Will County

County-Wide All Hazard Mitigation Plan

2013

Update of 2008 County-wide All Hazard Mitigation Plan

Developed by:

Will County All Hazard Mitigation Steering Committee

Based on 2008 Will County County-wide All Hazard Mitigation Plan by CTE | AECOM

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EXECUTIVE SUMMARY

The *Will County County-Wide All Hazard Mitigation Plan* is designed to meet the requirements of the Federal Disaster Mitigation Act of 2000 (DMA2K) and provide a useful document to reduce the impact of hazards county-wide. The plan will meet the Act's hazard mitigation planning regulations that require jurisdictions to have an adopted and Federal Emergency Management Agency (FEMA) approved Hazard Mitigation Plan to be eligible for mitigation grant funding. Although the DMA2K requires local governments to only address natural hazards, the Will County Emergency Management Agency thought it was imperative to address all hazards including technological and societal (including terrorism) hazards.

The 2013 update to the *Will County County-Wide All Hazard Mitigation Plan* provides a first step towards identifying strategies and actions to prepare the community for natural, technological, and societal hazards. To ensure the integration of the plan into existing emergency management operations and systems, the 2013 Will County Risk Assessment was updated and incorporated. The 2013 risk assessment consists of three documents:

- *Will County Hazard Analysis* dated November, 2013
- *Will County Terrorism Vulnerability Assessment* dated December, 2003
- *Will County Terrorism Vulnerability Assessment of Critical Infrastructur*e Results dated March, 2004

These documents are summarized within the mitigation plan and were a strong component in establishing the plan's goals and objectives as well as identifying specific actions outlined in this plan. Emergency Management agencies at all levels of government in Will County realize the inter-dependencies of mitigation with response, recovery, and preparedness functions. This plan identifies select response, recovery, and preparedness actions and identifies agencies responsible for these actions.

Purpose

Over the past two and half decades, the nation has witnessed an alarming increase in the number of and destruction from disasters. Destruction associated with disasters has created a significant increase in direct and indirect costs, as well as economic disruption and loss of life. The toll of a disaster on a community extends far beyond the physical damage, resulting in long term disruption of local and regional economies. The events of September 11th, 2001, underscored the importance in identifying emerging threats, while Hurricane Katrina demonstrated the importance of planning and inter-agency coordination for catastrophic disasters at a local level.

The intent of DMA2K is to control the cost of federal disaster assistance by initiating a sustained, national program for pre-disaster hazard mitigation planning. In order to be eligible for mitigation funding through FEMA's programs, communities must develop and adopt a hazard mitigation plan. This program enables participating communities to implement planned, cost-effective mitigation measures before and after an event.

The mitigation planning and hazard analysis simulation process in this plan identified and prioritized the steps and actions to mitigate the impact of all the various categories of hazards. This process identified gaps in existing documents and current operations and practices. The communities of Will County are familiar with the impacts of disasters and recognize that a disaster could occur with little or no warning. Planning for a sustainable, resilient, and prepared community is essential to reduce damages to homes, facilities, and infrastructure; prevent loss of life; minimize disruption of essential and critical services; and maintain continuity of the local economy and government operations.

Plan Review Tool

To ensure that the updated *Will County County-Wide All Hazard Mitigation Plan* meets the requirements of DMA2K, the Mitigation Project Team cross-referenced the All Hazard Mitigation Plan with FEMA's *Local Mitigation Plan Review Tool*. FEMA uses the tool to evaluate mitigation plans. In addition, the tool identifies where each plan element is located within the plan document. The tool can also be used as part of an internal quality assurance procedure.

Public Involvement

The broadened scope of an All Hazard Mitigation Plan did create challenges due to the sensitivity of some technological and societal hazards with regard to sharing sensitive information with the public. Today's society requires communities to control the distribution of sensitive and vital documents since the control of this information could minimize potential risks.

Despite the security issues, the Will County communities realize that public involvement is critical to the success of any strategic planning process, including hazard mitigation. It is important for hazard mitigation plans to target concerns, comments, and perception of risk as factors in the creation of mitigation strategies. To ensure consensus with the public, the Mitigation Project Team developed several mechanisms to secure sensitive information and to still reach out to the public to participate in the *Will County County-Wide All Hazard Mitigation Plan*. Public input was incorporated into the mitigation plan through various efforts including:

- Steering Committee - A Mitigation Steering Committee comprised of various professionals with local knowledge and expertise was organized. The Mitigation Steering Committee members are identified in Appendix E.

- Local Input - The Mitigation Steering Committee members met with local organizations and jurisdictions to update them on the progress of the project, as well as to solicit their participation and support of the All Hazard Mitigation Plan to identify potential mitigation projects. Information, comments, concerns, and ideas that would be incorporated into the plan were gathered during these meetings. A summary of these meetings is provided in Appendix E.

- Expert Guidance - The Mitigation Project Team, composed of CTE/AECOM and the Polis Center, held interviews to solicit input and guidance from experts in given fields and provide modeling of likely hazards. This information and guidance were included in the development of the plan. A summary of these interviews is provided in Appendices B and E.

- Workshops - The Hazard Mitigation Steering Committee held mitigation workshops to review and update the mitigation goals and objectives and to identify mitigation actions to be incorporated into the 2013 *Will County County-Wide All Hazard Mitigation Plan*. Invitations to attend this workshop were extended to local jurisdictions, various community organizations, and neighboring counties. A summary of meetings and workshops for the update of the plan are provided in Appendix E.

- Public Meetings - The Hazard Mitigation Steering Committee held a public meeting to inform the public of the All Hazard Mitigation Plan and the mitigation goals and objectives. The intent of this meeting was to provide a forum for the public to share their comments, concerns, and ideas that could be incorporated into the plan. An overview of the All Hazard Mitigation project and a questionnaire was distributed at this meeting, as well as posted on the Will County Emergency Management Agency (EMA) website. The questionnaire was developed to target the public's thought on what Will County's greatest risks are, what they have done to mitigate their home against disasters, and what they would do if a disaster strikes. Information on this public meeting is provided in Appendix E.

