE** Base flood elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
- ZONE AG** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined; flow areas of 100 ft² for flood log, velocities also determined.
- ZONE A99** To be protected from 100-year flood by Federal Flood protection works under construction; no base elevations determined.
- ZONE V** Coastal flood with velocity hazard (wave action); no base flood elevations determined.
- ZONE VE** Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

- ZONE X** Areas of 500-year flood, water of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

- ZONE X** Areas determined to be outside 500-year flood plain.
- ZONE D** Areas in which flood hazards are undetermined.

Boundaries

- Flood Boundary
- Floodway Boundary
- Zone D Boundary
- Zone V Boundary
- Boundary Dividing Special Flood Hazard Zones and Regulatory Districting Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones

Other Symbols

- 61.3 Base Flood Elevation Line; Elevation in Feet
- D Cross Section Line
- EL 897 Base Flood Elevation in Feet where Uniform Within Zone*
- RM7X Elevation Reference Mark
- MLE River Mile

*Referenced to the National Geodetic Vertical Datum of 1929

NOTES

This map is for use in administering the National Flood Insurance Program's flood area and is not to be used as an authoritative source for determining whether specific streets, properties, or buildings are within an SFHA. The appropriate FIRMA panel must be consulted for these purposes. This index is intended to be used only as a guide for determining which FIRMA panel displays the area in question and the relative location of the street on the FIRMA panel.

MAP REPOSITORY

Source: Information Center, 126 East Franklin, Arthur, Illinois (Map available for reference only, not for distribution.)

INITIAL IDENTIFICATION

MAY 3, 1974
FLOOD HAZARD BOUNDARY MAP REVISIONS

MARCH 6, 1976
FLOOD INSURANCE RATE MAP EFFECTIVE

DECEMBER 2, 1988
FLOOD INSURANCE RATE MAP REVISIONS

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at (800) 338-6830.

APPROXIMATE SCALE IN FEET

0 100 200 300 400 500

FLOOD PRONE STREET INDEX NOTES TO USER

This index provides a list of all streets shown on the Flood Insurance Rate Map (FIRM) that are partially or totally within Special Flood Hazard Areas (SFHA). This index should not be used as an authoritative source for determining whether specific streets, properties, or buildings are within an SFHA. The appropriate FIRMA panel must be consulted for these purposes. This index is intended to be used only as a guide for determining which FIRMA panel displays the area in question and the relative location of the street on the FIRMA panel.

KEY

STREET NAME	GRID NUMBER
BAKER STREET	0005 (A2)

NAMED STREETS

ASH STREET	0001 (B4.05)
BEECH STREET	0001 (B3.84)
BONE STREET	0001 (B4)
COLUMBIA DRIVE	0001 (B5)
DICKWOOD DRIVE	0001 (C2.23)
DEBANDOT DRIVE	0001 (A4-A5)
ELM STREET	0001 (B3.84)
FIRST STREET	0001 (B3)
INDUSTRIAL PARKWAY	0001 (D3)
NORTH FOURTH STREET	0001 (B3)
NORTH SECOND STREET	0001 (B3)
NORTH THIRD STREET	0001 (B3)
OAK CIRCLE	0001 (B3)
OAK STREET	0001 (B4.84)
PALMER STREET	0001 (A4, B4)
PARK STREET	0001 (B4)
PROGRESS STREET	0001 (A3.83)
SPRUCE STREET	0001 (C3)
VINE STREET	0001 (B4.85)
WALNUT STREET	0001 (B4.85)
WEST PARKVIEW STREET	0001 (C3)

NUMBERED STREETS

STATE ROUTE 133	0001 (B5)
-----------------	-----------

NATIONAL FLOOD INSURANCE PROGRAM

FIRM FLOOD INSURANCE RATE MAP

VILLAGE OF
ARTHUR,
ILLINOIS
MOULTRIE AND DOUGLAS
COUNTIES

(ONLY PANEL PRINTED)

