Ogle County Multi-Jurisdictional All Hazards Mitigation Plan

Participants

Byron, City of
Creston, Village of
Forreston, Village of
Hillcrest, Village of
Leaf River, Village of
Mt. Morris, Village of
Ogle County
Oregon, City of
Polo, City of
Rochelle, City of
Stillman Valley, Village Of

December 2010

ACKNOWLEDGEMENTS

Larry Acker and his family have kept the only source of continuous weather records in Polo, Illinois since 1883. The Acker site is the oldest continuous weather data site in Illinois that has not been moved to a different location. Larry's great grandfather, William Edwin Acker, started keeping records when the Acker Brothers began farming in Polo. Before him, Larry's mother, Helen Johnston Acker, assisted in keeping weather records. Larry currently lives on his family's centennial farm and provides weather information used by the National Weather Service.

Weather records compiled in this inaugural edition of the Ogle County All Hazards Mitigation Plan would be incomplete without the dedicated efforts of the Acker family. Future generations will be able to build on this foundation of weather information that Larry Acker and his family helped to assemble.

Vinde Wells, an editor with Ogle County Newspapers, provided numerous newspaper articles about storm events. These articles provided information about property damages, injuries and deaths not available in state and federal databases. Among these articles was a detailed description of the worst tornado impacts recorded in Ogle County which occurred in May 18, 1898 when two tornadoes simultaneously created paths of destruction across the entire County. In addition, Vinde shared photographs from the Ogle County Newspapers of storm damages that are also included in this Plan.

We extend our deepest gratitude to the Acker family and Vinde Wells for their enduring contributions.

OGLE COUNTY MULTI-JURISDICTIONAL ALL HAZARDS MITIGATION PLAN

OGLE COUNTY, ILLINOIS

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All Hazards Mitigation Planning Committee
by Greg R. Michaud and Andrea J. Bostwick
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 Ogle County. Since 1965, Ogle County has had four federally-declared major disaster declarations. **Figure 1** identifies each declaration including the year the disaster was declared and the type of natural hazard that triggered the declaration. In addition, Ogle County has had three federal emergency declarations during the past decade. An emergency declaration can be provided for events that do not quality under the definition of a major disaster. Funds generated from an emergency declaration are used to supplement state and local efforts to save lives, protect people or avert the threat of a catastrophe.

Figure 1
Federal Disaster Declarations for Ogle County

Declaration #	Year	Type of Natural Hazard(s) Event
373	1973	severe storm and flooding
438	1974	severe storm and flooding
997	1993	flooding
1129	1996	severe storm (severe winds; torrential rains) and flash flooding

In addition, in the past decade alone, there have been over 89 severe storms (thunderstorms, high winds, hail, lightning strikes, heavy rain etc.), 31 severe winter storms, 25 flood and flash flood events, one tornado, one drought and three earthquakes 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 Ogle 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 Ogle County Board passed a resolution on June 16, 2009 authorizing the development of the Ogle 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 Ogle County to participate. **Figure 2** identifies the municipalities that are represented in the Plan. The Ogle County Emergency Management Agency administered the Plan.

Figure 2
Municipalities Represented in the Plan

Byron, City of	Mt. Morris, Village of
Creston, Village of	Oregon, City of
Forreston, Village of	Polo, City of
Hillcrest, Village of	Rochelle, City of
Leaf River, Village of	Stillman Valley, Village of

1.2 DEMOGRAPHICS

Ogle County is located in northwestern Illinois and covers approximately 763 square miles. The topography is generally flat to gently sloping with the Rock River flowing on a southwesterly course through the center of the County. Ogle County is also home to three state parks: Lowden, White Pines and Castle Rock. The County seat is located in Oregon. The Byron Nuclear Power Facility and the Rochelle Municipal Utilities generating stations supplies much of the surrounding area with power.

Agriculture is a major industry in the County. According to the 2007 Census of Agriculture, there were 1,274 farms in Ogle County occupying approximately 75% (366,470 acres) of the total acreage in the County. The major crops include corn, soybeans and hay while the major livestock includes hogs and cattle. Ogle County ranks in the top 20 Illinois counties for crop and livestock cash receipts. Other important industries include printing, meat packing, production of electricity, recreation, lumber, and limestone and sand production. Manufacturing is the leading employment sector for County residents. This is due, in part, to nearby manufacturing jobs. Approximately 45% of Ogle County residents work outside of the County.

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 Ogle 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
Byron	2,917	3,376	2.5	1,160	464	$59,525,778
Creston	543	651	0.4	217	217	$8,611,858
Forreston	1,469	1,718	0.8	631	631	$17,511,293
Hillcrest	1,158	1,362	0.6	346	346	$17,685,495
Leaf River	555	652	0.9	237	237	$5,308,772
Mt. Morris	3,013	3,495	1.2	1,316	1,097	$35,076,127
Ogle County (unincorporated)	24,368	28,253	745.4	9,304	12	$918,860,228
Oregon	4,060	4,738	2.1	1,794	854	$52,424,042
Polo	2,477	2,843	1.3	1,082	832	$27,038,967
Rochelle	9,424	10,957	7.5	3,916	522	$176,841,923
Stillman Valley	1,048	1,185	0.6	417	417	$16,948,864

Sources: Harrison, James. Ogle County Supervisor of Assessments. "Untitled (Assessed Residential Values)." Email to Greg R. Michaud. June 21, 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. Ogle County is largely rural with a population that has experienced a recent growth trend. Between 1990 and 2000, the population of Ogle County increased by 11%, from 45,957 to 51,032. This recent growth is part of a larger trend. U. S. Census Bureau records indicate that between 1900 and 2000, the population of Ogle County increased by approximately 75% from 29,129 to 51,032. Since 1990, all of the municipalities participating in the development of this Plan have experienced population growth with the exception of Polo whose population decreased slightly. Proximity, scenic beauty, relatively lower taxes, and ease of travel to Rockford, Chicago and suburban Chicago have all contributed to Ogle County's growth. The Department of Commerce and Economic Opportunity projects that Ogle County's population will increase by approximately 7% between 2000 and 2010.

Since 1990, over 2,600 building permits were issued for new single-family dwellings in Ogle County. Nearly half of these permits were issued for unincorporated areas of the County located within three contiguous townships – Byron, Marion and Rockvale – which are situated along the Rock River between Oregon and Rockford. The increase in population coupled with an increase

in the number of building permits issued reflects a growth trend that has also been seen in counties to the north, east and northeast of Ogle County.

Aside from influences outside of the County that are affecting development, there is one major economic development initiative underway within Ogle County. In 2003, Union Pacific Railroad opened its Global III Intermodal Facility in Rochelle. This facility is one of the larger terminals of its kind in the Midwest, covering over 1,200 acres and providing convenient access to Interstates 39 and 88. Global III allows Union Pacific the necessary capacity to improve and expedite operations for current shipments, as well as provides room for additional expansion to keep pace with the projected growth in what is forecasted to be a robust intermodal market for years to come.

This facility is expected to attract warehouse and distribution centers, trucking businesses, equipment maintenance firms and manufacturing companies to the area and has the potential to stimulate residential development. As a result, noticeable changes in land use (from agricultural land to residential, commercial and industrial) are anticipated within the County in the near future.

2.0 PLANNING PROCESS

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The Ogle County Multi-Jurisdictional All Hazards Mitigation Plan (the Plan) was developed through the Ogle 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 four 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 Ron McDermott, the Ogle County Emergency Management Agency Coordinator. 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 two Planning Committee meetings.
- Submit a list of documents (i.e., plans, studies, reports, maps, etc.) relevant to the all hazard mitigation planning process.
- Identify and submit a list of critical infrastructure and facilities.
- Review the risk assessment and provide information on additional events and damages.
- Participate in the development of mitigation goals.
- Submit a list of mitigation actions.
- Review and comment on the draft Plan.
- Formally adopt the Plan.
- Where applicable, incorporate the Plan into existing planning efforts.
- Participate in the plan maintenance.

2.1 PLANNING COMMITTEE

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

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 Ogle 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, the Illinois State Geological 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.

Figure 5
Ogle County Multi-Jurisdictional All Hazards Mitigation Planning Committee Member Attendance Record

Representing	Name	12/10/2009	3/4/2010	6/24/2010	9/29/2010	11/18/2010
Byron	Hewitt, Larry				X	
	Millard, Chris	X			X	
	Murray, Todd		X			X
Creston	Byro, Tom	X	X		X	X
Exelon Corp. - Byron Nuclear Generating Station	Kartheiser, Bob	X		X	X	X
Forreston	Harn, Michael	X	X	X		
Guist Insurance Agency, Inc.	Guist, Hollie J. Jr.	X		X		
Hillcrest	Adams, Teresa		X			
	Messer, Melvin C.	X		X	X	X
Leaf River	Flick, Jacklyn		X	X		X
	Poggioli, Shirley		X	X		X
Lee/Ogle ROE #47	McMahon, Paul			X		
Mt. Morris	White, Jason	X	X	X	X	X
Ogle Co. - Administrator	McKinley, Meggon	X	X	X	X	X
Ogle Co. - Assessor' Office	Harrison, Jim	X				
Ogle Co. - Board	Rice, W. Ed	X				
Ogle Co. - Coroner's Office	Bennett, Jeanette	X	X	X	X	
Ogle Co. - Coroner's Office	Finch, Lou IV	X	X			
Ogle Co. - EMA	McDermott, Ron	X	X	X	X	X
Ogle Co. - EMA	Humphrey, Candace			X	X	X
Ogle Co. - 911	Beitel, Sandy	X	X			
Ogle Co. - GIS	Gilbert, Kris		X	X	X	X
Ogle Co. - GIS	Callant, Larry	X				X
Ogle Co. - Highway Dept.	Cook, Curtis	X		X	X	
Ogle Co. - Highway Dept.	Schwartz, Nathan		X			
Ogle Co. - Planning & Zoning Office	Reibel, Mike	X	X	X	X	
Ogle Co. - Public Health Dept.	O'Brien, Doreen	X	X	X	X	
Ogle Co. - Public Health Dept.	Thompson, Andy		X	X	X	
Ogle Co. - Sheriff's Office	Beitel, Gregory A.	X	X			
Ogle Co. - Solid Waste Management	Bliton, Joy			X		
Ogle Co. - Solid Waste Management	Rypkema, Steve		X			X
Ogle Farm Bureau	Kern, Ron	X	X	X	X	X
Oregon	DeHaan, Darin			X	X	X
Polo	Corbitt, Susie	X	X		X	X
Print Media	Wells, Vinde		X	X	X	X
Public Representative	Acker, Larry				X	X
	Cortese, Gary	X	X			
	Lewis, Mike	X	X	X	X	X
	Pinecrest Community			X	X	X
Rochelle	Stonebraker, Ron		X			
	Tesreau, Sam	X	X	X	X	X
Stillman Valley	Scott, Mary	X	X	X	X	X

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

Planning Committee Meetings

The Planning Committee met five times between December 2009 and November 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 – December 10, 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 an all hazard mitigation plan is and why one should be prepared. Drafts of the mission statement and mitigation goals were presented. Representatives for the County and the participating 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. Copies of the citizen questionnaire were also distributed.

Second Planning Committee Meeting – March 4, 2010

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.

Third Planning Committee Meeting – June 24, 2010

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. Representatives for the County and the participating municipalities were asked to provide information on any critical facilities that have been damaged by a natural hazard event within their jurisdiction and then complete the form entitled "Critical Facilities Hazard Data Collection" and return it at the next meeting.

Fourth Planning Committee Meeting – September 29, 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 – November 18, 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. A copy of the questionnaire is contained in **Appendix D**.

A total of 41 questionnaires were completed and returned to the Planning Committee. The questionnaires were filled out by residents of unincorporated Ogle County as well as all of the participating municipalities. While fewer questionnaires were returned than has been experienced using similar techniques with virtually the same survey in other counties, the responses provided useful information. A review of the questionnaires indicated the following:

- Severe storms and severe winter storms have been the most frequently encountered natural hazard in Ogle County. This response is consistent with the weather records from Ogle County compiled for this Plan.

- Electronic media (radio, television and internet) was identified as the most effective way to disseminate information about natural hazards. Fact sheets distributed via mail and through municipal and county government offices received strong support among respondents.
- Mitigation projects and activities felt to be most needed are:
  - maintaining power during storms;
  - public information describing actions residents can to take to protect themselves and their property; and
  - steps to reduce drainage problems along roadways.

  Some respondents felt that drainage studies may be needed to identify the specific cause of drainage problems (i.e., undersized culverts, buildup of debris and sediment in roadside ditches, changes in runoff patterns that may necessitate retention/detention ponds or other corrective measures.)

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**.

News Media

News releases were prepared and submitted to local print media, radio stations and television stations 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 listing of the news media outlets that received the news releases and copies of the news articles that were printed.

The planning process received television coverage from WIFR Channel 23, the local CBS affiliate who attended the March 4, 2010 Planning Committee meeting and interviewed Ron McDermott, the Planning Committee Chairman and Ogle County Emergency Management Agency Coordinator for their nightly news broadcast. **Appendix F** contains an abbreviated copy of the story that was aired.

Planning Committee Meetings

All of the meetings conducted by the Planning Committee were open to the public and publicized in advance to encourage public participation. At the end of each meeting, time was set aside for public comment. In addition, Committee members were available throughout the planning process to talk with residents and 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 November 18, 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.

After the public forum, the draft Plan was made available for public review and comment at the Ogle County Emergency Management Agency's Office through December 3, 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 documentation about natural hazards.* The Acker family has meteorological equipment that they have used to monitor and maintain weather information in Ogle County for three generations. All of their information supports readily available weather data, but, more importantly, filled gaps about the occurrence and severity of severe winter storms, flooding and severe storms that helped improve the profile of these hazards.
- *Obtained critical facilities damage information.* Data collection surveys soliciting information about critical facilities damaged by severe storms and other natural hazards were used to supplement information obtained from government files. This information was used to prepare the vulnerability assessment. In addition, local news media archives contained historical information that helped place tornado damages in a different context. The most devastating tornado on record struck Carroll and Ogle County in May, 1898. Specific details on human death, injury and property damage caused by this tornado are described in the Risk Assessment Section this Plan.
- *Enhanced understanding of the natural hazard events that impact the County, thus fostering dialogue about mitigation actions needed to reduce the risk to the participating jurisdictions.* Through the dialogue initiated at the Planning Committee meetings, conventional and creative approaches were generated at the local level to confront risks that municipalities, by themselves, might not be able to reduce or eliminate.

2.3 PARTICIPATION OPPORTUNITIES FOR INTERESTED PARTIES

Neighboring communities, agencies, businesses, academia, not-for-profits 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 Ogle 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.

When the Planning Committee was being formed, discussions between the Ogle County Emergency Management Agency (OCEMA) and local businesses resulted in the County's

largest private employer, Exelon, becoming involved. Exelon was an active participant throughout the planning process providing information helpful in drafting the Plan as well as commenting on preliminary drafts. To help overcome the absence of other businesses, individuals who could represent important segments of the business community were sought to serve on the Planning Committee. Since agriculture and its support businesses (agri-chemical facilities, implement dealers, etc.) are a dominant component of the Ogle County economy, every effort was made to provide this segment with representation. A highly experienced individual from the Ogle County Farm Bureau was able to serve on the Committee and represent agriculture. Input from the insurance industry was also needed to help with the topic of storm damages. A long-time local agency represented the insurance industry and helped answer questions and provided information regarding storm damages. Continual networking by OCEMA also resulted in the largest private provider of care and housing for senior citizens in the County joining the planning process.

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										
	Byron	Creston	Forreston	Hillcrest	Leaf River	Mt. Morris	Ogle County	Oregon	Polo	Rochelle	Stillman Valley
Plans											
Comprehensive Plan	x	x	x	x	x	x	x	x	x	x	x
Emergency Management Plan			x		x		x	x	x	x	x
Land Use Plan	x	x	x		x		x	x		x	x
Codes & Ordinances											
Building Codes	x	x		x	x			x	x	x	
Drainage Ordinances	x			x			x	x	x	x	
Historic Preservation Ordinance									x	x	
Subdivision Ordinance(s)	x	x	x	x	x	x	x	x	x	x	x
Zoning Ordinances	x	x	x	x	x	x	x	x	x	x	x
Maps											
Existing Land Use Map	x	x	x	x	x	x	x	x	x	x	x
Infrastructure Map	x	x	x			x			x	x	x
Zoning Map	x	x	x	x	x		x	x	x	x	x
Flood-Related											
Flood Ordinance(s)	x		x	x	x	x	x	x	x	x	
Flood Insurance Rate Maps	x		x	x	x		x	x	x	x	
Repetitive Flood Loss List											
Elevation Certificates for Buildings								x		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 Ogle 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 Ogle 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.

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)
- flood
- tornadoes
- drought
- extreme heat
- 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 contains three subsections: identifying the hazard, profiling the hazard and assessing vulnerability.

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

IDENTIFYING THE HAZARD

What is the definition of a severe storm?

The National 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 1 inch in diameter (quarter size) or larger; and/or
- a tornado.

While severe storms are capable of producing deadly lightning and excessive rainfall that may lead to flash flooding, the NWS does not use either to define a severe storm. 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.

Figure 8
Hail Size Descriptions

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

Source: NOAA, 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 1 inch in diameter (quarter size) 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 Chicago, Illinois is responsible for issuing severe thunderstorm watches or warnings for Ogle 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 1 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, 3 and **4** summarize the previous occurrences as well as the extent or magnitude of severe storms in Ogle County. The severe storm events are separated 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 Ogle County.

THUNDERSTORMS AND HIGH WINDS

The National Oceanic and Atmospheric Administration's Storm Events Database records show 134 reported occurrences of thunderstorms and high winds in Ogle County between 1967 and 2009. Of the 134 reported occurrences, 104 had wind speeds of 50 knots or greater. There were, however, 27 reported occurrences of thunderstorms and high winds where the wind speed was not recorded.

Damage sustained to a grain bin in rural Ogle County from a thunderstorm accompanied by high winds.

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. Of the 134 events, 102 took place between May and August, making this the peak period for thunderstorms and high winds in Ogle County. Approximately 72% of all thunderstorm and high wind events occurred during the p.m. hours, with 63 events taking place between 3 p.m. and 10 p.m.

Figure 10
Ogle County Thunderstorm & High Wind Events by Month – 1967 through 2009

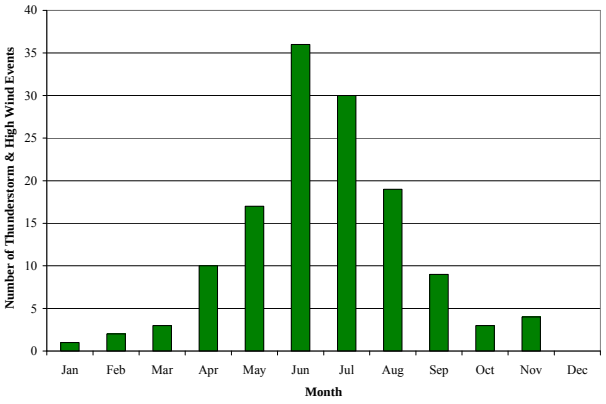
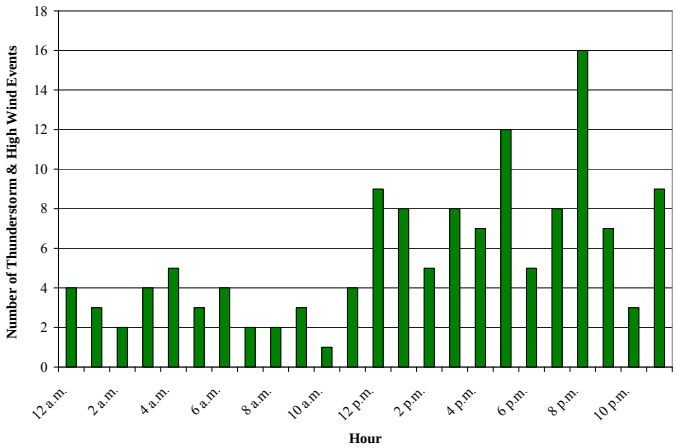


Figure 11
Ogle County Thunderstorm & High Wind Events by Hour – 1967 through 2009



NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Ogle County, 2010.
Larry Acker, 3F Forecasts, weather observations for Ogle County, July 20, 2010.
Vinde Wells, Ogle County Newspapers Editor, select news articles for thunderstorm & high wind events, September 29, 2010.

HAIL

The Storm Events Database records show 24 reported occurrences of hail 1 inch in diameter or greater in Ogle County between 1960 and 2009. Of the 24 reported occurrences, 11 produced hailstones 1.50 inches or larger in diameter. The largest hail recorded in Ogle County measured 3.00 inches in diameter (tea cup size) and fell on September 21, 1973 in Rochelle.

Figures 12 and **13** chart the reported occurrences of hail by month and hour. Fourteen of the 24 events took place between April and June, making this the peak period for hail events in Ogle County. Approximately 83% of all hail events occurred during the p.m. hours, with 15 events taking place between 3 p.m. and 8 p.m.

Figure 12
Ogle County Hail Events by Month 1960 through 2009

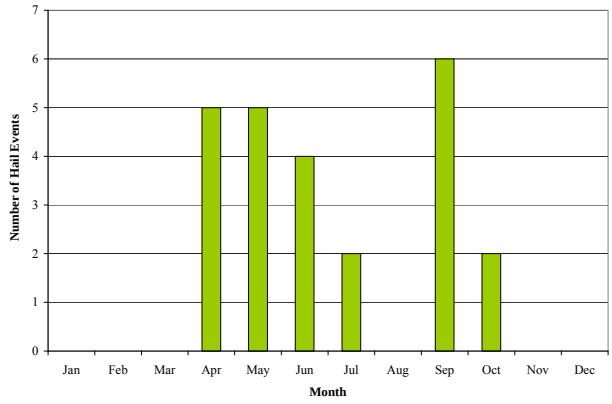
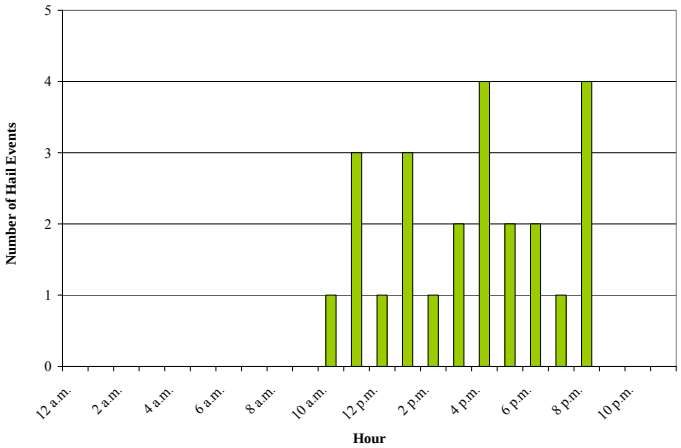


Figure 13
Ogle County Hail Events by Hour 1960 through 2009



NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Ogle County, 2010.

LIGHTNING

The Storm Events Database records show two reported occurrences of lightning strikes in Ogle County between 1998 and 2009. Property damages were not reported for either event.

HEAVY RAIN

The Storm Events Database records show one reported occurrence of heavy rain in Ogle County in 2009. More than two inches of rain fell between August 26th and 27th, 2009, however, no flooding was reported as a result of this event.

What locations are affected by severe storms?

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

What is the probability of future severe storm events occurring?

Ogle County has had 134 verified occurrences of thunderstorms and high wind events between 1967 and 2009. With 134 occurrences over the past 43 years, Ogle County should expect to experience at least three thunderstorm and high wind events each year. There were 15 years over the last 43 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 Ogle County is 35%.

There have been 24 verified occurrences of hail between 1960 and 2009. With 24 occurrences over the past 50 years, the probability or likelihood of a hail event occurring somewhere in Ogle County in any give year is 48%. There were four years over the last 50 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 8%.

ASSESSING VULNERABILITY

Are the participating jurisdictions vulnerable to severe storms?

Yes. All of Ogle County is vulnerable to the dangers presented by severe storms due to the topography of the region and its location in relation to the movement of weather fronts across northwestern Illinois. Since 2000, Ogle County has experienced 75 thunderstorm and high wind events, 12 hail events, one lightning strike event and one heavy rain event.

Damage sustained to a barn in rural Ogle County from a thunderstorm accompanied by high winds.

Of the participating municipalities, Oregon and Polo have had substantially more recorded occurrences of thunderstorm and high wind events than any of the other municipalities while Polo, Leaf River

and Rochelle have had the greatest number of recorded hail events. The difference in the number of thunderstorm and high wind events recorded in Oregon and Polo may be due to the fact that the county seat and the Ogle County Emergency Management Agency are located in Oregon and the Acker family who are official weather observers for the National Weather Service are located in the vicinity of Polo. **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
Byron	13	1
Creston	0	0
Forreston	9	3
Hillcrest	4	0
Leaf River	5	5
Mt. Morris	17	2
Oregon	29	2
Polo	28	6
Rochelle	18	4
Stillman Valley	3	1

Sources: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Ogle County, 2010.

Larry Acker, 3F Forecasts, weather observations for Ogle County, July 20, 2010.

Vinde Wells, Ogle County Newspapers Editor, select news articles for thunderstorm & high wind events, September 29, 2010.

What impacts resulted from the recorded severe storms?

Severe storms as a whole have caused an estimated $5,000 in crop damage and $771,300 in property damages and resulted in four injuries. The following provides a breakdown of impacts by category.

While severe summer storms frequently occur in Ogle County, the number of injuries and deaths is relatively low. The hospital in Rochelle as well as the hospitals in nearby Freeport (Stephenson County), Dixon (Lee County) and Rockford (Winnebago County) are all equipped to provide continuous care to those injured during a severe storm. Consequently, the risk or vulnerability to public health and safety from severe storms is low.

THUNDERSTORMS AND HIGH WINDS

The data provided by the Storm Events Database indicates that between 1967 and 2009, 21 thunderstorm & high wind events caused approximately $5,000 in crop damage and $621,300 in property damage. Damage information was either unavailable or none was recorded for the remaining 113 reported occurrences.

In addition to the property damages reported by the Storm Events Database, the Planning Committee members were asked to provide property damage estimates for any critical facilities damaged by severe storms within their jurisdictions. Mt. Morris estimated that approximately $95,000 in property damage was sustained during the summer of 2009 when the wastewater treatment facility and light poles in the business district were damaged due to thunderstorms and high wind events. Leaf River estimated that between $25,000 and $35,000 in property damage has been sustained to their Village Hall since 2004. However, this estimate includes damages sustained from both severe storms and severe winter storms. These additional property damages were not included in the reported event tables because specific dates for the events were not available. This information indicates that the total property damage figure for thunderstorm and high wind events is closer to $741,300.

The Storm Events Database has two recorded reports of injury as a result of two separate incidents on November 10, 1998. During the early morning hours of November 10th a line of thunderstorms with strong winds moved across northern Illinois blowing a car off the road in Ogle County and injuring the driver. After the line of thunderstorms passed through the winds increased and reached a peak during the late afternoon and evening hours when a semi truck was blown off an overpass near Rochelle, causing one injury.

HAIL

Of the 24 reported hail occurrences, damages were only recorded for two events. On April 18, 2002, hail measuring 2.50 inches in diameter (tennis ball size) caused $5,000 in damage to several vehicles in Forreston. Then on September 22, 2006, hail measuring 1.50 inches in diameter (ping pong ball size) caused $25,000 in damage to vehicles in Mt. Morris. 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 indicates that between 1998 and 2009, two lightning events caused two injuries. On June 18, 1998, a tree was struck by lightning and injured a bystander in Rochelle. On June 11, 2004, a house was struck by lightning in Byron injuring one person. No property damages were reported as a result of either event.

HEAVY RAIN

Damage information was either unavailable or none was recorded for the heavy rain event that started on August 26, 2009. In addition, no injuries or deaths were reported as result of this event.

What other impacts can result from severe storms?

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

In Ogle 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 10.1% to 14.1% of all crashes recorded annually in Ogle 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 Ogle County

Year	Total # of Crashes	Presence of Wet Road Surface Conditions		
		# of Crashes	# of Injuries	# of Deaths
2004	1,328	160	44	1
2005	1,387	140	46	0
2006	1,414	199	62	2
2007	1,455	180	39	1
2008	1,417	192	57	2

Source: Illinois Department of Transportation, Illinois Crash Data, County Crash Summaries, Ogle 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 Ogle 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.

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

operation of critical facilities such as emergency shelters, drinking water facilities 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 Ogle County, the amount of property damage previously reported and the potential for disruptions to power distribution and communication; the risk or vulnerability to buildings, infrastructure and critical facilities from severe storms is medium to high.

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

Yes. While seven 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 several other municipalities 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 23 of the 161 recorded events listing property damage numbers for severe storms, there is no way to accurately estimate future potential dollar losses. Since all structures within Ogle County are vulnerable to damage it is likely that there will be future dollar losses to severe storms.

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

IDENTIFYING THE HAZARD

What is the definition of a severe winter storm?

A severe winter storm can range from moderate snow over a few hours to 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 16** 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.

Figure 16
Wind Chill Index Chart

Temperature (°F)

Wind (mph)	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81

Frostbite Times

30 minutes 10 minutes 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.615T - 35.75(V^{0.16}) + 0.4275(V^{0.16})$$

Where, T = Air Temperature (°F) and V = Wind Speed (mph)

Source: National Weather Service

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 Chicago, Illinois is responsible for issuing winter storm watches and warnings for Ogle 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 conditions, such as heavy snow, blizzard conditions or significant accumulations of freezing rain or sleet, may affect the area within the next 12 to 36 hours.
- **Advisories.** Winter advisories are issued for lesser winter weather events that may cause significant inconvenience, but do not pose an immediate threat to life and/or property. The following advisories will be issued when an event is occurring, is imminent or is likely to occur.
  - **Snow Advisory.** A snow advisory is issued for an average snow fall of 3 to 5 inches.
  - **Freezing Rain Advisory.** A freezing rain advisory is issued when light freezing rain or freezing drizzle will produce less than ¼ inch of ice accumulation.
  - **Sleet Advisory.** A sleet advisory is issued when sleet accumulation are expected to be less than ½ inch.
  - **Blowing Snow Advisory.** A blowing snow advisory is issued when sustained winds or frequent gust of 25 to 35 mph are accompanied by falling and blowing snow, occasionally reducing visibility to ¼ mile or less.
  - **Winter Weather Advisory.** A winter weather advisory is issued when a combination of two or more of the following events are occurring, imminent or likely: snow, freezing rain or drizzle, sleet or blowing snow.
  - **Wind Chill Advisory.** A wind chill advisory is issued when the wind chill values are expected to be between -20°F and -30°F.
- **Warnings.** Winter weather warnings are issued for events that pose a threat to life and/or property. The following warnings will be issued when an event is occurring, is imminent, or is likely to occur.
  - **Blizzard Warning.** A blizzard warning is issued when sustained winds or frequent gusts greater than or equal to 35 mph are accompanied by considerable falling and/or blowing snow that frequently reduces visibility to less than ¼ mile for three hours or more. There are no temperature criterion, however, freezing temperatures and 35 mph winds will create sub-zero wind chills.

- **Heavy Snow Warning.** A heavy snow warning is issued when six inches or more of snow is expected to fall within 12 hours or less or when eight inches or more is expected to fall within 24 hours or less.
- **Ice Storm Warning.** An ice storm warning is issued when freezing rain is expected to produce ¼ inch or more of ice accumulation.
- **Heavy Sleet Warning.** A heavy sleet warning is issued when sleet accumulations are expected to be ½ inches or more.
- **Winter Storm Warning.** A winter storm warning is issued when a combination of two or more of the following events are occurring, imminent or likely: heavy snow, freezing rain, sleet and/or strong winds.
- **Wind Chill Warning.** A wind chill warning is issued when wind chill values are expected to be -30°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?

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

SNOW AND ICE

The Storm Events Database and community records identified 40 reported occurrences of severe snow and ice events in Ogle County between 1967 and 2009, making this one of the more frequently occurring hazards. Of the 40 reported occurrences, there were 34 severe snow events, three severe ice and sleet events and three events that were a combination of severe freezing rain, ice, sleet and snow.

Since 1978, at least one severe snow and/or ice event has occurred each year in Ogle County with the exception of 10 years (1980, 1984, 1985, 1987, 1989, 1991, 1992, 1993, 1996 and 2001.) Anecdotal information shared by long-time residents suggests that severe snow and ice events have occurred with similar frequency between 1950 and 1978. 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.

Damage sustained to a home in Mt. Morris during the December 24th, 2009 ice storm.

Photo provided by Ogle County Newspapers

Figures 17 and **18** chart the reported occurrences of severe snow and ice events by month and hour. Twenty-nine of the 40 events took place in December and January. Two of the 39 events spanned two months; one crossed from November into December and the other crossed December into January. Approximately 64% of all snow and ice events with recorded times began during the p.m. hours.

Figure 17
Ogle County Snow & Ice Events
by Month – 1967 through 2009

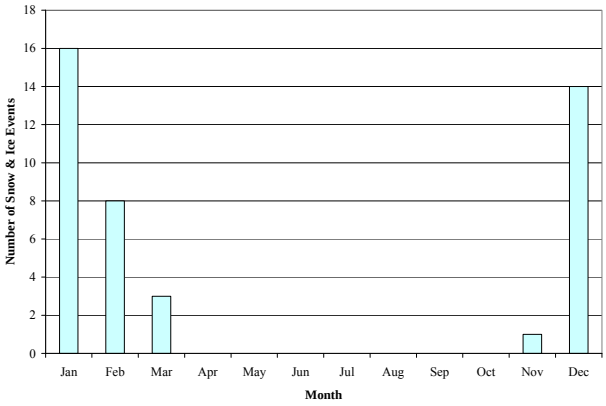
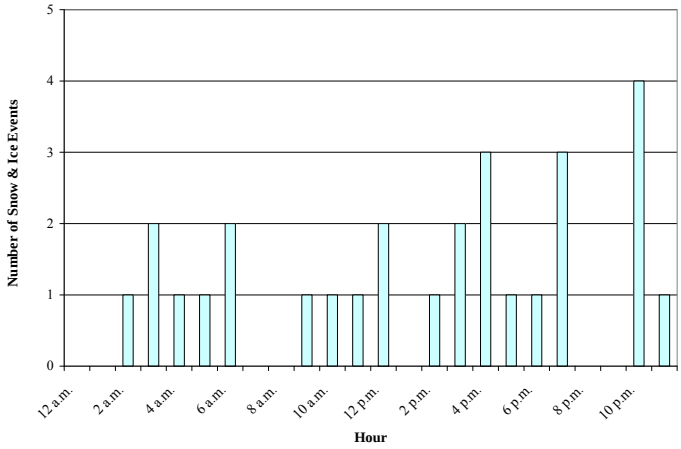


Figure 18
Ogle County Snow & Ice Events
by Hour – 1967 through 2009



NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Ogle County, 2010.
Larry Acker, 3F Forecasts, weather observations for Ogle County, July 20, 2010.
Vinde Wells, Ogle County Newspapers Editor, select news articles for thunderstorm & high wind events, September 29, 2010.

According to the Midwestern Regional Climate Center, over the last 100 years the maximum one-day accumulation of snow recorded in Ogle County first occurred on January 3, 1999 when 12 inches of snow fell. There have been two other days (February 18, 2000 and December 11, 2000) when the maximum one-day accumulation of snow also reached 12 inches.

EXTREME COLD

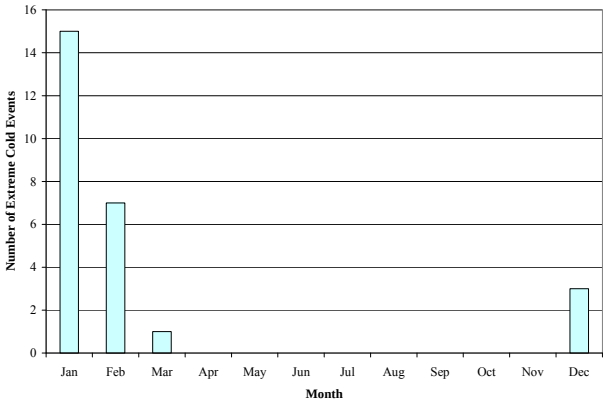
The Storm Events Database and community records identified 25 reported occurrences of extreme cold (i.e., low temperatures and wind chills) in Ogle County between 1979 and 2009. Of the 25 reported occurrences, only one event corresponded with a recorded severe snow and ice event. According to the Midwestern Regional Climate Center, the coldest temperature recorded in Ogle County over the last 120 years was -33°F on January 19, 1985.

Figure 19 charts the reported occurrences of extreme cold events by month. Twenty-one of the 25 events took place in January and February, with one of the events spanning from January into February. Approximately 70% of all extreme cold events with recorded times began during the a.m. hours.

What locations are affected by severe winter storms?

Severe winter storms affect the entire County. All communities in Ogle County have been affected by severe winter storms. The *2010 Illinois Natural Hazard Mitigation Plan* prepared by the Illinois Emergency Management Agency classifies Ogle County's hazard rating for severe winter storms as "Severe."

Figure 19
Ogle County Extreme Cold Events
by Month – 1979 through 2009



NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Ogle County, 2010.
Larry Acker, 3F Forecasts, weather observations for Ogle County, July 20, 2010.

What is the probability of future severe winter storms occurring?

Ogle County has had 40 verified occurrences of severe snow and ice events between 1967 and 2009. With 40 occurrences over the past 43 years, Ogle County is likely to experience at least one severe snow and ice event each year. There were 10 years over the past 43 years where two or more severe snow and ice events occurred. This indicates that the probability that more than one snow and ice event may occur during any given year within the County is 23%.

There have been 25 verified occurrences of extreme cold events between 1979 and 2009. With 25 occurrences over the past 31 years, the probability or likelihood that an extreme cold event will occur in any given year is 81%. There were five years over the past 31 years where two or more extreme cold events occurred. This indicates that the probability that more than one extreme cold event may occur during any given year within the County is 16%.