The Mitigation Team developed a public survey for the plan update to gauge the concerns of the public, as well as provide feedback to help guide the Committee in identifying potential mitigation actions. The questionnaire was developed to target the public's thoughts on what their and their community's greatest risks are, what they have done to mitigate at their home, and what they would do when a disaster strikes. This questionnaire was available through the Will County EMA website (http://www.willcountyema.org) and Facebook page along with jurisdictional websites. This allowed the public to communicate their concerns, comments, and ideas on what their community and/or Will County can do to mitigate hazards. A sample of the website and Facebook postings along with the results of the public survey are found in Appendix E.

The public was also given an opportunity to review the updated plan which was posted on the Will County EMA and jurisdictional websites along with the ability for the public to posts comments on a Survey Monkey link. The website posting can be found in Appendix E.

Mitigation Goals and Objectives

Through these efforts, All Hazard Mitigation Goals and Objectives were developed and updated. Goals define the expectations of the plan and serve as general guidelines. They are typically broad policy-type statements, long term, and represent global visions. Objectives are strategies or implementation steps to attain an identified goal. Unlike goals, objectives are specific and measurable. The goals and objectives were identified during the risk assessment and molded throughout the planning process, then finalized and updated during the Mitigation Workshops.

Goal #1: ***Protect and secure life and property.***

Objectives:

- *Increase public education and awareness of all hazards and what they can do to protect and secure their community.*
- *Implement effective approaches to protect neighborhoods, buildings, and critical facilities and infrastructure from all hazards.*
- *Nurture and support local and regional organizations that have missions that fulfill this goal.*
- *Increase capabilities to disseminate pre-event and post-event information*
- *Increase readiness of the public and all levels of government within Will County*

Goal #2: ***Continue to improve and enhance county-wide emergency management programs and develop relationships county-wide.***

Objectives:

- *Support and promote the integration of efficient emergency management and homeland security operations, functions, and tools with local, state, and federal governments, private industry, non-governmental organizations, community groups, and other emergency management partners.*
- *Identify essential government functions and develop back-up plans to ensure reliable services during a time of emergency.*
- *Leverage existing opportunities to upgrade aging equipment and infrastructure that are critical to emergency management.*
- *Encourage and support the professional development fields relevant to Emergency Management.*

Goal #3: ***Ensure economic stability, preserve cultural resources, and improve quality of life throughout Will County.***

Objectives:

- *Nurture and support strategic local and regional private/public partnerships to limit or minimize the impact from a disaster to key employers and from market sectors.*
- *Work with local universities, private/non-profit organizations, and other organizations to identify opportunities to implement mitigation.*
- *Promote and nurture mitigation actions that facilitate security to private and public sectors while leveraging available funding.*
- *Increase readiness of the private sector within Will County and promote private sector readiness within the region.*

Goal #4: ***Develop, promote, and integrate mitigation actions.***

Objectives:

- *Assist Will County and its participating jurisdictions in the development of mitigation proposals and identify sources of federal funding.*
- *Identify and facilitate mitigation opportunities pertinent to the locale with internal, neighboring, and regional partners.*
- *Assist essential and critical facilities (hospitals, universities, utilities, and eligible private/non-profits) to identify mitigation opportunities.*
- *Engrain mitigation strategies and actions into everyday planning and project development.*
- *Integrate mitigation projects with other federal funding sources (FEMA, DHS, US EPA, HUD, etc) and projects in order to maximize efficiency and program eligibility.*

Goal #5: ***Take advantage of opportunities offered by growth while also protecting natural systems and natural resources.***

Objectives:

- *Incorporate hazard mitigation practices into the activities of other County departments and Will County jurisdictions.*
- *Integrate mitigation actions into existing and future opportunities, projects, and developments.*
- *Focus on flood hazard mitigation actions that can increase open space and meet targets for natural environment sustainability.*

Planning Process

The *Will County County-Wide All Hazard Mitigation Plan* process involves four distinct phases that will enable communities to articulate their risks and identify and develop mitigation actions for all hazards. These phases are:

- Organize Resources
- Assess Risks
- Identify Mitigation Actions
- Implement the Mitigation Plan

Organize Resources

The vital component of this effort was to identify the Mitigation Steering Committee. The Mitigation Steering Committee acted as a point of contact for the various interested groups and provided support of the Mitigation Planning process. Identification of this core group is important in ensuring implementation and support of the Mitigation Plan. The following characteristics were considered when soliciting participation:

- Ability to speak for the organization;
- Provide visionary characteristics;
- Have a desire and time to commit, and;
- Have an understanding of local politics and issues.

Will County EMA chaired this committee and representatives from Will County departments provided strategic guidance and were active throughout the development of the hazard mitigation plan. Many of the Will County representatives were also members of local organizations that have relevance to the *Will County County-Wide All Hazard Mitigation Plan* and its update.

Risk Assessment

The County government recognized the importance of identifying and analyzing all of Will County's hazards; therefore, in 2013 Will County reviewed and updated the hazard risk analysis. The 2013 risk analysis consists of three documents:

- *Will County Hazard Analysis* dated November, 2013
- *Will County Terrorism Vulnerability Assessment* dated December, 2003
- *Will County Terrorism Vulnerability Assessment of Critical Infrastructure Results* dated March, 2004

These risk analysis documents were the fundamental building blocks of the *Will County County-Wide All Hazard Mitigation Plan*. As part of the hazard mitigation plan, these risk analyses were updated and summarized without detailing information that is sensitive to local security.

The assessment and analysis of the vulnerability to the County is a definitive measure of the risk associated with each individual hazard. The Risk Assessment describes, analyzes, and evaluates the risks facing Will County from three categories of hazards: Natural, Technological, and Societal.