COMMUNITY-PANEL NUMBER

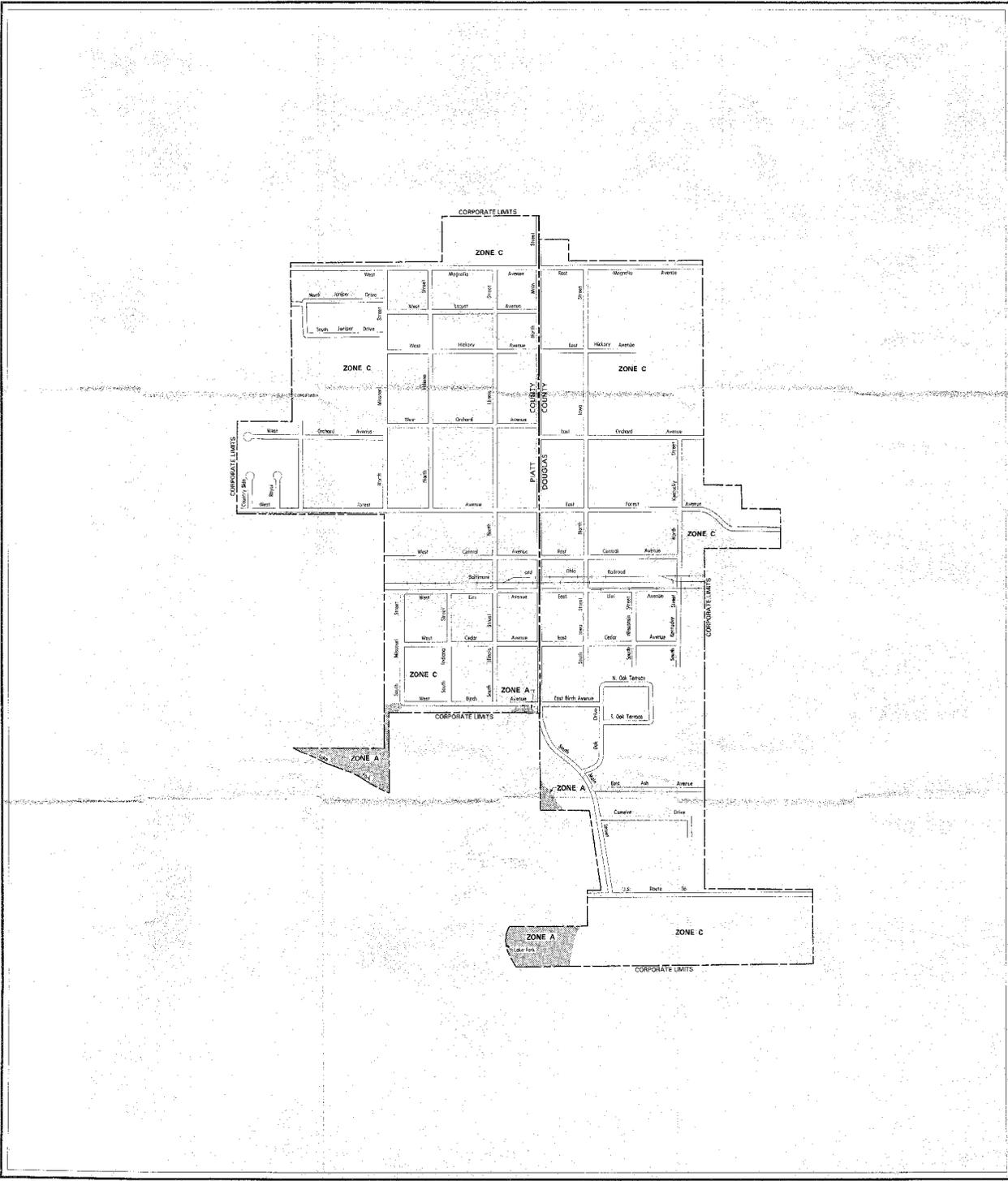
170520 0001 B

EFFECTIVE DATE:

DECEMBER 2, 1988



Federal Emergency Management Agency



KEY TO SYMBOLS

	ZONE C
	ZONE A
	ZONE C

See Flood Elevation List 513

Top Flood Elevation (513) MSL

Baseflow Reference Mark RMP

Flow Mile 1113

EXPLANATION OF ZONE DESIGNATIONS

A Flood Insurance Rate Map (FIRM) is a map showing the areas of a community that are subject to flooding. It is a map of the community's flood hazard areas, showing the areas that are subject to flooding and the areas that are not subject to flooding. The FIRM is used to determine the flood hazard areas of a community and to determine the flood hazard areas of a community.