ASSESSING VULNERABILITY

Are the participating jurisdictions vulnerable to severe winter storms?

Yes. All of Ogle 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 Ogle County at the Illinois Department of Human Services Office in Oregon.

Ice accumulations from the December 24th, 2009 ice storm caused damage to many trees in Mt. Morris.

Photo provided by Ogle County Newspapers

Since 2000, Ogle County has experienced 22 snow and ice events and nine extreme cold events. During five of these years, the County experienced multiple 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.

What impacts resulted from the recorded severe winter storms?

Damage information was either unavailable or none was recorded for any of the severe winter storms. 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.

While there were no property damages reported by the Storm Events Database for severe winter storms, the Planning Committee members were asked to provide property damage estimates for any critical facilities damaged by severe winter storms within their jurisdictions. The Ogle County Highway Department reported that approximately $150,000 in property damages was sustained during the winter of 2008-2009. Leaf River estimated that between $25,000 and $35,000 in property damage has been sustained to their Village Hall since 2004. However, this estimate includes damages sustained from both severe winter storms and severe storms. These additional property damages were not included in the reported event tables because specific dates for the events were not available. This information indicates that the total property damage figure for severe winter storms is around $175,000.

Two injuries and four deaths were reported as the result of four separate severe winter storm events in Ogle County. One fatality was reported as a result of a severe winter storm that blanketed northern Illinois with heavy snow on January 1, 1999. However, the event covered multiple counties and information on the location of the storm-related fatality was not provided. The first injury and second fatality resulted from a severe winter storm that covered Ogle County with between 10 inches and 18 inches of snow on November 30th and December 1st, 2006. A man was killed and a woman seriously injured during a head-on crash on Illinois Route 251 just south of Davis Junction. At the time of the accident, snow was drifting across the road which was snow-covered and slippery.

The second injury and third fatality occurred on December 1, 2007 during an ice storm. A child was killed and a woman was critically injured in a car accident on Kishwaukee Road north of Stillman Valley. The fourth fatality was a result of an extreme cold event which swept across the region on January 4, 2009. A 47 year-old man died of hypothermia near Davis Junction after he apparently abandoned his car to walk. In comparison, Illinois averages six deaths per year as a result of severe winter storms.

While severe winter storms occur regularly in Ogle County, the number of injuries and deaths is relatively 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 only two injuries and four deaths were reported by the Storm Events Database and community records for the recorded severe winter storm events in Ogle County, severe winter storms do have the ability to impact health and safety.

In Ogle 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 7.4% to 27.9% of all crashes recorded annually in Ogle County. **Figure 20** 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 20
Severe Winter Weather Crash Data for Ogle County

Year	Total # of Crashes	Presence of Treacherous Road Conditions caused by Snow and Ice		
		# of Crashes	# of Injuries	# of Deaths
2004	1,328	181	66	1
2005	1,387	187	33	1
2006	1,414	105	19	2
2007	1,455	328	58	3
2008	1,417	396	68	2

Source: Illinois Department of Transportation, Illinois Crash Data, County Crash Summaries, Ogle 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 Ogle 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 Ogle 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.

Ice accumulations from the December 24th, 2009 ice storm downed communication and power lines.

Photo provided by Ogle County Newspapers

Snow removal commences in Forreston following the January 21st and 22nd, 2008 winter storm.

Photo provided by Ogle County Newspapers

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.

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 Ogle 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 seven 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 several participating municipalities 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 Ogle 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 limited 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 Ogle County are vulnerable to damage it is likely that there will be future dollar losses to severe winter storms.

3.3 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 Ogle 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 Ogle 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.

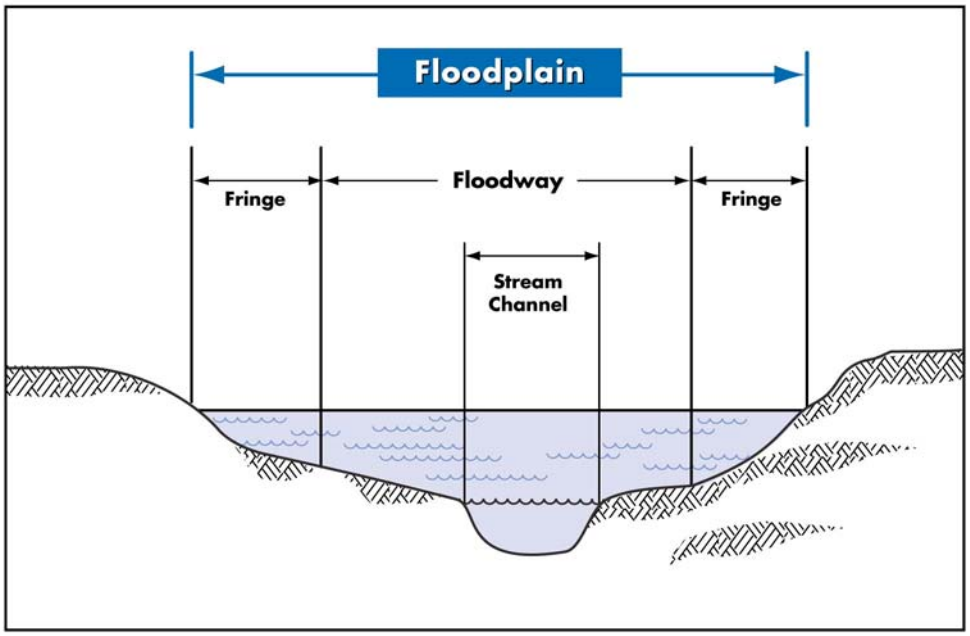
What is a floodplain?

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 21** illustrates the various components of a regulatory floodplain.

Figure 21
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.

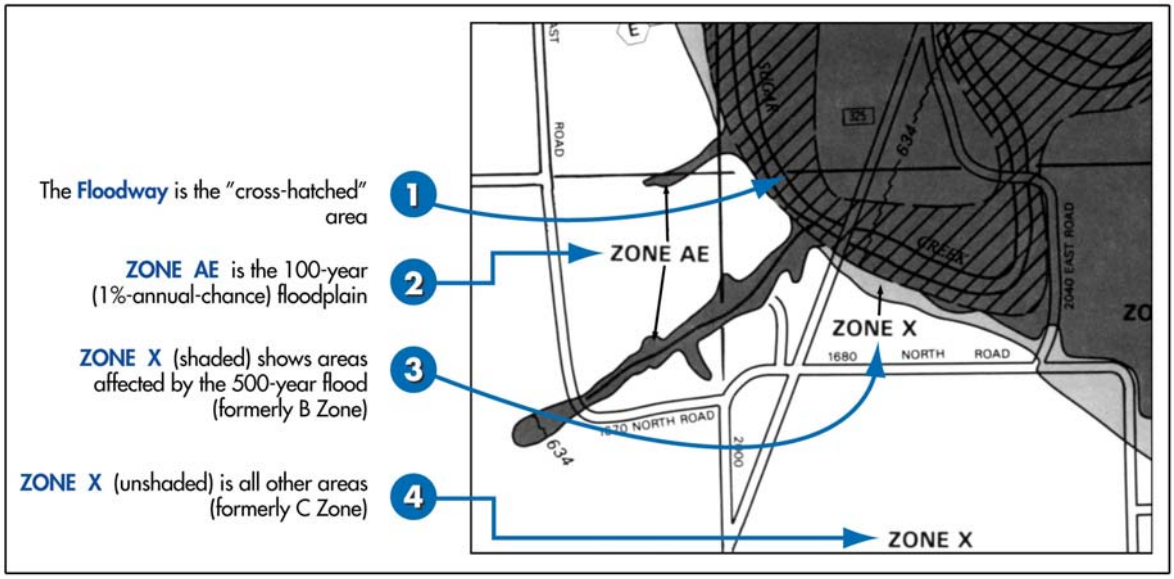
What is a Special Flood Hazard Area?

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 22** shows an example of a FIRM.

Figure 22
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 know 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 Chicago, Illinois is responsible for issuing flood watches or warnings for Ogle 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.
- **Flash Flood / Flood Warning.** A flash flood or flood warning is issued when flooding is in progress, imminent or highly likely. Warnings indicate imminent danger to life and property for those who are in the area of the flooding.

PROFILING THE HAZARD

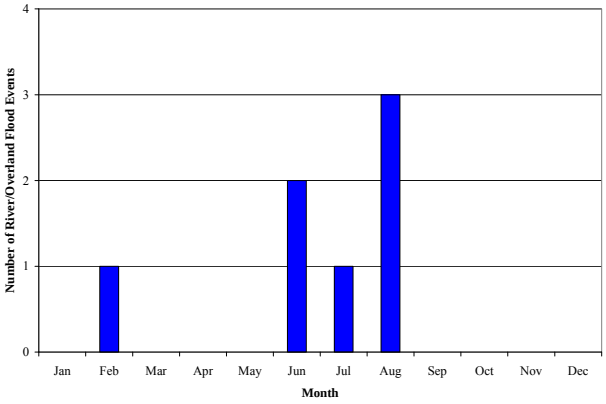
When has flooding occurred previously? What is the extent of these previous floods?

Tables 7 and **8** summarize the previous occurrences as well as the extent or magnitude of flood events in Ogle County. The flood events are separated into two categories: river/overland flood events and flash flood events.

RIVER/OVERLAND FLOOD EVENTS

The Storm Events Database records identified seven reported occurrences of river/overland flooding in Ogle County between 1996 and 2009. **Figure 23** charts the reported occurrences of river/overland flooding by month. Six of the seven events took place between June and August, with three of the events occurring in August. Approximately 71% of all river/overland flood events occurred during the p.m. hours, with three of the seven events taking place between 3 p.m. and 7 p.m.

Figure 23
Ogle County River/Overland Flood Events by Month – 1996 through 2009



NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Ogle County, 2010.

FLASH FLOOD EVENTS

The Storm Events Database and community records identified 37 reported occurrences of flash flooding in Ogle County between 1979 and 2009. **Figures 24** and **25** charts the reported occurrences of flash flooding by month and hour. Twenty-seven of the 37 events took place between May and August, with eight events apiece occurring in June and August. Approximately 56% of all flash flood events began during the a.m. hours, with nine of the 27 events beginning between 12 a.m. and 4 a.m.

Figure 24
Ogle County Flash Flood Events
by Month – 1979 through 2009

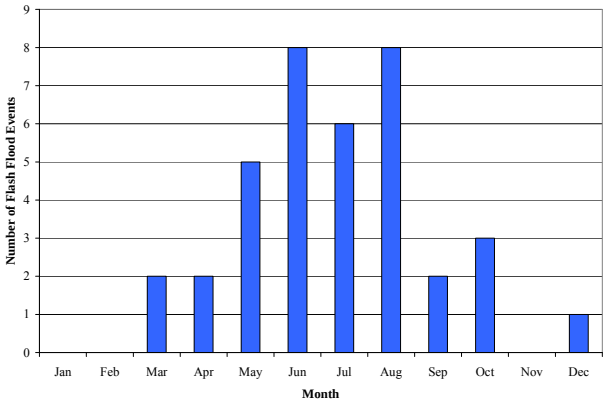
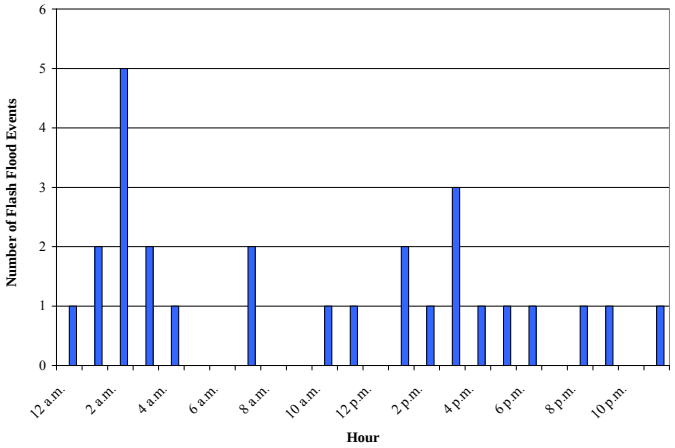


Figure 25
Ogle County Flash Flood Events
by Hour – 1979 through 2009



NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Ogle County, 2010.
Larry Acker, 3F Forecasts, weather observations for Ogle County, July 20, 2010.

What locations are affected by floods?

While specific locations are affected by river flooding, many more areas of the County can be affected by overland and flash flooding because of flat to gently sloping topography and seasonally high water table of the area. The areas along bluffs and ridges are not susceptible to floods. Approximately 4.6% of the area in Ogle County is designated as being within the regulatory floodplain and susceptible to river floods. The *2010 Illinois Natural Hazard Mitigation Plan* prepared by the Illinois Emergency Management Agency classifies Ogle County's hazard rating for floods as "elevated."

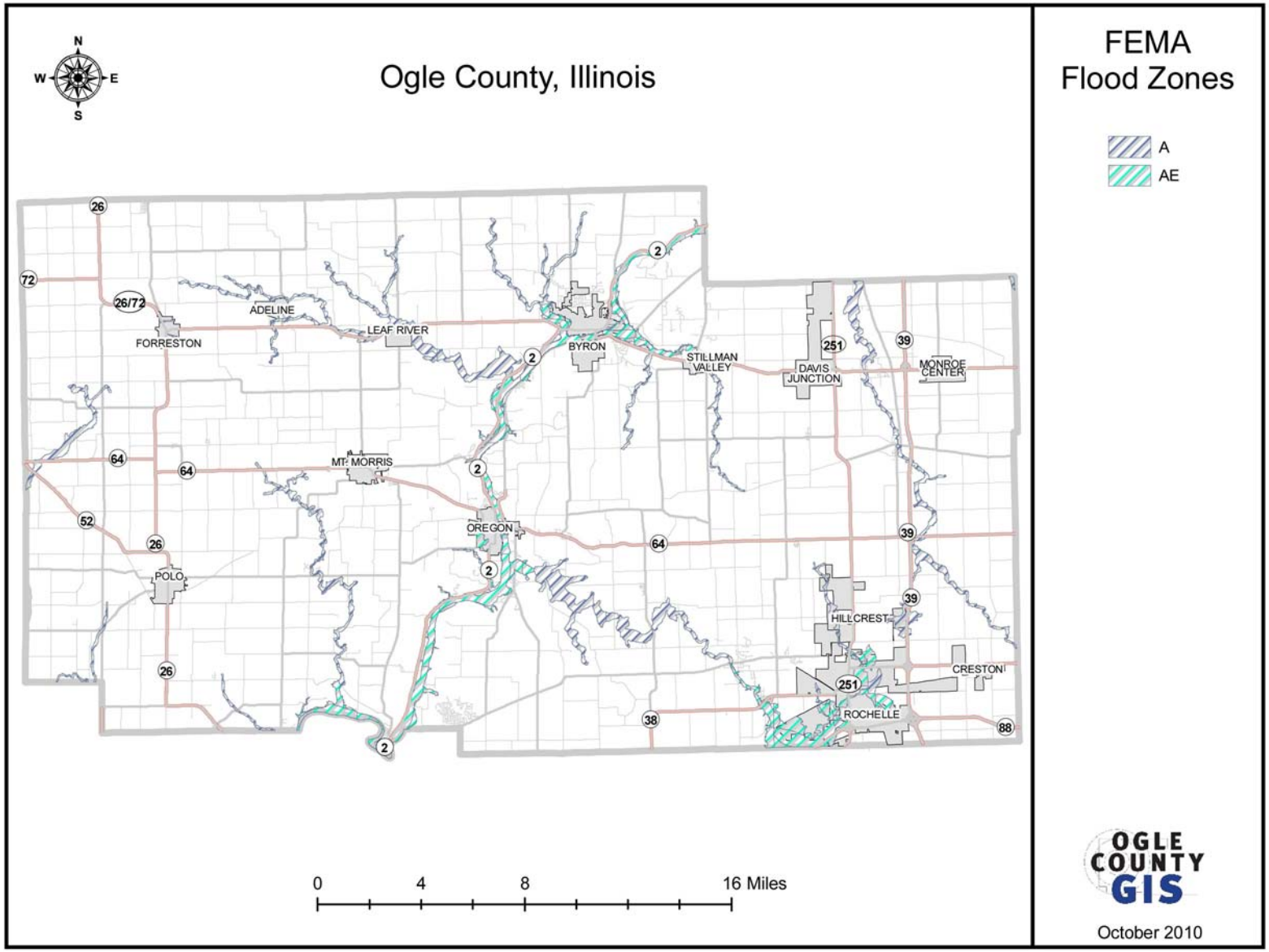
In 1979, the Leaf River overflowed its banks, flooding farm fields and causing damage to homes and roads in and around the Village of Leaf River.

Photo provided by the Village of Leaf River

A large portion of the area prone to river flooding is in the unincorporated portion of the County, although several participating municipalities including Leaf River, Byron, Oregon, Stillman Valley, Hillcrest and Rochelle are also susceptible to river flooding because of their proximity to floodplains.

Figure 26 shows the floodplains in Ogle County. This figure is based on the Digital Flood Insurance Rate Maps (DFIRMs) for Ogle County that have been finalized and will become

Figure 26
Floodplain Areas in Ogle County



effective on December 17, 2010. To review the DFIRMs for the participating municipalities, see **Appendix J. Figure 27** identifies the bodies of water by participating municipality that have FEMA-designated Special Flood Hazard Areas and are known to cause flooding.

Figure 27
Bodies of Water Subject to Flooding

Participating Jurisdiction	Water Bodies
Byron	Rock River, Stillman Creek
Creston	---
Forreston	---
Hillcrest	Kyte River
Leaf River	Leaf River, Mud Creek
Mt. Morris	unnamed tributaries of Pine Creek
Oregon	Kyte River, Rock River
Polo	---
Rochelle	Kyte River, Ryley Ditch
Stillman Valley	Stillman Creek
Unincorporated Ogle County	Beach Creek, Black Walnut Creek, Buffalo Creek, Clear Creek, East Fork Mill Creek, Elkhorn Creek, Gale Creek, Killbuck Creek, Kyte River, Leaf River, Middle Creek, Mill Creek, Mud Creek, Otter Creek, Pine Creek, Ryley Ditch, Seven Mile Branch, Silver Creek, Spring Run, Stillman Creek

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

Yes. Ogle County, Byron, Forreston, Hillcrest, Leaf River, Oregon, Polo and Rochelle all participate in the NFIP. **Figure 28** provides additional information about each jurisdiction, including the date each participant joined the NFIP. It is important to note that the development of this Plan occurred during the updating of the Ogle County FIRMs. While the new DFIRMs are final they do not become effective until December 17, 2010, subsequent to the public's review of this Plan. As a result, the dates listed in **Figure 28** for "Current Effective FIRM Date" and "Most Recently Adopted Floodplain Zoning Ordinance" reflect the information provided by the participants during the planning process and have not been updated to reflect the new finalized DFIRMs.

At the time this Plan was being developed Creston, Mt. Morris and Stillman Valley had no indentified flood hazard boundaries within their corporate limits and were not required to participate in the NFIP. However, with the development of the new DFIRMs, a special flood hazard area was identified within the corporate limits of Stillman Valley. As a result, the Village will be encouraged to become a participant of the NFIP by December 17, 2011 or risk becoming ineligible fro state and federal financial assistance.

What is the probability of future flood events occurring?

Ogle County has had seven verified occurrences of river/overland flooding between 1996 and 2009. With seven occurrences over the past 14 years, the probability or likelihood of a river/overland flood event occurring in Ogle County in any given year is 50%. There was one year over the past 14 years where two or more river/overland flood events occurred. This indicated that the probability that more than one river/overland flood event may occur during any given year within the County is 7%.

There have been 37 verified occurrences of flash flooding between 1979 and 2009. With 37 occurrences over the past 31 years, Ogle County should expect to experience at least one flash flood event each year. There were seven years over the last 31 years where two or more flash flood events occurred. This indicates that the probability that multiple flash flood events may occur during any given year within the County is 23%.

Figure 28
NFIP Participating Communities

Participating Jurisdictions	Participation Date	Current Effective FIRM Date	CRS Participation	Most Recently Adopted Floodplain Zoning Ordinance
Ogle County	4/5/1988	4/5/1988	No	2003
Byron	12/4/1984	12/4/1984	No	2008
Forreston	8/19/1987	8/19/1987	No	2000
Hillcrest	5/23/1994	9/15/1978	No	1994
Leaf River	6/18/1987	6/18/1987	No	2010
Oregon	10/15/1981	10/15/1981	No	1991
Polo	9/30/1976	NSFHA	No	1976
Rochelle	8/19/1986	4/1/1982	No	2003

Sources: FEMA, National Flood Program, Community Status Book Report – Illinois, June 7, 2010.

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

The Leaf River has overflowed its banks on several occasions, flooding homes and businesses along Main Street in the Village of Leaf River.

Since less than 5% of the area within Ogle County lies within a floodplain and the topography is relatively flat, a majority of the flooding experienced within the County is related to flash flooding. **Figure 29** details the number of river/overland flooding and flash flooding events by participating jurisdiction.

Figure 29
Verified River/Overland Flood & Flash Flood Events
by Participating Jurisdiction

Participating Jurisdiction	Number of Verified River/Overland Flood Events	Year of Flood Event	Number of Verified Flash Flood Events	Year of Flash Flood Event
Countywide / Portion of County	4	1997, 2000, 2002 (2)	8	1996, 1999, 2000, 2002 (2), 2007, 2009 (2)
Byron	0	---	0	---
Creston	0	---	0	---
Forreston	0	---	11	1981, 1985, 1987 (2), 1989, 1991, 1993, 1994, 1996, 2000, 2009
Hillcrest	0	---	0	---
Leaf River	0	---	0	---
Mt. Morris	0	---	13	1979, 1981, 1985, 1986, 1987, 1989, 1991, 1993, 1994, 1996, 1998, 2000, 2009
Oregon	1	2007	1	2007
Polo	0	---	25	1979, 1981, 1982, 1983, 1985 (2), 1986, 1987 (3), 1989, 1991, 1993, 1994, 1996, 1998, 2000, 2001, 2006, 2007 (2), 2008, 2009 (3)
Rochelle	2	2007 (2)	2	2004, 2007
Stillman Valley	0	---	1	2008

Source: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Ogle County, 2010.

Larry Acker, 3F Forecasts, weather observations for Ogle County, July 20, 2010.

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, noticeable changes in land use (from forested, open and agricultural land to residential, commercial and industrial) are anticipated within the County in the near future. Anticipated growth, including commercial and residential development, in the Rochelle and Byron areas has the potential to increase drainage problems. Hydrology, topography and soils should be considered as decisions are made about building density and stormwater mitigation.

What impacts resulted from the recorded floods?

Damage information was either unavailable or none was recorded for any of the river/overland flood events. Of the 37 reported flash flood events, damages were only recorded for two events. Damage information was either unavailable or none was recorded for the rest of the reported

occurrences. On June 19, 2009 multiple flash flood events were experienced across the County causing $100,000 in property damage. Several homes and businesses were flooded, numerous streets in Oregon, Polo and Mt. Morris experienced flooding and were closed, several rural roads between Oregon and Polo were washed out and thirty campers had to be evacuated through flood waters from the Rock River Marina and Campground on River Road near Oregon.

Several days later on June 22, 2009 heavy rain once again caused flash flooding across many of the same areas hit a few days earlier. This event caused $250,000 in property damages. Numerous roads across the County were flooded, several homes and one apartment building were flooded, the Lost Nation Bridge was washed out which cut off access to 30 homes, multiple trails in White Pines State Park were washed out or damaged, a few roads experienced wash outs and flood waters came over a bridge on Flagg Road. In addition, a small section of the Burlington Northern Santa Fe Railroad tracks between White Pine State Park and Lake LaDonna Family Campgrounds were washed out.

In addition to the property damages reported by the Storm Events Database, the Planning Committee members were asked to provide property damage estimates for any critical facilities damaged by flooding within their jurisdictions. The Ogle County Highway Department reported that flooding caused $50,000 in property damage to the Daysville Road Bridge over the Kyte River southwest of Oregon in 1996 and $100,000 in property damage to Lowell Park Road in June, 2009. Leaf River estimated flooding caused approximately $45,000 in property damage to streets within the Village between 1979 and 2009. These additional property damages are not included in the reported event tables because specific dates for the events were not available. This information indicates that the total property damage figure for flooding is closer to $545,000.

No injuries or deaths were reported as a result of any of the recorded river/overland flood events or flash flood events in Ogle County. In comparison, Illinois averages four deaths per year from flooding.

Based on the fact that less than 5% 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 river flooding is low. However, a majority of the 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.

Floodwaters also pose biological and chemical risks to public health. Flooding can force untreated sewage to mix with floodwaters. The polluted floodwaters then transport the biological contaminants into buildings and basements and onto streets and public areas. If left untreated, the floodwaters can serve as breeding grounds for bacteria and other disease-causing

agents. Even if floodwaters are not contaminated with biological material, basements and buildings that are not properly cleaned can grow mold and mildew which can pose a health hazard, especially for small children, the elderly and those with specific allergies.

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

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

Yes. Thirty-two repetitive flood loss properties are located within Ogle County. There are two single family dwellings and one condominium located in Byron, one single family dwelling located in Mt. Morris, 16 single family dwellings and one non-residential structure located in Oregon, one single family dwelling located in Rochelle and nine single family dwellings and one condominium located in unincorporated Ogle County. 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 30 identifies the type of repetitive flood loss structures/properties by participating jurisdiction and provides the total flood insurance claim payments for structure damages. A breakdown of flood insurance claim payments by structure type was unavailable in most cases. The exact location and/or addresses of the insured properties are not included in this Plan to protect the owners' privacy. According to FEMA, there have been 98 flood insurance claim payments totaling $825,704.95 for the 32 repetitive flood loss structures/properties located in Ogle County.

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

Yes. **Figure 31** identifies the existing buildings, infrastructure and critical facilities by participating jurisdiction that are located within the floodplain and vulnerable to flooding. Virtually all of the non-residential buildings identified in Figure __ are agricultural buildings (i.e., barns, shed and outbuildings.) Aside from key roads and bridges, the only other infrastructure and critical facilities that are vulnerable to flooding are the wastewater treatment facilities located in Leaf River and Stillman Valley. These facilities have experienced repeated flooding issues and both municipalities intend to construct new facilities safely outside of the floodplain.

Recent flooding caused the Leaf River to overflow its banks and wash out a portion of White Eagle Road west of Adeline.

While only 4.6% of the area in Ogle County is designated as being within the regulatory floodplain and susceptible to river/overland floods, most of the County is vulnerable to flash floods. A majority of the buildings, and virtually all infrastructure and critical facilities that may be impacted by flooding are located outside of the regulatory floodplain.

Figure 30
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	
Byron	NA	2	$20,519.40	NA	$20,519.40
Byron	NA	5	$46,358.17	NA	$46,358.17
Byron	NA	3	$15,342.90	NA	$15,342.90
Mt. Morris	Single Family	2	$12,375.87	NA	$12,375.87
Oregon	NA	8	$62,646.00	NA	$62,646.00
Oregon	NA	2	$26,063.71	NA	$26,063.71
Oregon	NA	3	$59,694.72	NA	$59,694.72
Oregon	NA	2	$6,887.60	NA	$6,887.60
Oregon	NA	2	$3,060.00	NA	$3,060.00
Oregon	NA	2	$5,849.31	NA	$5,849.31
Oregon	NA	2	$23,481.75	NA	$23,481.75
Oregon	NA	2	$9,269.55	NA	$9,269.55
Oregon	NA	4	$17,920.83	NA	$17,920.83
Oregon	NA	3	$15,252.42	NA	$15,252.42
Oregon	NA	2	$11,409.24	NA	$11,409.24
Oregon	NA	4	$19,148.55	NA	$19,148.55
Oregon	NA	2	$34,435.37	NA	$34,435.37
Oregon	NA	3	$25,634.04	NA	$25,634.04
Oregon	NA	4	$18,920.42	NA	$18,920.42
Oregon	NA	2	$36,628.02	NA	$36,628.02
Oregon	NA	4	$61,481.88	NA	$61,481.88
Rochelle	Single Family	2	$27,732.59	NA	$27,732.59
Unincorp. Ogle Co.*	NA	2	$1,045.17	NA	$1,045.17
Unincorp. Ogle Co.*	NA	6	$11,523.00	NA	$11,523.00
Unincorp. Ogle Co.*	NA	3	$8,797.76	NA	$8,797.76
Unincorp. Ogle Co.*	NA	2	$6,532.25	NA	$6,532.25
Unincorp. Ogle Co.*	NA	6	$32,445.18	NA	$32,445.18
Unincorp. Ogle Co.*	NA	5	$56,808.68	NA	$56,808.68
Unincorp. Ogle Co.*	NA	2	$19,109.60	NA	$19,109.60
Unincorp. Ogle Co.*	NA	2	$4,703.75	NA	$4,703.75
Unincorp. Ogle Co.*	NA	5	$120,734.73	NA	$120,734.73
Unincorp. Ogle Co.*	NA	2	$3,892.49	NA	$3,892.49
Totals:		**98**	**$825,704.95**	**$0**	**$825,704.95**

* These structures are located in unincorporated Ogle County near the Ogle County/Lee County border. FEMA records associate the location of these structures with the nearest city, which is Dixon, Illinois in Lee County.

Sources: Owen, Jared. Hazard Mitigation Planner. Illinois Emergency Management Agency. "Ogle RL." E-mail to Greg R. Michaud. November 10, 2009.
Owen, Jared. Hazard Mitigation Planner. Illinois Emergency Management Agency. "RE: Flood Letters." E-mail to Greg R. Michaud. April 15, 2010.

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.

Figure 31
Existing Buildings, Infrastructure and Critical Facilities Vulnerable to Flooding in Ogle County

Participating Jurisdiction	Buildings		Infrastructure/ Critical Facilities
	Residential	Non-Residential	
Byron	42	15	---
Creston	0	0	---
Forreston	14	13	---
Hillcrest	11	0	---
Leaf River	9	14	1
Mt. Morris	0	0	---
Oregon	20	33	---
Polo	0	0	---
Rochelle	301	32	---
Stillman Valley	0	0	1
Unincorporated Ogle County	325	96	---

Source: Gilbert, Kris. Ogle County GIS Specialist. "Ogle County Data." Email to Greg R. Michaud. June 2, 2010.

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

Yes and No. All of the participating jurisdictions that are subject to flooding and have current and effective FIRMs that show floodplains within their corporate limits at the time this Plan was prepared 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.

At the time this Plan was being developed, Stillman Valley had no indentified flood hazard boundaries within its corporate limits and had not adopted a floodplain ordinance. However, the development of the new DFIRMs identified a special flood hazard area within the Village's municipal boundaries. This area is associated with Stillman Creek on the north and east sides of the Village. Future buildings, infrastructure and critical facilities within these areas of the Village have the potential to be vulnerable to flooding. As a result, the Village will be encouraged to become a participant of the NFIP and adopt a floodplain ordinance. While Mt. Morris does not have any identified flood hazard boundaries within its corporate limits and is not required to participate in the NFIP, it does have a floodplain ordinance in place.

While new buildings, infrastructure and critical facilities should be protected from river 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

The first step in determining potential dollar losses to vulnerable structures is to estimate the number of vulnerable buildings. This task was undertaken by the County's GIS Department. Using the current FIRMs, the Department was able to estimate the number of residential buildings within the floodplain for each of the participating jurisdictions. **Figure 32** lists the estimated number of vulnerable buildings by 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 Ogle 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 Ogle 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 32
Potential Dollar Losses to Vulnerable Residential Buildings from a Single Flood Event*

Participating Jurisdiction	Estimated Number of Vulnerable Residential Buildings	Average Assessed Value	Average Market Value	Potential Dollar Losses		Total Potential Dollar Losses
				Housing Unit	Content	
Byron	42	$51,315	$153,945	$1,293,138	$1,939,707	$3,232,845
Creston	0	$39,686	$119,058	$0	$0	$ 0
Forreston	14	$27,752	$83,256	$233,117	$349,675	$582,792
Hillcrest	11	$51,114	$153,342	$337,352	$506,029	$843,381
Leaf River	9	$22,400	$67,200	$120,960	$181,440	$302,400
Mt. Morris	0	$26,654	$79,962	$0	$0	$ 0
Oregon	20	$29,222	$87,666	$350,664	$525,996	$876,660
Polo	0	$24,990	$74,970	$0	$0	$ 0
Rochelle	301	$45,159	$135,477	$8,155,715	$12,233,573	$20,389,288
Stillman Valley	0	$40,645	$121,935	$0	$0	$ 0
Unincorporated Ogle County	325	$98,760	$296,280	$19,258,200	$28,887,300	$48,145,500

* For the purposes of this scenario, it is assumed the vulnerable residential buildings are one or two story homes with basements that are flooded with two feet of water.

Sources: Gilbert, Kris. Ogle County GIS Specialist. "Ogle County Data." Email to Greg R. Michaud. June 2, 2010. Harrison, James. Ogle County Supervisor of Assessments. "Untitled (Assessed Residential Values)." Email to Greg R. Michaud. June 21, 2010.

When comparing the average assessed value of a residential property in unincorporated Ogle 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 ***structure of 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 the structure of the vulnerable housing units would be 20%. After calculating the adjusted average market value number, multiply it by the number of vulnerable housing units. **Figure 33** provides a sample calculation of potential dollar loss to the structure of vulnerable housing units.

Figure 33
Calculation of Potential Dollar Loss to the Structure of Vulnerable Housing Units

Step 1:
Average Market Value ($) x Percent Damage (%) = Average Structural Damage in Dollars
Byron Example: $153,945 x 20% = $30,789

Step 2:
Average Structural Damage ($) x Number of Vulnerable Housing Units =
Total Structural Damages to the Vulnerable Housing Units within a Jurisdiction
Byron Example: $30,789 x 42 housing units = $1,293,138

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. **Figure 34** provides a sample calculation of potential dollar loss to the content of vulnerable housing units.

Figure 34
Calculation of Potential Dollar Loss to the Content of Vulnerable Housing Units

Step 1:
Average Market Value ($) x Percent Damage (%) = Average Content Damage in Dollars
Byron Example: $153,945 x 30% = $46,184

Step 2:
Average Content Damage ($) x Number of Vulnerable Housing Units =
Total Content Damages to the Vulnerable Housing Units within a Jurisdiction
Byron Example: $46,184 x 42 housing units = $1,939,728

Finally, the total potential dollar losses may be calculated 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 32** 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 $300,000 to $20 million.

Infrastructure & Critical Facilities

The wastewater treatment facilities located in Leaf River and Stillman Valley have experienced repeated flooding issues. Both municipalities intend to construct new facilities safely outside of the floodplain. The potential dollar loss to relocate these facilities will be several million dollars respectively. No other above-ground infrastructure or critical facilities within the municipalities, other than key roads and bridges, were identified as being vulnerable to flooding.

Considerations

The calculations presented above are meant to provide the reader with a sense of the scope or magnitude of a large flood event in dollars. These calculations do not address the physical damages sustained by businesses or other infrastructure, such as roads and bridges. These calculations also do not address the monetary impacts to businesses that can not operate or lose goods through the failure of crucial services (i.e., power, drinking water and sewer). While average dollar amounts can not be supplied for these items at this time, they should be taken into account when officials discuss the overall impacts that a large-scale flood event would have on their jurisdiction.

3.4 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. Torndoes are known to blow off roofs, move cars and tractor trailers and demolish homes. Typically tornadoes cause the greatest damage to structures of light construction, such as residential homes.

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 35** gives a brief description of each category.

Figure 35
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 36** 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 36
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 Chicago, Illinois is responsible for issuing tornado watches or warnings for Ogle 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 tornadoes and severe thunderstorms 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.

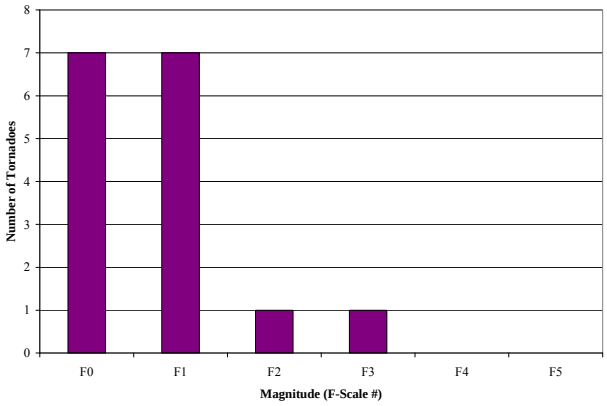
PROFILING THE HAZARD

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

Table 9 summarizes the previous occurrences as well as the extent or magnitude of tornado events recorded in Ogle County. The Storm Events Database records show 16 reported occurrences of tornadoes in Ogle County between 1959 and 2009. In comparison, Illinois has averaged 36 tornadoes annually since 1950. Tornadoes have occurred every decade in Ogle County since 1959.

Figure 37 charts the reported occurrences of tornadoes by magnitude. Of the 16 reported occurrences, one was classified as an F3 tornado, one was classified as an F2 tornado, seven were classified as F1 tornadoes and seven were classified as F0 tornadoes. These 16 reported tornadoes were produced by 15 weather events. There was a single weather event where two tornadoes were produced.

Figure 37
Ogle County Tornadoes by Magnitude
1959 through 2009



NOAA, NESDIS, National Climatic Data Center, Storm Events Database, Illinois, Ogle County, 2010.

Figures 38 and **39** chart the reported occurrences of tornadoes by month and hour. Ten of the 16 events took place between April and June. This three-month period has the highest frequency of tornado occurrences not only in Ogle County but statewide as well. Approximately 94% of all tornadoes occurred during the p.m. hours, with 11 of the 16 events taking place between 2 p.m. and 5 p.m.