The description of each hazard category elaborates upon and:

- Defines the different types of hazards
- Identifies historical events that have occurred locally and/or regionally
- Defines the hazard profiles, parameters, and characteristics
- Assesses possible vulnerabilities
- Determines probable scenarios
- Models select hazards

The technological and societal portions of the County-Wide Hazard Risk Assessment contain sensitive information and therefore are marked "FOR OFFICIAL USE ONLY - NOT FOR PUBLIC DISTRIBUTION". The risks include the following:

Natural Hazards	Technological Hazards	Societal Hazards
Tornado	Infrastructure Failure	Terrorist Attack
Winter/Ice Storm	Hazardous Materials – Fixed Site	Enemy Attack
Thunderstorm	Nuclear Power Plant Accident	Public Health
Flood	Pipelines	Civil Disturbance
Earthquake	Hazardous Materials –	
Drought	Transportation Accident	
Flash Flood	Non-Hazardous Materials	
High Temperatures	Transportation Accident	
	Fire	
	Dam Failure	
	Land Subsidence	

Mitigation Actions and Implementation

The updated Mitigation Action Plan identifies mitigation actions intended to reduce loss from future hazard events throughout the County. The mitigation strategies were developed from the risk assessment and the public participation process. Each mitigation strategy describes the problem or opportunity, how to implement it, funding sources, and responsible agencies. Mitigation strategies were defined and prioritized primarily through a formalized workshop with steering committee members and jurisdictional representatives. To support the mitigation actions identified, this plan also identifies select response, recovery, and preparedness actions that are related to the overall mitigation strategy.

The initial selection and prioritization of these strategies was drafted by the mitigation steering committee, using the following criteria to identify mitigation strategies and actions that:

- Address plan goals and objectives.
- Take advantage of opportunities presented by on-going or prospective initiatives, programs, and activities related to emergency management, public safety, homeland security.
- Are within the capabilities to execute the mitigation action.
- Offer a significant benefit to the community in relation to its cost.

- Have an identified funding source or sources.
- Have an identified lead agency with appropriate jurisdictional authority to coordinate implementation.
- Have an identified schedule for implementation.

A benefit/cost analysis is an important component in the hazard mitigation planning process. As the scope of mitigation actions are defined and costs are developed, the Mitigation Steering Committee will work with other departments and local jurisdictions to analyze these actions based on FEMA's benefit cost methodology. This analysis will assist in determining the actions necessary to effectively minimize costs and prevent damage from future hazards.

Implementation, Monitoring, and Maintenance

Will County EMA will maintain and update the 2013 *Will County County-Wide All Hazard Mitigation Plan* and continue to encourage participation by all communities in the County. The update of this plan will occur every five years as mandated by DMA2K with input from participating communities. The Will County Mitigation Steering Committee will gather each year to assess the status of the mitigation actions. Public input will continuously be solicited via the Will County EMA website as well as through local organizations and public-private partnerships.

CHAPTER 1: INTRODUCTION

Will County is one of the nation's fastest growing counties. It is all too familiar with natural disasters, the existing risk of technological hazards, and the growing threat of societal hazards. After decades of gradual change, urban sprawl is moving into the farmland areas. In the last twenty years, the population of the County increased by 320,000 (89% growth). This population was attracted to the County because of opportunities that developed due to the expansion of businesses and homes. Although many residents welcome this growth as a sign of prosperity and progress, it also results in increased traffic, greater demand on infrastructure, and a loss of open space. The most devastating impact can be one that is not realized each day, but when a disaster strikes.

WILL COUNTY FEDERAL DECLARATION HISTORY

Date	Declaration #	Incident Type
05/27/1961	115	Flood & Tornadoes
04/25/1965	194	Tornadoes, Severe Storms & Flooding
04/25/1967	DR-227	Tornado
06/10/1974	DR-438	Tornado & Flooding
01/16/1979	DR-3068	Snow
06/30/1981	DR-643	Flood
02/23/1985	DR-735	Severe Storm, Flooding & Ice Jams
08/29/1990	DR-878	Tornado
07/18/1996	DR-1129	Flood
01/01/1999	EM-3134	Snow
12/11/2000	EM-3161	Severe Winter Storm
09/11/2001		Simultaneous Terrorist Attacks
04/20/2004	DR-1513	Tornadoes
08/29/2005	EM-3230	Hurricane Katrina Evacuation
08/23/2007	DR-1729	Severe Storms & Flooding
09/13/2008	DR-1800	Severe Storms & Flooding
02/02/2011	DR-1960	Snow Storm
04/18/2013	DR-4116	Flood
11/17/2013	DR-4157	Tornado

Although disasters have occurred in the County, Will County and its jurisdictions have not experienced a catastrophic natural event, a terrorist attack, or an incident of national significance. Despite this, emergency management agencies throughout the County recognize that a disaster could occur in the future with little or no warning. The development of open space and farmland, increasing dependency on technology, and new developing threats greatly enhance the possibility and impact of a disaster. Planning for a sustainable, resilient, and prepared community is essential to prevent loss of life, disruption of essential and critical services, economic and business interruption, and damages to homes, facilities, and infrastructure. Most importantly, this plan will assist the communities of Will County in recognizing its vulnerabilities and preparing for future recovery efforts.

Over the past three decades, the nation has witnessed an alarming number of disasters incurring substantial destruction. Destruction associated with disasters has created a significant increase in direct and indirect costs, as well as economic disruption and loss of life.

The toll of a disaster on a community extends far beyond the physical damage, but can also result in the long term disruption of local and regional economies. As a result, Congress passed Public Law 106-390, The Disaster Mitigation Act of 2000 (DMA2K). The intent of DMA2K was to control federal costs of disaster assistance by initiating a national, sustained program for pre-disaster hazard mitigation. This program enables participating communities to implement planned, pre-identified, cost-effective mitigation measures before or after an event. In order to be eligible for mitigation funding through FEMA programs, communities must develop and adopt a hazard mitigation plan.