EXPLANATION OF ZONE DESIGNATIONS

A Flood Insurance Rate Map (FIRM) is a map showing the areas of a community that are subject to flooding. It is a map of the community's flood hazard areas, showing the areas that are subject to flooding and the areas that are not subject to flooding. The FIRM is used to determine the flood hazard areas of a community and to determine the flood hazard areas of a community.

INITIAL IDENTIFICATION

NOVEMBER 21, 1978

FLOOD HAZARD BOUNDARY MAP REVISIONS

SEPTEMBER 11, 1979

CONFORMS TO REGULAR PROGRAM

MAY 21, 1988 (REVISED A MAP)

FLOOD INSURANCE RATE MAP EFFECTIVE

DECEMBER 31, 1982

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE 6/30/80 ON THE TITLE TO DETERMINE WHEN AVAILABLE DATA IS SUBJECT TO THE AREA WHERE DEVIATIONS OF DEPTH HAVE BEEN ESTABLISHED.

APPROXIMATE SCALE

400' 0" 800' 0" 1200' 0"

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

VILLAGE OF ATWOOD, ILLINOIS

PLATT AND DOUGLAS COUNTIES

ONLY PANEL PRINTED

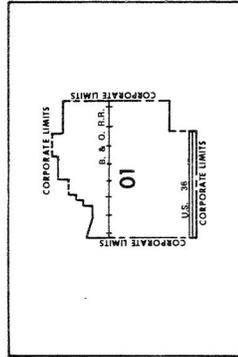
COMMUNITY PANEL NUMBER
170543 0001 B

EFFECTIVE DATE:
DECEMBER 31, 1982

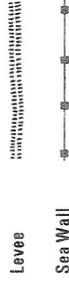
Federal Emergency Management Agency

COMMUNITY No. 170769

These maps may not include all Special Flood Hazard Areas in the community. After a more detailed study, the Special Flood Hazard Areas shown on these maps may be modified, and other areas added. Consult NFIA Servicing Company or local insurance agent or broker to determine if properties in this community are eligible for flood insurance.