Figure 38
Ogle County Tornadoes by Month
1959 through 2009

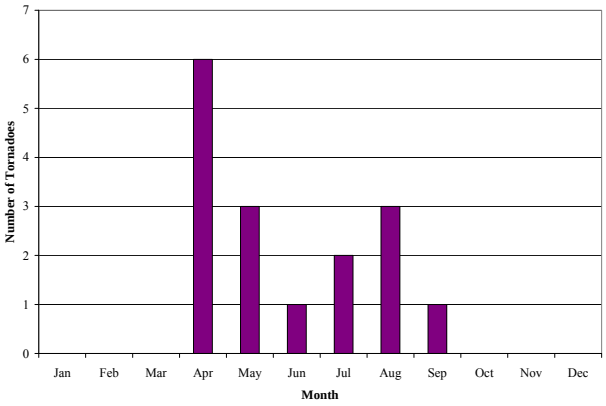
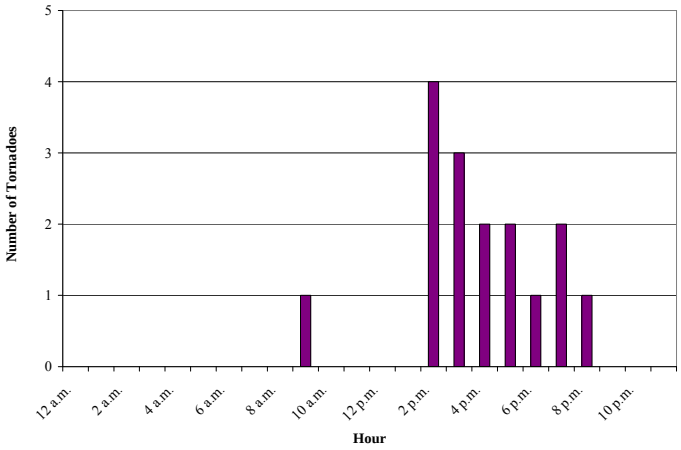


Figure 39
Ogle County Tornadoes by Hour
1959 through 2009



NOAA, NESDIS, National Climatic Data Center, Storm Events Database, Illinois, Ogle County, 2010.

The recorded tornadoes varied in length from the touchdown point to 10.9 miles long and in width from 10 yards to 67 yards wide. The average length of a tornado in Ogle County is 3.1 miles, the average width is 36 yards and the average damage pathway is approximately 0.1 square miles. The longest tornado recorded in Ogle County occurred on April 6, 1972. This F2 tornado, measuring 50 yards wide, touched down approximately 4 miles northwest of Polo and traveled southeast for 10.9 miles before dissipating southeast of Grand Detour in Lee County. The damage pathway of this tornado covered approximately 0.3 square miles.

The widest tornado recorded in Ogle County occurred on August 5, 1979. This F3 tornado, measuring 67 yards wide, touched down approximately 1 ½ miles north of Polo and traveled southeast for 5.7 miles before dissipating 4 miles southeast of Polo. The damage pathway of this tornado covered approximately 0.2 square miles.

What locations are affected by tornadoes?

Tornadoes have the potential to affect the entire County. The *2010 Illinois Natural Hazard Mitigation Plan* prepared by the Illinois Emergency Management Agency classifies Ogle County's hazard rating for tornadoes as "elevated".

All of the participating municipalities except Hillcrest have had reported occurrences of tornadoes in or near their locations. **Figure 40** shows the pathway each reported tornado took. Records indicate that most of these tornadoes moved from northwest to southeast 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?

Ogle County has had 16 verified occurrences of tornadoes between 1959 and 2009. With 16 occurrences over the past 51 years, the probability or likelihood of a tornado hitting somewhere in Ogle County in any given year is 31%. There were two years over the last 51 years where more than one tornado occurred. This indicates that the probability that more than one tornado may occur during any given year within Ogle County is 4%.

ASSESSING VULNERABILITY

Are the participating jurisdictions vulnerable to tornadoes?

Yes. All of Ogle County is vulnerable to the dangers presented by tornadoes. Municipalities located in the western portions of the County (Polo, Forreston and Oregon) have experienced more tornadoes and appear to be more vulnerable than those located in the eastern portions of the County. Five tornadoes have occurred in the immediate vicinity of Polo. This is more than twice the number of tornadoes that have affected any other participating municipality in the County, with the exception of Oregon. **Figure 41** lists the verified tornadoes that have touched down in or near each participating municipality.

What impacts resulted from the recorded tornadoes?

The data provided by the Storm Events Database indicates that between 1959 and 2009, tornadoes caused approximately $3,425,000 in property damage. Property damages for four of the occurrences totaled $250,000 or more. There were, however, six occurrences where the amount of the property damage was not reported.

Five injuries and one death were reported as a result of two separate incidents between 1959 and 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 Ogle County.

Figure 40
Tornado Touchdowns in Ogle County: 1959 – 2009

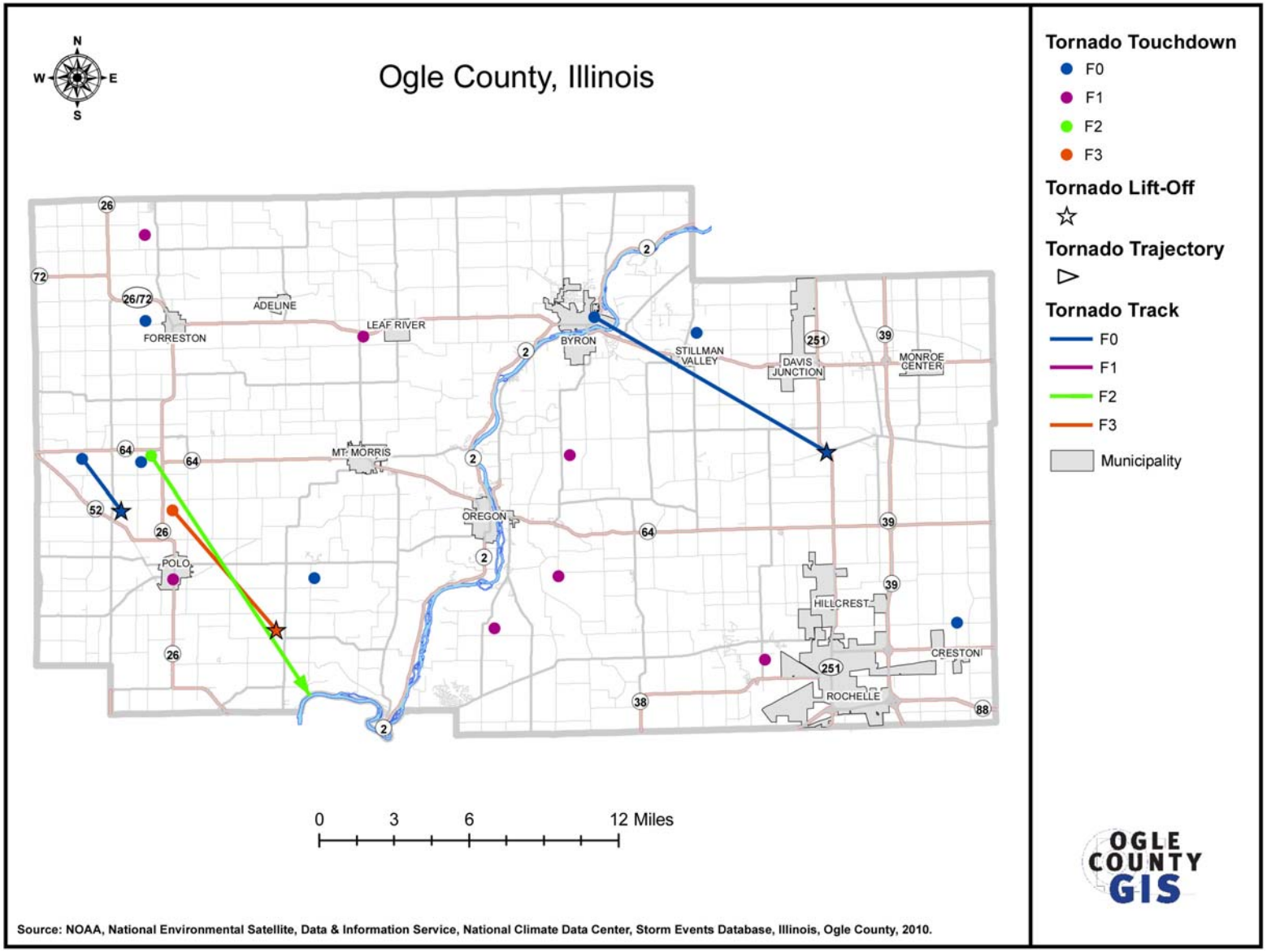


Figure 41
Verified Tornado Touchdowns by Participating Municipality

Participating Municipality	Number of Verified Tornadoes	Year Tornado Touchdown
Byron	1	1963
Creston	1	2000
Forreston	2	1974, 1995
Hillcrest	0	---
Leaf River	1	1993
Mt. Morris	1	1959
Oregon	3	1967, 1974, 1988
Polo	5	1972, 1974, 1979, 1992, 1999
Rochelle	1	1959
Stillman Valley	1	1974

Source: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Ogle County, 2010.

The most destructive tornadoes in terms of impacts ever recorded in Ogle County occurred on May 18, 1898. A local reporter provided the Planning Committee with a copy of a news article published by The Ogle County Press on May 21, 1898 entitled "Cyclone Extra" which described the damages caused by two tornadoes that entered the County on May 18th. **Appendix K** contains a copy of the news article.

According to the article, these tornadoes appear to have caused extensive damage in Carroll, Ogle and Winnebago Counties and were part of a larger outbreak of tornadoes that impacted Kansas, Missouri, Iowa, Illinois and Wisconsin. The first tornado came from Carroll County west of Forreston and continued on an eastward path causing deaths and severe property damage near Forreston, at Adeline and at Stillman Valley. This tornado passed Leaf River and Byron with little or no damage. It appears that this tornado exited Ogle County by continuing on a northeast path between Davis Junction and New Milford. The second tornado entered Ogle County south of Polo and continued northeasterly staying in the rural areas moving between Mt. Morris and Oregon before crossing the Rock River south of Byron and hitting Stillman Valley. This second tornado caused extensive property damage and at least one death before lifting off near Stillman Valley.

Cumulatively these tornadoes caused injuries, deaths and damaged homes, barns, outbuildings, churches, schools, other businesses, and injured and killed livestock. **Figure 42** provides an approximate tally of the impacts sustained from these two tornadoes.

While more injuries have been attributed to tornadoes in Ogle 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. Assuming that the hospital in Rochelle is not directly impacted by a tornado event, it is equipped to provide continuous care to those injured during a tornado. In addition, there are nearby hospitals in Freeport (Stephenson County), Dixon (Lee County) and Rockford (Winnebago County) which are closer

to some Ogle County residents than the hospital in Rochelle. All of these nearby hospitals are sufficiently equipped to provide continuous care to persons injured during a tornado. As a result, the risk or vulnerability to public health and safety has been relatively low. However, if a tornado were to touchdown in any of the municipalities, the risk or vulnerability for that location would be elevated to high. This high vulnerability rating is due in part to the lack of tornado safe shelters located within the municipalities.

Figure 42
Impacts Resulting from May 18, 1898 Tornadoes

Injuries/Death	11 injuries; 13 deaths
Residential/Farm Buildings Destroyed	16 homes, 17 barns, 9 outbuildings
Residential/Farm Buildings Damaged	6 homes, 1 barn, 2 outbuildings
Churches Destroyed	3 churches (Swedish Mission, German Lutheran, and Radical U.B.)
Churches Damaged	1 church (Baptist)
Schools Destroyed	1 school (Mud Creek)
Businesses Severely Damaged	4 businesses including one train depot (Chicago & Great Western Depot)
Livestock Injured/Killed	29 animals (horses, cows & hogs)

Source: "Death and Destruction." Ogle County Press, May 21, 1898, Cyclone Extra. Reprinted in the Tri-County Press, April 13 1972.

What other impacts can result from tornadoes?

In addition to causing damage to buildings and properties, tornadoes can damage infrastructure and critical facilities such as roads, bridges, railroad tracks, drinking water treatment 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 Ogle 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 (20,420) and dividing that number by the total land area of the County (763.3 square miles). The result suggests that there is an average of 27 housing units per square mile in Ogle 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 those counties with large, sparsely populated rural areas such as Ogle County.

In Ogle County, and many other northwestern counties, differences in housing density must be considered when assessing the vulnerability of buildings to tornado damage. Approximately 69% of all housing units within Ogle County are located in six of the County's 24 townships (Buffalo, Byron, Flagg, Marion, Mount Morris and Oregon-Nashua). **Figure 43** 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 Ogle County. In addition, over half of the mobile home units (which are more vulnerable to tornadoes) within the County are located in two of these six townships (Flagg and Mount Morris).

To more accurately assess building vulnerability in Ogle County, the average housing unit density for each township was calculated. **Figure 43** illustrates the substantial differences in housing unit density between the various townships in Ogle County. By comparing the average county housing unit density calculated above (27 housing units per square mile) to the township housing unit densities listed in **Figure 43**, the shortcomings of using a countywide average housing unit density for counties such as Ogle become apparent. For 17 of the 24 townships, the average county housing unit density is greater (in most 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 six most populated townships.

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 Ogle 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 0.1 square miles was chosen, the average damage pathway recorded for a tornado in Ogle County. **Figure 43** provides a breakdown of the number of potentially damaged housing units by township.

It is important to note that for the six townships with the greatest number of total housing units, the potential damage estimates would only be reached if a tornado's pathway included the major municipality within the township. If the tornado pathway remained in the rural portion of the township, then the number of potentially damaged housing units would be considerably lower.

Ogle County ranks among the top 60 counties in Illinois in terms of tornado frequency. This fact suggests that the overall risk posed by tornadoes in Ogle County might be relatively high. While frequency is important, other factors must be examined when assessing vulnerability.

When such factors as population distribution, the absence of high risk living accommodations (such as high rise buildings, etc.), the largely rural pathway of the previously recorded tornadoes, and the presence of uniform building codes among most of the participating municipalities are taken into consideration, the overall risk posed by tornadoes becomes 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.

Figure 43
Potential Tornado Damage to Housing Units in Ogle 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 0.1 Sq. Mile Area)
Brookville	18.0	102	0	6	1
Buffalo	33.7	1,261	4	37	4
Byron	37.2	2,119	29	57	6
Dement	34.9	330	3	9	1
Eagle Point	19.6	107	0	5	1
Flagg	35.7	5,222	262	146	15
Forreston	36.3	886	58	24	2
Grand Detour	11.6	380	0	33	3
Lafayette	17.5	78	2	4	1
Leaf River	35.7	520	0	15	2
Lincoln	36.0	209	4	6	1
Lynnville	34.9	230	1	7	1
Marion	45.3	1,303	15	29	3
Maryland	36.2	217	0	6	1
Monroe	36.2	597	13	16	2
Mount Morris	36.2	1,796	180	50	5
Oregon-Nashua	39.7	2,312	31	58	6
Pine Creek	39.7	300	14	8	1
Pine Rock	38.2	385	9	10	1
Rockvale	35.9	667	26	19	2
Scott	35.9	586	112	16	2
Taylor	15.6	404	0	26	3
White Rock	35.6	271	0	8	1
Woosung	17.7	138	0	8	1

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.

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

Yes. While seven of the ten 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 Ogle 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 Ogle 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 Ogle County could be used to estimate the area impacted; it was decided that the area impacted should be based on an average of the tornadoes that have been recorded in Ogle County. The average area impacted by a tornado in Ogle County was calculated and found to cover approximately 0.1 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 Ogle 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 unity 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 Ogle 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 44** 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 (0.1 square miles). **Figure 44** provides a breakdown of the number of impacted housing units by municipality.

Figure 44
Estimated Number of Residential Housing Units Impacted by a Tornado

Participating Municipality	Land Area (Sq. Miles)	Number of Housing Units (2000)	Housing Unit Density (Units per Sq. Mile)	Housing Units Impacted (Units per 0.1 Sq. Miles)
Byron	2.5	1,160	464	46
Creston	0.4	217	217	22
Forreston	0.8	631	631	63
Hillcrest	0.6	346	346	35
Leaf River	0.9	237	237	24
Mt. Morris	1.2	1,316	1,097	110
Oregon	2.1	1,794	854	85
Polo	1.3	1,082	832	83
Rochelle	7.5	3,916	522	52
Stillman Valley	0.6	417	417	42

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.

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 Ogle 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 Ogle County is approximately one-third of the market value). **Figure 45** provides the average assessed value and average market value for each participating municipality.

Figure 45
Estimated Potential Dollar Losses to Impacted Residential Housing Units from a Tornado

Participating Jurisdiction	Housing Units Impacted	Average Assessed Value	Average Market Value	Potential Dollar Losses		Total Potential Dollar Losses
				Housing Unit	Content	
Byron	46	$51,315	$153,945	$7,081,470	$3,540,735	$10,622,205
Creston	22	$39,686	$119,058	$2,619,276	$1,309,638	$3,928,914
Forreston	63	$27,752	$83,256	$5,245,128	$2,622,564	$7,867,692
Hillcrest	35	$51,114	$153,342	$5,366,970	$2,683,485	$8,050,455
Leaf River	24	$22,400	$67,200	$1,612,800	$806,400	$2,419,200
Mt. Morris	110	$26,654	$79,962	$8,795,820	$4,397,910	$13,193,730
Oregon	85	$29,222	$87,666	$7,451,610	$3,725,805	$11,177,415
Polo	83	$24,990	$74,970	$6,222,510	$3,111,255	$9,333,765
Rochelle	52	$45,159	$135,477	$7,044,804	$3,522,402	$10,567,206
Stillman Valley	42	$40,645	$121,935	$5,121,270	$2,560,635	$7,681,905
County*	3	$98,760	$296,280	$888,840	$444,420	$1,333,260
County†	1	$98,760	$296,280	$296,280	$148,140	$444,420

* Uses the generic average housing unit density (27 housing units per square mile)
† Uses the average housing unit density for the 18 least populated townships (12 housing units per square mile)

Source: Harrison, James. Ogle County Supervisor of Assessments. "Untitled (Assessed Residential Values)." Email to Greg R. Michaud. June 21, 2010.

When comparing the average assessed value of a residential property in unincorporated Ogle 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.

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 45** 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 27 housing units per square mile is used for the County and it is assumed that the tornado impacts a 0.1 square mile area, then the total number of housing units impacted would be three. 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 18 least populated townships (6,407 housing units divided by 535.5 square miles equals approximately 12 housing units per square mile) and multiplied by the area impacted by the tornado (0.1 square miles), then the total number of housing units impacted is reduced to one. 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 Ogle County would be expected to exceed $2 million in any of the participating municipalities. Although Rochelle is the largest municipality in Ogle County, residential dollar losses are potentially higher in other municipalities because of housing density. An average size tornado that hits Mt. Morris may cause more dollar losses than in Rochelle because Mt. Morris has a higher density of housing units. If, however, a tornado equivalent to the worst recorded in Ogle County were to hit both Rochelle and Mt. Morris, the dollar damages would be expected to be larger in Rochelle because more homes would be impacted.

3.5 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 Ogle 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 46** shows the classification system utilized by the Palmer Drought Severity Index.

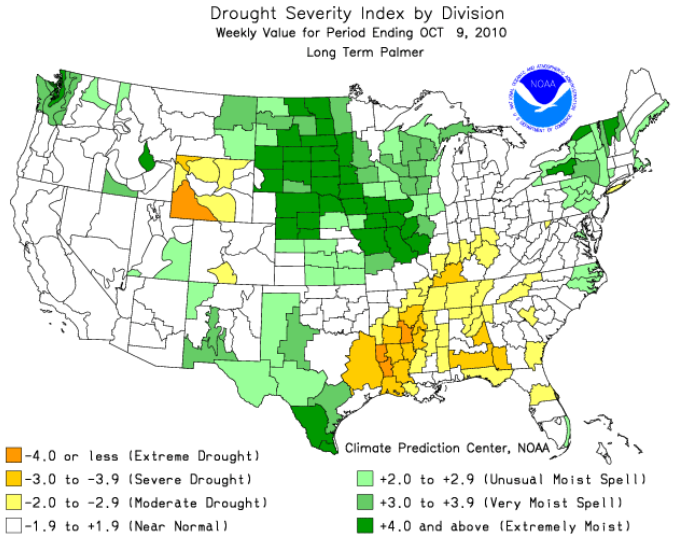
Calculations of the PDSI are made for 350 climate divisions in the United States and Puerto Rico. PDSI values have typically been calculated on a monthly basis. The National Climate Data Center has records on the monthly PDSI values for every climate division in the United States dating back to 1895.

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 47** shows an example of this map.

Figure 46 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 47
Palmer Drought Severity Index Map



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 48** provides a brief description of each category.

Figure 48
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 indictors. The five key indicators include the Palmer Drought Severity Index, Climate Prediction Center's Soil Moisture Model (percentiles), United States Geological Survey Weekly Streamflow (percentiles), Standardized Precipitation Index and Objective Short and Long-term Drought Indicator Blends (percentiles).

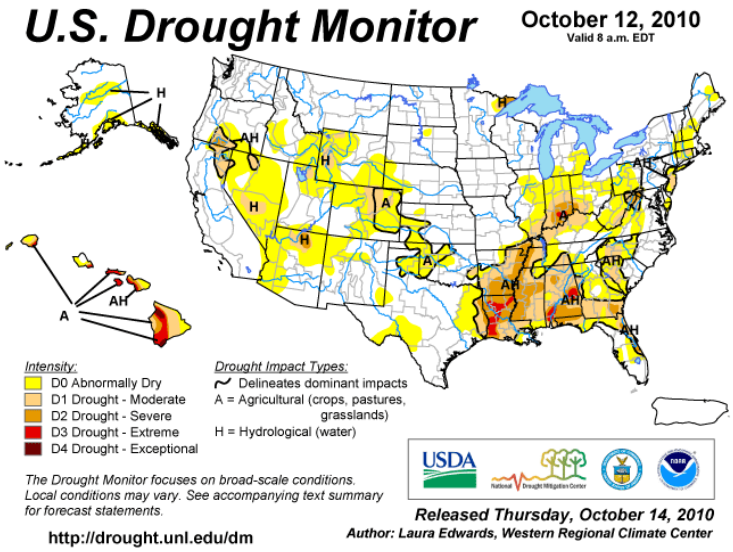
Because the ranges of the various indicators often don't coincide, the final drought category tends to be based on what a majority of the indictors show. The authors also weight the indices according to how well they perform in various parts of the country and at different times of the year. While the maps are based in part on the key indices and other measures of moisture, they also incorporate real-world conditions as reported by numerous experts throughout the country, providing a more comprehensive approach to identifying and monitoring drought conditions.

In addition to identifying and categorizing general areas of drought, the weekly map also identifies whether a drought's impacts are agricultural (crops, pastures and grasslands) and/or hydrological (rivers, groundwater and reservoirs). **Figure 49** shows an example of the U.S.

Drought Monitor weekly map. A summary also accompanies the map outlining the general conditions by regions.

The U.S. Drought Monitor is designed to provide a general and up-to-date overview of current drought conditions. It is not designed to depict local conditions. As a result, there could be water shortages or crop failures within areas not designated as drought, just as there could locations with adequate water supplies in an area designated as D3 or D4.

Figure 49
U.S. Drought Monitor Map



Source: Drought Monitor, National Drought Mitigation Center, 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 Ogle County. Information obtained from the Storm Events Database and the Illinois Emergency Management Agency show three reported drought events in Ogle County between 1983 and 2009.

- 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 Ogle 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.

- In 2005-2006, drought conditions impacted much of the state, including Ogle County. Dry conditions reached a historic level of severity in some parts of Illinois and ranked as one of the three most severe droughts in Illinois based on 112 years of data.

For each event lower than normal precipitation levels were recorded between April and June and unusually dry weather conditions persisted throughout the summer months. The Illinois State Water Survey records indicate that droughts also occurred in the region in 1931, 1934, 1936 and 1954; however, the extent to which Ogle County was impacted was unavailable.

What locations are affected by drought?

Drought events affect the entire County. All communities in Ogle County have been affected by drought. Droughts, like extreme heat and severe winter storms, tend to impact large areas, extending beyond county boundaries. The *2010 Illinois Natural Hazard Mitigation Plan* classifies Ogle County's hazard rating for drought as "guarded".

What is the probability of future drought events occurring?

Ogle County has experienced three droughts between 1983 and 2009. With three occurrences over 27 years, the probability or likelihood that Ogle County may experience a drought in any given year is 11%. However, if earlier recorded droughts are factored in, then the probability that Ogle County may experience a drought in any given year decreases slightly to 9%.

ASSESSING VULNERABILITY

Are the participating jurisdictions vulnerable to drought?

Yes. All of Ogle 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 Ogle County.

What impacts resulted from the recorded drought events?

Comprehensive damage information was either unavailable or none was reported for any of the three 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 Ogle 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 Ogle 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 a leading industry in Ogle County. According to the 2007 Census of Agriculture, there were 1,274 farms in Ogle County occupying 366,470 acres. Farm land accounts for approximately 75% of all the land in Ogle County. Of the 366,470 acres of farm land, approximately 91% or 333,550 acres of this land was in crop production. Less than one percent of this land is irrigated.

Drought in Ogle County has caused significant reductions in corn yields.

Photo Provided by the Ogle County Extension Service

Crop sales accounted for $173,675,000 in revenue while livestock sales accounted for $85,072,000. 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, 1988 and 2005 droughts. **Figure 50** illustrates the reduction in yields seen for corn and soybeans during the three 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 31%, while soybean yield reductions were only 5%. In 1983, 91 bushels per acre were harvested for corn and 38 bushels per acre for soybeans in contrast to 131 bushels per acres of corn and 40 bushels per acres of soybeans the previous year.

Figure 50
Crop Yield Reductions Due To Drought in Ogle County

Year	Corn		Soybeans	
	Yield (bushel)	% Reduction from Previous Year	Yield (bushel)	% Reduction from Previous Year
1982	131	---	40	---
1983	**91**	**31%**	**38**	**5%**
1987	133	---	47	---
1988	**66**	**50%**	**29.5**	**37%**
2004	184	---	50	---
2005	**139**	**24%**	**46**	**8%**
2006	179	---	54	---

Source: United States Department of Agriculture, National Agricultural Statistics Service, Quick Stats – Crops, Ogle County, Illinois, 2010.

Corn yield reductions were 50% and soybean yield reductions were 37% as a result of the 1988 drought when only 66 bushels per acre of corn and 29.5 bushels per acre of soybeans were harvested in contrast to 133 bushels per acre of corn and 47 bushels per acre of soybeans harvested the previous year. The 2005-2006 drought caused a 24% yield reduction in corn and 8% yield reduction in soybeans for 2005, but did not impact yields in 2006. In 2005, 139

bushels per acre of corn and 46 bushels per acre of soybeans were harvested in contrast to 184 bushels per acre of corn and 50 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 Ogle County, none of the participating municipalities rely on surface water sources for their drinking water supplies. All obtain water from deep underground wells. 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 Ogle 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 within the County are no more vulnerable to drought than the existing building, infrastructure and critical facilities. As discussed above, buildings do not typically sustain damage from drought. Infrastructure and critical facilities may, in rare cases, be damaged by drought, but very little can be done to prevent this damage.

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

Unlike other natural hazards that affect the County, drought does not typically damage buildings. The primary concern associated with drought is loss of crop 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 water conservation measures that typically accompany a drought will most likely impact businesses and industries that are water-dependent (i.e., car washes, landscapers etc.).

3.6 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?

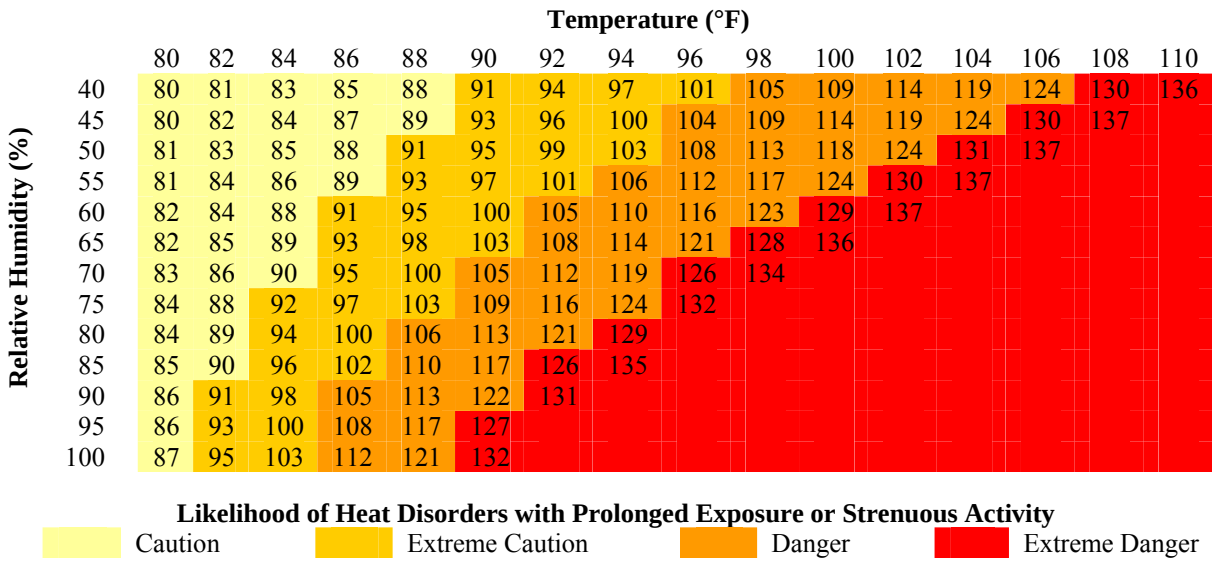
The Heat Index, sometimes referred to as the "apparent temperature", is a measure of how hot it feels when relative humidity is added to the actual air temperature. **Figure 51** shows the Heat Index as it corresponds to various air temperatures and relative humidity. As an example, if the air temperature 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.

Figure 51
Heat Index Chart



Source: National Weather Service

- **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 52 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 52
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 Chicago, Illinois. The Chicago office is responsible for issuing alerts for Ogle County.

- **Excessive Heat Outlook.** An excessive heat outlook is issued when the potential exists for an excessive heat event to develop over the next three to seven days.
- **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 (northern Illinois).** An excessive heat advisory is issued when the heat index is expected to be between 105°F and 110°F, with a minimum temperature of 75°F or higher for two or more consecutive days.
- **Excessive Heat Warning (northern Illinois).** An excessive heat warning is issued when the heat index is expected to equal or exceed 110°F and the minimum temperature is 75°F for two or more consecutive days.

PROFILING THE HAZARD

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

Only one extreme heat event has been recorded by the National Oceanic and Atmospheric Administration's Storm Events Database for Ogle County. Between July 12, 1995 and July 16, 1995 an extreme heat event affected all of northern Illinois, including Ogle County. The temperatures for this time period soared into the middle to upper 90s and the heat index reached a high of 125°F. According to the Midwestern Regional Climate Center, the highest temperature recorded in Ogle County over the last 110 years was 104°F on August 29, 1945.

What locations are affected by extreme heat?

Extreme heat events affect the entire County. A single extreme heat event will generally extend across an entire region and affect multiple counties. The *2010 Illinois Natural Hazard Mitigation Plan* classifies Ogle County's hazard rating for extreme heat as "elevated."

What is the probability of future extreme heat events occurring?

Ogle County has experienced one verified extreme heat event between 1995 and 2009. With one occurrence over the past 15 years, the probability or likelihood that the County may experience an extreme heat event in any given year is 7%.

ASSESSING VULNERABILITY

Are the participating jurisdictions vulnerable to extreme heat?

Yes. All of Ogle County is vulnerable to extreme heat. One extreme heat event was recorded over the past 15 years. There is one official cooling center located in Ogle County at the Illinois Department of Human Services Office in Oregon.

What impacts resulted from the recorded extreme heat events?

There were reports of road buckling and power outages as a result of the July 12, 1995 event; however the locations and the extent of the damages were not recorded. Property and crop damage information was either unavailable or none was recorded for this event. Approximately 583 heat-related deaths were recorded as a result of this event in Illinois; however none were reported in Ogle County. While no heat-related injuries were reported, the heat indices were sufficiently high 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 in Ogle 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 Ogle 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 Ogle 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 Ogle 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 Ogle 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 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 highways within Ogle 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 Ogle 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, Ogle 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.

3.7 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.

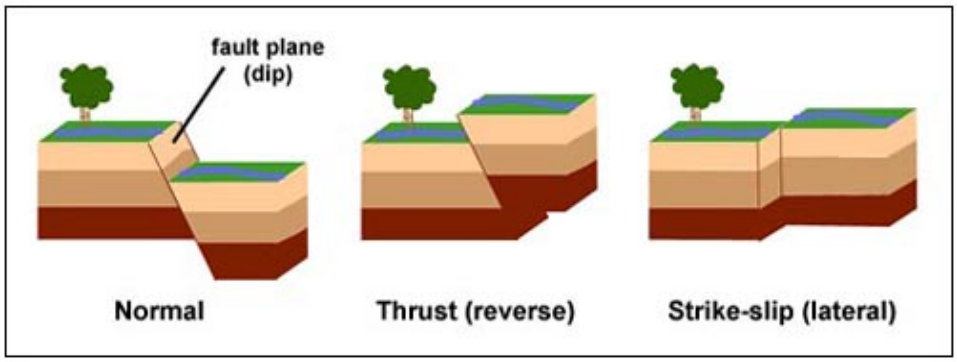
The destruction caused by an earthquake may range from light to catastrophic depending on a number of factors including the magnitude of the earthquake, the distance from the epicenter, the local geologic conditions as well as construction standards and time of day (i.e., rush hour). Earthquake damage 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 53** provides an illustration of each type of fault.

Figure 53
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 54** 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 54
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 55** 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 Himalayan Mountains, the Mediterranean Sea and out into the Atlantic Ocean. It accounts for about 17 percent of the world's largest earthquakes,

Figure 55
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".

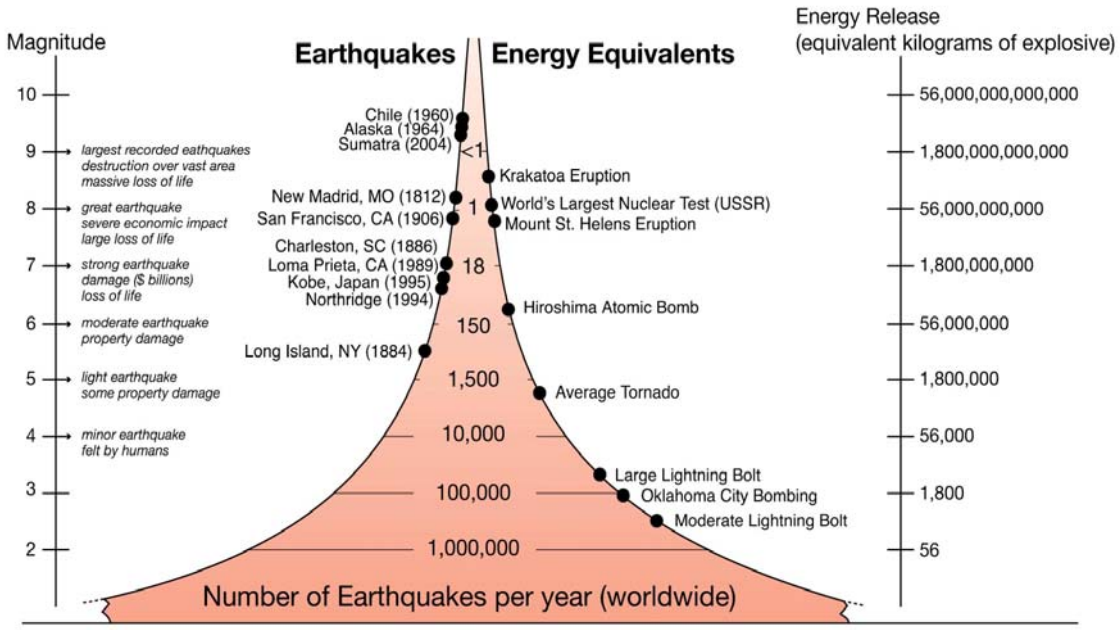
including those in Iran, Turkey and Pakistan. The third belt follows the submerged mid-Atlantic Ridge, the longest mountain range in the world, nearly splitting the entire Atlantic Ocean north to south.

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 56** 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 56
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

Are there any fault zones located within the County?