The *Will County County-Wide All Hazard Mitigation Plan* covers those jurisdictions that participated in the hazard mitigation planning process. Will County EMA is the local organization that provides emergency management services throughout Will County. Will County EMA applied for and received funding to develop the 2008 hazard mitigation plan and worked closely with local jurisdictions, municipalities and townships throughout the mitigation planning process and plan update.

Resolution of Adoption

This *Plan* serves to recommend mitigation measures for Will County. Adoption of this plan by the Will County Board and the participating communities initiates the implementation of these recommendations. Adoption is also a requirement for recognition of the plan by mitigation funding programs.

The adoption of this *Will County County-Wide All Hazard Mitigation Plan* was done by resolution of the County Board. A sample resolution of adoption is included as Appendix A of the plan. Resolutions of adoption by Will County and participating jurisdictions will become part of this plan as they are adopted. Through these resolutions of adoption, each jurisdiction will certify their agreement with the risk assessment and the mitigation goals, objectives, strategies, implementation, monitoring, and update schedule.

The municipal, fire protection districts, colleges, and other agencies' resolutions should adopt each action item that is pertinent to the community and assign a person responsible for it. Once the state and federal reviewers certify the plan approval, Will County will forward the plan to each participating jurisdiction for formal adoption. Copies of these resolutions will be held on file with the Will County EMA. With adoption, the County and each municipality, agency, or institution are individually eligible to apply for FEMA mitigation grant funding.

Planning Process Methods

The *Will County County-Wide All Hazard Mitigation Plan* process involves four distinct phases that will enable the communities within Will County to articulate their risks and identify and develop mitigation actions. These phases include:

- Organize Resources
- Assess Risks
- Identify Mitigation Actions
- Develop and Implement the Mitigation Plan

Organize Resources

Will County EMA served as the coordinating body for the planning process. They collaborated closely with the communities of Will County and local organizations. Furthermore, Will County EMA solicited participation from surrounding communities to be involved throughout the process.

The Will County Mitigation Steering Committee was actively involved in all of the stages of the planning process: hazard identification, risk assessment, mitigation strategy development, and mitigation action identification. Disasters often cross county boundaries; therefore, Will County solicited the participation of several jurisdictions that straddle the boundaries of the County to improve the opportunity to identify and implement regional mitigation actions. Several advantages of this relationship include:

- Collaboration allows for resource sharing between communities and neighboring counties.
- Issues that affect multiple jurisdictions can be discussed and leveraged together to show a greater benefit of a mitigation action.
- Reduced duplication of efforts.
- Establishment of relationships prior to an event occurring. These relationships are fundamental to emergency management activities during all phases: preparedness, response, recovery, and mitigation.

Many individuals and groups were crucial contributors to the creation of this plan. The following identifies them and their role in the process.

Will County Emergency Management Agency

Will County EMA works closely with all jurisdictional emergency management agencies throughout the County to provide emergency management services. Will County EMA applied for and received funding from IEMA and FEMA to develop the 2008 hazard mitigation plan. Will County EMA was the lead for the 2013 update of the original plan and chaired the Will County Mitigation Steering Committee. Will County EMA served as the coordinating body for the planning process and collaborated closely with other County departments, local jurisdictions, local organizations, and the public. Furthermore, Will County EMA solicited participation from the public and surrounding communities to be involved throughout the process.

Mitigation Project Team

The Mitigation Project Team consisted of a core team with mitigation and recovery experience, as well as Geographic Information Systems (GIS) analysis and Hazards U.S Multi-hazard (HAZUS-MH) modeling. The Mitigation Project Team was led by a Certified Emergency and Floodplain Manager and consisted of professionals with diverse backgrounds in emergency management, engineering, environmental sciences, and homeland security. GIS analysis and HAZUS-MH modeling were performed by the Polis Center (Polis), a not-for-profit, university-based organization with staff dedicated to researching and applying GIS technology.

Will County Mitigation Steering Committee

The Will County Mitigation Steering Committee was comprised of officials from various Will County departments that are actively involved with local organizations and are conduits to local jurisdictions:

- Will County EMA
- Will County Engineering and Transportation
- Will County Department of Planning
- Will County GIS

Participating Communities

The Mitigation Steering Committee solicited the participation of local jurisdictions throughout the mitigation planning process. County and local jurisdictions were invited to participate in the plan update process. This includes the thirty-seven municipalities that have all or some of their municipal limits within Will County. The municipalities that are predominantly within surrounding counties but whose municipal limits expand into Will County are denoted (*) in the following table.

The following thirty-seven municipalities were invited to participate by furnishing data, information, ideas, mitigation suggestions, and issues on the topics included within the development of this *Plan*:

City of Aurora *	Village of Homer Glen	Village of Plainfield
Village of Beecher	City of Joliet	Village of Rockdale
Village of Bolingbrook	Village of Lemont *	Village of Romeoville
Village of Braceville *	City of Lockport	Village of Sauk Village *
City of Braidwood	Village of Manhattan	Village of Shorewood
Village of Channahon	Village of Minooka *	Village of Steger *
Village of Coal City *	Village of Mokena	Village of Symerton
City of Crest Hill	Village of Monee	Village of Tinley Park *
Village of Crete	City of Naperville *	Village of University Park
Village of Diamond *	Village of New Lenox	City of Wilmington
Village of Elwood	Village of Orland Park *	Village of Woodridge *
Village of Frankfort	Village of Park Forest *	
Village of Godley *	Village of Peotone	

* Jurisdictions that border or have only a portion of their corporate limits in Will County and may choose not to adopt this *Plan*.

Jurisdictions participated in a variety of ways as outlined in the following table.