LEGEND



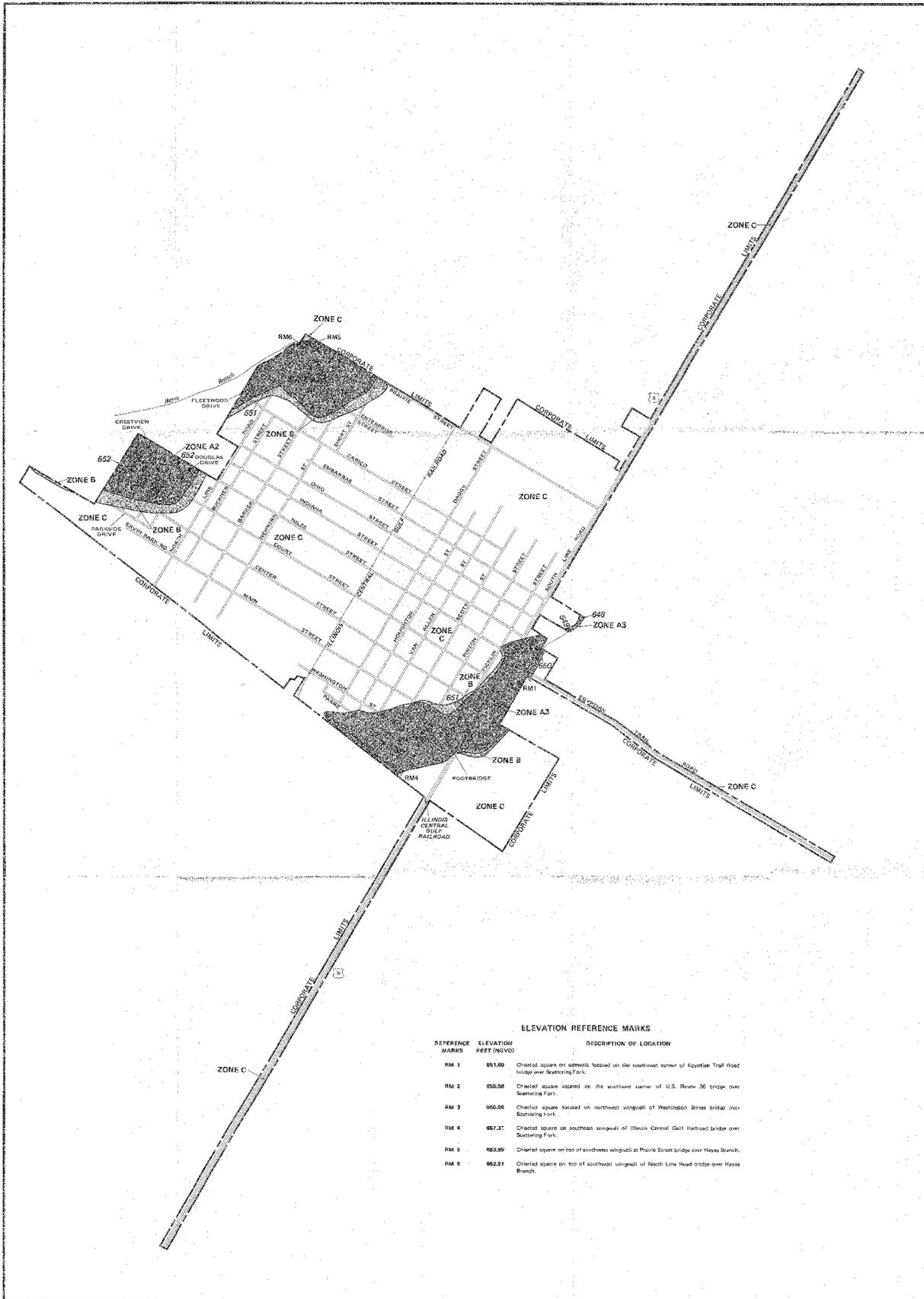
SPECIAL FLOOD HAZARD AREA ZONE A

SPECIAL FLOOD HAZARD AREA
IDENTIFICATION DATE
NOVEMBER 29, 1974

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration
VILLAGE OF NEWMAN, IL
(DOUGLAS CO.)
MAP INDEX
FIA FLOOD HAZARD BOUNDARY MAPS
No. H01



10	DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT Federal Insurance Administration	APPROXIMATE SCALE		
	VILLAGE OF NEWMAN, IL (DOUGLAS CO.)	500	0	1000 2000 3000 FEET
	FHA FLOOD HAZARD BOUNDARY MAP No. H 01			Effective Date NOVEMBER 28, 1974



KEY TO MAP

- 100-Year Flood Boundary
- 100-Year Flood Boundary
- Zone Delineations* With Date of Finalization No. 12/27/74
- 100-Year Flood Boundary
- 500-Year Flood Boundary
- Base Flood Elevation Line With Elevation in Feet**
- Base Flood Elevation in Feet Where Uniform Within Zone**
- Elevation Reference Mark
- River Mile



***EXPLANATION OF ZONE DESIGNATIONS**

- | ZONE | EXPLANATION |
|--------|---|
| A | Area of 100-year flood; base flood elevations and flood hazard factors not determined. |
| A1 | Area of 100-year shallow flooding where depths are between one (1) and three (3) feet; average ground elevations are shown, but no flood hazard factors are determined. |
| A1-A30 | Area of 100-year flood; base flood elevations and flood hazard factors determined. |
| A30 | Area of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined. |
| B | Area between limits of the 100-year flood and 100-year flood; or certain areas subject to 100-year flood with average depths less than one (1) foot; or areas of areas produced by levees from the base flood. (Medium shading) |
| C | Area of minimal flooding (No shading) |
| D | Area of water-retention, but possible, flood hazards. |
| V | Area of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined. |
| VI-V30 | Area of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined. |

NOTES TO USER

Effective as to the structure flood hazard areas (zones A and V) may be protected by flood control structures.
 This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all potential features outside special flood hazard areas.

INITIAL IDENTIFICATION:

NOVEMBER 30, 1972
 FLOOD HAZARD BOUNDARY MAP REVISIONS:
 JULY 3, 1997
 SEPTEMBER 12, 1995
 FLOOD INSURANCE RATE MAP EFFECTIVE:
 APRIL 1, 1982
 FLOOD INSURANCE RATE MAP REVISIONS:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE date shown on this map to determine where actual rates apply to structures in the zone whose elevation or depth have been established.
 To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program at (800) 638-6620.