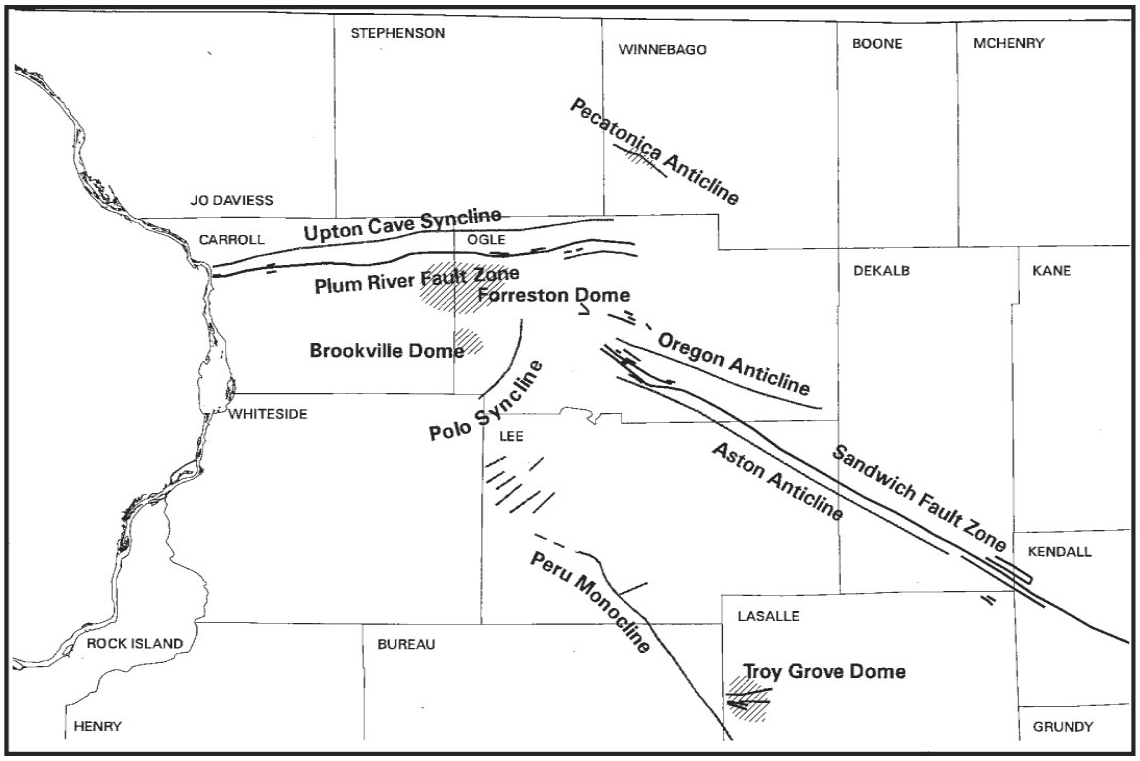
Yes. There are two known fault zones in Ogle County, the Plum River Fault Zone and the Sandwich Fault Zone. The Plum River Fault Zone is 112 miles long and trends slightly northeast across eastern Iowa and northwestern Illinois, from Linn County, Iowa to Ogle County, Illinois. It varies in width from a few hundred feet to approximately 3,900 feet. **Figure 57** illustrates the location of the Plum River Fault Zone in Illinois.

The Sandwich Fault Zone is the largest fault zone in northern Illinois. It is approximately 85 miles long and runs northwest/southeast across northern Illinois, from central Ogle County to southern Will County. It varies in width from ½ mile to 2 miles. **Figure 57** illustrates the location of the Sandwich Fault Zone.

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

According to the Illinois State Geological Survey's *Northern Illinois Earthquakes* fact sheet and the *Earthquakes of Illinois: 1795 – 2010* map, no earthquakes have originated in Ogle County during the last 200 years. However, there have been at least a dozen earthquakes that have occurred in northern Illinois in the last century, though none of them were greater than a magnitude 5.1. These earthquakes generally caused minor damage within 10 to 20 miles of the epicenter and were felt over several counties. Earthquakes greater than a magnitude 5 are generally not expected in this region.

Figure 57
Geological Structures in Northern Illinois



Source: "Northern Illinois Earthquakes," Earthquake Facts 1999-1, Illinois State Geological Survey.

The most recent earthquake to take place in northern Illinois occurred on February 10, 2010. This magnitude 3.8 earthquake was located approximately two miles northeast of Virgil in Kane County and was felt over much of Illinois, Indiana and central and southern Wisconsin. Some minor structural damage was reported as a result of this earthquake. On June 28, 2004, a magnitude 4.2 earthquake was reported in northern Illinois approximately eight miles northwest of Ottawa in La Salle County. Ground shaking was felt over six states.

On September 2, 1999, a magnitude 3.5 earthquake was reported in northern Illinois near Dixon in Lee County. This earthquake was not directly linked to any known fault in Northern Illinois. Ground shaking was felt over several counties. The September 2, 1999 earthquake occurred in roughly the same vicinity as the September 15, 1972 earthquake. On September 15, 1972, a magnitude 4.5 earthquake was reported near Amboy in Lee County. Minor structural damage, such as cracks in chimneys and plaster, was reported. Ground shaking was felt over most of northern Illinois.

The largest earthquake to take place in northern Illinois in the past several hundred years occurred on May 26, 1909. The exact location of this magnitude 5.1 earthquake isn't known, but the greatest damage occurred in and near Aurora where many chimneys fell and gas lines were ruptured. Minor structural damage was reported across northern and central Illinois and southern Wisconsin. Ground shaking was felt over seven states.

Ogle County has also felt ground shaking caused by several earthquakes that have originated in southeastern Illinois. 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.

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. Ogle County's proximity to two earthquake fault zones (the Plum River and the Sandwich) makes the entire area likely to be affected by an earthquake if these faults become seismically active. The *2010 Illinois Natural Hazard Mitigation Plan* classifies Ogle County's hazard rating for earthquakes as "guarded."

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%.

ASSESSING VULNERABILITY

Are the participating jurisdictions vulnerable to earthquakes?

Yes. All of Ogle 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 Ogle 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 infrequency of major earthquakes, coupled with relatively low magnitude/intensity past events, has led the public to perceive that Ogle 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 Ogle County felt the earthquakes that occurred in northern Illinois in 2010, 2004, 1999, 1972 and 1909, 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 Ogle County felt those quakes; however historical records do not indicate the intensity or impacts that these quakes had on the County. If another earthquake the magnitude of those recorded 1811 and 1812 occurs again along the New Madrid seismic zone, the damage that will be experienced in northern Illinois is not expected to be substantial.

The risk or vulnerability to public health and safety from an earthquake is dependent on the intensity of the event. Since there are two known faults in Ogle County, an earthquake may originate in the County at some point in the future, increasing the chances that damage will occur. However, since there have not been any earthquakes associated with these faults in over 200 years, there is a higher likelihood that Ogle County residents will experience impacts from earthquakes that originate from outside of the County. As a result, the risk or vulnerability to public health and safety from a light earthquake such as the one that occurred on June 28, 2004 is low. However, if a great earthquake similar to those experienced in 1811 and 1812 were to originate in northern Illinois, then the risk or vulnerability to public health and safety would be elevated to high.

What other impacts can result from earthquakes?

Earthquakes can impact human life, health and public safety. **Figure 58** details the potential impacts that may be experienced within the County should a magnitude 6.0 or greater earthquake ever occur in the region.

Figure 58
Potential Earthquake Impacts

Direct	Indirect
Buildings • Temporary displacement of businesses, households, schools and other critical services where heat, water and power are disrupted • Long-term displacement of businesses, households, schools and other critical services due to structural damage or fires *Transportation* • Damages to bridges (i.e., cracking of abutments, subsidence of piers/supports, etc.) • Cracks in the pavement of critical roadways • Increased traffic on I-39 and I-88 (especially if the quake originates along the Sandwich Fault) as residents move out of the region to seek shelter and medical care and as emergency response, support services and supplies move in to the region to aid in recovery. • Misalignment of rail lines due to landslides (most likely near stream crossings), fissures and/or heaving *Utilities* • Downed power and communication lines • Breaks in drinking water and sanitary sewer lines resulting in the temporary loss of service • Disruptions in the supply of natural gas due to cracking and breaking of pipelines *Health* • Injuries/deaths due to falling debris and fires *Other* • Cracks in the earthen dams of the lakes and reservoirs within the County which could lead to dam failures	*Health* • Use of County health facilities to treat individuals injured closer to the epicenter • Emergency services (ambulance, fire, law enforcement) may be needed to provide aid in areas where damage was greater *Other* • Disruptions in land line telephone service throughout an entire region (i.e., northern 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 Ogle 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 Ogle 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 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 Ogle County and the participating jurisdictions are vulnerable to damage from earthquakes. While seven 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 Ogle County. Sufficient information was not available to make useful predictions regarding potential earthquake damage through the use of computer modeling. Since all structures within Ogle 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 83,983 dams in the United States and Puerto Rico, with 1,504 dams located in Illinois. (The NID is maintained by the U.S. Army Corps of Engineers and is updated approximately every two years, with the last update occurring in 2009.) Ninety-four 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 59** 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 59
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 Ogle County is the Oregon Dam which is owned by the Illinois Department of Natural Resources. This Class I dam was completed in 1914.

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

Yes. There are seven privately-owned classified dams located within Ogle County. All of these dams are Class III earth dams. Two of these dams, the Lost Nation Country Club Lake Dam and the Hidden Valley Lake Dam, are located near residential housing developments and are used for recreational purposes. A third dam is located at the Union Pacific Global III Intermodal Facility and is used for flood control.

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 Ogle County.

What locations are affected by dam failure?

Dam failures have the potential to affect Oregon and unincorporated portions of Ogle 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 Oregon and portions of unincorporated Ogle County are vulnerable to the dangers presented by dam failures, none of the other participating municipalities are vulnerable.

What impacts resulted from the recorded dam failures?

Since there have been no recorded dam failures in Ogle 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. Flooding of roadways is also a major concern for emergency response personnel who would have to find alternative routes around any section of road that becomes flooded due to a dam failure.

In addition to concerns about injuries and death, the water released by a dam failure poses the same biological and chemical risks to public health as floodwaters. The flooding that results from a dam failure has the potential to force untreated sewage to mix with floodwaters. The polluted floodwaters then transport the biological contaminants into buildings and basements and onto 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 Ogle 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 several of 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 can damage roads and utilities. Roadways, culverts and bridges can be weakened by dam failure floodwaters and may collapse under the weight of a vehicle. Power and communication lines, both above and below ground, are also vulnerable to dam failure flooding. Depending on their location and the velocity of the water as it escapes the dam, power poles may be snapped causing disruptions to power and communication. Water may also get into any buried lines causing damage and disruptions.

As with public health and safety, the risk or vulnerability to buildings, infrastructure and critical facilities is dependent on several factors including the severity of the event, the capacity of the reservoir and the extent and type of development and infrastructure located downstream. In general, the risk 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?

Unlike other hazards, such as flooding, there are no standard loss estimation models or methodologies for dam failures. Given that there have been no recorded dam failures in Ogle County, sufficient information was not available to prepare a reasonable estimate of future potential dollar losses to vulnerable structure from dam failures.

3.9 MAN-MADE HAZARDS

While the process to develop this Plan focused on natural hazards, the Planning Committee recognized that man-made hazards can also pose risks to public health and property. The extent and magnitude of the impacts that result from man-made hazard events can be influenced by natural hazard events. For example, severe winter storms can cause accidents involving trucks transporting hazardous substances. These accidents may lead to the release of these substances which can result in injury and potential contamination of the natural environment.

Consequently, the Planning Committee decided to profile the more prominent man-made hazards in Ogle 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 Ogle 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

Ogle County has several sites that generate hazardous waste as a result of their operations according to the Illinois Environmental Protection Agency (IEPA). **Figure 60** identifies the hazardous waste generators located in Ogle County along with the type of hazardous waste generated (solid and/or liquid) and the amount.

Figure 60
Generators of Solid & Liquid Hazardous Waste in Ogle County – 2007

Name	Hazardous Waste Generated	Amount Generated (Tonnage)
Byron		
Austin-Westran LLC	manganese	0.012
Quality Metal Finishing Co.	contaminated debris (paper, rags, etc.)	0.600
	spent acid	17.627
	caustic aqueous waste (pH > 12.5)	63.057
	other inorganic aqueous waste or wastewater	190.536
	other inorganic liquids	3.498
	other inorganic solids	65.496
	other organic solids	0.594
	cyanide-bearing sludges	19.743
	other organic sludges	6.305
	copper compounds	2.943
	nickel compounds	2.198
	Total:	*372.597*
Davis Junction		
Veolia ES (Formerly BFI)	other inorganic aqueous waste or wastewater	1,031.624
Mt. Morris		
Quad Graphics (Formerly Quebecor World)	acidic aqueous waste (pH < 2)	10.468
	concentrated non-halogenated solvent	84.452
	other inorganic solids	0.075
	metal bearing sludges (not containing cyanide)	26.058
	paint or ink sludges	9.460
	copper	0.810
	zinc compounds	0.855
	Total:	*132.178*
Oregon		
Ed Etnyre & Co.	paint, ink lacquer or varnish	16.892
	paint thinner or petroleum distillates	13.402
	Total:	*30.294*
HA International LLC	4,4,'-isopropylidenediphenol	0.915
	formaldehyde	2.497
	phenol	7.800
	zinc compounds	0.295
	Total:	*11.507*

Figure 60
Generators of Solid & Liquid Hazardous Waste in Ogle County – 2007
Continued…

Name	Hazardous Waste Generated	Amount Generated (Tonnage)
Rochelle		
Southeast Wood	copper compounds	0.125
Silgan Containers Manufacturing Corp.	caustic aqueous waste without cyanides	7.141
	paint, ink lacquer or varnish	12.313
	Total:	*19.454*

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, Ogle County, Illinois, 2007.

In addition to the solid and liquid hazard wastes generated in Ogle 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 61** identifies the hazardous air emissions generators located in Ogle County along with the type of hazardous emissions generated and the amount.

Figure 61
Generators of Hazardous Air Emissions in Ogle County – 2007

Name	Hazardous Waste Generated	Amount Generated (Tonnage)
Byron		
Austin-Westran LLC	manganese	0.158
Quality Metal Finishing Co.	copper compounds	0.164
	cyanide compounds	0.159
	lead compounds	0.004
	nickel compounds	0.041
	nitric acid	0.438
	trichloroethylene	50.117
	Total:	*50.923*
Lindenwood		
Swenson Spreader LLC	chromium	0.170
	cobalt	0.028
	manganese	0.052
	nickel	0.109
	Total:	*0.359*
Mt. Morris		
Quad Graphics (Formerly Quebecor World)	ethylbenzene	5.717
	toluene	167.225
	xylene	10.279
	Total:	*183.221*

Figure 61
Generators of Hazardous Air Emissions in Ogle County – 2007
Continued…

Name	Hazardous Waste Generated	Amount Generated (Tonnage)
Oregon		
HA International LLC	4,4,'-isopropylidenediphenol	0.658
	ammonia	3.480
	formaldehyde	8.400
	phenol	125.794
	Total:	*138.332*
WEC Co.	antimony	0.015
	chromium	0.026
	copper	0.031
	manganese	0.286
	nickel	0.025
	selenium	0.015
	Total:	*0.398*
Rochelle		
Illinois River Energy LLC	acetaldehyde	1.853
	ammonia	0.125
	n-hexane	1.813
	toluene	0.438
	Total:	*4.229*
Silgan Containers Manufacturing Corp.	1,2,4-trimethylbenzene	0.070
	certain glycol ethers	3.169
	ethylbenzene	0.586
	methyl isobutyl ketone	0.228
	n-butyl alcohol	1.169
	naphthalene	0.035
	xylene	2.189
	Total:	*7.446*

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

On-site generation of hazardous waste at permitted sites in Ogle 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

Interstates 39 and 88, US Route 52 and State Routes 2 and 251 are major highways that carry traffic north, south, east and west throughout Ogle County and connect with Chicago, Rockford 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 Ogle 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 62** provides information on these accidents.

Figure 62
Roadway Accidents involving Shipment of Hazardous Products in Ogle County: 2005 – 2009

Date	Location	Hazardous Product Released
8/8/2006	Dement Road – Rochelle	diesel fuel
6/7/2007	Lowell Park Road – Mt. Morris	herbicide
11/7/2008	Petro Drive – Rochelle	gasoline
12/1/2008	Mulford Rd. & Hwy. 64 - Rochelle	gasoline

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

Railways

Illinois' rail system is the country's second largest, with the Chicago and East St. Louis terminals being two of the nation's busiest. In Ogle County, there are three rail lines that run east-west (Union Pacific, Canadian Pacific and the Burlington Northern and Santa Fe) and one that runs north-south (Illinois Railway). Rail usage is expected to expand in Illinois and in Ogle County through intermodal freight transportation. Union Pacific has constructed a 1,200 acre intermodal facility in Rochelle that provides convenient access to Interstates 39 and 88.

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.

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 63**.

Figure 63
Railroad Accident Classification Categories

Category	Description
A	railroad derailments resulting in the release of the hazards substance(s) being transported
B	railroad derailments where hazards substance(s) were being transported but no release occurred
C	releases of hazardous substance(s)s from railroad equipment occurred, however no railroad derailment was involved

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 A railway accidents, two Category B railway accidents and seven Category C railway accidents involving hazardous substances in Ogle County, all occurring in Rochelle. 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 64** provides a breakdown by category of the railway accidents/incidents involving hazardous substances that have occurred in Ogle County as well as Illinois.

Figure 64
Railway Accidents/Incidents Involving Hazardous Substances: 2000 – 2009

Year	Category	Accident/Incident Location			
		Illinois	Ogle County	Cook & Collar Counties	All Other Counties
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	1	7	6
	B	6	0	1	5
	C	73	1	44	29
2003	A	4	0	1	3
	B	7	0	2	5
	C	73	0	46	27
2004	A	16	1	6	10
	B	4	1	2	2
	C	57	1	30	27
2005	A	11	0	4	7
	B	8	0	3	5
	C	57	0	29	28
2006	A	6	0	1	5
	B	12	0	6	6
	C	95	2	58	37
2007	A	7	0	5	2
	B	10	1	8	2
	C	81	1	46	35
2008	A	7	0	4	3
	B	4	0	2	2
	C	62	2	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 first of the two Category A railway accidents occurred on July 14, 2002 when less than 10 gallons of diesel fuel was released from an engine due to a train derailment. The second accident

occurred on March 17, 2004 when 200 gallons of diesel fuel was released from an engine due to the derailment of a locomotive.

On January 19, 2004 the first of the two Category B railway accidents occurred when a train carrying 30,000 gallons of fuel oil derailed after being side swiped. The second accident occurred on June 12, 2007 when an engine filled with 1,500 gallons of diesel fuel was derailed. Neither derailment led to the release of any hazardous substances.

The first of the seven Category C railway accidents occurred on July 13, 2002 when vapors escaped from a tanker car carrying approximately 25,600 gallons of diesel fuel. The release was caused by a missing vapor valve on a valve stem. On June 29, 2004 less than 50 gallons of diesel fuel was released when a fuel tank was punctured. In 2006 there were two reported releases. The first occurred on July 17, 2006 when less than 25 gallons of diesel fuel was released from a container on a flat car due to a fuel line leak. The second occurred on November 26, 2006 when 1 pint of fuel oil was released from a tanker car due to a loose bottom outlet cap. On April 16, 2007 approximately 8 ounces of a corrosive liquid disinfectant was released from a portable tank when a gasket on a valve failed. Finally, there were two reported releases in 2008. The first occurred April 2, 2008 when less than 2 cups of diesel fuel was released from an engine due to a cracked fuel cell. The second occurred on December 10, 2008 when 5 gallons of diesel fuel was released due to human error.

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 Ogle County, there are multiple pipelines that carry energy gases and petroleum liquids. Since 2005, there has only been one pipeline incident in Ogle County involving the release of a hazardous substance. On May 28, 2007 a leak was detected in an 8 inch propane pipeline during an aerial inspection. There is ongoing remediation occurring on a Magellan Midstream Partners L.P. petroleum products pipeline, but there have been no recent releases reported.

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 Ogle County residents generated approximately 42,300 tons of solid waste during 2008. Of the approximately 42,300 tons, nearly 40% or approximately 16,100 tons of this solid waste was recycled.

According to the Landfill Capacity Report, there are two landfills currently operating in Ogle County: the Rochelle Municipal Landfill #2 in Rochelle and the Veolia ES Orchard Hills Landfill Inc. (formerly BFI) in Davis Junction. There are no ongoing violations at either landfill that pose a threat to surface or groundwater.

There are currently six landfills (including the two mentioned previously) that serve Ogle and the adjacent counties. Four of these six landfills (including the Veolia Es Orchard Hills Landfill) are rated in the top ten landfills in Illinois based on the amount of waste accepted for disposal. At the present rate that solid waste is being generated, the IEPA estimates that there is sufficient capacity to meet the disposal needs of this region for approximately 15 years, if not longer.

Hazardous Waste

There are currently no off-site hazardous waste disposal facilities located in Ogle County. The solid and liquid hazardous waste identified in **Figure 60** is either disposed of or stored at facilities outside of Ogle County. Furthermore, there are no on-site hazardous waste treatment or disposal operations located in the County.

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 Ogle 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 has been only ***one Superfund site in Ogle County***. The Byron Salvage Yard site, which consists of two properties south of Byron near Razorville Road, received electroplating wastes, oil sludges, paint wastes, solvents and scrap metal prior to 1980. Improper disposal of these wastes led to soil and groundwater contamination that impacted nearby properties, including private drinking water wells.

Between 1984 and 2003 several remedies were applied to cleanup the site. These remedies included removal of contaminated soils, surface debris and buried drums, extension of the Byron municipal water supply to those homes impacted by groundwater contamination plume, monitoring of surface and groundwater, and implementation of institutional controls restricting the drilling of additional drinking water wells in the contaminated areas. Groundwater sampling continues to be conducted on a routine basis. Sampling results indicate that the groundwater contamination plume has stabilized and contamination levels are declining.

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. In some cases, a "4 Y" letter will issued when limited remedial actions, such as the removal of drums, tanks, containers or relatively small amounts of surface soil affected by spills or leaks, have been completed.

Of the nearly 4,000 SRP sites found in Illinois, there are only 15 in Ogle County. ***All of these sites have received either No Further Remediation letters or 4 Y letters from the IEPA***. Eight of these sites are located in the Rochelle area. The remaining sites are scattered throughout the County with no municipality having more than one site within its immediate vicinity.

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 Ogle County there are approximately 150 cases involving remediation of leaks and contaminated soil*** through this Program.

The majority of these 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 two 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 65** provides information on the HazMat incidents recorded in Ogle County.

Between 2005 and 2009, there were 50 HazMat incidents recorded in Ogle County. Of the 51 incidents, four involved roadway accidents, three involved railway accidents and one involved a pipeline leak where hazardous substances were being transported. Many of the incidents recorded in Ogle County are similar to those reported in other rural counties in that they commonly involve agricultural chemical, fuel and oil. In 2009, six HazMat incidents were

recorded in Ogle 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 65
HazMat Incidents in Ogle County: 2005 – 2009

Date	Location	Hazardous Substances Released
2005		
1/12/2005	Rochelle	diesel fuel or hydraulic oil
3/6/2005	Lindenwood	diesel fuel
3/6/2005	Rochelle	diesel fuel
4/4/2005	Davis Junction	unknown substance (fuel smell)
4/4/2005	Leaf River	chemicals from burning railroad ties
7/21/2005	Oregon	gasoline
8/16/2005	Rochelle	diesel fuel
10/25/2005	Mt. Morris	solvent & ink
11/7/2005	Davis Junction	gasoline
12/10/2005	Kings	diesel fuel
12/23/2005	Polo	koh potassium hydroxide
2006		
2/17/2006	Davis Junction	oil, antifreeze
5/12/2006	Polo	diesel fuel
5/30/2006	Rochelle	hydraulic oil
6/1/2006	Davis Junction	gasoline
6/13/2006	Rochelle	lube oil
7/17/2006	Rochelle	diesel fuel*
8/8/2006	Rochelle	diesel fuel^
9/12/2006	Rochelle	gasoline
9/24/2006	Lindenwood	diesel fuel
10/12/2006	Rochelle	diesel fuel
10/17/2006	Polo	heating oil
10/23/2006	Byron	natural gas
11/29/2006	Rochelle	fuel oil
2007		
1/30/2007	Rochelle	oil and water mixture
4/16/2007	Rochelle	corrosive liquid disinfectant*
4/20/2007	Rochelle	lube oil, formaldehyde
4/23/2007	Rochelle	gasoline
5/28/2007	Rochelle	propane†
6/7/2007	Mt. Morris	herbicide^
6/29/2007	Rochelle	gasoline, diesel fuel
8/23/2007	Rochelle	herbicide
10/5/2007	Mt. Morris	gasoline
12/11/2007	Mt. Morris	gasoline

* Incident involved transportation of a hazardous substance by rail. See Section 3.9.1 – Transportation: Railways for more information.

^ Incident involved the transportation of a hazardous substance by road. See Section 3.9.1 – Transportation: Roadways for more information.

† Incident involved the transportation of a hazardous substance by pipeline. See Section 3.9.1 – Transportation: Pipelines for more information.

Figure 65
HazMat Incidents in Ogle County: 2005 – 2009
Continued…

Date	Location	Hazardous Substances Released
2008		
2/17/2008	Rochelle	anhydrous ammonia
4/2/2008	Rochelle	diesel fuel*
5/24/2008	Davis Junction	herbicide
6/17/2008	Mt. Morris	diesel fuel, hydraulic fluid
8/6/2008	Rochelle	diesel fuel
8/28/2008	Byron	hydraulic oil
9/29/2008	Rochelle	diesel fuel
10/28/2008	Rochelle	diesel fuel
11/7/2008	Rochelle	gasoline^
12/1/2008	Rochelle	gasoline^
12/10/2008	Rochelle	diesel fuel
2009		
1/25/2009	Rochelle	diesel fuel
6/23/2009	Rochelle	anhydrous ammonia
7/17/2009	Polo	diesel fuel
10/6/2009	Rochelle	anhydrous ammonia
10/11/2009	Rochelle	anhydrous ammonia
12/29/2009	Rochelle	diesel fuel

* Incident involved transportation of a hazardous substance by rail. See Section 3.9.1 – Transportation: Railways for more information.

^ Incident involved the transportation of a hazardous substance by road. See Section 3.9.1 – Transportation: Roadways for more information.

† Incident involved the transportation of a hazardous substance by pipeline. See Section 3.9.1 – Transportation: Pipelines for more information.

Sources: Illinois Environmental Protection Agency, Office of Emergency Response, "FOIA Request for Ogle County HazMat Incidents between 2005 and 2009", April 19, 2010.
Illinois Emergency Management Agency, Freedom of Information Act, Hazardous Materials Incident Reports, Ogle 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 Ogle County, one death and at least six injuries requiring hospitalization were reported as the result of separate HazMat incidents between 2005 and 2009. None of the recorded incidents caused severe, widespread damages.

Based on the recorded incidents, Ogle County experienced an average of 10 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 Ogle County, exposure to radioactive material/radiation could occur through an accident:

- at the Byron Nuclear Power Facility located near Byron or
- as spent nuclear fuel rods are being transported by railway through the County.

3.9.3.1 Byron 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. Procedures are in place and exercises are conducted with state and local officials to protect the public in the unlikely event of a nuclear emergency.

The consequences associated with a release at any nuclear power facility would depend on the magnitude of the accident and the prevailing weather conditions. A significant incident might require individuals to stay indoors or to evacuate to temporary relocation centers. Temporary relocation centers have been established in Rockford, Dixon and Freeport. 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.

Municipalities located within the 10-mile Emergency Planning Zone include Byron, Davis Junction, Leaf River, Mt. Morris, Oregon and Stillman Valley. The 50-mile Ingestion Pathway Zone covers all of Ogle County. To protect the food supply, persons owning livestock may be advised to remove all livestock from pasture, shelter if possible, and provide them with stored feed and protected water. The American Nuclear Insurers (ANI) Company provides insurance to cover the Exelon Corporation's legal liability (operator of the Byron Generating Station) up to the limits imposed by the Price-Anderson Act, for bodily injury and property damage such as the loss of livestock and crops caused by a nuclear energy incident at the Byron Nuclear Power Facility.

In 2006, the Exelon Corporation discovered concentrations of tritium in vaults along a three-mile long blow-down line which runs west from the station to the Rock River. While two deep groundwater monitoring wells had detectable concentrations of tritium above background, no private drinking water wells contained detectable levels of tritium above a 200 pCi/L (picocuries per liter of water) detection level. By comparison, 20,000 pCi/L of tritium is the maximum contaminant level that is allowed in drinking water by federal regulations. Exelon has installed leak detection devices at each vault along the line to give immediate notification should a leak occur. No further releases of tritium have occurred.

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. At the present time, the Byron Nuclear Power Facility is storing spent fuel rods on-site. If a national or regional repository is established, then the spent fuel rods will be moved off-site. 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 Terrorism[1]. During this same time span, the Consortium documented 1,347 terrorist events within the U.S. The greatest number of these events occurred in New York (266), Miami (70), San Francisco (66), Washington (59) and Los Angeles (54). There are approximately 40 terrorist groups have been documented as operating within the U.S.

Acts of terrorism have resulted in deaths and injuries as a result of kidnappings, hijackings, bombings, and the use of chemical and biological weapons. The Global Terrorism Database has documented 18 fatalities and 44 injuries attributed to terrorism in the United States since 2000. The attack on the World Trade Center and the Pentagon on September 11, 2001 resulted in nearly 3,000 additional deaths and an estimated 12,000 injuries.

The Federal Bureau of Investigation's (FBI) provides supporting documentation on domestic terrorist attacks between 1970 and 2005 in a series of reports on terrorism. These reports provide a chronological summary of terrorist incidents in the United States with detailed information on attacks between 1980 and 2005. During this time period 192 incidents were documented within the United States. Five of these incidents occurred in Illinois; four in the Chicago area and one downstate.

[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 the past several years there have been other terrorism incidents in Illinois that have received media coverage. In 2001, a suspected terrorist with possible ties to al-Qaeda was apprehended after engaging in communication and fiscal activities in support of terrorism in the Peoria and Macomb areas. Most recently a single individual from Macon County sought to carry out his anger at the federal government by detonating a van filled with explosive outside of the Federal Courthouse in Springfield on September 24, 2009. This attempt was thwarted by the FBI.

It is impossible to predict with any reasonable degree of accuracy how many terrorism events might be expected to occur in Ogle County or elsewhere in Illinois. Although targets for terrorist activity are more likely centered in larger urban areas, recruitment, training and other support activities, such as the one described above, are as likely to occur in rural areas as in urban areas. The economic resources available to some terrorist groups coupled with the combination of global tensions, economic uncertainty and frustration towards government appear to have recently raised the frequency of attempts. Enhanced efforts by law enforcement officials and civilian vigilance for unusual activity or behavior will be needed to repel terrorists whether they are domestic or foreign in origin.

4.0 MITIGATION STRATEGY

4.0 MITIGATION STRATEGY

This section focuses on determining how to reduce or eliminate the potential loss of life and property damage that results from the natural 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 December 10, 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 March 4, 2010 meeting, the group discussed the preliminary list of hazard mitigation goals and approved them with no changes or additions. **Figure 66** identifies the eight hazard mitigation goals approved by the Planning Committee.

Figure 66
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 jurisdictions 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 67** identifies each category and provides a brief description.

Figure 67
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 or hazards are 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 68** 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 68
Mitigation Action Prioritization Methodology

		Hazard	
		Most Significant Hazard **(M)** (i.e., severe storms, severe winter storms, floods, tornadoes)	Less Significant Hazard **(L)** (i.e., drought, extreme heat, earthquakes, dam failures)
Mitigation Action	Mitigation Action with the Potential to Virtually Eliminate or Significantly Reduce Impacts **(H)**	**HM** mitigation action will virtually eliminate damages and/or significantly reduce the probability of deaths and injuries from the most significant hazards	**HL** mitigation action will virtually eliminate damages and/or significantly reduce the probability of deaths and injuries from less significant hazards
	Mitigation Action with the Potential to Reduce Impacts **(L)**	**LM** mitigation action has the potential to reduce damages, deaths and/or injuries from the most significant hazards	**LL** mitigation action has the potential to reduce damages, deaths and/or injuries from less significant hazards

4.3 IMPLEMENTING MITIGATION ACTIONS

The final step outlined in the mitigation strategy involves describing how each jurisdiction will implement the mitigation actions identified. For each of mitigation action identified 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 69 through **79** summarize the results of the mitigation strategy. The mitigation actions identified by the County and each participating municipality are ordered by prioritization category.

Figure 69
Ogle 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				
Ogle County – General												
LM	Purchase new ArcInfo software/ license to utilize specific data sets in order to generate maps for use by the County.	DF, EQ, F, SS, SWS, T	MP	Reduces	Large	1, 2	Yes	Yes	Ogle County GIS	TBD	TBD	Low/Medium
HM	Purchase enclosed emergency backup generator to power Sheriff's Office during power outages.	EQ, F, SS, SWS, T	MP	Eliminates	Large	2, 3, 5	NA	Yes	Ogle County Sheriff's Office	3 years	TBD	Low/High
HM	Purchase a stand alone server with software to backup the County's computer files. This backup would be housed outside of the County and would provide access to important County's files should there be an incident at the Byron Generating Station or an electromagnetic pulse disruption that knocks out the main County server.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Large	2, 3, 5, 8	Yes	Yes	Ogle County IT	TBD	TBD	Low/High
Ogle County EMA												
HM	Construct new Emergency Operations Center.	DF, EH, EQ, F, SS, SWS, T	SP	Reduces	Large	2, 3, 5	Yes	NA	Ogle County EMA	TBD	75% Federal 25% Local	High/High
HM	Update the EMA's website so that it provides up-to-date information on current hazard conditions in addition to acting as the County's clearinghouse for public information on natural and man-made hazards.	DF, DR, EH, EQ, F, SS, SWS, T	MP	Reduces	Large	1, 2	Yes	Yes	Ogle County EMA	TBD	TBD	Low/High
LM	Develop public information materials to alert residents about the risks to life and property associated with natural hazards events.	DF, EH, EQ, F, SS, SWS, T	PI	Reduces	Large	1, 2	Yes	Yes	Ogle County EMA	TBD	County	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 69
Ogle 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				
Ogle County Planning and Zoning												
LM	Enforce the *Ogle County Flood Damage Prevention Ordinance* in order to protect new construction from flood damage and mitigate flood damages to existing pre-FIRM buildings.*	F	RA	Reduces	Large	6, 7	Yes	Yes	Ogle County Planning and Zoning	TBD	County	Low/High
LM	Make the most recent Flood Insurance Rate Maps available at the County Planning and Zoning 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	Large	1, 6, 7	Yes	Yes	Ogle County Planning and Zoning	TBD	County	Low/High
LM	Become a participant in the National Flood Insurance Program's voluntary Community Rating System.*	F	PP	Reduces	Large	1, 6, 7	Yes	Yes	Ogle County Planning and Zoning	TBD	County	Low/High
Ogle County Highway Department												
LM	Conduct hydraulic/drainage study to determine the cause of recurring drainage problems in Ogle County.	F, SS, SWS	S	Reduces	Small	2, 3, 5	Yes	Yes	Ogle County Highway Department	TBD	75% Federal 25% Local	Medium/High
HM	Raise a 600' section of River Road (CH 33) to an elevation consistent with the rest of the road to alleviate recurring flooding issues.	F, SS, SWS	SP	Eliminates	Medium	2, 3, 5	Yes	Yes	Ogle County Highway Department	3 years	75% Federal 25% Local	Medium/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
Ogle 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				
Ogle County Highway Department Continued…												
HM	Install storm sewer at the intersection of Pines Road (CH 6) and Ridge Road (CH 36) to alleviate recurring ponding of water on the roadways.	F, SS, SWS	SP	Eliminates	Medium	2, 3, 5	Yes	Yes	Ogle County Highway Department	1 year	75% Federal 25% Local	Low/High
HM	Construct a material storage pad at the County Highway Department facilities to allow for all-season storage of pipe culverts, guardrail, posts, barricades and barriers.	F, SS, SWS, T	SP	Reduces	Large	2, 3, 5	NA	NA	Ogle County Highway Department	2 years	75% Federal 25% Local	Low/High
HM	Replace existing narrow bridge over Gale Greek at the County Highway Department facility to allow larger and heavier trucks to carry equipment to the Department's salt storage buildings and storage pad.	F, SS, SWS, T	SP	Eliminates	Large	2, 3, 5	NA	Yes	Ogle County Highway Department	3 years	75% Federal 25% Local	Medium/High
HM	Connect the County Highway Department Building to public sewer.	F, SS, SWS	SP	Eliminates	Small	2, 3, 5	NA	Yes	Ogle County Highway Department	4 years	75% Federal 25% Local	Medium/High
HM	Construct an equipment storage building at the County Highway Department facilities to protect highway maintenance equipment from inclement weather. This building could also be utilized as a storm shelter if necessary.	F, SS, SWS, T	SP	Eliminates	Large	2, 3, 5	NA	NA	Ogle County Highway Department	5 years	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 70
Byron 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 to determine the cause of recurring drainage issues in the northwest corner of Byron.	F, SS, SWS	S	Reduces	Medium	2, 3, 5	Yes	Yes	City Council	TBD	75% Federal 25% Local	Medium/High
HM	Design and construct a containment berm on the south and east sides of the Byron Wastewater Treatment Facility to protect against flooding.	F, SS, SWS	SP	Reduces	Large	2, 3, 5	Yes	Yes	City Council	3-5 years	75% Federal 25% Local	Medium/High
HM	Construct a dike with an emergency overflow to divert stormwater runoff to an unused quarry pit from a major drainage ditch that feeds into Lake Louise to reduce flooding problems associated with the Lake.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5, 6	Yes	Yes	City Council	TBD	75% Federal 25% Local	High/High
HM	Designate the gym and auditorium at the Mary Morgan Grade School as a tornado safe shelter.	SS, T	MP	Reduces	Medium	2, 3, 5	NA	Yes	City Council	TBD	City	Low/High
HM	Purchase an emergency backup generator to provide uninterrupted power to the tornado safe shelter at the Mary Morgan Grade School.	SS, T	MP	Eliminates	Medium	2, 3, 5	NA	Yes	City Council	TBD	TBD	Low/High
HM	Rebuild existing storm sewer inlets at the Prairie Place and Rose Meadows subdivisions to address the formation of sink holes around inlets that are heaving due to ground water pressure.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	City Council	TBD	75% Federal 25% Local	Medium/High
HM	Conduct sewer line reconnaissance study to identify locations where storm water infiltrates the lines.	F, SS	S	Reduces	Large	2, 3, 5	Yes	Yes	City Council	TBD	75% Federal 25% Local	Medium/High

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 70
Byron 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	Upgrade the emergency backup generator at City Hall to provide uninterrupted power to the entire facility during a power outage.	EH, F, SS, SWS, T	MP	Eliminates	Small	2, 3, 5	NA	Yes	City Council	TBD	TBD	Low/High
LM	Review Digital Flood Insurance Rate Maps and present for adoption revised floodplain ordinance.*	F	RA	Reduces	Large	6, 7	Yes	Yes	City Council	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 Council	TBD	City	Low/High
LM	Make information materials available to the public about the National Flood Insurance Program's voluntary Community Rating System.*	F	PP	Reduces	Large	1, 6, 7	Yes	Yes	City Council	TBD	City	Low/High

* Mitigation action to ensure continued compliance with NFIP.