Jurisdiction participation was defined by the Mitigation Steering Committee during the planning process. Collectively, it was decided that each jurisdiction must meet one of the following criteria to be included within the plan.

- Provide representation during at least one planning meeting
- Submit an inventory of plans, data, and reports relevant to hazard mitigation planning
- Review and complete the Hazard Mitigation Action form
- Identify and delineate natural, technological, and societal hazards throughout Will County
- Identify critical “at risk” structures and facilities
- Develop community wide mitigation goals
- Submit techniques to plan for, reduce, and manage expected losses
- Provide technical and financial assistance and incentives to facilitate loss reduction projects
- Review and comment on the draft plan
- Incorporate the plan into existing planning efforts
- Formally adopt the plan
- Participate in plan maintenance through yearly reviews and five year updates

The municipalities listed above along with County and other stakeholders were invited to three Mitigation Plan Update Workshops. After each workshop, all jurisdictions were provided by email workshop materials and suggested updates collected during the workshop for review. Those who were not able to attend a workshop were encouraged to provide their comments and questions. Not all of the jurisdictions were able to attend the workshops, but of those that did, many submitted comments on the workshop results by email, telephone, or contact with Mitigation Steering Committee members. Those jurisdictions that did not attend any workshop or respond to workshop follow-up emails were contacted numerous times by telephone, email, and face-to-face at other meetings. The importance of the mitigation plan update and their participation was stressed in these contacts. Most of the jurisdictions whose municipal limits are within Will County that did not respond are small communities that only have part-time or volunteer staff.

A number of jurisdictions whose municipal limits are predominantly outside of Will County participated in the development of the plan update. Those jurisdictions that did not are involved with the Hazard Mitigation Plan of their respective county. These jurisdictions were aware of Will County's progress in updating the plan and indicated they were following the progress through the email updates.

Representatives from jurisdictions within and outside Will County who met the participation requirement by participating in meetings, document review, and information gathering are identified in the following table. Additional information on jurisdictional participation may be found in Appendix E (see E-9).

WILL COUNTY ALL HAZARD MITIGATION PLAN – 2013 UPDATE COUNTY & COMMUNITY PLANNING REPRESENTATIVES		
Community	**Representative**	**Title**
Beecher	Robert Barber	Village Administrator
	Greg Szymanski	Village President, Village of Beecher
	Donna Rooney	Water Billing Technician, Village of Beecher
	Jeff Weissgerber	Chief, Beecher Police Department
Bolingbrook	Troy Kirch	Bolingbrook Emergency Services
Braidwood	Aubrey Glisson	Coordinator, Braidwood EMA
Channahon	Joe Pena	Village Administrator, Village of Channahon
	Lupe Olvera	Coordinator, Channahon EMA
Coal City*	Matt Fritz	Village Administrator, Village of Coal City
	Georgette Vota	Trustee, Village of Coal City
Crest Hill	Bradley Hertzmann	Deputy Chief of Police
	John Tomasoski	City Administrator
	Heather McGuire	City Attorney
* *Neighboring Jurisdiction Partner*		

WILL COUNTY ALL HAZARD MITIGATION PLAN – 2013 UPDATE COUNTY & COMMUNITY PLANNING REPRESENTATIVES		
Crete	Marty Braccio	Director, Crete EMA
	Thomas Durkin	Village Administrator
Diamond*	Teresa Kernc	Mayor, Village of Diamond
	Dean Johnson	Commissioner, Village of Diamond
	Dana Grunwald	Village Clerk, Village of Diamond
Frankfort	Adam Nielsen	Development Coordinator, Village of Frankfort
Homer Glen	John Robinson	Coordinator, Homer Glen EMA
Joliet	Joe Formhals	Fire Chief, Joliet Fire Department
	Greg Sebben	Director, Joliet EMA
	Ray Randich	Deputy Fire Chief, Joliet Fire Department
	James Haller	Director, City of Joliet Community & Economic Development
	Kendall Jackson	Director, Planning Division Community & Economic Development
	James Trizna	Director, Public Works
Lockport	Edward Stobba	Lockport EMA
	Dave Dornan	Lockport EMA
	Grant Spooner	Lockport EMA
Manhattan	Joel Werner	Deputy Chief, Manhattan EMA
	Terry Doyle	Chief, Manhattan, EMA
Monee	Ruben Bautista	Community Services Director, Monee EMA
New Lenox	Daniel Martin	Chief, New Lenox Public Safety Division
	Mike Potocki	Director, Emergency Services & Disaster Agency
	Bill Potocki	Deputy Chief, Emergency Services & Disaster Agency
Orland Park*	Ron Kus	Orland Park Police Department
Park Forest*	Steven Bobzin	Coordinator, Park Forest EMA
	Bruce Ziegle	Chief, Park Forest Fire Department
	Tracy Natyshok	Deputy Chief, Park Forest Fire Department
Peotone	Bill Mort	Chief, Peotone Police Department
Plainfield	Ken Ruggles	Commander, Plainfield Police & Emergency Management
	Roger Bonuchi	Captain, Plainfield Emergency Management
Romeoville	Mike Littrell	Coordinator, Romeoville EMA
	Kent Adams	Chief, Romeoville Fire
	Mark Turvey	Chief, Romeoville Police
	Steve Gulden	Village Manager, Village of Romeoville
Shorewood	Aaron Klima	Director, Shorewood EMA / Chief, Shorewood Police
Steger*	Tom Johnston	Chief, Steger EMA
* *Neighboring Jurisdiction Partner*		

WILL COUNTY ALL HAZARD MITIGATION PLAN – 2013 UPDATE COUNTY & COMMUNITY PLANNING REPRESENTATIVES		
University Park	Brian Chellios	Deputy Chief, University Park Fire Department
	Chuck Exner	Chief, University Park Fire Department
	Lafayette Linear	Village Manager
	Ross Burgess	Director, Department of Public Works
Wilmington	Dennis Houseman	Director, Wilmington ESDA
	Tony Graff	City Administrator
Will County	Harold Damron	Director, Will County EMA
	Brenda Lutz	Deputy Director – Preparedness, Will County EMA
	Derek O'Sullivan	Asst. Director, Will County Stormwater Management Planning Committee
	Rebecca Colwell	GIS Specialist, Will County
	Jackie Mansholt	Emergency Response Coordinator, Will County Health Dept.
	John Cicero	Director, Will County Health Department
	Elizabeth Bilotta	Director, Environmental Health Division – Will County Health Dept.
	Alison Anderson	Emergency Response Specialist, Will County Health Dept.
	Jayne Ballun	Emergency Preparedness Planning Consultant
* *Neighboring Jurisdiction Partner*		

Many of these jurisdictions helped to solicit public participation by posting links to the public survey and draft plan update on their websites and through social media.