APPROXIMATE SCALE
 1" = 100 FEET

ELEVATION REFERENCE MARKS

REFERENCE MARKS	ELEVATION FEET (NGVD)	DESCRIPTION OF LOCATION
RM 1	691.00	Charleston square on approach, located on the southwest corner of Egyptian Trail Road bridge over Scatterfield Park.
RM 2	696.06	Charleston square located on the southwest corner of U.S. Route 36 bridge over Scatterfield Park.
RM 3	690.06	Charleston square located on northwest wingwall of Washington Street bridge over Scatterfield Park.
RM 4	697.37	Charleston square on southeast wingwall of Illinois Central Gulf Railroad bridge over Scatterfield Park.
RM 5	693.99	Charleston square on top of southeast wingwall at Pacific Street bridge over Hayes Branch.
RM 6	692.51	Charleston square on top of southwest wingwall of Reach Line Road bridge over Hayes Branch.

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
 FLOOD INSURANCE RATE MAP

CITY OF
TUSCOLA,
 ILLINOIS
 DOUGLAS COUNTY

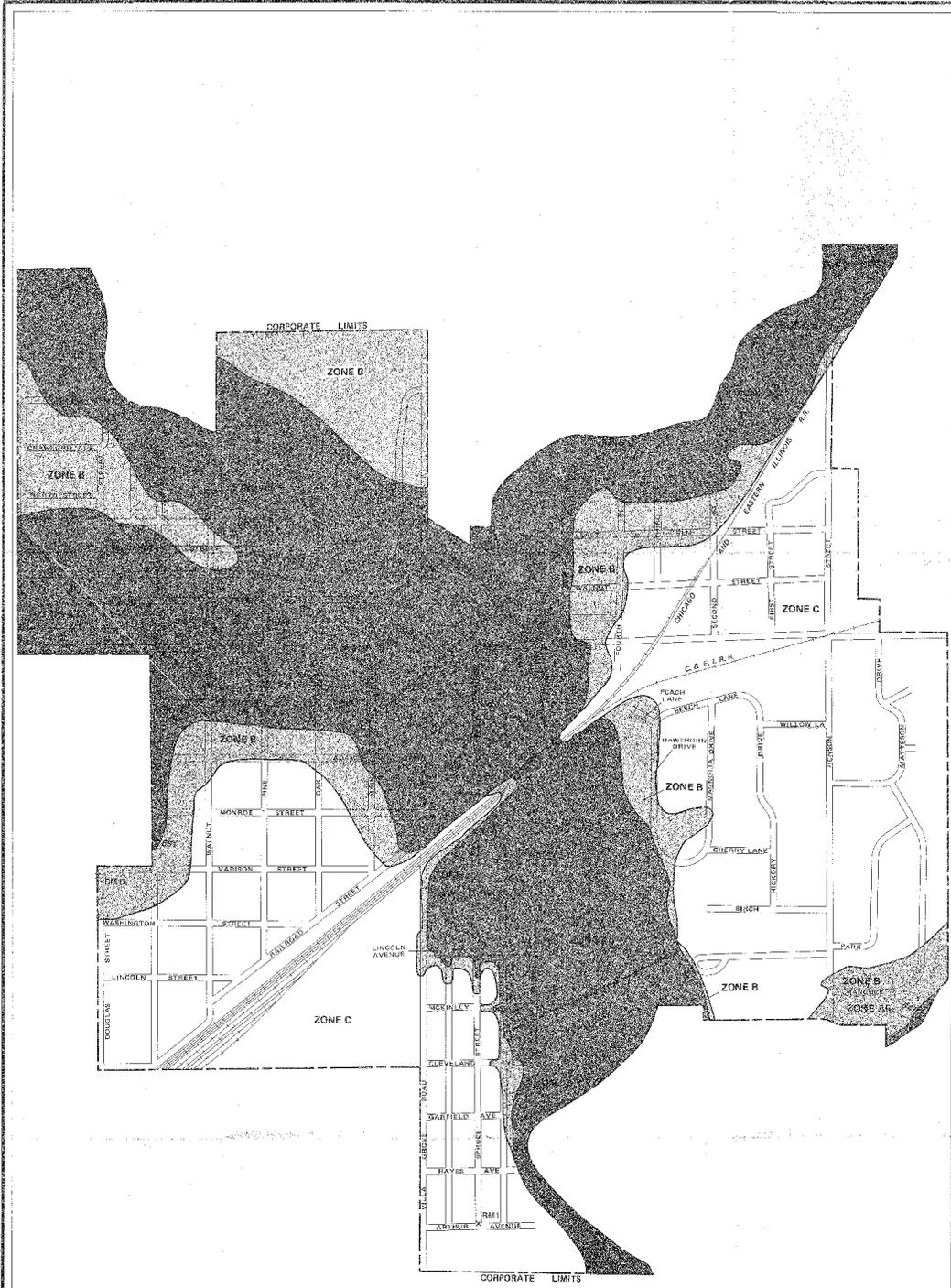
(ONLY PANEL PRINTED)