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 71
Creston Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
HM	Design and construct a stormwater control and collection system (outlined in the Village's Drainage Plan) to alleviate recurring drainage problems within the Village.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Village Board	TBD	TBD	High/High
HM	Purchase emergency backup generator to power drinking water well houses during power outages.	EQ, F, SS, SWS, T	MP	Eliminates	Large	2, 3, 5	Yes	Yes	Village Board	TBD	TBD	Low/High
HM	Purchase and install storm siren(s).	SS, T	MP	Reduces	Large	2, 3, 5	NA	NA	Village Board	TBD	TBD	Medium/High
HM	Conduct sewer line reconnaissance study to identify locations where storm water infiltrates the lines.	F, SS	S	Reduces	Large	2, 3, 5	Yes	Yes	Village Board	TBD	75% Federal 25% Local	Medium/High

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 72
Forreston Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
LM	Conduct sewer line reconnaissance study to identify locations where storm water infiltrates the lines.	F, SS	S	Reduces	Large	2, 3, 5	Yes	Yes	Village Board	1-2 years	75% Federal 25% Local	Medium/High
HM	Repair sewer line sections where storm water infiltration is occurring to prevent sewage backup into residential basements.	F, SS	SP	Eliminates	Large	2, 3, 5	Yes	Yes	Village Board	2-3 years	75% Federal 25% Local	High/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 73
Hillcrest Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
HM	Purchase and install an emergency backup generator at pump house to provide an uninterrupted drinking water supply to residents during power outages.	EQ, F, SS, SWS, T	MP	Eliminates	Large	2, 3, 5	Yes	Yes	Village Board	TBD	TBD	Low/High
HM	Repair road salt bin to prevent salt loss.	SS	MP	Eliminates	Small	3, 5, 6, 8	NA	Yes	Village Board	TBD	TBD	Medium/High
HM	Replace storm warning sirens.	SS, T	MP	Reduces	Large	2, 3, 5	NA	NA	Village Board	TBD	TBD	Medium/High
LM	Purchase an all terrain vehicle outfitted with emergency warning equipment to aid victims and respond to incidents associated with natural hazard events.	EQ, F, SS, SWS, T	MP	Reduces	Small	2	NA	NA	Police Department	TBD	TBD	Medium/Medium
LM	Review Digital Flood Insurance Rate Maps and present for adoption revised floodplain ordinance.*	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 74
Leaf River Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
HM	Retrofit Village Hall to include a storm shelter safe room that can also act as a heating/cooling center.	EH, F, SS, SWS, T	SP	Reduces	Large	2, 3, 5	NA	Yes	Village Trustees	2-3 years	75% Federal 25% Local	Medium/High
HM	Purchase an emergency backup generator to provide uninterrupted power to the storm/bad weather shelter at Village Hall.	EH, F, SS, SWS, T	MP	Eliminates	Large	2, 3, 5	NA	Yes	Village Trustees	3 years	TBD	Low/High
LM	Conduct a feasibility/design study to construct a new wastewater treatment facility located outside of the floodplain to prevent flooding.	F, SS	S	Reduces	Large	2, 3, 5	Yes	Yes	Village Trustees	2 years	75% Federal 25% Local	Medium/High
LM	Conduct sewer line reconnaissance study to identify locations where storm water infiltrates the line.	F, SS	S	Reduces	Large	2, 3, 5	Yes	Yes	Village Trustees	1-2 years	75% Federal 25% Local	Medium/High
HM	Repair sewer line sections where storm water infiltration is occurring to prevent sewage backup into residential basements.	F, SS	SP	Eliminates	Large	2, 3, 5	Yes	Yes	Village Trustees	2-3 years	75% Federal 25% Local	High/High
HM	Construct drainage remedy to divert farm field runoff near Fifth Street to alleviate recurring drainage problems.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Village Trustees	3-5 years	75% Federal 25% Local	Medium/High
HM	Reconfigure storm drain at the intersection of First and Main Streets to reduce water impacts on adjacent properties and improve safety for travelers and pedestrians.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Village Trustees	3-5 years	75% Federal 25% Local	Low/High
LM	Purchase pump(s) for removal of excess water during flooding.	F, SS, SWS	MP	Reduces	Medium	2, 3, 5	Yes	Yes	Village Trustees	1 year	TBD	Low/High
LM	Purchase emergency backup generator to run pumps during power outages.	F, SS, SWS	MP	Eliminates	Medium	2, 3, 5	Yes	Yes	Village Trustees	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 74
Leaf River 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	Trim trees and remove dead material to minimize disruptions to power and communication networks.	SS, SWS, T	MP	Reduces	Large	2, 3, 5	Yes	Yes	Village Trustees	Ongoing	Village	Medium/High
HM	Identify special needs residents and coordinate with local organizations to provide assistance during and after a hazard event.	EH, EQ, F, SS, SWS, T	PI	Reduces	Small	1, 2, 4	NA	NA	Village Trustees	Ongoing	Village	Low/High
LM	Distribute brochures/fact sheets on weather emergencies including the locations of the heating/cooling centers and what to do in the event of an emergency.	EH, EQ, F, SS, SWS, T	PI	Reduces	Large	1, 2	NA	NA	Village Trustees	Ongoing	Village	Low/High
HM	Clean brush and debris from drainage ditches and culverts in Leaf River to reduce flooding problems.	F, SS, SWS	MP	Reduces	Medium	2, 3, 5	Yes	Yes	Village Trustees	Ongoing	Village	Low/High
LM	Review Digital Flood Insurance Rate Maps and present for adoption revised floodplain ordinance.*	F	RA	Reduces	Large	6, 7	Yes	Yes	Village Trustees	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 Trustees	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 Trustees	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 75
Mt. Morris Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
HM	Retrofit the Coliseum to include a storm shelter safe room that can also act as a heating/cooling center.	EH, F, SS, SWS, T	SP	Reduces	Large	2, 3, 5	NA	Yes	Village Board	TBD	75% Federal 25% Local	Medium/High
HM	Purchase and install a fossil fuel-powered emergency backup generator at the Coliseum to serve the safe room/bad weather shelter.	EH, F, SS, SWS, T	MP	Eliminates	Large	2, 3, 5	NA	Yes	Village Board	TBD	TBD	Low/High
LM	Conduct drainage study to determine the cause of recurring drainage problems at Cross Creek Subdivision.	F, SS, SWS	S	Reduces	Small	2, 3, 5	Yes	Yes	Village Board	TBD	75% Federal 25% Local	Low/High
LM	Conduct drainage study to determine the cause of recurring drainage problems at East Hitt Street.	F, SS, SWS	S	Reduces	Small	2, 3, 5	Yes	Yes	Village Board	TBD	75% Federal 25% Local	Low/High
LM	Conduct drainage study to determine the cause of recurring drainage problems at Clinton Ave., Clifford St. and South McKendrie Ave.	F, SS, SWS	S	Reduces	Small	2, 3, 5	Yes	Yes	Village Board	TBD	75% Federal 25% Local	Low/High
LM	Conduct drainage study to determine the cause of recurring drainage problems in the Village.	F, SS, SWS	S	Reduces	Medium	2, 3, 5	Yes	Yes	Village Board	TBD	75% Federal 25% Local	Medium/High
HM	Install new drinking water main line for fire suppression from North McKendrie Ave. at the railroad tracks to the northern Village limits then looping to the west and south to hook up with North Hannah Ave.	EQ, SS, SWS, T	SP	Reduces	Small	2, 3, 5	Yes	Yes	Village Board	TBD	75% Federal 25% Local	High/Medium

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 75
Mt. Morris 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 sewer line reconnaissance study to identify locations where storm water infiltrates the sanitary sewer lines.	F, SS	S	Reduces	Large	2, 3, 5	Yes	Yes	Village Board	TBD	75% Federal 25% Local	Medium/High
HM	Repair sewer line sections where storm water infiltration is occurring to prevent sewage backups.	F, SS	SP	Eliminates	Large	2, 3, 5	Yes	Yes	Village Board	TBD	75% Federal 25% Local	High/High
HM	Replace and install an emergency backup generator to provide uninterrupted power to the Village Hall which houses the Village's Emergency Operations Center.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Large	2, 3, 5	NA	Yes	Village Board	TBD	TBD	Low/High
LM	Develop a Memorandum of Agreement with Pinecrest Grove designating the Community Center as a heating/cooling center for Mt. Morris and surrounding area residents.	EH, SWS	RA	Reduces	Medium	2	NA	NA	Village Board	TBD	Village	Low/High
HM	Expand the existing Pinecrest Grove Community Center for use as a heating/cooling center for Mt. Morris and surrounding area residents.	EH, SWS	SP	Reduces	Medium	2	NA	Yes	Village Board	TBD	75% Federal 25% Local	Medium/High
HM	Purchase and install a fossil fuel-powered emergency backup generator at the Pinecrest Grove Community Center to serve the heating/cooling center.	EH, SWS	MP	Eliminates	Medium	2	NA	Yes	Village Board	TBD	TBD	Low/High

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 76
Oregon Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
LM	Conduct a study of the existing City Hall structure to determine the best location for a new Emergency Operations Center.	EH, EQ, F, SS, SWS, T	S	Reduces	Large	2, 3, 5	NA	Yes	City Council	TBD	75% Federal 25% Local	Medium/High
HM	Design and engineer a new Emergency Operations Center at City Hall that will meet the needs of the Oregon community during a natural disaster or other emergency event.	EH, EQ, F, SS, SWS, T	SP	Reduces	Large	2, 3, 5	NA	Yes	City Council	TBD	75% Federal 25% Local	Medium/High
HM	Purchase and install an emergency backup generator to provide uninterrupted power to the Emergency Operations Center and City Hall during a power outage.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Large	2, 3, 5	NA	Yes	City Council	TBD	TBD	Low/High
HM	Construct Emergency Operations Center.	EH, EQ, F, SS, SWS, T	SP	Reduces	Large	2, 3, 5	NA	Yes	City Council	TBD	75% Federal 25% Local	High/High
LM	Conduct drainage study to determine the cause of recurring drainage/flooding problems on the east side of the City.	F, SS, SWS	S	Reduces	Medium	2, 3, 5	Yes	Yes	City Council	TBD	75% Federal 25% Local	Medium/High
HM	Select and design 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	City Council	TBD	75% Federal 25% Local	Medium/High
HM	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	City Council	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 76
Oregon 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	Review Digital Flood Insurance Rate Maps and present for adoption revised floodplain ordinance.*	F	RA	Reduces	Large	6, 7	Yes	Yes	City Council	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 Council	TBD	City	Low/High
LM	Make information materials available to the public about the National Flood Insurance Program's voluntary Community Rating System.*	F	PP	Reduces	Large	1, 6, 7	Yes	Yes	City Council	TBD	City	Low/High

* Mitigation action to ensure continued compliance with NFIP.

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 77
Polo 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	Upgrade wastewater treatment facility lift station.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	NA	Yes	Water/Sewer Department	6 months	75% Federal 25% Local	Medium/High
HM	Purchase and install emergency backup generators to maintain operations at both wastewater treatment facility lift stations during power outages.	EQ, F, SS, SWS, T	MP	Eliminates	Large	2, 3, 5	Yes	Yes	Sewer Department	1 year	TBD	Low/High
HM	Purchase and install an emergency backup generator to provide uninterrupted power to City Hall during a power outage.	EQ, F, SS, SWS, T	MP	Eliminates	Large	2, 3, 5	NA	Yes	City Council/ City Clerk	1 year	TBD	Low/High
LM	Develop and adopt a stormwater management ordinance.	F, SS, SWS	RA	Reduces	Large	4	Yes	Yes	City Council	1 year	City	Low/High
LM	Conduct a drainage study to determine the cause of recurring drainage problems following heavy precipitation.	F, SS, SWS	S	Reduces	Medium	2, 3, 5	Yes	Yes	City Council	1-2 years	75% Federal 25% Local	Medium/High
HM	Select, design and construct the appropriate drainage remedy to alleviate recurring drainage problems within the City.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	City Council	2 years	75% Federal 25% Local	Medium/High
HM	Clean brush and debris from drainage ditches and culverts in Polo to reduce flooding problems.	F, SS, SWS	MP	Reduces	Medium	2, 3, 5	Yes	Yes	Public Works Department	Ongoing	City	Low/High
HM	Upgrade and maintain storm sewer lines, including relining as needed.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Public Works Department	2 years	75% Federal 25% Local	High/High
LM	Trim trees and remove dead material to minimize disruptions to power and communication networks.	SS, SWS, T	MP	Reduces	Large	2, 3, 5	Yes	Yes	Public Works Department	Ongoing	City	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 77
Polo 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	Develop a Memorandum of Agreement with Crossroads Church designating it as a heating/cooling center and tornado safe shelter for Polo and surrounding area residents.	EH, SS, SWS, T	RA	Reduces	Medium	2	NA	NA	City Council	1 year	City	Low/High
HM	Expand the existing Crossroad Church for use as a heating/cooling center and tornado safe shelter for Polo and surrounding area residents.	EH, SS, SWS, T	SP	Reduces	Medium	2	NA	Yes	City Council	TBD	75% Federal 25% Local	Medium/High
HM	Purchase and install a fossil fuel-powered emergency backup generator at Crossroads Church to serve the heating/cooling center and tornado safe shelter.	EH, SS, SWS, T	MP	Eliminates	Medium	2	NA	Yes	City Council	TBD	TBD	Low/High
LM	Review Digital Flood Insurance Rate Maps and present for adoption revised floodplain ordinance.*	F	RA	Reduces	Large	6, 7	Yes	Yes	City Council	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 Council	TBD	City	Low/High
LM	Make information materials available to the public about the National Flood Insurance Program's voluntary Community Rating System.*	F	PP	Reduces	Large	1, 6, 7	Yes	Yes	City Council	TBD	City	Low/High

* Mitigation action to ensure continued compliance with NFIP.

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 78
Rochelle 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 Hemstock Dam Flood Control Facility.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5, 6	Yes	Yes	Engineering Division	TBD	75% Federal 25% Local	High/High
HM	Construct Banning lateral (Kyte River tributary) Stormwater Facility north of the Union Pacific Railroad.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5, 6	Yes	Yes	Engineering Division	TBD	75% Federal 25% Local	High/High
HM	Expand the Lake Sule Stormwater Facility located west of I-39 and south of Creston Road.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5, 6	Yes	Yes	Engineering Division	TBD	75% Federal 25% Local	High/High
HM	Construct Creston Road Stormwater Facility located east of Caron Road and south of Creston Road.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5, 6	Yes	Yes	Engineering Division	TBD	75% Federal 25% Local	High/High
HM	Acquire flood-prone properties along Kyte River.	F, SS, SWS	PP	Eliminates	Small	2, 6	NA	Yes	Engineering Division	TBD	75% Federal 25% Local	High/High
HM	Widen the Kyte River and stabilize the banks on both sides of the channel.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5, 6	Yes	Yes	Engineering Division	TBD	75% Federal 25% Local	High/High
HM	Replace the School Ave. bridge and widen the Kyte River channel to alleviate flood problems.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5, 6	Yes	Yes	Engineering Division	TBD	75% Federal 25% Local	Medium/High
HM	Replace the 1st Ave. bridge and widen the Kyte River channel to alleviate flood problems.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5, 6	Yes	Yes	Engineering Division	TBD	75% Federal 25% Local	Medium/High
HM	Construct the Southwest Regional Stormwater Facility located south of Intermodal Drive and west of Route 251.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5, 6	Yes	Yes	Engineering Division	TBD	75% Federal 25% Local	High/High
HM	Install eight stream gauges along the Kyte River and nearby tributaries as part of the Greater Rochelle Early Warning System.	F, SS, SWS	MP	Reduces	Medium	2	NA	NA	Engineering Division	TBD	75% Federal 25% Local	Medium/High

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 78
Rochelle 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	Replace triple-cell box culvert between 7th Avenue and the Union Pacific Railroad near the Price Brothers Midwest site to alleviate flood problems.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Engineering Division	TBD	75% Federal 25% Local	High/High
HM	Widen the Riley Ditch at its confluence with the Kyte River and stabilize the banks on both sides of the channel.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5, 6	Yes	Yes	Engineering Division	TBD	75% Federal 25% Local	High/High
HM	Extend water line along South Steward Road and connect to the Village of Steward's existing drinking water distribution network to provide the Village with a backup water supply.	EQ, F, SS, SWS, T	SP	Eliminates	Small	2, 3, 5	Yes	Yes	Rochelle Municipal Utilities	TBD	75% Federal 25% Local	High/Medium
HM	Extend sanitary sewer lines northwest to Kings in order to alleviate septic field runoff into nearby streams.	F, SS, SWS	SP	Eliminates	Small	2, 3, 5	Yes	Yes	Rochelle Municipal Utilities	TBD	75% Federal 25% Local	High/Medium
HM	Extend sanitary sewer lines west to Westwood and Woodlawn subdivisions to eliminate septic field runoff.	F, SS, SWS	SP	Eliminates	Small	2, 3, 5	Yes	Yes	Rochelle Municipal Utilities	TBD	75% Federal 25% Local	High/Medium
LM	Review Digital Flood Insurance Rate Maps and present for adoption revised floodplain ordinance.*	F	RA	Reduces	Large	6, 7	Yes	Yes	City Council	TBD	City	Low/High

* Mitigation action to ensure continued compliance with NFIP.

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 78
Rochelle 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 Council	TBD	City	Low/High
LM	Make information materials available to the public about the National Flood Insurance Program's voluntary Community Rating System.*	F	PP	Reduces	Large	1, 6, 7	Yes	Yes	City Council	TBD	City	Low/High

* Mitigation action to ensure continued compliance with NFIP.

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 79
Stillman Valley Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
HM	Construct a new wastewater treatment facility located outside of the 100-year floodplain to prevent flooding.	F, SS, SWS	SP	Eliminates	Large	2, 3, 5	Yes	Yes	Village Board	2 years	75% Federal 25% Local	High/High
HM	Purchase and install a transfer switch at drinking water well #1 which would automatically provide a continual supply of drinking water during power outages.	EQ, F, SS, SWS, T	SP	Eliminates	Large	2, 3 5	Yes	Yes	Village Board	1 year	75% Federal 25% Local	Low/High
HM	Purchase emergency backup generator to power drinking water well house during power outages.	EQ, F, SS, SWS, T	MP	Eliminates	Large	2, 3, 5	Yes	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

5.0 RECOMMENDATIONS

5.0 RECOMMENDATIONS

The following recommendations came about as a result of the planning process. These recommendations should be periodically reviewed and discussed by the professional staff and elected officials of each participating jurisdiction as the Plan evaluated and updated to determine if appropriate actions should be taken.

GENERAL

Emergency Operations Center

The Ogle County Emergency Management (EMA) office operates out of a stationary trailer. This facility is vulnerable to severe storm damage, especially from high winds, and extreme temperatures. In addition, a new facility is important especially since Ogle County hosts a growing population that includes a nuclear generating station and an intermodal facility. Ogle County should place a high priority on constructing a new Emergency Operations Center to house its EMA office.

Planning Tools

Planning tools, such as building codes and zoning ordinances, have repeatedly proven effective throughout the Nation in reducing and eliminating damages caused by storms. These tools should be adopted and enforced, where needed, throughout the County.

Developing and Disseminating Hazard Information

Public information materials should be prepared that will help residents take protective actions prior to natural hazard events. These materials should be based on risk communication principles to improve their effectiveness. In addition to developing printed materials that are made available through the schools, Farm Bureau, and other government offices, feedback from Ogle County residents indicated that radio, television and the internet should be utilized as part of the distribution network.

JURISDICTION-SPECIFIC

Byron

- With the Byron area poised for continued growth, collaboration between the City and other government entities can help avoid adverse impacts—such as drainage and flooding problems. Hydrology should be given careful consideration as development decisions are made in the North Tower Road Drainage Basin. The relationship between hydrology, soils, and topography is especially important to reduce impacts caused by rain and snowmelt runoff.

Mt. Morris

- Lightning strikes and other natural hazards cause fires every year across the Nation. Approximately one-third of all Mt. Morris fire hydrants are unfit for firefighting because of numerous problems with the water distribution system. Upgrading the water distribution system to ensure adequate pressure to fight fires should be encouraged.

- Infiltration of rain and snowmelt into the sanitary sewer collection system can place a hydraulic overload on the sewer plant. Grant funding should be sought to upgrade mains and manholes in an effort to reduce stormwater infiltration.

Polo

- The Polo Comprehensive Plan (2003) should be updated to accurately reflect the services, infrastructure capacity, and related steps that have been taken to support business and residential development. This update should include planned and completed capital development projects along with descriptions of any economic development incentives that may have been implemented or are imminent.
- The Polo area has experienced approximately one-third of all tornadoes recorded in Ogle County. A tornado shelter to serve this area should be discussed. The shelter might be more likely to be developed through a partnership with other entities such as a township, church, or school.

Rochelle

- Flooding and drainage issues associated with the Kyte River and Ryley Ditch will require multiple projects to resolve. Funding for these projects will likely be needed from various sources.
- Topography and hydrology factors in the Rochelle area contribute to the stormwater problems. As with flooding and drainage, multiple projects and various funding sources will be needed.

Stillman Valley

- The wastewater treatment facility for the Village is located in the floodplain. In addition, it has exceeded its life expectancy from when it began service in 1972. Seeking grant money to update and relocate this facility should be a high priority.
- Storm sewer lines exist in Stillman Valley, but their exact locations are not known. The location, type and condition of these lines should be identified and mapped.
- Stillman Valley has recently become eligible to participate in the National Flood Insurance Program (NFIP). Participation in this program will help Stillman Valley receive grants, loans, and other payments for development in floodplain areas. In addition, federal assistance for any type of declared disaster to acquire, construct or repair property located in floodplains depends on whether an eligible municipality participates in the NFIP.

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 Ogle 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 Ogle 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 jurisdiction 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 jurisdictions will be given an opportunity to add new mitigation actions to the Plan and modify

or discontinue mitigation actions already identified. In some cases a project may need to be removed from the list of mitigation actions because of unforeseen problems with implementation.

6.1.2 Updating the Plan

The Plan must be updated within five years of the date the first participating jurisdiction adopts the Plan. This ensures that all the participating jurisdictions will remain eligible to receive federal grant money to implement those mitigation actions identified in this Plan. It will be the responsibility of the Plan Maintenance Subcommittee to update the Plan. The update will incorporate all of the information gathered and changes proposed at the previous 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 forum will be held to present the updated Plan to the public for review and comment. The comments received at public forum will be reviewed and incorporated into the updated Plan.

The Subcommittee will then present the updated Plan to the participating jurisdictions for approval. Once the Subcommittee has received approval from all of the participating entities, it will submit the updated Plan to the Illinois Emergency Management Agency and FEMA for review. ***Once the updated Plan has received approval, FEMA requires that each of the participating jurisdictions re-adopt the Plan to remain eligible to receive federal grant money to implement identified mitigation actions.***

6.2 INCORPORATING THE MITIGATION STRATEGY INTO EXISTING PLANNING MECHANISMS

As part of the planning process, the Planning Committee identified current plans, 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 jurisdiction to incorporate, where applicable, the mitigation strategy and other information contained in the Plan into the planning mechanisms identified for their jurisdiction.

6.3 CONTINUED PUBLIC INVOLVEMENT

The County and participating 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 Ogle County Emergency Management Agency 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 forum will be held prior to updating the Plan to provide the public an opportunity to comment on the updates proposed for the Plan.

7.0 PLAN ADOPTION

7.0 PLAN ADOPTION

The final step in the planning process is the 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, Ogle County forwarded the Plan to each participating jurisdiction for formal adoption. Signed copies of these resolutions are located in **Appendix L**. **Figure 80** identifies the participating jurisdictions and the date each formally adopted the Plan.

Figure 80
Multi-Jurisdictional Plan Adoption Dates

Participating Jurisdiction	Adoption Date
Byron	
Creston	
Forreston	
Hillcrest	
Leaf River	
Mt. Morris	
Ogle County	
Oregon	
Polo	
Rochelle	
Stillman Valley	

8.0 REFERENCES

8.0 REFERENCES

Provided below is a listing, by section, of the resources utilized to create this document.

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6.0 PLAN MAINTENANCE

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9.0 TABLES

Table 1
Thunderstorm & High Wind Events Reported in Ogle County
1967 through 2009

Date	Time	Location	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage
1/24/1967	9:00 p.m.	Mt. Morris	0 kts	0	0	$0	$0
5/12/1970	9:00 p.m.	Polo	70 kts	0	0	$0	$0
4/6/1972	6:45 p.m.	Polo	87 kts	0	0	$0	$0
7/24/1972	7:20 a.m.	Polo	60 kts	0	0	$0	$0
9/21/1973	1:16 p.m.	Rochelle	50 kts	0	0	$0	$0
6/6/1974	2:00 p.m.	Davis Junction	0 kts	0	0	$0	$0
6/20/1974	5:45 p.m.	Oregon	0 kts	0	0	$0	$0
6/22/1974	8:30 a.m.	Polo	61 kts	0	0	$0	$0
7/3/1974	5:00 p.m.	Oregon	52 kts	0	0	$0	$0
3/23/1975	8:30 p.m.	Rochelle	0 kts	0	0	$0	$0
5/20/1975	2:15 p.m.	Polo	0 kts	0	0	$0	$0
6/12/1976	11:10 p.m.	Mt. Morris	0 kts	0	0	$0	$0
7/15/1977	6:40 p.m.	Mt. Morris	0 kts	0	0	$0	$0
5/17/1982	11:07 p.m.	Oregon	0 kts	0	0	$0	$0
5/17/1982	11:30 p.m.	Oregon	0 kts	0	0	$0	$0
4/29/1984	9:00 p.m.	Mt. Morris Polo	52 kts	0	0	$0	$0
7/10/1984	8:10 p.m.	Forreston Polo	50 kts	0	0	$0	$0
5/26/1985	7:00 p.m.	Oregon	0 kts	0	0	$0	$0
6/23/1985	11:00 a.m.	Rochelle	0 kts	0	0	$0	$0
5/17/1986	12:46 a.m.	Mt. Morris	56 kts	0	0	$0	$0
9/28/1986	5:50 p.m.	Rochelle	0 kts	0	0	$0	$0
5/19/1987	4:00 p.m.	Forreston Polo	50 kts	0	0	$0	$0
7/8/1987	6:40 p.m.	Byron	0 kts	0	0	$0	$0
8/16/1987	7:10 p.m.	Oregon	68 kts	0	0	$0	$0
11/15/1988	11:05 p.m.	Byron	0 kts	0	0	$0	$0
5/24/1989	11:00 p.m.	Oregon	0 kts	0	0	$0	$0
6/17/1990	3:23 a.m.	Oregon	0 kts	0	0	$0	$0
6/28/1990	3:12 p.m.	Forreston	52 kts	0	0	$0	$0
6/29/1990	1:05 a.m.	Byron	0 kts	0	0	$0	$0
7/2/1992	11:22 a.m.	Polo	0 kts	0	0	$0	$0
7/13/1992	3:25 p.m.	Byron	52 kts	0	0	$0	$0
5/23/1993	5:43 p.m.	Leaf River	0 kts	0	0	$5,000	$0

* Denotes High Wind Event.

Table 1 Continued…
Thunderstorm & High Wind Events Reported in Ogle County
1967 through 2009

Date	Time	Location	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage
6/14/1994	12:50 p.m.	Polo	0 kts	0	0	$0	$0
4/18/1995	9:50 a.m.	Oregon	0 kts	0	0	$0	$0
10/24/1995	12:00 p.m.	countywide	44 kts*	0	0	$0	$0
3/25/1996	12:00 a.m.	countywide	48 kts*	0	0	$0	$0
4/19/1996	8:25 p.m.	Adeline	78 kts	0	0	$0	$0
4/19/1996	8:25 p.m.	Polo	70 kts	0	0	$0	$0
4/19/1996	8:30 p.m.	Adeline Leaf River	70 kts	0	0	$0	$0
4/19/1996	8:40 p.m.	Byron Stillman Valley Davis Junction	0 kts	0	0	$0	$0
6/23/1996	7:50 p.m.	Polo	0 kts	0	0	$0	$0
6/23/1996	8:00 p.m.	Mt. Morris	81 kts	0	0	$0	$0
6/23/1996	8:15 p.m.	Oregon	0 kts	0	0	$0	$0
6/23/1996	8:35 p.m.	Rochelle	0 kts	0	0	$0	$0
10/29/1996	4:25 p.m.	countywide	0 kts	0	0	$0	$0
4/5/1997	3:50 p.m.	Polo	50 kts	0	0	$0	$0
4/6/1997	12:00 p.m.	countywide	61 kts*	0	0	$0	$0
9/29/1997	12:00 p.m.	countywide	56 kts*	0	0	$0	$0
5/28/1998	8:10 p.m.	Polo	50 kts	0	0	$0	$0
6/18/1998	3:00 p.m.	Leaf River Stillman Valley	50 kts	0	0	$0	$0
6/25/1998	11:30 p.m.	Byron	50 kts	0	0	$0	$0
6/28/1998	1:50 a.m.	countywide	50 kts	0	0	$0	$0
8/24/1998	11:20 a.m.	Forreston Rochelle	50 kts	0	0	$0	$0
11/10/1998	5:30 a.m.	countywide	50 kts	1	0	$0	$0
11/10/1998	7:30 a.m.	countywide	56 kts*	1	0	$0	$0
2/11/1999	2:20 p.m.	Byron	50 kts	0	0	$0	$0
4/21/1999	10:16 p.m.	Rochelle	50 kts	0	0	$0	$0
5/16/1999	11:35 p.m.	Forreston	50 kts	0	0	$0	$0
6/6/1999	1:20 p.m.	Polo	50 kts	0	0	$0	$0

* Denotes High Wind Event.

Table 1 Continued…
Thunderstorm & High Wind Events Reported in Ogle County
1967 through 2009

Date	Time	Location	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage
9/11/2000	7:24 p.m.	Polo	60 kts	0	0	$0	$0
9/11/2000	7:45 p.m.	Byron Oregon	60 kts	0	0	$0	$0
2/25/2001	4:00 a.m.	countywide	44 kts*	0	0	$0	$0
6/14/2001	6:30 p.m.	Oregon Rochelle	52 kts	0	0	$0	$0
8/9/2001	6:00 p.m.	countywide	50 kts	0	0	$0	$0
3/9/2002	11:52 a.m.	countywide	51 kts*	0	0	$0	$0
7/8/2002	7:40 p.m.	Polo Oregon	57 kts	0	0	$5,000	$0
5/11/2003	1:00 p.m.	countywide	50 kts*	0	0	$0	$0
6/25/2003	2:45 p.m.	Mt. Morris	60 kts	0	0	$0	$0
6/28/2003	4:43 p.m.	Mt. Morris	50 kts	0	0	$0	$0
7/5/2003	2:55 a.m.	countywide	57 kts	0	0	$0	$0
7/7/2003	6:20 a.m.	Byron	50 kts	0	0	$0	$0
7/21/2003	12:35 a.m.	Polo	52 kts	0	0	$0	$0
11/13/2003	2:00 p.m.	countywide	51 kts*	0	0	$0	$0
5/7/2004	4:40 a.m.	Oregon	60 kts	0	0	$0	$0
5/31/2004	3:00 p.m.	Oregon	55 kts	0	0	$0	$0
5/31/2004	3:33 p.m.	Rochelle	50 kts	0	0	$0	$0
7/21/2004	8:50 a.m.	Oregon	50 kts	0	0	$0	$0
7/21/2004	9:00 a.m.	Hillcrest Rochelle	50 kts	0	0	$0	$0
6/11/2005	1:05 p.m.	Leaf River	50 kts	0	0	$0	$0
9/13/2005	4:43 p.m.	Polo	50 kts	0	0	$0	$0
9/13/2005	4:53 p.m.	Mt. Morris	50 kts	0	0	$0	$0
9/13/2005	4:57 p.m.	Oregon	50 kts	0	0	$0	$0
7/17/2006	8:15 p.m.	Forreston	60 kts	0	0	$0	$0
7/17/2006	8:32 p.m.	Polo	50 kts	0	0	$0	$0
7/20/2006	2:50 a.m.	Byron Oregon	50 kts	0	0	$0	$0
7/20/2006	5:23 a.m.	Polo	50 kts	0	0	$0	$0
8/3/2006	3:48 a.m.	Polo	50 kts	0	0	$0	$0
8/25/2006	4:58 p.m.	Rochelle	55 kts	0	0	$0	$0
10/2/2006	9:30 p.m.	Oregon Hillcrest	50 kts	0	0	$0	$0

* Denotes High Wind Event.

Table 1 Continued…
Thunderstorm & High Wind Events Reported in Ogle County
1967 through 2009

Date	Time	Location	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage
6/7/2007	9:05 p.m.	Mt. Morris	52 kts	0	0	$0	$0
6/7/2007	9:20 p.m.	Byron	50 kts	0	0	$0	$0
7/17/2007	11:07 p.m.	Polo	55 kts	0	0	$50,000	$0
7/18/2007	12:26 a.m.	Polo	50 kts	0	0	$0	$0
7/18/2007	8:30 p.m.	Hillcrest	50 kts	0	0	$0	$0
7/18/2007	8:35 p.m.	Oregon	50 kts	0	0	$0	$0
8/12/2007	1:50 a.m.	Rochelle	55 kts	0	0	$0	$0
8/14/2007	3:20 a.m.	Forreston	50 kts	0	0	$0	$0
8/14/2007	4:01 a.m.	Mt. Morris	55 kts	0	0	$5,000	$0
8/14/2007	4:16 a.m.	Stillman Valley	50 kts	0	0	$0	$0
8/14/2007	4:19 a.m.	Rochelle	50 kts	0	0	$2,000	$0
8/22/2007	7:00 p.m.	Polo	50 kts	0	0	$0	$0
8/22/2007	7:25 p.m.	Polo	50 kts	0	0	$2,000	$0
8/23/2007	12:41 p.m.	Mt. Morris	50 kts	0	0	$0	$5,000
9/25/2007	12:45 p.m.	Oregon	55 kts	0	0	$0	$0
6/5/2008	6:28 a.m.	Mt. Morris	61 kts	0	0	$0	$0
6/5/2008	6:30 a.m.	Forreston	55 kts	0	0	$0	$0
6/5/2008	6:32 a.m.	Byron	55 kts	0	0	$1,000	$0
6/6/2008	1:25 p.m.	countywide	50 kts*	0	0	$0	$0
6/6/2008	1:48 p.m.	Rochelle	50 kts	0	0	$0	$0
6/6/2008	1:55 p.m.	Davis Junction	56 kts	0	0	$1,000	$0
6/6/2008	1:55 p.m.	Monroe Center	65 kts	0	0	$5,000	$0
6/8/2008	9:55 a.m.	Mt. Morris	52 kts	0	0	$0	$0
6/8/2008	10:00 a.m.	Oregon	50 kts	0	0	$11,300	$0
6/12/2008	11:00 p.m.	Rochelle	60 kts	0	0	$50,000	$0
6/15/2008	5:25 a.m.	Oregon	50 kts	0	0	$0	$0
7/2/2008	3:00 p.m.	Davis Junction	55 kts	0	0	$0	$0
7/2/2008	3:03 p.m.	Byron	55 kts	0	0	$0	$0
7/7/2008	10:04 p.m.	Hillcrest	55 kts	0	0	$0	$0
7/7/2008	3:25 a.m.	Rochelle	50 kts	0	0	$0	$0
7/19/2008	10:20 p.m.	Polo	50 kts	0	0	$0	$0

* Denotes High Wind Event.

Table 1 Continued…
Thunderstorm & High Wind Events Reported in Ogle County
1967 through 2009

Date	Time	Location	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage
7/31/2008	12:12 p.m.	Oregon	60 kts	0	0	$0	$0
7/31/2008	12:17 p.m.	Mt. Morris	57 kts	0	0	$0	$0
7/31/2008	12:20 p.m.	Oregon	50 kts	0	0	$0	$0
8/4/2008	5:29 p.m.	Forreston	61 kts	0	0	$15,000	$0
8/4/2008	5:30 p.m.	Polo	61 kts	0	0	$50,000	$0
8/4/2008	5:30 p.m.	Mt. Morris	70 kts	0	0	$300,000	$0
8/4/2008	5:35 p.m.	Oregon	70 kts	0	0	$25,000	$0
8/4/2008	5:35 p.m.	Leaf River	0 kts	0	0	$70,000	$0
8/4/2008	5:40 p.m.	Rochelle	56 kts	0	0	$2,000	$0
5/13/2009	8:35 p.m.	Mt. Morris	61 kts	0	0	$15,000	$0
5/13/2009	8:55 p.m.	Oregon	50 kts	0	0	$0	$0
6/19/2009	5:15 p.m.	Oregon	56 kts	0	0	$1,000	$0
6/19/2009	5:30 p.m.	Rochelle	50 kts	0	0	$1,000	$0
7/27/2009	9:05 p.m.	Oregon	55 kts	0	0	$5,000	$0
Totals:				**2**	**0**	**$621,300**	**$5,000**

Source: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Ogle County, 2010.

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Vinde Wells, Ogle County Newspapers Editor, news articles for select thunderstorm and high wind events, provided on September 29, 2010.