In addition to the local municipality participation, the Will County Stormwater Management Planning Committee was involved throughout the mitigation planning process. The Will County Stormwater Management Planning Committee is comprised of municipal representatives that promote and support stormwater management practices. A representative of the Will County Stormwater Management Planning Committee was part of the plan update team to assist in the mitigation planning process, review and draft mitigation goals and objectives, and act as a subject matter expert with regards to natural hazards and land use issues.

Agency and Authority Meetings

Will County EMA and the Mitigation Project Team met with a variety of County departments, jurisdictions, and local organizations to obtain a strong understanding of their facilities and operations, risks, existing programs and projects, and opportunities to implement mitigation actions. A summary and explanation of these meetings is provided in Appendix E.

Expertise Interviews

The Mitigation Project Team interviewed and solicited input from a variety of experts in the field of engineering, natural hazards, technological hazards, terrorism, etc. A summary and explanation of these meetings is provided in Appendix E.

Public Involvement

The broad scope of the *Will County County-Wide All Hazard Mitigation Plan* did create challenges due to the nature of technological and societal hazards and the ability to share sensitive information with the public. Today's society prohibits openly sharing vital documents and information since this information could identify potential vulnerabilities. Despite the security issues, the Mitigation Team developed several mechanisms to secure sensitive information and still reach out to the public to participate in the *Will County County-Wide All Hazard Mitigation Plan*. Public input was incorporated into the plan through various efforts.

- A Mitigation Steering Committee comprised of various professionals with local knowledge and expertise was organized. The Mitigation Steering Committee members are identified in Appendix E.
- The Mitigation Project Team held meetings with various governing entities and jurisdictions to understand their risks and to gather information, as well as comments, concerns, and ideas that would be incorporated into the plan. Those attending included various professionals in emergency services, engineering and planning; local jurisdictions; County departments; and community organizations. A summary of these meetings is provided in Appendix E.
- The Mitigation Project Team held interviews to solicit input and guidance from experts in given fields. This information and guidance was included in the development of the plan. A summary of these interviews is provided in Appendix E.
- The Hazard Mitigation Steering Committee held workshops to review and define the mitigation goals and objectives and to review and identify mitigation actions to be incorporated into the *Will County County-Wide All Hazard Mitigation Plan*. Invitations were extended to various

community organizations to attend this workshop. A copy of the Hazard Mitigation Action form that was distributed is provided in Appendix D.

- Will County EMA held a public meeting to allow the public to participate in the 2008 *Will County County-Wide All Hazard Mitigation Plan*. This public meeting enabled the community to learn about the hazards and the mitigation planning process. It also allowed them to communicate their concerns, comments, and ideas on what their community and/or Will County can do to mitigate all hazards. A copy of the public notice is provided in Appendix E.
- Will County EMA posted an overview of the County-Wide All Hazard Mitigation project and a public survey on the Will County and jurisdictional websites. The questionnaire was developed to target the public's thoughts on what their and their community's greatest risk is, what they have done to mitigate at their home, and what they would do when a disaster strikes. A copy of the survey and results is provided in Appendix E.
- A draft of the 2013 *Will County County-Wide All Hazard Mitigation Plan* was posted on the Will County EMA and jurisdictional websites for public review and comment.

Resources

The Will County Planning Committee utilized a variety of planning documents and technical data, reports and studies to direct the plans development. Resources include land use plans, comprehensive plans, city ordinances, building codes, zoning ordinances, historical research documents, subject-specific text books, interviews with local officials, interviews with regional experts, local planning, engineering, GIS data, and emergency management documents. The planning process also incorporated the existing *2008 Will County Hazard Mitigation Plan* and elements of the *2010 and 2013 State Hazard Mitigation* plan into the creation of this update along with a variety of FEMA reference documents. When applicable, the Project Team utilized HAZUS-MH. HAZUS-MH is a GIS based loss estimation model developed by FEMA. HAZUS-MH was used to model the county-wide impacts of historical earthquakes and flooding events.

REFERENCE AND INFORMATION SOURCES	
AT&T	Information and data on area communication systems
Centers for Disease Control and Prevention	Information, data, charts/graphs, and loss history on public health risks
City of Redmond Office of Emergency Management	Hazard Identification Vulnerability Analysis (HIVA) 2001
Climatology for Chicago O'Hare IL	Area climate information
Commonwealth Edison	Information and data on energy systems
Exelon Corporation	Information on nuclear power plants and their function
Federal Emergency Management Agency	Guides, plans, data, charts/graphs, authorities, hazard information, and other emergency planning information
GEOMET Technologies, Inc	Maryland Hazard Analysis
HAZUS	Hazard modeling
International Code Council	Jurisdictional adoption of International Codes
Illinois Department of Natural Resources	Information, data, charts/graphs on rivers, dams, levees
Illinois Emergency Management Agency	Planning guides, state and local mitigation plans, data, charts/graphs, hazard information, and descriptions of Federal and State roles
Illinois State Geological Survey	Information, data, charts/graphs on earthquakes
Illinois State Water Survey	Information data, charts/graphs on climate
Joliet/Will County Center for Economic Development	Information, data, charts/graphs on county economics
Landesman, L.	Public Health Management of Disaster (2001). Washington, D.C.: American Public Health Association.
Michigan Department of State Police.	Planning guides Michigan Hazard Analysis and Mitigation Plan
National Climatic Data Center	Information, data, and loss history on natural hazards
National Flood Insurance Program	Information, data, and loss history on floods
National Inventory of Dams	Information and data on county dams