COMMUNITY-PANEL NUMBER
 170195 0805 C

EFFECTIVE DATE:
 APRIL 1, 1982



federal emergency management agency
 federal insurance administration



KEY TO MAP

500-Year Flood Boundary
 100-Year Flood Boundary
 Zone Delineations* With Date of Identification
 100-Year Flood Boundary
 500-Year Flood Boundary

Base Flood Elevation Line With Elevation in Feet**

Base Flood Elevation in Feet Where Different Within Zone**

Elevation Reference Mark

River Mile

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

EXPLANATION

ZONE

A Area of 100-year flood; base flood elevations and flood hazard factors not determined.

A0 Area of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths are determined on plan, but no flood hazard factors are determined.

A1 Area of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.

A1-A3C Area of 100-year flood; base flood elevations and flood hazard factors determined.

A3B Area of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.

B Area between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile or areas protected by levees from the base flood. (Medium shading)

C Area of minimal flooding (No shading)

D Area of undetermined, but possible, flood hazards.

V Area of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.

VI-V30 Area of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only. It does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

INITIAL IDENTIFICATION
MAY 17, 1974

CONVERSION TO REGULAR PROGRAM
FEBRUARY 1, 1979

Refer to the CONVERSION TO REGULAR PROGRAM data shown on this map to determine when actuarial rates apply to structures in the zones where revisions or debts have been experienced.

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program, at (800) 538-6620, or (301) 424-8572.

APPROXIMATE SCALE
1" = 100'

ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION (FT. NGVD)	DESCRIPTION OF LOCATION
RM1	658.07	Top of south bolt on rim of fire hydrant in the northeast quadrant of intersection of Arthur Avenue and Spruce Street. Established by Roy F. Weston, Inc.
RM2	648.06	Top of south bolt on rim of fire hydrant in the northwest quadrant of intersection of Lincoln Avenue and Elm Street. Established by Roy F. Weston, Inc.
RM3	660.90	On top of southeast wingwall of Chicago and Eastern Illinois Railroad bridge over Embarras River. Established by Roy F. Weston, Inc.
RM6	646.70	On top of southwest wingwall of Harrison Street bridge over Embarras River. Established by Roy F. Weston, Inc.
RM8	646.40	On top of southeast wingwall of Seymour Street bridge over the Embarras River. Established by Roy F. Weston, Inc.
RM5	643.52	On southeast corner of south headwall of box culvert at junction of West Dixon and Adams Street. Established by Roy F. Weston, Inc.
RM7	647.00	Top west bolt rim of fire hydrant on northeast quadrant of intersection of Main and Harrison Streets. Established by Roy F. Weston, Inc.
RM8	645.75	In center of concrete headwall of concrete box culvert at junction of West Dixon and Pine Street. Established by Roy F. Weston, Inc.
RM9	644.50	Top of bolt east end of corrugated metal pipe at junction of West Dixon and Walnut Street. Established by Roy F. Weston, Inc.
RM10	646.27	On top of the western wingwall of the box culvert at junction of West Dixon and Harrison Street. Established by Roy F. Weston, Inc.
RM11	660.02	Railroad spike in light pole in southwest quadrant of intersection of Douglas and Madison Streets. Established by Roy F. Weston, Inc.
RM12	647.21	Top of cast bolt on rim of fire hydrant in the southwest quadrant of intersection of Oak and Maple Streets. Established by Roy F. Weston, Inc.

NATIONAL FLOOD INSURANCE PROGRAM

FIRM FLOOD INSURANCE RATE MAP

CITY OF
VILLA GROVE, ILLINOIS
DOUGLAS COUNTY

ONLY PANEL PRINTED

COMMUNITY-PANEL NUMBER
17018B 0001 B

EFFECTIVE DATE:
FEBRUARY 1, 1979

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