Table 2
Hail Events Reported in Ogle County
1960 through 2009

Date	Time	Location	Magnitude (Diameter)	Injuries	Death	Property Damage	Crop Damage
9/18/1960	7:30 p.m.	Oregon	1.25 in.	0	0	$0	$0
9/21/1973	1:16 p.m.	Rochelle	1.75 in.	0	0	$0	$0
9/21/1973	1:20 p.m.	Rochelle	3.00 in.	0	0	$0	$0
9/21/1973	2:15 p.m.	Leaf River	1.00 in.	0	0	$0	$0
6/20/1974	4:30 p.m.	Polo	1.00 in.	0	0	$0	$0
5/20/1975	4:20 p.m.	Leaf River	1.75 in.	0	0	$0	$0
6/23/1985	11:00 a.m.	Rochelle	1.50 in.	0	0	$0	$0
6/23/1985	11:18 a.m.	Rochelle	1.50 in.	0	0	$0	$0
4/22/1988	8:15 p.m.	Polo	1.75 in.	0	0	$0	$0
6/27/1995	12:07 p.m.	Polo	1.00 in.	0	0	$0	$0
5/18/1997	4:50 p.m.	Polo	1.00 in.	0	0	$0	$0
5/12/1999	3:55 p.m.	Forreston	1.75 in.	0	0	$0	$0
9/11/2000	1:03 p.m.	Forreston	1.00 in.	0	0	$0	$0
4/18/2002	5:03 p.m.	Byron	1.75 in.	0	0	$0	$0
4/18/2002	5:37 p.m.	Forreston	2.50 in.	0	0	$5,000	$0
7/31/2003	6:45 p.m.	Leaf River	1.50 in.	0	0	$0	$0
7/13/2004	10:37 a.m.	Polo	1.00 in.	0	0	$0	$0
4/13/2006	8:23 p.m.	Leaf River	1.00 in.	0	0	$0	$0
4/16/2006	11:25 a.m.	Stillman Valley	1.00 in.	0	0	$0	$0
5/24/2006	6:21 p.m.	Leaf River	1.00 in.	0	0	$0	$0
9/22/2006	3:23 p.m.	Mt. Morris	1.50 in.	0	0	$25,000	$0
10/2/2006	8:34 p.m.	Mt. Morris	1.00 in.	0	0	$0	$0
10/2/2006	8:38 p.m.	Polo	1.00 in.	0	0	$0	$0
5/13/2008	4:24 p.m.	Oregon	1.00 in.	0	0	$0	$0
Totals:				**0**	**0**	**$30,000**	**$0**

Source: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Ogle County, 2010.

Table 3
Lightning Events Reported in Ogle County
1998 through 2009

Date	Time	Location	Injuries	Death	Property Damage	Crop Damage
6/18/1998	2:29 p.m.	Rochelle	1	0	$0	$0
6/11/2004	6:22 p.m.	Byron	1	0	$0	$0
Totals:			**2**	**0**	**$0**	**$0**

Source: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Ogle County, 2010.

Table 4
Heavy Rain Events Reported in Ogle County
January 1, 2009 through 2009

Date	Time	Location	Magnitude (inches)	Injuries	Death	Property Damage	Crop Damage
8/26/2009 thru 8/27/2009	6:00 a.m.	Byron	approx. 2”	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, Ogle County, 2010.

Table 5
Snow & Ice Events Reported in Ogle County
1967 through 2009

Date	Time	Event (Magnitude)	Injuries	Death	Property Damage
1/25/1967 thru 1/26/1967	NA	Heavy Snow 23" snow	0	0	$0
12/28/1978 thru 1/1/1979	NA	Heavy Snow 30" snow	0	0	$0
1/24/1979	NA	Winter Storm 4.2" snow; strong winds	0	0	$0
2/11/1979 thru 2/12/1979	NA	Winter Storm 6 ½" snow; strong winds	0	0	$0
2/10/1981	NA	Winter Storm 4" snow; strong winds; low temperatures	0	0	$0
1/10/1982	NA	Winter Storm blizzard conditions; record low temperatures (-24°F) & very low wind chills (-82°F)	0	0	$0
12/21/1983	NA	Winter Storm approx. 6" snow; strong winds	0	0	$0
1/3/1986 thru 1/4/1986	NA	Winter Storm approx. 6" snow; strong winds; blowing snow	0	0	$0
2/16/1986	3:00 p.m.	Ice Storm ¼" ice accumulations	0	0	$0
2/10/1988	NA	Winter Storm 6" snow; strong, gusting winds causing blizzard conditions	0	0	$0
12/3/1990	NA	Winter Storm 9" snow; strong winds	0	0	$0
12/6/1994	11:00 p.m.	Winter Storm 6" – 10" snow	0	0	$0
1/18/1995 thru 1/19/1995	6:00 p.m.	Heavy Snow 10" snow; strong, gusting winds causing blizzard conditions	0	0	$0

Table 5 Continued…
Snow & Ice Events Reported in Ogle County
1967 through 2009

Date	Time	Event (Magnitude)	Injuries	Death	Property Damage
12/8/1995 thru 12/9/1995	12:00 p.m.	Winter Storm 2" – 4" snow; strong winds; blowing & drifting snow; low temperatures & very low wind chills	0	0	$0
1/15/1997 thru 1/18/1997	6:00 a.m.	Winter Storm 4" – 6" snow; low temperatures & very low wind chills; blowing & drifting snow	0	0	$0
1/8/1998	6:00 a.m.	Heavy Snow 4" – 8" snow	0	0	$0
1/1/1999 thru 1/2/1999	7:00 p.m.	Heavy Snow 9" – 15" snow; blowing & drifting snow	0	1*	$0
3/8/1999 thru 3/9/1999	5:00 p.m.	Heavy Snow 5" – 8" snow; blowing & drifting snow	0	0	$0
1/19/2000 thru 1/20/2000	12:00 p.m.	Heavy Snow 4" – 9" snow	0	0	$0
2/18/2000	3:00 a.m.	Heavy Snow 5" – 12" snow; blowing & drifting snow	0	0	$0
12/11/2000	3:00 a.m.	Heavy Snow 6" – 8" snow; blowing & drifting snow; very low wind chills	0	0	$0
12/20/2000	NA	Heavy Snow 8" – 22" snow	0	0	$0
1/30/2002 thru 1/31/2002	7:00 p.m.	Winter Storm 6" – 10" snow	0	0	$0
3/2/2002 thru 3/3/2002	9:00 a.m.	Winter Storm 6" – 11" snow	0	0	$0
3/4/2003 thru 3/5/2003	10:00 p.m.	Winter Storm 5" – 7" snow	0	0	$0

* Information was not available on the location of the severe winter storm- related fatality. The data provided for this event covered 18 counties including Ogle County.

Table 5 Continued…
Snow & Ice Events Reported in Ogle County
1967 through 2009

Date	Time	Event (Magnitude)	Injuries	Death	Property Damage
1/27/2004	5:30 a.m.	Winter Storm approx. 5" snow; strong winds	0	0	$0
1/4/2005 thru 1/6/2005	7:00 p.m.	Heavy Snow 6" – 12" snow	0	0	$0
1/21/2005 thru 1/22/2005	4:00 p.m.	Heavy Snow approx. 8" snow	0	0	$0
11/30/2006 thru 12/1/2006	10:00 p.m.	Winter Storm 10" – 18" snow	1	1	$0
2/25/2007 thru 2/26/2007	4:00 p.m.	Winter Storm ½" sleet & ice accumulation; 3" – 5" snow; gusting winds causing blizzard conditions	0	0	$0
12/1/2007	10:30 a.m.	Ice Storm accumulations of 1" sleet and ¾" ice	1	1	$0
12/11/2007	2:00 a.m.	Ice Storm ¼" ice accumulations	0	0	$0
1/21/2008 thru 1/22/2008	2:00 p.m.	Winter Storm 7" – 8" snow	0	0	$0
2/5/2008 thru 2/6/2008	3:00 p.m.	Winter Storm 9" – 11" snow	0	0	$0
2/25/2008 thru 2/26/2008	4:00 p.m.	Winter Storm 6" – 8" snow	0	0	$0
12/18/2008 thru 12/19/2008	10:00 p.m.	Ice Storm/Winter Storm ½" sleet accumulation; freezing rain 2" – 6" snow	0	0	$0
1/13/2009 thru 1/14/2009	10:00 p.m.	Winter Storm 6" snow	0	0	$0

Table 5 Continued…
Snow & Ice Events Reported in Ogle County
1967 through 2009

Date	Time	Event (Magnitude)	Injuries	Death	Property Damage
12/8/2009 thru 12/9/2009	4:00 a.m.	Winter Storm 9" snow	0	0	$0
12/23/2009 thru 12/24/2009	11:00 a.m.	Ice Storm mixture of sleet, snow & freezing rain with ¼" to ½" ice accumulation	0	0	$0
12/26/2009 thru 12/27/2009	NA	Winter Storm 5" snow	0	0	$0
Totals:			**2**	**3***	**$0**

* The location of the January 1, 1999 severe winter storm-related fatality was not available. The data provided for this event covered 18 counties including Ogle County.

Sources: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Ogle County, 2010.

Larry Acker, 3F Forecasts, weather observations for Ogle County, provided on July 20, 2010.

Vinde Wells, Ogle County Newspapers Editor, news articles for select snow and ice events, provided on September 29, 2010.

Table 6
Extreme Cold Events Reported in Ogle County
1979 through 2009

Date	Time	Event (Magnitude)	Injuries	Death	Property Damage
1/2/1979 thru 1/3/1979	NA	Extreme Cold record low temperatures (-17°F)	0	0	$0
1/10/1979 thru 1/12/1979	NA	Extreme Cold record low temperatures (-16°F to -24°F)	0	0	$0
1/14/1979 thru 1/15/1979	NA	Extreme Cold record low temperatures (-17°F to -24°F)	0	0	$0
2/5/1979	NA	Extreme Cold record low temperatures (-21°F)	0	0	$0
2/19/1979	NA	Extreme Cold record low temperatures (-16°F)	0	0	$0
1/17/1982 thru 1/19/1982	NA	Extreme Cold record low temperatures (-22°F)	0	0	$0
12/19/1983 thru 12/25/1983	NA	Extreme Cold record low temperatures (-12°F to -25°F) *(Coldest December in Ogle Co. History)*	0	0	$0
1/19/1984 thru 1/21/1984	NA	Extreme Cold record low temperatures (-16°F to -23°F)	0	0	$0
3/9/1984 thru 3/10/1984	NA	Extreme Cold record low temperatures (-2°F to 0°F)	0	0	$0
1/19/1985 thru 1/20/1985	NA	Extreme Cold/Wind Chill record low temperatures (-20°F to -33°F) & very low wind chills (-60°F)	0	0	$0
2/1/1985	NA	Extreme Cold record low temperatures (-22°F)	0	0	$0
1/8/1986	NA	Extreme Cold record low temperatures (-21°F)	0	0	$0
1/10/1988	NA	Extreme Cold/Wind Chill record low temperatures (-20°F) & very low wind chills (-43°F)	0	0	$0
12/21/1989 thru 12/23/1989	NA	Extreme Cold record low temperatures (-16°F to -21°F)	0	0	$0

Table 6 Continued…
Extreme Cold Events Reported in Ogle County
1979 through 2009

Date	Time	Event (Magnitude)	Injuries	Death	Property Damage
1/18/1994	NA	Extreme Cold record low temperatures (-23°F)	0	0	$0
1/31/1996 thru 2/4/1996	12:00 a.m.	Extreme Cold record low temperatures (-22°F to -24°F)	0	0	$0
1/23/2003	1:00 a.m.	Extreme Cold/Wind Chill low temperatures (0°F to -5°F) & very low wind chills (-20°F to -25°F)	0	0	$0
1/29/2004 thru 1/30/2004	6:00 p.m.	Extreme Cold/Wind Chill low temperatures (-5°F to -10°F) & very low wind chills (-20°F to -34°F)	0	0	$0
2/18/2006	12:00 a.m.	Extreme Cold/Wind Chill low temperatures (3°F to -11°F) & very low wind chills (-30°F to -35°F)	0	0	$0
2/3/2007 thru 2/6/2007	6:00 p.m.	Extreme Cold/Wind Chill low temperatures (5°F to -10°F) & very low wind chills (-20°F to -30°F)	0	0	$0
1/29/2008 thru 1/30/2008	10:00 p.m.	Extreme Cold/Wind Chill 1" – 3" blowing snow; low temperatures & very low wind chills (-15°F to -25°F)	0	0	$0
2/10/2008	3:00 a.m.	Extreme Cold/Wind Chill low temperatures (-5°F to -10°F) & very low wind chills (-25°F to -35°F)	0	0	$0
12/21/2008	7:00 a.m.	Extreme Cold/Wind Chill low temperatures (-5°F to -10°F) & very low wind chills (-35°F)	0	0	$0
1/4/2009	12:00 a.m.	Extreme Cold/Wind Chill low temperatures	0	1	$0
1/15/2009 thru 1/16/2009	12:00 a.m.	Extreme Cold/Wind Chill low temperatures (-15°F to -32°F) & very low wind chills (-30°F to -45°F)	0	0	$0
Totals:			**0**	**1**	**$0**

Sources: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Ogle County, 2010.

Larry Acker, 3F Forecasts, weather observations for Ogle County, provided on July 20, 2010.

Table 7
River/Overland Flood Events Reported in Ogle County
1996 through 2009

Date	Time	Location	Magnitude (inches)	Injuries	Death	Property Damage
2/20/1997 thru 2/22/1997	6:00 p.m.	countywide	3" – 4"	0	0	$0
6/12/2000 thru 6/15/2000	3:00 p.m.	countywide	no additional rainfall – flooding caused by runoff from morning flash flood event	0	0	$0
6/4/20002	7:00 a.m.	countywide	no additional rainfall – flooding caused by runoff from early morning flash flood event	0	0	$0
8/22/2002	6:00 a.m.	northern portion of county	unavailable	0	0	$0
7/18/2007	8:37 p.m.	Rochelle	2.75"	0	0	$0
8/23/2007	1:20 p.m.	Rochelle	unavailable	0	0	$0
8/23/2007	3:14 p.m.	Oregon	unavailable	0	0	$0
Totals				**0**	**0**	**$0**

Source: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Ogle County, 2010.

Larry Acker, 3F Forecasts, weather observations for Ogle County, provided on July 20, 2010.

Table 8
Flash Flood Events Reported in Ogle County
1979 through 2009

Date	Time	Location	Magnitude (inches)	Injuries	Death	Property Damage
8/20/1979	NA	Polo Mt. Morris	approx. 2.3" in 6 hours	0	0	$0
6/13/1981	NA	Polo Mt. Morris Forreston	approx. 3"	0	0	$0
10/9/1982	NA	Polo	2" in 1 hour	0	0	$0
7/2/1983	7:30 a.m. to 8:00 a.m.	Polo	2"	0	0	$0
8/13/1985	1:30 a.m. to 3:00 a.m.	Polo Mt. Morris Forreston	3"	0	0	$0
10/9/1985	NA	Polo	2"	0	0	$0
5/17/1986	2:00 a.m. to 5:00 a.m.	Polo Mt. Morris	3"	0	0	$0
5/19/1987 thru 5/20/1987	3:00 p.m. to 7:00 a.m.	Polo Forreston	4"	0	0	$0
8/13/1987 thru 8/14/1987	9:00 p.m. to 3:00 a.m.	Polo Mt. Morris Forreston	approx. 3.5"	0	0	$0
8/26/1987	10:00 a.m. to 3:30 p.m.	Polo	4"	0	0	$0
8/4/1989 thru 8/5/1989	NA	Polo Mt. Morris Forreston	approx. 3.5"	0	0	$0
10/4/1991 thru 10/5/1991	NA	Polo Mt. Morris Forreston	approx. 2.7"	0	0	$0
6/7/1993 thru 6/8/1993	NA	Polo Mt. Morris Forreston	approx. 3.7"	0	0	$0
6/14/1994	2:00 a.m. to 3:00 a.m.	Polo Mt. Morris Forreston	2.6"	0	0	$0
5/28/1996	NA	Polo Mt. Morris Forreston	2.8"	0	0	$0

Table 8 Continued…
Flash Flood Events Reported in Ogle County
1979 through 2009

Date	Time	Location	Magnitude (inches)	Injuries	Death	Property Damage
7/17/1996 thru 7/18/1996	6:00 p.m. to 7:00 a.m.	countywide	4" – 6"	0	0	$0
3/31/1998	4:00 a.m. to 8:00 a.m.	Polo Mt. Morris	2" – 2.5"	0	0	$0
5/12/1999	4:45 p.m. to 11:00 p.m.	western portion of the county	approx. 6.5"	0	0	$0
4/20/2000	NA	Polo Mt. Morris Forreston	3"	0	0	$0
6/12/2000	1:00 p.m. to 3:00 p.m.	countywide	3" – 5"	0	0	$0
9/6/2001	2:10 p.m. to 2:40 p.m.	Polo	1.25"	0	0	$0
6/4/2002	2:00 a.m. to 7:00 a.m.	countywide	4" – 5"	0	0	$0
8/22/2002	2:00 a.m. to 6:00 a.m.	northern portion of county	2"	0	0	$0
6/12/2004	3:13 a.m. to 3:43 a.m.	Rochelle	unavailable	0	0	$0
4/16/2006	11:00 a.m. to 2:00 p.m.	Polo	2.25"	0	0	$0
7/17/2007 thru 7/18/2007	11:45 p.m. to 3:00 a.m.	Polo	4.5" – 5"	0	0	$0
7/18/2007	12:26 a.m. to 3:00 a.m.	White Pine State Park	4"	0	0	$0
7/18/2007	7:00 a.m. to 8:00 p.m.	Polo	4.8"	0	0	$0

Table 8 Continued…
Flash Flood Events Reported in Ogle County
1979 through 2009

Date	Time	Location	Magnitude (inches)	Injuries	Death	Property Damage
8/23/2007	3:14 p.m. to 6:00 p.m.	Rochelle	unavailable	0	0	$0
8/23/2007	8:00 p.m.	Oregon	unavailable	0	0	$0
9/13/2008	NA	Polo	2”	0	0	$0
12/27/2008	1:12 p.m. to 8:30 p.m.	Stillman Valley Davis Junction Monroe Center	1” – 1.5”	0	0	$0
3/23/2009	3:00 a.m. to 10:00 p.m.	Polo Mt. Morris Forreston	2.6”	0	0	$0
5/6/2009	3:30 p.m. to 7:00 p.m.	Polo	1.5”	0	0	$0
6/19/2009	5:00 p.m. to 10:30 p.m.	countywide	2.8” – 5”	0	0	$100,000
6/22/2009	2:00 a.m. to 10:00 a.m.	countywide	3.3”	0	0	$250,000
7/22/2009	1:30 a.m. to 2:30 a.m.	Polo	3.3”	0	0	$0
Totals				**0**	**0**	**$350,000**

Source: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Ogle County, 2010.

Larry Acker, 3F Forecasts, weather observations for Ogle County, provided on July 20, 2010.

Table 9
Tornadoes Reported in Ogle County
1959 through 2009

Date	Time	Location	Magnitude (Fujita Scale)	Injuries	Deaths	Property Damage
7/10/1959	7:30 p.m.	Mt. Morris*	F0	0	0	$25,000
8/15/1959	2:30 p.m.	Rochelle*	F1	0	0	$25,000
9/2/1963	8:00 p.m.	Byron	F0	0	0	$25,000
4/21/1967	4:00 p.m.	Oregon*	F1	0	0	$25,000
4/6/1972	6:45 p.m.	Polo*	F2	3	1	$250,000
4/21/1974	3:15 p.m.	Oregon*	F1	2	0	$250,000
4/21/1974	3:55 p.m.	Polo	F1	0	0	$250,000
6/20/1974	5:45 p.m.	Stillman Valley*	F0	0	0	$0
8/10/1974	2:29 p.m.	Forreston*	F0	0	0	$0
8/5/1979	4:45 p.m.	Polo*	F3	0	0	$2,500,000
5/8/1988	3:30 p.m.	Oregon*	F1	0	0	$25,000
4/10/1992	7:28 p.m.	Polo*	F0	0	0	$0
5/23/1993	5:40 p.m.	Leaf River*	F1	0	0	$50,000
4/18/1995	9:45 a.m.	Forreston*	F1	0	0	$0
5/12/1999	2:45 p.m.	Polo*	F0	0	0	$0
7/31/2000	2:40 p.m.	Creston*	F0	0	0	$0
Totals:				**5**	**1**	**$3,425,000**

* 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, Ogle County, 2010.

APPENDIX A

Resolution 2009-0606

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

WHEREAS; Ogle 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; Ogle 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 and activities that can help reduce the damages caused by these storms; and

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

Presented and Adopted by the Ogle County Board on June 16, 2009.

W. Ed Rice
Ogle County Board Chairman

OGLE COUNTY CLERK * OGLE COUNTY, ILLINOIS *

ATTEST:

Rebecca Huntley
Ogle County Clerk and Recorder

APPENDIX B

Attendance Sheet
Ogle County Multi-Jurisdictional
All Hazards Mitigation Planning Committee
December 10, 2009

	Name (Please Print)	Organization/Entity
1.	Mel C Messer	Ogle County
2.	Ron McDermott	OC EMA
3.	Tom Byrd	Creston
4.	Molly O'Toole	MOVA
5.	Sue	Polo
6.	Lou Finh	Ogle County
7.	Larry Gallant	Ogle County
8.		Byron
9.	Ron Kern	Farm Bureau
10.	Jason White	Mt Morris police
11.	Jeanette Bennett	Ogle County
12.		Forest Preserve
13.	Ed Reep	ogle county
14.		Ogle County HS
15.	Sandy Beitel	Ogle Co 911
16.	Megan Meeny	Ogle County Coordinator
17.	Mike Reibel	Ogle Co. Plng. & Zoning
18.	Bob Kartheiser	Exelon/Byron Nuclear Plant
19.	Curtis Cook	Ogle County Hwy Dept
20.	Sam Tesreau	City of Rochelle
21.	Greg Beitel	Ogle County Sheriff
22.	Gary Cifarese	Byron Fire Chaplain OCMC
23.	Mike Lewis	OCMC
24.	Mary Scott	Village of Stillman Valley

Attendance Sheet
Ogle County Multi-Jurisdictional
All Hazards Mitigation Planning Committee
December 10, 2009

	Name (Please Print)	Organization/Entity
25.	James Harrison	Ogle Co. Assessor
26.	Ken Sandy	Carroll C.O. S.O.
27.	Michael Ahern	Forreston Village
28.	Andrea Bostwick	Johnson, Depp & Quisenberry
29.	Greg Michalio	JDQ
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Attendance Sheet
Ogle County Multi-Jurisdictional
All Hazards Mitigation Planning Committee
March 4, 2010

	Name (Please Print)	Organization/Entity
1.	Susie Corbitt	City of Polo
2.	Jacklyn Flick	Leaf River
3.	Sharon Faggiani	Leaf River
4.	Mary Scott	Stillman Valley
5.	Michael Hahn	Forreston
6.	GARY CORTESE	BYRON FIRE CHAPLAIN
7.	Nathan Schwartz	Ogle County Hwy
8.	JASON WHITE	
9.	MIKE REISEL	OGLE CO PLNG & ZONING
10.	Doreen O'Brien	Ogle County Health Dept
11.	Steve Rypkema	Ogle Co Solid Waste
12.	Linda Wells	Ogle Co Life
13.	Maggon McKinley	Ogle County Admin
14.	Andy Thompson	Ogle Cty H.D
15.	Alex Nowak	WIFR-TV
16.	Andrea Bostwick	JDQ
17.	GREG MICHAUD	JDQ
18.		
19.		
20.		
21.		
22.		
23.		
24.		

Attendance Sheet
Ogle County Multi-Jurisdictional
All Hazards Mitigation Planning Committee
March 4, 2010

	Name (Please Print)	Organization/Entity
1.	Ron McDermott	Ogle Co. EMA
2.	Teresa Adams	Ildlcast LL
3.	Tom Byrd	CRESTON
4.	Todd Murray	Byron
5.	Sue Coers	IEMA -
6.	Ron KERN	FARM BUREAU
7.	Kris Gilbert	G.I.S.
8.	Lon Ford	Coroner
9.	Janette Bennett	Coroner
10.	GREGORY A. Beitel	Sheriff
11.	Sandy Beitel	Ogle Co 911
12.	Mike Lewis	Public
13.	Amy TESREAU	CITY OF ROCHELLE
14.	Ken Hostetler	Rochelle
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Attendance Sheet
Ogle County Multi-Jurisdictional
All Hazards Mitigation Planning Committee
June 24, 2010

	Name (Please Print)	Organization/Entity
1.	ROD KERN	FARM BUREAU
2.	Mike Lewis	Ogle County
3.	Candy Humphrey	OCEMA
4.	Jacklyn Flack	Leaf River
5.	Kris Gilbert	OCIS
6.	Dawn O'Brien	Health Dept.
7.	Jeanette Bennett	LEPC / Coroner
8.	Michael HARN	Ogle Co. Sheriff
9.	Jim Laybourn	Pinecrest Community
10.	Curtis Cook	Ogle County Hwy Dept.
11.	Andrea Bostwick	IDOA
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Attendance Sheet
Ogle County Multi-Jurisdictional
All Hazards Mitigation Planning Committee
June 24, 2010

	Name (Please Print)	Organization/Entity
1.	Mary Scott	Village of Stillman Valley
2.	Mel Messer	Village of Hillcrest
3.	Ron McDermott	Ogle Co EMA
4.	Shirley Taggioli	Leaf River
5.	Jason White	MT Morris
6.	Paul McMahon	ROE #47
7.	Hollie Guisy JK	INSURANCE
8.	Andy Thompson	Ogle Cty Health Dept
9.	Joy Bluto	Ogle Cty Solid Waste Mgmt
10.	Mike Reibel	Ogle Co. Plng & Zoning
11.	Dick Schmidt	Pinecrest Community
12.	Bob Kartheiser	Exelon - Byron Nuclear Plant
13.	Sam Tesreau	City of Rochelle
14.	Meagan McGinley	Ogle County
15.	Darin Dellgan	Oregon
16.	Greg Michaud	JDQ
17.	Wade Mills	Ogle Co Newspapers
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Attendance Sheet
Ogle County Multi-Jurisdictional
All Hazards Mitigation Planning Committee
September 29, 2010

	Name (Please Print)	Organization/Entity
1.	[illegible]	
2.	Candy Humphrey	OCEMA
3.	Janette Bennett	Coroner's Office
4.	Larry Acker	3F Forecasts
5.	CHRIS MILLARD	BYRON / CITY / F.D.
6.	LARRY HEWITT	CITY of BYRON
7.	Darin DeHaan	Oregon
8.	Ferol Labash	Pinecrest
9.	Susie Corbitt	Polo
10.	BOB KARTHEISER	EXELON NUCLEAR - BYRON
11.	MIKE TEIBEL	OGLE Co. PLNG. & ZONING
12.	Linda Wells	Ogle Co Newspapers
13.	JASON WHITE	MT MORRIS Police
14.	Mary Scott	Stillman Valley
15.	Guy Michaud	JDQ
16.	Andrea Bostwick	JDQ
17.	RON KUHN	FARM BUREAU
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Attendance Sheet
Ogle County Multi-Jurisdictional
All Hazards Mitigation Planning Committee
September 29, 2010

	Name (Please Print)	Organization/Entity
1.	John Spaine	
2.	Ron McDermott	OC EMA
3.	Mel Messer	Hillcrest PD
4.	Mike Lewis	Ogle County
5.	Tom Byrne	Village of Oregon
6.	Andy Thompson	OCHD
7.	Curtis Cook	Ogle County Hwy Dept.
8.	Maggon McKinley	Ogle County Admin.
9.	Doreen O'Brien	Health Dept.
10.	Kris Willert	GIS
11.	Sam Tesreau	City of Rochelle
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Attendance Sheet
Ogle County Multi-Jurisdictional
All Hazards Mitigation Planning Committee Meeting
November 18, 2010

	Name (Please Print)	Organization/Entity
1.	Ron McDermott	Ogle County EMA
2.	Larry Cullard	Ogle County GIS
3.	Candy Humphrey	Ogle County EMA
4.	Tom Byrd	CRESTON - VILLAGE
5.	Darin DeHaan	oregon P.D.
6.	Meagan McKinley	Ogle County
7.	~~Loren~~ Larry Acker	3F Forecasts
8.	~~Jason~~ White	MT Morris
9.	Andrea Bostwick	JDQ
10.	Greg Michaud	JDQ
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Attendance Sheet
Ogle County Multi-Jurisdictional
All Hazards Mitigation Planning Committee Meeting
November 18, 2010

	Name (Please Print)	Organization/Entity
1.	Melvin Mercer	Bullock
2.	Kris Gilbert	OC GIS
3.	Todd Murray	Byron Police
4.	Fred Lobash	Pinecrest with Morris
5.	Mike Lewis	Ogle County
6.	Mary Scott	Stillman Valley
7.	BOB KARTHEISER	EXELON NUCLEAR - BYRON STATION
8.	Steve Rypkema	Ogle County Solid Waste Mgt.
9.	Jessie Cordell	City of Polo
10.	Ron Klein	FARM BUREAU
11.	Jackie Flick	Leaf River
12.	Shirley Poggiali	Leaf River
13.	Sam TESREAU	CITY OF RUTHELLE
14.	Vicki Wells	Ogle Co Newspapers
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APPENDIX C

Ogle County Multi-Jurisdictional
All Hazards Mitigation Planning Committee Meeting

December 10, 2009
Ogle County Sheriff's Administration Building
103 Jefferson , Oregon
1:00 p.m.

Meeting Minutes

Committee Members

Byron, City of
Creston, Village of
Exelon/Byron Nuclear Plant
Forreston, Village of
Hollie Guist Insurance Agency
Mt. Morris, Village of
Ogle County
- Administrator
- Assessor
- Board Chairman
- Coroner's Office
- Emergency Management Agency
- Farm Bureau
- Geographic Information Services
- Health Department
- Highway Department

Ogle County Continued…
- 911
- Planning & Zoning

Mitigation Planning Consultants
- Johnson, Depp & Quisenberry
- Molly O'Toole & Associates

Polo, City of
Public Representatives
- Gary Cortese
- Mike Lewis
- Mel Messer

Rochelle, City of
Stillman Valley, Village of

General Public
- Ken Sandy, Carroll County

Welcome and Introductions

Ron McDermott, Chairman of the Ogle County Multi-Jurisdictional All Hazards Mitigation Planning Committee, welcomed attendees. He thanked attendees for agreeing to serve on this Committee and he noted that through their attendance they will help make the municipalities they represent and Ogle County eligible for grant money to help with projects and activities aimed at reducing damages caused by natural hazards. The purpose of this Committee is to assemble a hazard mitigation plan (the Plan) that will focus on natural hazards, but will also evaluate some man-made hazards of concern to the Committee. He noted that the severe winter storm that dropped approximately 9 inches of snow over Ogle County led to three members being unable to attend today's meeting. Ron asked the Committee members to introduce themselves by providing their name and who they represent. An opening prayer was made by the Ogle County Chaplain, Gary Cortese.

Binders and handout materials were distributed to each member.

What Is A Natural Hazard Mitigation Plan and Why Should We Prepare It?
Greg Michaud of Johnson, Depp & Quisenberry (an environmental and engineering consulting firm hired by Ogle County to help prepare the Plan) provided an overview based on two questions:

1. Why do we need a mitigation plan when we already have an emergency operations plan?

2. Storms and other natural hazards are unavoidable, so why plan?

This Plan, the mitigation plan, is aimed at reducing and in some instances eliminating the damages caused by natural hazards. Ogle County already has a plan on how to respond to emergency situations, but this Plan will identify projects and activities to be taken before natural hazards occur. As mentioned by Ron McDermott, this Plan will help make Ogle County and the participating municipalities eligible for money to conduct projects that might not otherwise get implemented. Another reason to prepare this Plan is to help improve cooperation between various offices.

He provided some examples of mitigation projects and activities to illustrate the difference between taking action to reduce damages before natural hazards occur (mitigation) and knowing what steps will be taken after a storm hits (emergency response).

Of the millions of dollars spent annually on damages caused by natural disasters, the Federal Emergency Management Agency (FEMA) has calculated that for every dollar spent on mitigation, $3 to $4 dollars can be reaped in savings.

While the focus is on natural hazards, shipments of hazardous substances through Ogle County as well as the kind of transportation facilities present (rail, highways, and intermodal facility) also suggests the need to evaluate the impact on people and property from man-made disasters.

The Planning Process

Greg commended the Committee members who volunteered to serve by noting that there are few opportunities to become involved with something that protects current and future generations. The work of this Committee is expected to provide a legacy that should benefit Ogle County residents for many years.

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:

1st Committee meeting	Orientation to the Planning Process Begin identifying Critical Facilities
2nd Committee meeting	Discuss the Risk Assessment Develop 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

3rd Committee meeting	Begin discussing Mitigation Projects and Activities Develop a Mitigation Strategy
4th Committee meeting	Finish discussion of Mitigation Projects and Activities Review and Discuss the Draft Plan
5th Committee meeting	Present the Revised Plan for public review

Natural hazards identified in the Plan include severe storms, flooding, tornados, severe winter storms, drought, and extreme heat. Other hazards may be added pending the results of the Risk Assessment. Ogle County's Plan will also include man-made hazards.

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 Plans, 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. 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.

Other highlights of this discussion include:

- Submitting a list of mitigation projects does not commit any municipality or the County to obligate funds. These lists help assure eligibility for funding. All mitigation projects and activities for which federal funding will be sought, must be included in the Plan.

- FEMA's intent is to encourage mitigation. FEMA has not used these Plans to "penalize" municipalities or counties who do not implement mitigation projects included in their Plans. Even if funding appears doubtful, it is better to include a project or activity in the Plan.

- Any communities already involved in mitigation planning, such as Rochelle, 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 problems for others.

- Committee members were asked to answer three questions to help measure perceptions regarding risks.

- Other municipalities who want to be included in this Plan after it is adopted may do so; however, a risk assessment and vulnerability analysis must be completed and added to the Plan for each municipality who joins at a later date.

Mission Statement & Goals

In the packet of materials contained in the binders distributed to each Committee member 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.

A list of goals is also included in the packet of materials. Each mitigation project and activity must be aimed at one of these goals. Goals can be added that are tied to specific geographic areas. For example, if a particular area experiences drainage problems a goal can be added to address this problem. If the cause or causes of the drainage problem are unclear, a hydraulic study to identify the cause(s) is considered by FEMA/IEMA as an acceptable mitigation project. In addition, the remedy identified during the hydraulic study is another mitigation project that, in all likelihood, will be eligible for state/federal funding. Examples of such remedies include something as relatively simple as cleaning a culvert or resizing a drainage ditch to more complex projects such as constructing a stormwater retention pond.

Community Participation

Two municipalities who intend to participate were not in attendance at this inaugural meeting; however, they can establish their eligibility—as can any other municipalities—by attending the rest of the planning meetings. 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.

What Happens Next?

Greg told Committee members that the 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.

Committee members were asked to determine if a Fact Sheet and Citizen Survey could be made available from their offices. Following minor edits, electronic copies will be made available upon request.

The second meeting of the Committee was set for:

Thursday, March 4
10 a.m.
Ogle County Sheriff's Administration Building

Public Comment

Public notice of this committee meeting clearly invited public attendance. In addition to the four Committee members who are general representatives of the public, one member of the public attended this meeting.

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

Ogle County Multi-Jurisdictional
All Hazards Mitigation Planning Committee Meeting

March 4, 2010
Ogle County Sheriff's Administration Building
103 Jefferson , Oregon
1:00 p.m.

Meeting Minutes

Committee Members

Byron, City of
Creston, Village of
Forreston, Village of
Hillcrest, Village of
Johnson, Depp & Quisenberry
Leaf River, Village of
Mt. Morris, Village of
News Media
- Ogle County Newspapers
- Channel 23, WIFR-TV, Rockford

Ogle County
- Administrator
- Coroner's Office
- Emergency Management Agency

Ogle County Continued…
- Farm Bureau
- Geographic Information Services
- Health Department
- Highway Department
- 911
- Planning & Zoning
- Sheriff's Office
- Solid Waste Coordinator

Polo, City of
Public Representatives
- Gary Cortese
- Mike Lewis

Rochelle, City of
Stillman Valley, Village of

Welcome and Introductions

Ron McDermott, Chairman of the Ogle County Multi-Jurisdictional All Hazards Mitigation Planning Committee, welcomed attendees. He asked that since there were some first-time attendees that everybody introduce themselves.

He noted that in addition to the materials contained in each notebook, information about animal disease outbreaks and mitigation planning calendars were available at the registration table. He welcomed Byron Fire Chaplin Gary Cortese who provided an opening prayer.

Meeting Minutes

Chairman McDermott asked Committee members to review meeting minutes from the previous meeting. Although no changes were suggested, Chairman McDermott asked members to provide any changes they might have to either Andrea Bostwick or Greg Michaud of Johnson, Depp & Quisenberry (JDQ), the planning consultants assisting the County to prepare this Plan.

Risk Assessment

Before presenting the results of the Risk Assessment, Greg asked Committee members to recall storm events that created problems or caused damages to critical facilities. The following events were described:

- Beginning on December 28, 1978, and ending on New Year's Day, 1979, approximately 30" of snow blanketed Ogle County. Blowing snow made all major roads impassable. Route 38 was closed for one week. Routes 64, 72 & 251 were also closed. Some residents shoveled snow off their roofs to prevent roof cave-ins and interior drainage damage.
- Snow melt has caused flooding problems in Leaf River have on several occasions causing damage to the road bed of Main Street and to the Wastewater Treatment Facility.
- Microbursts in the vicinity of Polo caused damage to the elementary school while it was being used for church service.
- In December, 1989, an ice storm deposited 1" of ice and knocked down power lines and trees in Hillcrest and Rochelle.
- When spring rain events are greater than 4", Creston experiences drainage problems.
- A 2" hail storm in June, 1980, caused damage to automobiles and homes in Hillcrest.
- On August 18, 1996, major flooding was experienced in many parts of Ogle County.
- In March, 1985, dynamite was used to break loose an ice jam on the Rock River. Flooding occurred during this time to the Masonic Temple in Byron.

Greg began the summary of the Risk Assessment for Ogle County by noting the following:

- Over 182 Severe Storms (non-winter) have occurred since 1960
- Over $4.5 million in property and crop damages have been verified from all natural hazards.
- At least 9 injuries and 3 deaths have been confirmed as a result of natural hazards.