REFERENCE AND INFORMATION SOURCES	
National Oceanic and Atmospheric Administration	Information, data, charts/graphs on weather
National Transportation Safety Board	Information, data, and loss history on transportation hazards
National Weather Service Forecast Office	Information, data, charts/graphs on weather events
Nicor Gas	Information and data on energy sources
Northeastern Illinois Planning Commission	Regional planning information
Office of Pipeline Safety	Information, data, charts/graphs, loss history on pipeline hazards
Pipeline and Hazardous Materials Safety Administration	Information, data, charts/graphs, loss history on pipeline and transportation hazards
The Polis Center at IUPUI	Hazard modeling
State Climatologist Office for Illinois	Information, data, charts/graphs, loss history on weather
U.S. Army Corps of Engineers	Information, data, charts/graphs, loss history on dams/levees
U.S. Census Bureau	Population data and characteristics (2010)
U.S. Department of Agriculture	Information, data, and charts/graphs
U.S. Department of Transportation	Information, data, charts/graphs, loss history on transportation hazards
U.S. Environmental Protection Agency	Information and data on environmental issues
U.S. Geological Survey	Information, data, charts/graphs, loss history on earthquakes
Will County Government	Plans, authorities, data, maps, and descriptions of county government roles
World Health Organization	Information, data, and charts/graphs on public health hazards

Identify Hazards and Assess Risk

The Mitigation Project Team recognizes that the assessment and analysis of the vulnerability is a definitive measure of the risk associated with each individual hazard. The All Hazard Risk Assessment summarizes the 2013 *Will County Hazard Analysis* and further describes, analyzes, and assesses the county-wide risks from three categories of hazards: natural, technological, and societal. The description of each hazard category elaborates upon and defines the different types of hazards, identifies historical events that have occurred locally and/or regionally, defines the hazard profiles, parameters, and characteristics; assesses possible vulnerabilities; determines probable scenarios; and models select hazards. The associated risks for each hazard were defined through the following process:

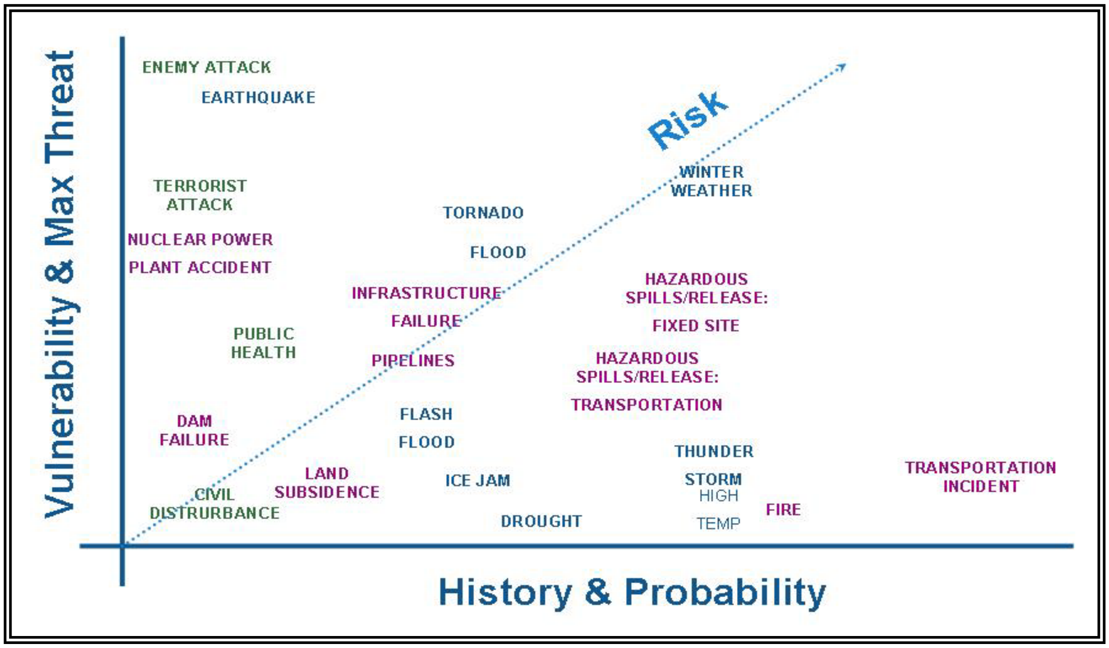
1. Identify, define, and describe each hazard
2. Determine hazard profile and characteristics
3. Identify historical occurrences
4. Analyze and assess hazard risk

In order to effectively and efficiently integrate existing documents and operations, the 2013 *Will County Hazard Analysis* was incorporated into the *Will County County-Wide All Hazard Mitigation Plan*. This allowed Will County to identify mitigation objectives, strategies, and actions that address all of Will County's risks. The *Will County Terrorism Vulnerability Assessment* and the *Terrorism Vulnerability Assessment of Critical Infrastructure Results* were not referenced in this document due to the sensitive information that is contained in these reports.