Severe storms including thunderstorms, hail and lightning are the most frequently occurring natural hazard in Ogle County. There have been at least 130 thunderstorms and high wind events since 1967, and approximately 50 hail storms since 1960. Property damages have been verified at approximately $570,000 and at least $5,000 in crop damages have been recorded. Most hail storms have occurred in April and May while most thunderstorms have occurred in June and July. Ogle County can expect to see an average of 4 major severe storms of this type per year.

Severe winter storms are the second most frequently occurring natural hazard. At least 35 severe winter storms, including heavy snow, ice and blizzard conditions have been reported. While two deaths have been attributed to these storms, accident statistics from the Illinois Department of Transportation show that additional 244 injuries and 9 deaths are attributable to accidents over a five year period from 2004-2009 when road conditions had snow or ice. Extreme snow conditions include: 23" event in 1967, 30" event in 1979, and an 18" event in 2006. A

temperature extreme of -24 F was recorded on February 2, 2004. While there is a gap for severe winter storms between 1970 and 1995, anecdotal evidence indicates severe storms have occurred during this time and verification of additional storms is expected to be obtained before the next Committee meeting.

Flood events number at least twenty since 1996. Most flood events in Ogle County have occurred in June. Property damages from floods are more difficult to verify because the dollar amounts reported to the National Weather Service tend to cover multiple counties. However, property damages in Ogle County are at least $350,000 for flooding and this number could be higher based on flood insurance records that will be requested, and the recollections provided by Committee members.

Although the number of tornadoes verified in Ogle County place this natural hazard as the fourth most frequently occurring, the verified property damages for tornadoes exceeds the cumulative sum of all the other natural hazards examined. Property damages caused by tornadoes in Ogle County are nearly $3.5 million. Sixteen tornadoes have been verified in Ogle County. Similar to the rest of Illinois, tornadoes most frequently occur in April and May. Six of these tornadoes have occurred in the immediate vicinity of Polo. The severest tornado on record in Ogle County was an F3 in August, 1979 that caused $2.5 million in property damage. Fourteen of these tornadoes were classified as F1 or F0.

During the last 30 years three droughts—1983, 1988, and 2005—have hit Ogle County. Substantial decreases in crop yields occurred during these droughts.

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.

Natural hazards identified in the Plan include severe storms, flooding, tornados, severe winter storms, drought, earthquake, and extreme heat. Other hazards may be added pending the results of the Risk Assessment. Ogle County's Plan will also include man-made hazards.

At the conclusion of this discussion, Andrea collected the "Critical Facilities List" and "Relevant Documents List" from Committee members.

Mission Statement & Goals

A draft Mission Statement and Goals were reviewed by Committee members. Committee members were reminded that each mitigation project and activity must be aimed at one of these goals. Following a short discussion, Chairman McDermott asked Committee members for a vote. The Mission Statement and Goals were passed unanimously.

What Happens Next?

Mitigation Projects & Activities

Examples of fundable projects and activities were provided to Committee members. In addition to projects, studies are fundable projects. In the situation described in Creston, the cause or

causes of the drainage problem in one part of the Village may be unclear. Therefore, a hydraulic study to identify the cause or causes is an appropriate first step. Studies are considered by FEMA/IEMA as acceptable and fundable mitigation entries to include in Natural Hazard Mitigation Plans.

To further stimulate discussion about mitigation projects and activities, Committee members were asked to identify mitigation discussions and efforts underway. Rochelle and Creston have begun what can be considered the first phase of projects aimed at reducing drainage problems. Several member asked questions and the answers helped clarify several points that will help communities as they assemble their lists.

Communities were also asked to identify needs involving buildings or infrastructure. Greg provided some examples of how to tie needs with mitigation projects. These examples led to further discussion which should help municipal and county officials when they conduct discussions with their constituents about mitigation.

Prioritization Strategy
FEMA requires a prioritization strategy in each Natural Hazard Mitigation Plan. A subcommittee will be formed to help develop a draft strategy to be presented at the next Committee meeting.

Citizen Surveys
Creston, Hillcrest, Rochelle, and several Ogle County offices are making copies of Citizen Surveys available for public use.

The third meeting of the Committee was set for:

Thursday, June 24
10 a.m.
To Be Determined—Either the Ogle County Farm Bureau or the Ogle County Sheriff's Administration Building will be the location. Members will receive notice once a location is selected.

Public Comment

Public notice of this committee meeting clearly invited public attendance. Two Committee members, who are general representatives of the public, attended this meeting.

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

Ogle County Multi-Jurisdictional
All Hazards Mitigation Planning Committee Meeting

June 24, 2010
Ogle County Farm Bureau Auditorium
421 West Pines Road, Suite 8, Oregon
10:00 a.m.

Meeting Minutes

Committee Members

Exelon – Byron Nuclear Facility
Forreston, Village of
Hillcrest, Village of
Hollie Guist Insurance Agency
Johnson, Depp & Quisenberry
Leaf River, Village of
Lee-Ogle Regional Office of Education # 47
Mt. Morris, Village of
News Media
- Ogle County Newspapers
- Channel 23, WIFR-TV, Rockford

Ogle County
- Administrator
- Coroner's Office

Ogle County Continued…
- Emergency Management Agency
- Farm Bureau
- Geographic Information Services
- Health Department
- Highway Department
- Planning & Zoning
- Sheriff's Office
- Solid Waste

Oregon, City of
Public Representatives
- Mike Lewis
- Pinecrest Community

Rochelle, City of
Stillman Valley, Village of

Welcome & Meeting Minutes

Ron McDermott, Chairman of the Ogle County Multi-Jurisdictional All Hazards Mitigation Planning Committee, welcomed attendees. He reminded participants that the purpose for this Committee is to develop a mitigation plan. Participants who adopt the approved mitigation plan become eligible for IEMA/FEMA mitigation project grant money. He asked Mike Lewis to provide an opening prayer.

Chairman McDermott asked Committee members to review meeting minutes from the previous meeting. Although no changes were suggested, Chairman McDermott asked members to provide any changes they might have to Andrea Bostwick of Johnson, Depp & Quisenberry (JDQ), the planning consultants assisting the County in preparing this Plan.

He added that JDQ staff are a resource for grant information and project design. He reminded the Committee that there are multiple grants to help participants implement their projects.

Critical Facilities and the Vulnerability Assessment

Greg Michaud, JDQ, provided a recap of what was accomplished at the previous Committee meeting. He presented a chart listing each of the five committee meetings and their objectives. He commended the Committee for accomplishing all of their objectives thus far and he noted that they are on schedule.

Greg explained how the Critical Facilities form, distributed at the first committee meeting, will be used to complete the Vulnerability Assessment. He noted that Jim Harrison, Ogle County Property Tax Assessor, provided residential tax assessment figures for the participating jurisdictions that will be used to complete the vulnerability assessment.

Differences in vulnerability between the municipalities and the County will be described in the Vulnerability Assessment. The Vulnerability Assessment will be based on the historical hazard information and the critical facilities information that is presented.

To help acquire additional information that will be used to complete the vulnerability assessment, attendees were asked to respond to this question:

"How have critical facilities been damaged by flood, tornado, lightning, wind, or other natural hazards in Ogle County?"

A one page form was distributed for Committee members to provide information on this question. Committee members were asked to complete this form and provide it to JDQ before the next Committee meeting.

Project Prioritization Method

A Project Prioritization Subcommittee was formed at the previous committee meeting to help develop a Project Prioritization Method for this Plan. Handouts of the draft project prioritization method were distributed to each member. A suggestion by Subcommittee member Doreen O'Brien was used to develop a grid that distinguishes the four factors used in this method.

After Greg described the project prioritization method including each of the four factors, Chairman McDermott asked if there were any further questions or discussion. The Committee unanimously adopted this method for their Plan.

Mitigation Projects

Andrea asked that the Mitigation Projects forms be collected from the participating municipalities and the County.

Andrea used one example—a tornado shelter—to show how a typical project is prioritized and entered into the Plan. She used a large chart to demonstrate how various categories of information will be completed for each mitigation project. She noted that the mitigation projects will be grouped by jurisdiction to help readers and users of the Plan.

The categories of information include: project prioritization, hazard(s) to be mitigated, type of mitigation activity, size of population affected, goal of the activity, organization responsible for implementation, estimated time frame to complete each activity, funding sources, and cost/benefit analysis.

Andrea pointed out that size of population affected and costs are relative to each participating jurisdiction and will be designated appropriately for each impacted jurisdiction. If the number of persons affected is large for the impacted community, but considered small for other communities, the number will designated as large on the chart. The purpose of the column titled Cost/Benefits Analysis is to provide a rough cost/benefit overview to help jurisdictions compare relative costs and benefits between projects. A refined, detailed, cost/benefit analysis will be required during the grant application process. Andrea used the example of signs and road construction as examples of the difference between low and high cost.

To remain in compliance with the National Flood Insurance Program, Andrea explained that there are three administrative activities that must be listed in the Mitigation Action Table for each National Flood Insurance Program participating municipality and the County.

She reminded attendees that the project prioritization method applied to a particular mitigation project does not enhance that projects likelihood to receive funding. While the mitigation projects will be listed in the relative importance to each jurisdiction, there are many factors, such as local needs and changing circumstances among others, that will ultimately determine when projects are conducted. For example, a project that is listed as number five on one community's list could actually become the first project implemented.

What Happens Next?

Mitigation Project Lists

Completing the mitigation project lists is essential for the Plan to be completed. Additional tips were provided that may help to complete these lists. While structural projects are often the type of project listed, public information and public notification projects can be equally important to prevent injuries and save lives. Although storm warning sirens are not presently being funded through the Illinois Emergency Management Agency, there are other grants that can be tapped for this kind of project. Projects that have been agreed upon but not built and projects that have had the first phase constructed, but not the second or third phase, should also be included on the mitigation lists being assembled.

Meeting Schedule

Since all of the mitigation project lists have not been submitted, the committee was asked which month was reasonable to expect completion of these lists. September was agreed upon. The next committee meeting was scheduled for:

Wednesday, September 29
Ogle County Farm Bureau
10 a.m.

Discussion of man-made hazards in Ogle County and completion of the mitigation project lists will be the objectives of the next Committee meeting. There will be also be further discussion about how the public forum will be conducted. The final Committee meeting will be conducted as an open-house style public forum where the draft Plan will be presented for review and comment. This public forum is anticipated to occur in October or November.

Public Comment

Chairman McDermott asked if any non-Committee attendees had questions or comments about today's proceedings. Representatives from the Pinecrest Community commented that the presentations helped them to better understand the planning process and the purpose for a mitigation plan.

With no further comments or questions, Chairman McDermott thanked Committee members for attending and he adjourned the meeting.

Post-Meeting Notes of Interest

- Jacki Flick provided color photographs of flood damage from 1979 in Leaf River.
- Vinde Wells provided some historical information about natural hazards.

Ogle County Multi-Jurisdictional
All Hazards Mitigation Planning Committee Meeting

September 29, 2010
Ogle County Farm Bureau Auditorium
421 West Pines Road, Suite 8, Oregon
10:00 a.m.

Meeting Minutes

Committee Members

Byron, City of
Creston, Village of
Exelon-Byron Nuclear Facility
Hillcrest, Village of
Mt. Morris, Village of
Ogle County
- Administrator
- Coroner's Office
- Emergency Management Agency
- Geographic Information Services
- Health Department
- Highway Department
- Planning & Zoning

Mitigation Planning Consultants
- Johnson, Depp & Quisenberry

News Media
- Ogle County Newspapers

Oregon, City of
Polo, City of
Public Representatives
- Larry Acker
- Mike Lewis
- Pinecrest Community

Rochelle, City of
Stillman Valley, Village of

General Public
- John Spaine

Welcome & Meeting Minutes

Ron McDermott, Chairman of the Ogle County Multi-Jurisdictional All Hazards Mitigation Planning Committee, welcomed attendees. He reminded participants that the purpose for this Committee is to develop a mitigation plan. Participants who adopt the approved mitigation plan become eligible for IEMA/FEMA mitigation project grant money. He asked Mike Lewis to provide an opening prayer.

Chairman McDermott asked Committee members to review meeting minutes from the previous meeting. Although no changes were suggested, Chairman McDermott asked members to provide any changes they might have to Andrea Bostwick of Johnson, Depp & Quisenberry (JDQ), the planning consultants assisting the County in preparing this Plan.

Mitigation Projects & Mitigation Action Tables

Greg Michaud, JDQ, provided a recap of what was accomplished at the previous Committee meeting. He noted that the recent Federal disaster declaration that included Ogle and six other

counties in northern Illinois should remind the public of the importance of developing a mitigation plan. Thus far, the Committee has accomplished all of their objectives.

He commended the Committee members for assembling their lists of mitigation projects and activities. These lists are the basis for the Mitigation Action Tables developed for each participating jurisdiction.

Andrea, JDQ, asked Committee members to review these tables. In addition to reviewing the table for their jurisdiction, Andrea noted that Committee members should also review the other tables because they may see a project or activity that might be added to their list.

The categories of information described at the previous Committee Meeting – project prioritization, hazard(s) to be mitigated, type of mitigation activity, size of population affected, goal of the activity, organization responsible for implementation, estimated time frame to complete each activity, funding sources, and cost/benefit analysis – have been drafted for the Committee's review.

Approximately twenty minutes were used for Committee review. As the Committee reviewed these tables, Andrea and Greg moved throughout the room to discuss questions with each member.

This review and discussion prompted several jurisdictions to inquire about potential additions to their lists. Committee members were asked to submit any additions by Friday, October 8.

Risk / Vulnerability Assessment

The Committee reviewed the risk assessment for natural hazards at the second Committee meeting. Copies of the risk assessment for man-made hazards were included in the meeting packet and Greg provided the following summary of findings.

- Eleven generators of hazardous substances are identified along with the types and quantities of substances generated. ***None of these generators have current or ongoing violations.***

- Since 2000, there have been eleven incidents involving the transportation of hazardous substances via rail in Ogle County. While the quantities released were small, and no evacuations were needed, ***these numbers should be reviewed when this Plan is updated to see if the existing intermodal center or the proposed intermodal center results in an increase in the number of incidents.***

- Highway and pipeline transportation incidents of hazardous substances in Ogle County are ***about normal*** when compared to other downstate counties.

- The majority of remediation at the only Superfund site in Ogle County, the Johnson Salvage Yard near Byron, is completed. ***While the installation of new drinking water wells on or adjacent to this site is restricted, no other drinking water wells in the area are threatened by this site.***

- Fifteen other sites in Ogle County did not qualify as Superfund sites, but contained hazardous substances requiring remediation. Remediation has occurred at these sites and ***they no longer pose a threat to adjacent properties***.

- Between 2005 and 2009, there were 50 HazMat incidents in Ogle County. ***The number of incidents indicates the importance of continued support for first responders and the County EMA Office.***

Information regarding nuclear accidents and terrorism was also included the packets.

In addition to the information provided on man-made hazards, a handout was distributed that estimated the potential dollar loss to residential properties from flooding. These estimates were based on 2009 property tax assessment figures provided by Jim Harrison, Ogle County Supervisor of Assessments, and on the number of residential buildings located in the floodplain for each participating jurisdiction provided by the Ogle County GIS department. These estimates were assembled to provide the participants with a sense of the potential magnitude caused by one large-scale flood event.

What Happens Next?

The fifth Committee meeting will be conducted as a public forum and is scheduled for.

Thursday, November 18
Ogle County Farm Bureau
5 p.m. - 7 p.m.

The final Committee meeting will be conducted in the early evening as an open-house style public forum where the draft Plan will be presented for review and comment. Contrary to conventional public meetings, at an open-house style public forum, the public can come and go at their convenience.

After this public forum, there are three important milestones:

1. **Submission of the Plan** to IEMA and FEMA for their approval;
2. **Adoption of the Plan** by each participating jurisdiction through a resolution; and
3. **Submission of the resolutions to JDQ** so that each participating jurisdiction is eligible for state/federal funding.

Following the close of the public comment period on December 3rd, the Plan will be readied for submission. When FEMA approves the Plan, an e-mail will be sent to the Committee Members asking them to adopt the Plan. The Plan should **not** be adopted until after FEMA approval. Andrea will provide paper or electronic copies of a model resolution to the Committee members at the public forum.

In response to a question from Susie Corbitt, Greg said that each municipality is only responsible for their portion of the Plan.

Chairman McDermott reminded Committee members that any additions to their list of mitigation projects and activities must be submitted to Andrea and Greg by Friday, October 8th so that they can complete preparations for the November 18th forum.

Public Comment

Chairman McDermott asked if any non-Committee attendees had questions or comments about today's proceedings. John Spaine, a resident of Mt. Morris, asked three questions:

1.) In regard to a recent severe storm involving high winds, should the public be alerted before a storm hits?

2.) Are weather events the only time sirens are used?

3.) How can the public be made aware of the protocols regarding warning sirens?

Sirens are used as storm alerts for tornados in Ogle County only after the County receives confirmation of a tornado in the area. Sirens are not used to alert residents when strong winds occur. In addition to tornados, sirens are used to alert the public if an emergency were to occur at the nuclear power facility near Byron. Protocols regarding the use of warning sirens and safety precautions for other natural hazards have been distributed each March during severe storm Preparedness Week. This subject is among the topics being considered for public information materials included in the County's list of mitigation projects.

With no further comments or questions, Chairman McDermott thanked committee members for attending and adjourned the meeting.

APPENDIX D

Ogle County
Multi-Jurisdictional All Hazards Mitigation Plan
Questionnaire

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

1. Please indicate where you live in Ogle County:

_____ Unincorporated area of Ogle County
_____ Byron
_____ Creston
_____ Davis Junction
_____ Forreston
_____ Leaf River
_____ Monroe Center
_____ Mt. Morris
_____ Oregon
_____ Polo
_____ Stillman Valley
_____ Other (please specify): _____

2. Please place a check mark next to each of the natural hazards listed below that you have experienced in Ogle County. (Please check all that apply.)

_____ Severe Summer Storms (thunderstorms, hail and/or lightning strikes)
_____ Floods
_____ Severe Winter Storms (snow, sleet and/or ice)
_____ Extreme Heat
_____ Tornadoes
_____ Earthquakes
_____ Drought
_____ Other (please specify): _____

2a. Which of the natural hazards above have you encountered most frequently?

_____

3. Rank the natural hazards listed below from 1 to 7 based on which hazard you feel poses the greatest threat. (1 = greatest threat and 7 = least threat).

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

Ogle County
Multi-Jurisdictional All Hazards Mitigation Plan
Questionnaire

4. What types of mitigation projects or activities are most needed in Ogle County? (Please check the five you feel are most important.)

_____ Public information fact sheets and brochures describing actions residents can take to protect themselves and their property against natural hazard impacts

_____ Building Codes and Enforcement

_____ Sirens or other Alert Systems

_____ Flood or Drainage protection (Please check below the type of flood or drainage activity that is needed.

- ____ Culvert and drainage ditch maintenance
- ____ Retention pond construction
- ____ Dam or levee construction/maintenance
- ____ Hydraulic studies to determine cause of drainage problems

_____ Maintain power during storms by burying power lines, trimming trees and/or purchasing a back-up generator

_____ Tornado Safe Shelters

_____ Maintain roadway passage during snow storms and heavy rains

_____ Provide sufficient water supply during drought

_____ Identify residents with special needs in order to provide assistance during a natural hazard event

_____ Retrofit critical infrastructure(public water supplies, schools, sewage treatment facilities, bridges, hospitals and other important services) to reduce potential damages

_____ Other (please specify): _____

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.

APPENDIX E

Ogle County Multi-Jurisdictional
All Hazards Mitigation Planning Committee

Frequently Asked Questions

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

The Ogle 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 Ogle 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 Ogle County All Hazards Mitigation Planning Committee is preparing the Plan with assistance from technical experts in emergency planning, environmental matters, and infrastructure. The Committee includes members from agriculture, business and economic development, emergency services, municipal, county and state government, health care, insurance, law enforcement, and institutions such as the American Red Cross.

5) How can I participate?

You are invited to attend public meetings of the Ogle County All Hazards Mitigation Planning Committee. In addition you are encouraged to provide photographs, other documentation, and anecdotal information about damages you experienced with natural and man-made hazards in Ogle County. Surveys will be available at participating municipalities and through Ogle County to help gather specific information from residents. All of this information will be used to draft the Plan. The draft Plan will be presented in a public forum for further public input.

More information can be obtained by contacting:

Ron McDermott
Ogle County Emergency Management Agency
103 Jefferson Street
Orgeon, Illinois 61061
Tel: (815) 732-6666 Ext. 289

APPENDIX F

Rochelle News-Leader
December 6, 2009

Rochelle News-Leader 12/6/09

Ogle County to prepare plan for disasters

OREGON — Ogle 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).

All Ogle County municipalities are invited to participate in this planning process. Byron, Creston, Forreston, Hillcrest, Mt. Morris, Oregon, Polo, Rochelle, and Stillman Valley have already committed to participate. There is still time for other municipalities to join the process.

"Developing this plan will help us be better prepared before storms hit. We can reduce the damages to property and the grief to residents by identifying appropriate projects for the county and each participating municipality. This plan will provide us with a clearer direction as well as make us eligible for federal funding for projects that might not otherwise be constructed," said Ron McDermott, Ogle County EMA Coordinator.

"This plan will provide us with a clearer direction as well as make us eligible for federal funding for projects that might not otherwise be constructed."

Ron McDermott

Ogle County is vulnerable to flooding, severe winter storm, and tornado damage. Since 1981 Ogle County has been federally declared as a flood disaster on two occasions in addition to experiencing local flood and drainage problems. Major weather fronts moving and colliding across northern Illinois frequently trigger severe winter storms with some of the higher snowfall accumulations in Illinois being recorded in this region of the state. While the most destructive tornadoes have occurred in other counties, Ogle County has experienced 16 tornadoes since 1950 that resulted in over $3.5 million in damages.

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.

An Ogle 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. he 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 1 p.m. at the Ogle County Sheriff's Administrative Building, 103 Jefferson Street, in Oregon. The committee will meet periodically through the next several months to develop a draft plan. Ogle County residents are welcome to attend every meeting.

"Continual input from the public is a key part of this planning process. An ongoing dialogue between local government and agriculture, business, education, emergency management, health and utility representatives, along with other interested residents will be encouraged. Through this dialogue the plan will be assembled," added Ron McDermott. After the plan is drafted, more opportunity for public review and comment will be provided through public forums and other methods.

Planning for floods, storms and more in Ogle County

Freeport Journal-Standard
December 12, 2009

By Travis Morse
The Journal-Standard
Sat Dec 12, 2009, 08:09 PM CST

Oregon, Ill. -

To Ron McDermott, creating an All Hazard Mitigation Plan for Ogle County will not only foster additional teamwork among various agencies, but will also identify projects to reduce potential damages caused by tornadoes, floods, storms, and other disasters.

By having this plan in place, the county will be eligible for federal grant funding to pay for different improvement projects, said McDermott, coordinator of the Ogle County Emergency Management Agency. These projects would be designed to lessen or "mitigate" the damages from storms and other hazards on people and property in the community, he said. The plan will evaluate both natural and man-made disasters, meaning the topic of terrorism will also be addressed.

"The whole purpose going into this is to be eligible for other federal funds that will now be available to us if we have a plan," McDermott said. "It also brings different agencies in the county together as a whole and builds our working relationship as a team. ... Without a positive, strong team, we are not going to succeed as a county."

The newly formed Ogle County Hazard Mitigation Planning Committee held its initial meeting this past week. This is the first time that Ogle County is forming an All Hazard Mitigation Plan, and the process will likely take six to 18 months to complete, McDermott said.

County officials received a $70,000 grant from the Federal Emergency Management Agency to create the plan. Much of this funding is being used to hire a consulting firm for the project. Because of in-kind services provided by the county, the plan project should not cost the county any "out-of-pocket money," McDermott said.

Now that funding has been secured, the planning committee will begin gathering data for the plan. So far, Byron, Creston, Forreston, Hillcrest, Mount Morris, Oregon, Polo, Rochelle, and Stillman Valley have committed to participate in the process. All Ogle County municipalities have been invited

to take part, and county residents will also be encouraged to attend future planning meetings to provide input, McDermott said.

At the end of the process, Ogle County will have an estimated 100-page document that will identify improvement projects across the county that are needed to reduce potential damages. For example, if a building or bridge is identified as vulnerable to damage from a storm or flood, county officials will work to secure grant funding to renovate the structure before a disaster occurs, McDermott said.

"By making improvements before the storm, it may save the collapse of a bridge or other structure," McDermott said. "After gathering data, we will hopefully identify areas that need attention. ... Once we identify (those projects) in the plan, we will hopefully qualify for grants on projects we've identified."

Stephenson County Plan

Stephenson County, in cooperation with the City of Freeport, created an All Hazard Mitigation Plan about two years ago, said Terry Groves, director of the Stephenson County Emergency Management Agency. Officials were initially just going to draft a flood mitigation plan, but decided to expand the project to create an all hazard plan, he said.

Forming the plan not only provided a valuable document to help secure grants, but the process itself was educational for everyone involved, Groves said. It was a lengthy process that included numerous public meetings, and participants learned a great deal about flooding and other issues, he said.

"It cleared up a lot of misconceptions on the part of the public," Groves said of the planning process. "It was an educational process for the whole community."

Stephenson County's plan identifies a need for installing flood gauges to monitor levels on Yellow Creek, and county officials will complete this project in the near future, Groves said. Organizers will revisit the plan in three years.

"With the plan, we know what kind of improvements we need to make," Groves said. "As long as we have it in the plan, we're eligible for grant funding from the federal or state government."

Vulnerable To Hazards

Ogle County is vulnerable to flooding, severe winter storms, and tornado damage, according to a county news release. Since 1981, Ogle County has been federally declared as a flood disaster area on two occasions, the release states. Also, there are frequent winter storms in the region, and the county has experienced 16 tornadoes since 1950, that resulted in more than $3.5 million in damages, the release states.

The next planning committee meeting will be at 10 a.m. on March 4 at the Ogle County Sheriff's Administrative Building, 103 Jefferson St. in Oregon. The public is invited to attend.

For more information on Ogle County's plan project, contact McDermott at (815) 732-6666, ext. 289.

Ogle Co News Papers
2/25/10

Ogle County News
February 25, 2010

County Record

Plan to reduce disaster damages moves forward

Representatives from Ogle County and local municipalities will meet Thursday, March 4 at the Ogle County Sheriff's Administrative Building, Oregon at 10 a.m. to continue working on a plan to reduce damage from natural and man-made disasters.

This group, called the Ogle County Hazard Mitigation Committee, will meet through the next several months 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 the frequency of these natural hazards and their magnitude in our county, we can better develop a strategy to reduce damages caused by these events," said Ron McDermott, Ogle County Emergency Management Agency 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 Ogle County's plan.

"By identifying the frequency of these natural hazards and their magnitude in our county, we can better develop a strategy to reduce damages caused by these events," —

Ron McDermott

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 Ogle 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, Ogle County and the participating municipalities can adopt the plan making them eligible for hazard mitigation funds.

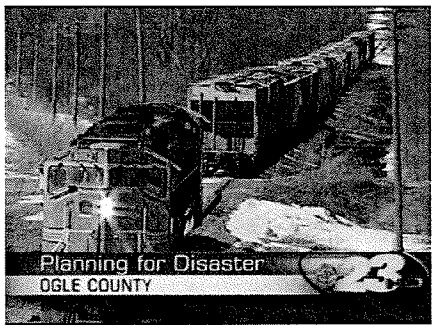
Channel 23 (WIFR)
March 4, 2010

Updated: 6:17 PM Mar 4, 2010

Ogle County Prepping New Disaster Plan

Coalition of county and local agencies examines county's ability to handle disasters.

Posted: 6:09 PM Mar 4, 2010
Reporter: Chris Linden, 23Hometowns
Email Address: hometowns@wifr.com



How would your local agencies respond to a disaster?

That's a question Ogle County authorities tackled today as they continue reviewing how to prevent disasters and improve their emergency response.

Participating Agencies
The following local and county agencies are part of the county's Hazard Mitigation Committee

Local Agencies:
City of Byron
Village of Creston
Exelon/Byron Generating Station
Village of Forreston
Hollie Guist Insurance Agency
Village of Mt. Morris
Johnson, Depp & Quisenberry (Mitigation Planning Consultant)
Molly, O'Toole & Associates (Mitigation Planning Consultant)
City of Polo
Gary Cortese (Public Representative)
Mike Lewis (Public

Today's meeting was the second chance for city and county agencies to identify possible hazards and responses. The ultimate goal is to prepare for and prevent disasters like flooding, train derailments and nuclear hazards. It could lead to new bridges, flood walls and alert systems. It could also pay off – in the form of federal dollars for construction and equipment.

"This plan has allowed us to broaden to other areas throughout the county that possibly have not been part of the process," said Ron McDermott, director of the county's Emergency Management Agency. "It strengthens our county as a response entity when these situations arise."

The entire process could take nearly two years. Meetings for the mitigation committee are open to the public.

Appendix F

Representative)
Mel Messer (Public Representative)
City of Rochelle
Village of Stillman Valley
Ken Sandy, Caroll County (General Public)

Ogle County Agencies:
Administrator
Board Chairman
Coroner's Office
Emergency Management Agency
Farm Bureau
Geographic Information Systems
Health Department
Highway Department
911
Planning & Zoning

Find this article at:
http://www.wifr.com/home/headlines/86428297.html

☐ Check the box to include the list of links referenced in the article.

Ogle Co LIFE June 2, 2010

Ogle County all hazard mitigation planning committee to meet

OREGON — How can vital services be maintained for Ogle County residents when floods and severe storms hit? What steps might be taken to prevent injuries and death? These and other questions will be discussed when the Ogle County All Hazard Mitigation Planning Committee meets at 10 a.m. on June 24 at the Ogle County Farm Bureau, 421 W. Pines Road in Oregon. Committee meetings are open to the public.

This committee has been conducting working meetings since December 2009 to prepare a plan that will identify projects and activities to protect Ogle County residents and property from storms and other natural and man-made disasters. This plan, unlike all other emergency plans, is aimed at identifying projects and activities that can be taken before these disasters occur.

"Other emergency plans are directed at responding after a storm or natural disaster hits. This is the first time in Ogle 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 Ron McDermott, county Emergency management agency coordinator.

Byron, Creston, Forreston, Hillcrest, Leaf River, Mt. Morris, Oregon, Polo, Rochelle and Stillman Valley are participating in this planning process. These municipalities and various county departments are identifying the kinds of projects that should be included in the plan.

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.

Interested persons can submit questions and comments to the committee members or directly to the Ogle County Emergency Management Agency by contacting Ron McDermott at 815-732-6666.

Any arrests listed in this paper are merely charges and the defendants are presumed innocent unless proven guilty in a court of law.

The Crossing is retaining its contemporary worship style driven by an acoustic lead guitar, electric bass and strong vocals. "We also have a projection system that displays the song lyrics and sermon points during worship," Kruger stated.

While the church has adopted contemporary music and technology, its message the Bible and LTGs are an extremely non-threatening context to ask questions and have spiritual discussions. Everything is confidential and there are no designated leaders or expectations. LTGs are easy to get started."

People can also connect through the Crossing's blog site. "We are not a program driven church," explained

The Crossing would like to invite Byron and surrounding communities to Stone Quarry Day, an all church fellowship on Sunday, June 27. Everyone attending Sunday morning worship will receive a free wrist band admission to the Stone Quarry. For more information about the Crossing, visit the website at www.thebyroncrossing.org.

Gregory A. Beitel
Director

XXXXXXXXXXXXXXXXXXXX

Ron McDermott
Coordinator

Ogle County Emergency Management Agency

FOR IMMEDIATE RELEASE

Contact: Ron McDermott
(815)732-6666

Reducing Damages Caused By Storms

Oregon, IL (September 14, 2010)—Steps to protect residents and property from storms and other hazards will be discussed at the Ogle County All Hazards Mitigation Planning Committee meeting on **September 29 at the Ogle County Farm Bureau on 421 W. Pines Road, Oregon. The meeting begins at 10 a.m. and is open to the public.**

Byron, Creston, Forreston, Hillcrest, Leaf River, Mt. Morris, Oregon, Polo, Rochelle, Stillman Valley and Ogle County representatives are on this Committee. Agriculture, insurance, schools and utilities are also participating.

"Severe storms that hit Ogle County and other parts of northern Illinois in early August remind us of the need to prepare a mitigation plan. While other emergency plans are directed at responding after a storm hits, this mitigation plan focuses on actions that can reduce damages before a storm occurs," according to Ron McDermott, Ogle County Emergency Management Coordinator.

This Committee has been conducting meetings open to the public since December, 2009. Ogle County and the participating municipalities have been assembling lists of mitigation projects and activities. The mitigation plan is expected to be finished this fall.

While the public has provided input on portions of the plan, the entire plan will be presented for public review and comment before it is submitted to the state and federal government for approval. "A public forum will be conducted during the evening for interested persons to review the plan and ask questions of Committee members. A two week public comment period will be established to accommodate interested persons who are unable to attend the forum. We want to make sure that everyone who is interested has an opportunity to review and comment on the draft plan." added McDermott.

Following approval by the Federal Emergency Management Agency, the plan must be adopted by each participating municipality and the County before the mitigation projects can become eligible for government funding.

Interested persons can submit questions and comments to the Committee members or directly to the Ogle County Emergency Management Agency.

Emergency Management
PO Box 197, Oregon, Illinois 61061
Telephone: 815-732-6666 Email: rmcdermott@oglecounty.org

Gregory A. Beitel
Director

Ron McDermott
Coordinator

Ogle **C**ounty **E**mergency **M**anagement **A**gency

FOR IMMEDIATE RELEASE

Contact: Ron McDermott
(815)732-6666

Public Forum on Plan to Reduce Storm Damages

Oregon, IL (November 8, 2010)—Projects and activities that might be taken to prevent injuries and deaths from major storms will be identified and presented for public comment in the Ogle County All Hazards Mitigation Plan. Members from the Ogle County All Hazards Mitigation Planning Committee will be available to discuss this Plan on November 18 from 5 p.m. to 7 p.m. at the Ogle County Farm Bureau.

"Persons can come and go at their convenience to review the plan and comment. This forum was designed to accommodate busy schedules. If an interested person only has a few minutes to review the plan, ask a question, or make a comment, they can easily do so at anytime during the forum. Unlike conventional meetings, there are no formal presentations forcing attendees to wait before providing input," according to Ron McDermott, Ogle County Hazard Mitigation Committee Chairperson.

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

"We have received public input to develop this Plan since we began meeting last year. This input has included information about storm events, property damages, and potential projects that could reduce harm to people and property. The upcoming public forum allows the public to see the draft plan in its entirety," added McDermott.

Byron, Creston, Forreston, Hillcrest, Mt. Morris, Polo, Rochelle, and Stillman Valley 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.

A public comment period will remain open until December 3. Comments can be directed to the Ogle County Emergency Management Agency. Following the public comment period, any revisions that are needed will be made before the Plan is submitted to the Illinois Emergency Management Agency and the Federal Emergency Management Agency for approval.

Each participating jurisdiction must adopt the plan to become eligible for project funds distributed by the state and federal emergency management agencies.

XXXXXXXXXXXXXXXXX

Emergency Management
PO Box 197, Oregon, Illinois 61061
Telephone: 815-732-6666 Email: rmcdermott@oglecounty.org

OGLE COUNTY NEWS MEDIA

Newspapers

Byron Tempo
418 W. Blackhawk Dr.
Byron, IL 61010
(815) 234-4821

Dixon Telegraph
113 S. Peoria Ave.
Dixon, IL 61021
(815) 284-2224

Freeport Journal-Standard
27 S. State Ave.
Freeport, IL 61032
(815) 232-1171

Ogle County Life
311 W. Washington St.
Oregon, IL 61061
(815) 732-2156

Ogle County News
121A S. Fourth St.
Oregon, IL 61061
(815) 732-6166

Rochelle News-Leader
211 Hwy 38 East
Rochelle, IL 61068
(815) 562-4171

Rockford Register Star
99 E. State St.
Rockford, IL 61104
(815) 987-1200

Radio Stations

WIXN (1460 AM/101.7 FM)
1460 S. College Ave.
Dixon, IL 61021
(815) 288-3341

WLLT (107.7 FM)
260 St. Rte 2
Dixon, IL 61021
(815) 284-1077

WSDR (1240 AM)
3101 Freeport Rd.
Sterling, IL 61081
(815) 625-1240

WRHL (1060 AM/102.3 FM)
400 May Mart Dr.
Rochelle, IL 61068
(815) 562-7001

WZOK (97.5FM)
3901 Brendenwood Rd.
Rockford, IL 61107
(815) 399-2233

Television Stations

Channel 13 (WREX)
NBC Affiliate
10322 Auburn Rd.
Rockford, IL 61103
(815) 335-2710

Channel 17 (WTVO)
ABC Affiliate
1917 N. Meridian Rd.
Rockford, IL 61101
(815) 963-2773

Channel 23 (WIFR)
CBS Affiliate
2523 N. Meridian Rd.
Rockford, IL 61101
(815) 987-5330

Channel 39 (WQFR)
FOX Affiliate
1917 N. Meridian Rd.
Rockford, IL 61101
(815) 963-2773

APPENDIX G

OGLE COUNTY MULTI-JURISDICTIONAL ALL HAZARDS MITIGATION PLAN

PUBLIC FORUM – OPEN HOUSE

NOVEMBER 18, 2010
OGLE COUNTY FARM BUREAU AUDITORIUM
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 Ogle County residents. Since 1965, Ogle County has had four federally-declared disasters. In addition, in the past decade alone, there have been over 89 severe storms (thunderstorms, high winds, hail, lightning strikes, heavy rain etc.), 31 severe winter storms, 25 flood and flash flood events, one tornado, one extreme heat event, one drought and three earthquakes 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 Ogle County Multi-Jurisdiction All Hazards Mitigation Plan?

Recognizing the benefits that could be gained from preparing an all hazards mitigation plan, the Ogle County Board passed a resolution on June 16, 2009 authorizing the development of the Ogle County Multi-Jurisdictional All Hazards Mitigation Plan. The County then invited all the municipalities within Ogle County to participate. The following municipalities chose to participate in the Plan's development:

- Byron
- Creston
- Forreston
- Hillcrest
- Leaf River
- Mt. Morris
- Oregon
- Polo
- Rochelle
- Stillman Valley

How was the Plan developed?

The Ogle County Multi-Jurisdictional All Hazards Mitigation Plan was developed through the Ogle County Multi-Jurisdictional All Hazards Mitigation Planning Committee. The Planning Committee included representatives from each participating jurisdiction, the general public as well as agriculture, business, education, emergency services (ambulance, fire and law enforcement), healthcare, GIS and insurance. The Planning Committee met five times between December, 2009 and November, 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)
- flood
- tornadoes
- drought
- extreme heat
- 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 Ogle County residents as well as the buildings, critical facilities and infrastructure located within the County.

What happens next?

Any comments received at tonight's public forum will be are incorporated into the Plan before it is submitted to the Illinois Emergency Management Agency (IEMA) and the Federal Emergency Management Agency (FEMA) for review. Once IEMA and FEMA have reviewed and approved the Plan, it will be presented to the County and each participating jurisdiction for formal adoption. After adopting the Plan, each participating jurisdiction can apply for federal mitigation funds and begin implementation of the mitigation actions identified in the Plan.

APPENDIX H

OGLE COUNTY
MULTI-JURISDICTIONAL ALL HAZARDS MITIGATION PLAN

PUBLIC FORUM – NOVEMBER 18, 2010
COMMENT SHEET

The Ogle County Multi-Jurisdictional All Hazards Mitigation Plan evaluates damage to life and property from natural and man-made hazards that occur in the County. This Plan also identifies projects and activities submitted by the County and each participating municipality that will help reduce these damages. This comment sheet should be used to provide feedback on the draft Plan.

What comments, concerns or questions do you have regarding the draft Plan? (Use additional sheets if necessary.)

Please Print Your Name, Address, and Phone Number Below

Name: _____ Phone: _____

Address: _____

_____ Zip Code: _____

Comments will be accepted until December 3, 2010.

Place
Stamp
Here

Ogle County Emergency Management Agency
103 Jefferson St.
Oregon, IL 61061

APPENDIX I

TO: Carroll County ESDA (Greg Miller); DeKalb County (Dennis Miller). Jo Daviess County (Colin Fulrath), Lee County EMA (Kevin Lalley); Stephenson County (Terry Groves);Whiteside County (Jim Wetzell); and Winnebago County(Dennis Lolli)

From: Ron McDermott, Ogle County EMA Coordinator

Subject: Hazard Mitigation Planning

Date: November 13, 2009

The purpose of this memorandum is to let you know that Ogle 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 Ogle County All Hazards Mitigation Planning Committee has been formed to work on the Plan. The next meeting of the Committee will be:

Thursday, December 10
Ogle County Sheriff's Administrative Office
103 Jefferson Street
Oregon, IL
1 p.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

TO: Carroll County ESDA (Greg Miller); DeKalb County (Dennis Miller). Jo Daviess County (Colin Fulrath), Lee County EMA (Kevin Lalley); Stephenson County (Terry Groves);Whiteside County (Jim Wetzell); and Winnebago County(Dennis Lolli)

From: Ron McDermott, Ogle County EMA Coordinator

Subject: Hazard Mitigation Planning

Date: March 4, 2010

The purpose of this memorandum is to let you know that Ogle 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.

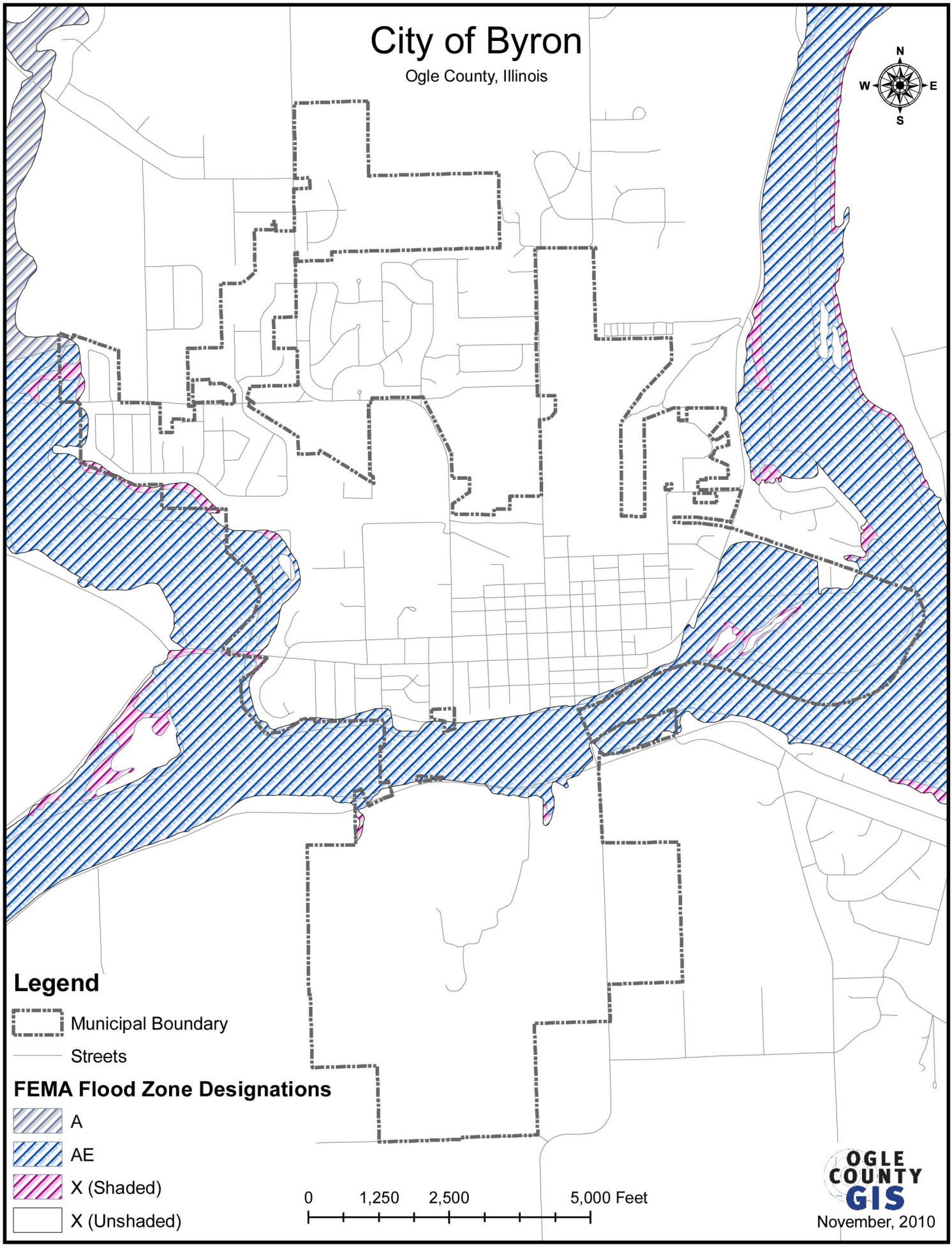
The Ogle County All Hazards Mitigation Planning Committee has been formed to work on the Plan. The next meeting of the Committee will be:

Thursday, March 4
Ogle County Sheriff's Administrative Office
103 Jefferson Street
Oregon, IL
10 am

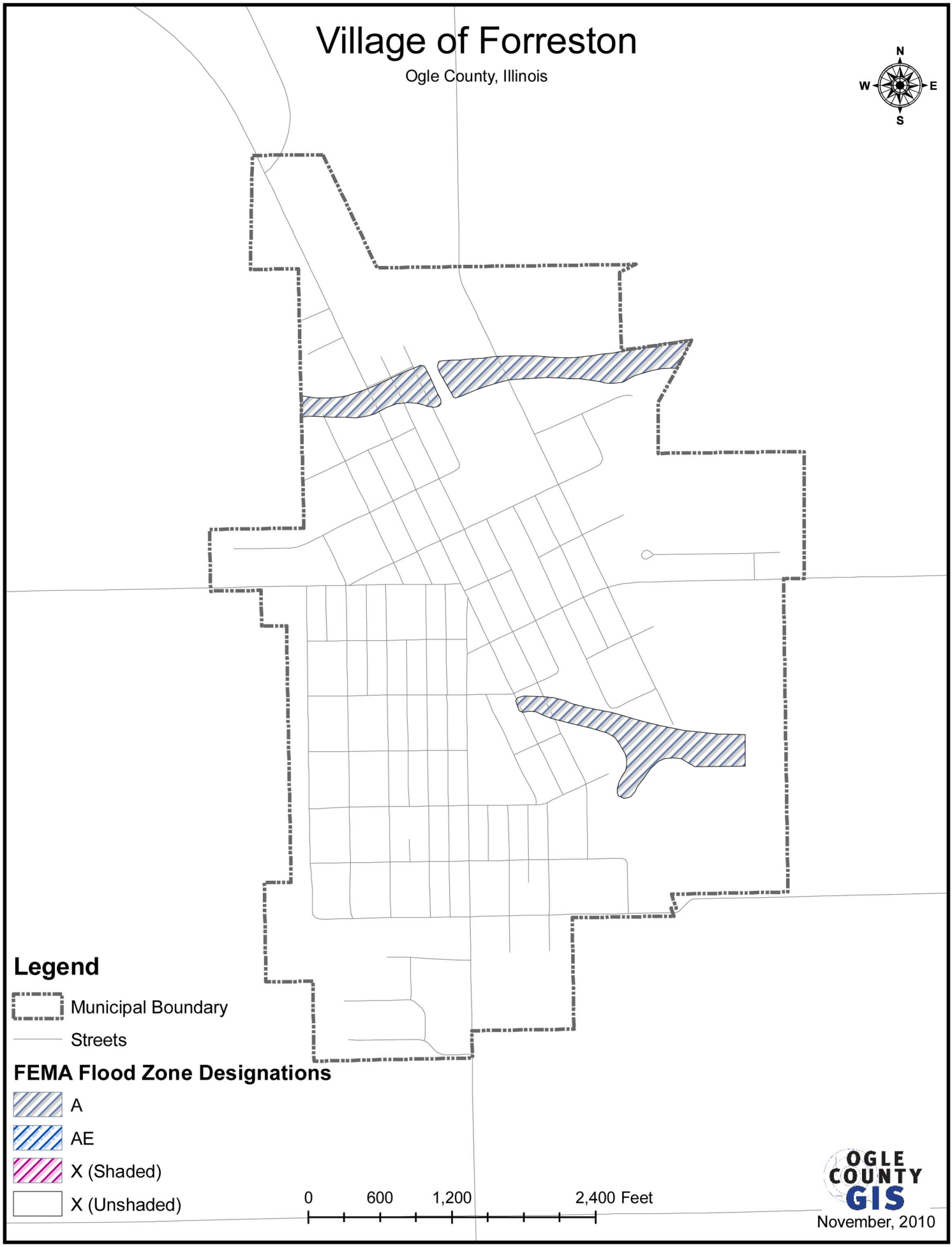
The Committee meetings are open to the public and you are welcome to attend.

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

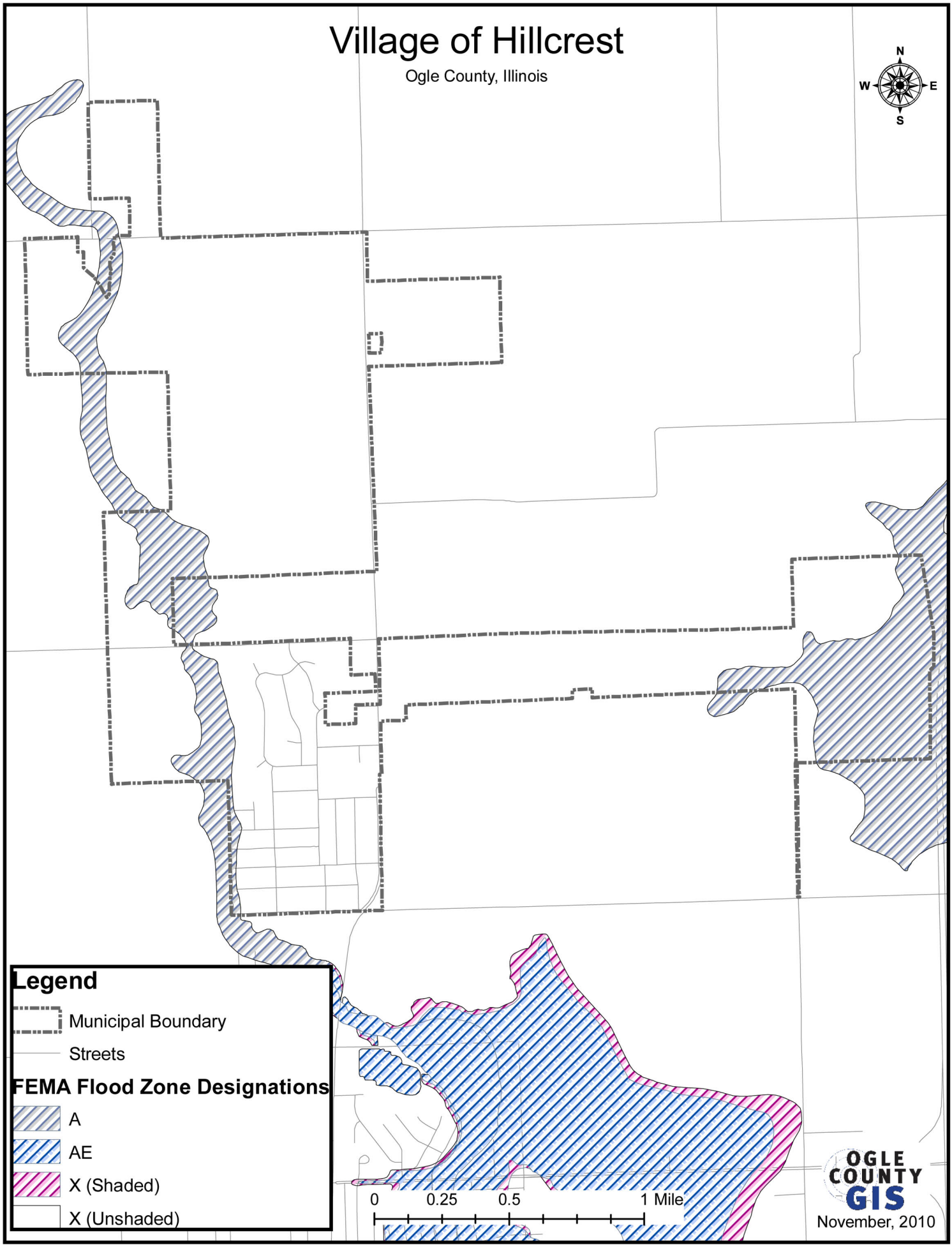
APPENDIX J


City of Byron
Ogle County, Illinois
N
W
E
S
Legend
Municipal Boundary
Streets
FEMA Flood Zone Designations
A
AE
X (Shaded)
X (Unshaded)
0
1,250
2,500
5,000 Feet
OGLE COUNTY GIS
November, 2010

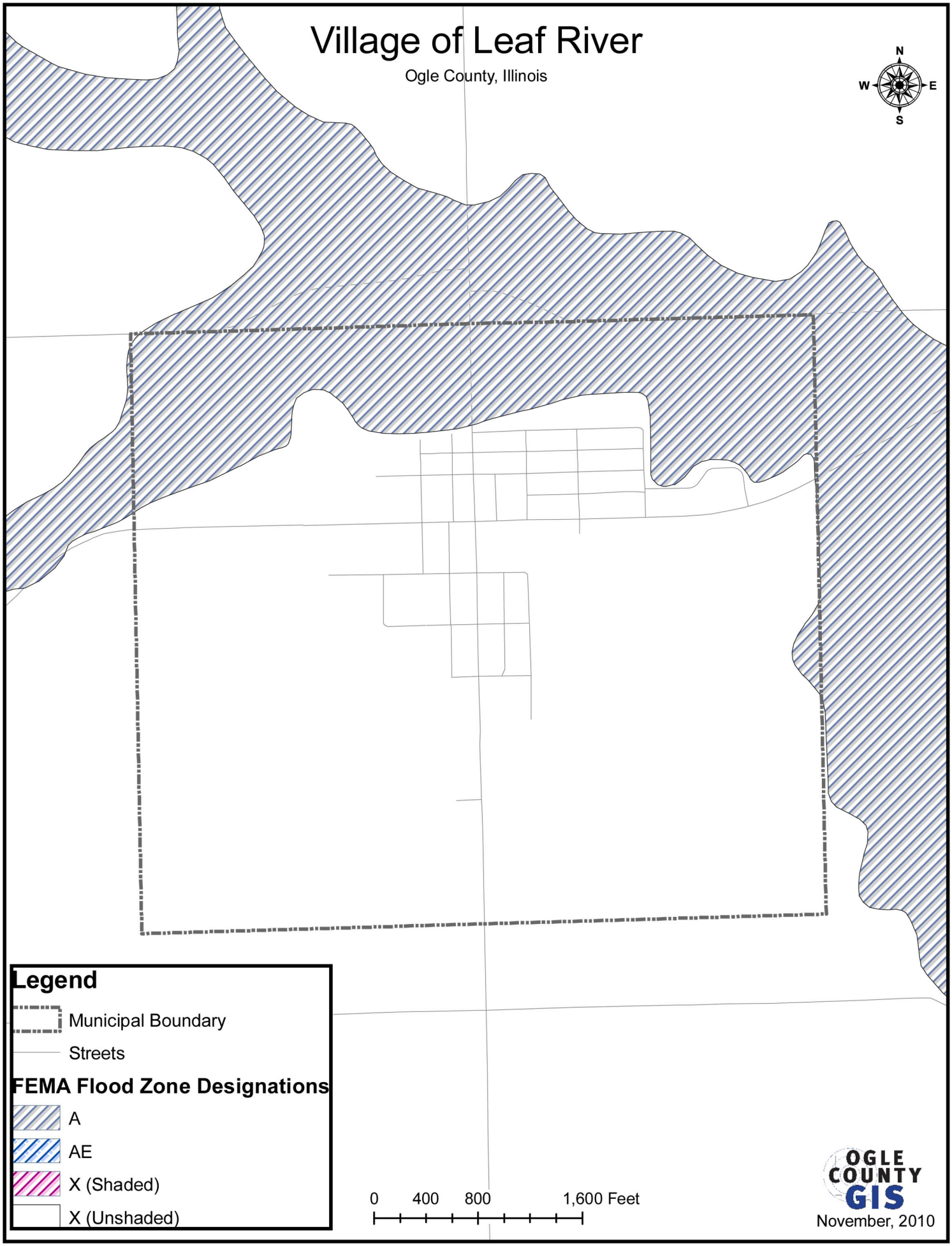
Appendix J


Village of Forreston
Ogle County, Illinois
N
W
E
S
Legend
Municipal Boundary
Streets
FEMA Flood Zone Designations
A
AE
X (Shaded)
X (Unshaded)
0
600
1,200
2,400 Feet
OGLE COUNTY GIS
November, 2010

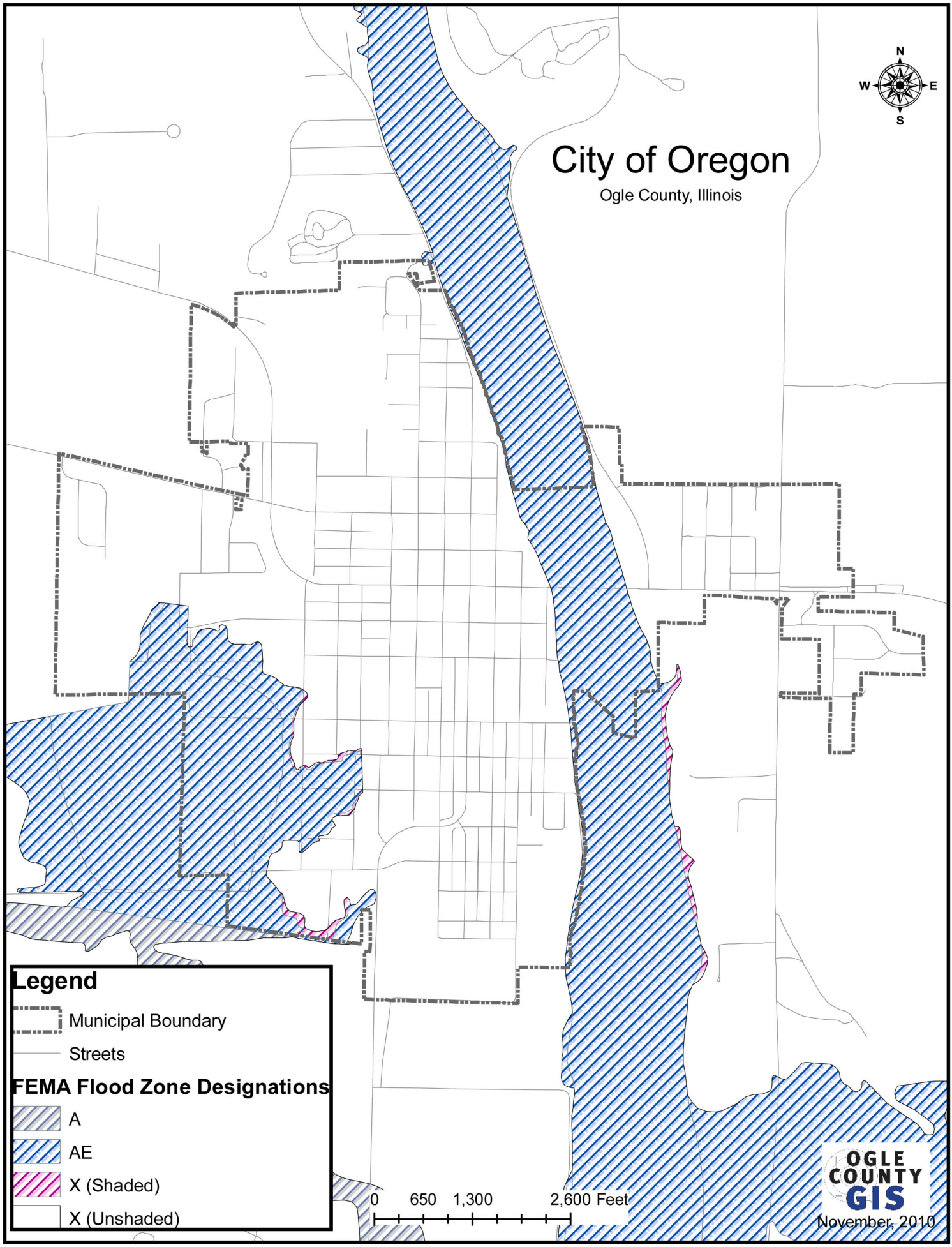
Appendix J


Village of Hillcrest
Ogle County, Illinois
N
W
E
S
Legend
Municipal Boundary
Streets
FEMA Flood Zone Designations
A
AE
X (Shaded)
X (Unshaded)
0
0.25
0.5
1 Mile
OGLE COUNTY GIS
November, 2010

Appendix J


Village of Leaf River
Ogle County, Illinois
N
W
E
S
Legend
Municipal Boundary
Streets
FEMA Flood Zone Designations
A
AE
X (Shaded)
X (Unshaded)
0 400 800 1,600 Feet
OGLE COUNTY GIS
November, 2010

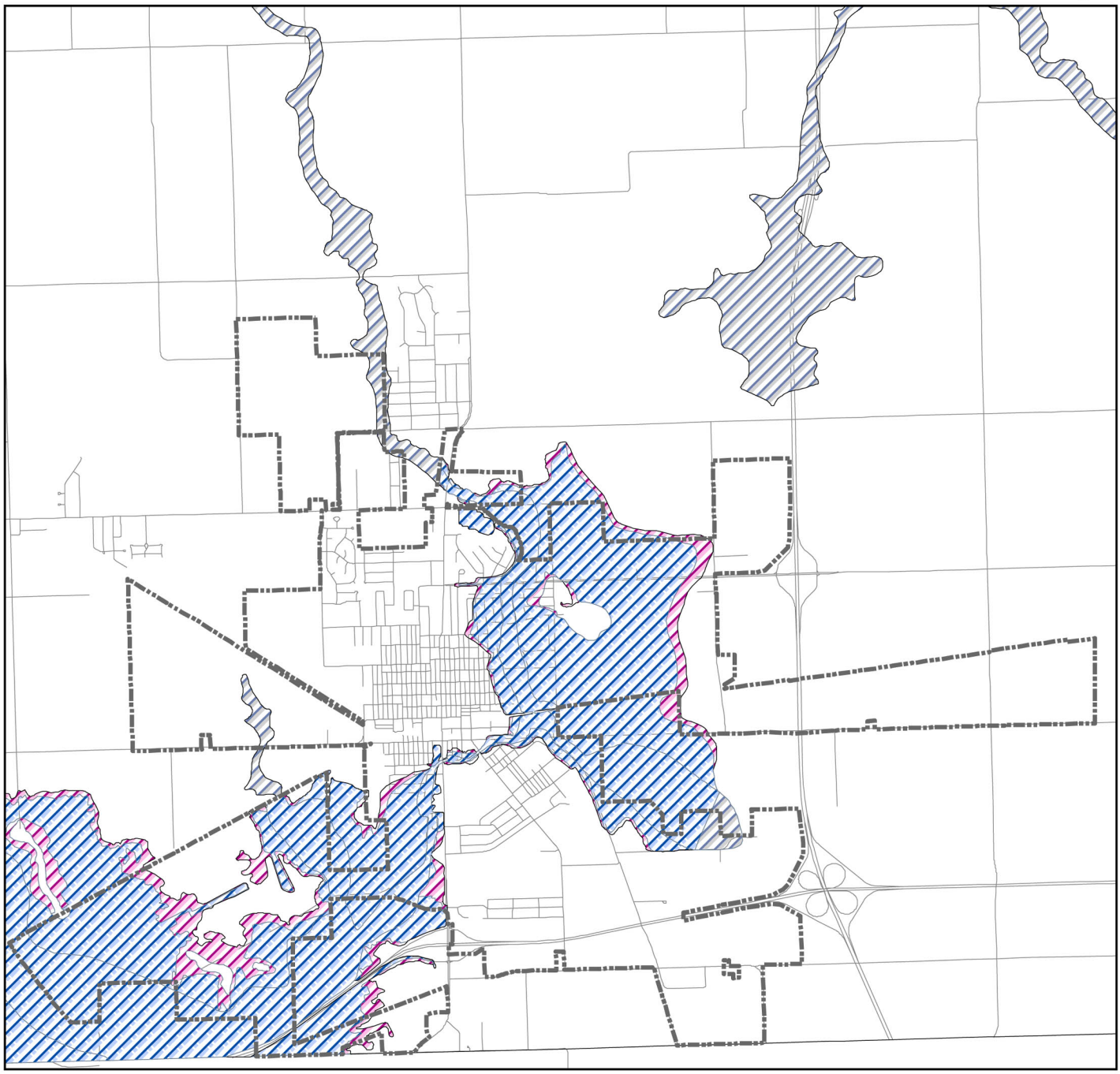
Appendix J


N
W
E
S
City of Oregon
Ogle County, Illinois
Legend
Municipal Boundary
Streets
FEMA Flood Zone Designations
A
AE
X (Shaded)
X (Unshaded)
0
650
1,300
2,600 Feet
OGLE COUNTY GIS
November, 2010

Appendix J

City of Rochelle

Ogle County, Illinois



Legend

- Municipal Boundary
- Streets

FEMA Flood Zone Designations

- A
- AE
- X (Shaded)
- X (Unshaded)

0 0.5 1 2 Miles

OGLE COUNTY GIS

November, 2010

APPENDIX K

Ogle County Press.

CYCLONE EXTRA.

POLO, ILLINOIS, MAY 21, 1898.

DEATH AND DESTRUCTION.

Two Cyclones Sweep Over Ogle County.

Wednesday, May 18th, will be long remembered in Ogle county, as the terrible tornado day. From the meager reports received in Thursday's papers this cyclone swept a path of destruction from Kansas across a corner of Missouri, through Iowa, into Northern Illinois and Wisconsin, spreading out like a fan when it crossed the Mississippi into Illinois. Two terrible paths were cut through Ogle county. The southern one entering the southern part of Buffalo and the northern wing crossing the Carroll county line into Forreston township about six miles north of Brookville, and nearly due west of Forreston. The first mentioned destroyer first struck Ogle county soil in the oat field of Lawrence Stull merely gathering dust and dirt, thence its course lay in a north easterly direction, across the old William Mason farm, tearing out the south part of the orchard. It next passed over Alfred Beck's in a north-eastern direction, going south of Dr. Maltby's striking G. W. Fahrney's, passing on just north of G. W. Garnharts and south of Gardners, through Charley Hays's thence through Wm. Coffman's thence north-east past Wm. Ambrose property, past David Price's, on south of Mt. Morris, through Wm. Watts' timber, past Benj. and John Fridley's, Andrew Gigous' and the houses of Lee Thomas and his mother, past Mud Creek school house, on north-east to Rock river three miles below Byron, where, near the river a young man named Reese was killed in a barn. The cyclone which swept near Mt. Carroll across Shannon, Forrefton and Maryland townships seemed to do no damage after leaving Adeline until it seemed to unite with the one which passed over Polo, near Stillman Valley.

THE SOUTH CYCLONE.

Some particulars of the storm near Polo are as follows: As near as can be ascertained, the tornado first struck the ground in the oat field of L. Stull, south and east of the Doty school house. It next swept through the south end of the orchard on the old Wm. Mason farm destroying trees. Next, it damaged the out buildings on the Alfred Beck (Mason) farm, due south of Polo. A number of the evergreen and other trees near the house were destroyed. Robert Keddie who resides just a little east of Beck's had a barn blown to pieces but his horses escaped, the barn just across the I. C. track was also destroyed. It next struck a big cottonwood tree on the Higley farm. In its north-east passage, it just touched with its outmost finger the roof of Dr. Maltby's barn, tearing off a patch of the shingles and sheeting two yards square.

DESTRUCTION AT FAHRNEY'S.

Next it swept over G. W. Fahrney's house and barn. Here for the first time in its course it manifested its terrific power. Fahrney's house and barn are near each other. The storm seemed to have lifted the house, crushed it, except the north side, and then to have dumped as much of it as possible into the cellar on the unfortunate family. Mr. and Mrs. F. and their children were in the cellar close the west wall, and they were cut and scratched by the broken material of all descriptions, which was piled in upon them. Fahrney says it seemed as if he had 500 pounds on his back but somehow, he and his family escaped, without serious bruises; a big cottonwood tree which stood a rod from the house, was lifted out of the ground by the roots, turned, twisted and thrown down several feet away and some large iron kettles were thrown into the hole. Three of his horses were killed and two severely injured. His cattle were all injured or killed. Thursday morning some one took two crotchet needles out of the back of one of his living cows. The barn and outbuildings were converted into kindling wood. Bert Powell had just passed west of Fahrneys with a load of lumber when seeing the destroyer coming, he left the team and struck out across the fields for safety. After the storm, his lumber and a part of his wagon and harness had disappeared. Just east of the house lies a large log of seasoned wood eight to ten inches in diameter. Through this log a short piece of fence board had been forced. The board is held as in a vice.

Trees, fences and out buildings, hedges, household furniture of all description, were crushed into an inextricable mass of ruins. And yet a part of the north side of the house and the floor of the second story were standing partly toppled over, and at the window hung the curtain apparently uninjured, and the carpet lay on the floor. The barn at the Gardner place, across the road to the north, was lifted bodily into the air, so that the family saw the corn cribs beyond, below it, then it careened and fell to the ground, bottom side up, the buggy lodging in the hay loft. A board was driven through the siding and plastering of the Gardner house.

A short distance east of Fahrney's is the residence of G. W. Garnhart. This house faces north and the yard between it and the road is full of trees, a number of which were twisted off like pipe stems, but the house was untouched. In the yard stands a good sized cottonwood, on the southwest and northeast of it stand the stumps of a pine and larch, that were twisted off, while the cottonwood was hardly touched. In the path of the tornado no fences remain. The east end of J. A. Powell's barn was torn out. The next man to suffer was Charley Hays, whose barn and out buildings were demolished. The chimneys were knocked off his house but no one was injured. Hays' loss was small compared with Fahrney's.

Leaving Hays' place the storm swept down on William Coffman's house, barn and outbuildings, and the refuse was scattered over several acres. Mr. Coffman, his wife and children took refuge in the cellar and escaped unhurt. The hired man, who was in the house was caught up with the building and carried with the fragments, perhaps two or three rods, when he was dropped uninjured. When the house started he said the carpet seemed to rise from the floor and wrap about him. He did not go to the cellar, because he had his money up stairs, and he was going for that when he took his ride in the air. Thursday morning he found the pants, in which his money was placed, under the ruins of the house, and recovered the money. At Coffman's the house and all it contained was moved away from the foundation, nothing dropping into the cellar. In a tree, near the house, the remnents of a bed tick were wrapped about the broken limbs. A piece of board was driven through the side of the iron water tank. Coffman lost horses, cows and hogs, in all numbering 18 or 20. Every building was completely torn to pieces and scattered.

After the storm left Coffman's it held to a northeasterly direction, until it struck Rock River, about two and a half miles below Byron. In its path it destroyed the barn on the William Ambrose farm and took out the south side of the house. Chas. Weller lost a barn. At David Price's it took the roof off the house and destroyed the barn. At the old Sam Price farm, outbuildings were destroyed. It mowed a swath 300 feet wide through William Watts' timber, for forty rods. Benjamin Fridley's house and barn were destroyed and one son had his leg broken. John Fridley's barn was destroyed, so was that of Andrew Gigous. Lee Thomas' house and his mother's house and barn were demolished. And thus the work of destruction went on. The Mud Creek school house and a barn, about 2½ miles south of Byron, was destroyed and in it was Richard Reese, who was killed. In the house were the family and Judge Frank Dresser, of Rochelle, who was there electioneering, all took refuge in the cellar and escaped.

THE NORTH CYCLONE.

This cyclone next struck near Stillman Valley, where it crossed the path of its more terrible twin which is traced from the county house, south of Mt. Carroll, up to the cemetery at Lanark, thence through Shannon, across just north of Forreston to Adeline, south of Leaf River and Byron to Stillman Valley, and on north of Davis Junction, scattering death and destruction all along its path. At Mt. Carroll it destroyed the county house, the inmates escaping death by taking refuge in the cellar. It destroyed S. J. Campbell's house and large barn, on the Hostetter farm, and demolished between five and ten acres of timber, scarcely a tree left standing. Geo. Snyder's house and barn was completely destroyed, all stock being killed.

About Lanark, the Gazette notes casualties, as follows: "C. Rowland's barn and outbuilding, trees, etc., were totally destroyed. At the cemetery it destroyed trees and nearly one-half of the monuments were overturned and broken. Henry Arnold's new house, barn and nine outbuildings were utterly ruined, as were also the house, barn and all outbuildings on George Taber's farm. Conrad Dampman's house and barn was destroyed and Mr. Dampman and a young woman were injured. Cal Putterbaugh's barn was wrecked and house injured. George Nichol's house and barn gone, ditto Alt Nichols'. Henry Peters lost all buildings, as did also Jacob Grossman. John Steinman's barn was demolished and house badly wrenched. At Manning's place the barn was totally wrecked and stock killed. And many others were more or less affected by the storm."

AT FORRESTON AND ADELINE.

This storm swept on east until three miles west of Forreston, where Mrs. Moss and three children were killed or died of injuries before morning. All the buildings on the Halsey farm, just north of Forreston, were swept away. The north road from Forreston to Adeline is said to be swept clean of buildings. The storm struck Adeline about 6:00 p. m., and the north end of the village is in ruins. Mr Shoemaker and J. Mullen were killed instantly and many others injured more or less seriously. The German Lutheran church was leveled to the ground and the Radical U. B. church is a ruin. The houses destroyed were those of the Harrison family, Shoemaker's, Mullen's, Rinehart's, Mrs. Hammond's house, occupied by Thos. Rinehart, Rummell's and perhaps others.

DEALS DEATH AT STILLMAN VALLEY.

The storm passed Leaf River and Byron and little or no damage was done, but at Stillman Valley it was terribly destructive. Five or six were killed and many injured. The dead are the Nelson family who did not go to the cellar.

Mrs. Mary J. Bly and her three children were lifted with the house fifty feet in the air, when the house was dropped, bottom up, on the foundation. Mrs. B. and her baby will probably die of their injuries. The Chicago & Great Western depot was unrooted, Eli Hoisington's milk depot and ice house were wrecked and the house occupied by E. S. Lindsay was destroyed but the family escaped by taking to the cellar. W. S. Hurd's house was blown off the foundation and barn demolished. The Baptist church was moved off the foundation and badly injured. The Nelson home was carried 20 rods over a hedge and crushed to pieces. The dead and living were found on top of the ruins. Mrs. Yarden's barn was destroyed, and the Swedish Mission church was crushed to attoms. Mrs. Dora Zink's house was demolished and blown away. Peter Holtquists was ruined, and Lovejoy Johnson's creamery was twisted off the foundation and badly wrecked. From Stillman Valley the storm veered to the north-east and continued with unabated fury. It passed between Davis Junction and New Milford and could be seen plainly from the latter place, where it excited the greatest terror.

The foregoing is doubtless very imperfect and possibly in some things, incorrect, it is certainly very incomplete, but it will serve to give something of an idea of the extent and severity of the cyclone as it crossed Ogle county.

APPENDIX L