The 2013 *Will County Hazard Analysis* utilized a formal, structured procedure to develop mitigation and emergency operation plans. FEMA has developed a process for assessing and evaluating hazards. Will County utilized this process for assessing and evaluating hazards in order to promote a common base for completing the analysis by defining criteria and providing a scoring system. Four criteria were used to describe and assess the potential hazards, the four criteria include:

- History – past record of occurrences of the specified hazard. It is a guide of what has occurred in the past but is not a guarantee of what may occur in the future.
- Vulnerability – pertains to the people that might be killed, injured, or contaminated and to property that might be destroyed, damaged, or contaminated due to the occurrences of a specified hazard.
- Maximum Threat – consists of the impacts from a 'worst case' scenario of a specified hazard and is where the greatest impact to people and property is expected and assessed.
- Probability – refers to the likelihood of the occurrence of a specified hazard. It is expressed as the number of chances per year that an event of a specific intensity will occur.

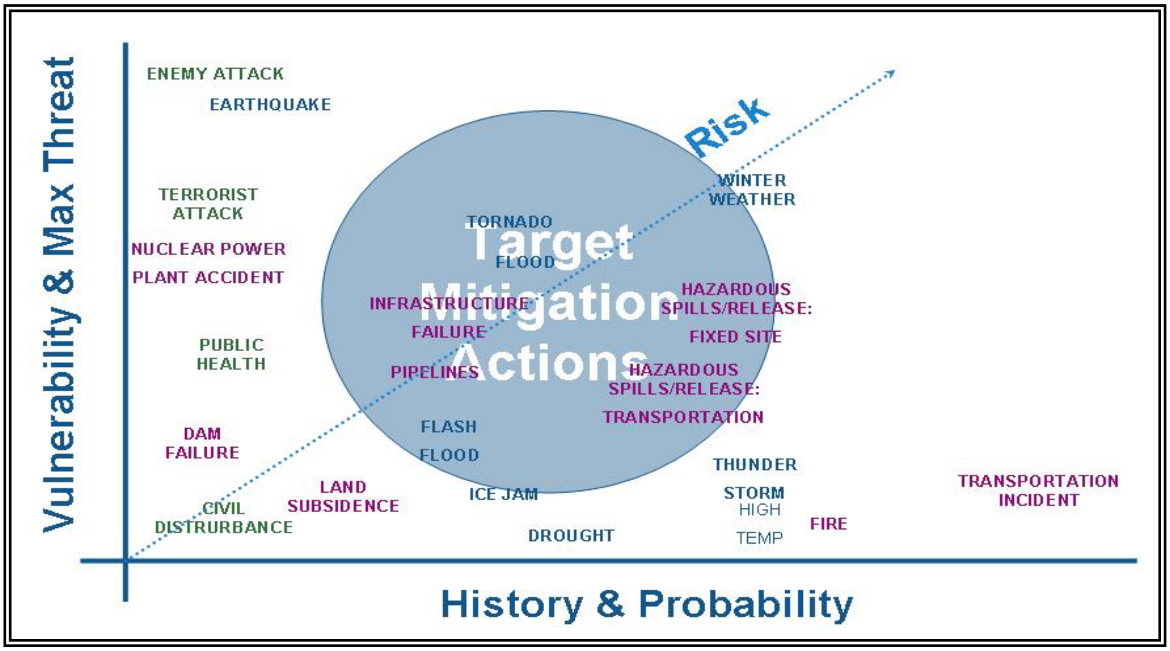
To complement the 2013 Risk Analysis, the methods employed by the Illinois Emergency Management Agency (IEMA) and FEMA were incorporated to provide consistency between all levels of government. The following graph illustrates the risk analysis based on the probability/history of the event and the vulnerability/maximum threat (or impact) of the hazard.



Identify Mitigation Goals, Objectives, and Actions

The Mitigation Goals, Objectives, and Actions address the intent of this document and the actions to reduce loss from future hazard events throughout the County. Mitigation strategies were reviewed, defined, and prioritized primarily through Mitigation Workshops with committee members and participating jurisdictions. The Mitigation Workshop participants were encouraged to identify mitigation strategies that had an all hazards impact or targeted the community's greatest risks. Potential strategies were developed using criteria developed by FEMA. These evaluation criteria consist of public support, technical feasibility, staffing, funding, maintenance requirements, political support, legal authority, and cost effectiveness.

The mitigation plan identifies mitigation actions and implementation strategies. The mitigation actions and strategies were developed from the risk assessment and the public participation process. The mitigation actions were prioritized by those hazards that have the greatest risk (i.e. significant probability of occurring and a significant impact). The Mitigation Steering Committee was encouraged to not limit their focus of mitigation actions to these hazards. The following graph illustrates the relationship.



Each mitigation strategy describes the opportunity, how to implement it, funding sources, and responsible agencies.

Problem/Opportunity:	This describes either a problem or a possible opportunity to reduce risk.
Implementation Strategy:	Each mitigation strategy includes ideas to implement and accomplish the specific project and potential resources, which may include grant programs or human resources.
Lead Agency:	This is the agency or agencies that will organize resources, find appropriate funding, or oversee project implementation, monitoring and evaluation.
Funding:	This offers suggestions on potential financial resources for implementing the mitigation strategy. This includes funding from government agencies as well as various different types of grants.
Timeline:	This estimates the amount of time it will take to begin implementation of each strategy.

Mitigation Plan Development

The *Will County County-Wide All Hazard Mitigation Plan* documents the mitigation planning process and addresses the elements required in 44 CFR Part 201.6(c). Although the DMA2K requires local governments to only address natural hazards, Will County EMA thought it was imperative to address all hazards, including technological and societal (which includes terrorism) hazards. Will County EMA also recognizes the importance of integrating mitigation with other state and federal directives.

Plan Monitoring and Maintenance

The Mitigation Steering Committee, with support of participating jurisdictions, will review the plan annually or within 45 days of any disaster event. They will regularly review each goal and objective to determine its relevance to the changing situation throughout Will County. They will also monitor and evaluate the mitigation strategies in this plan to ensure that the document reflects current hazard analyses, development trends, code changes, and risk analyses and perceptions. The committee will hear progress reports from the parties responsible for the various implementation actions to monitor progress and create future action plans and mitigation strategies. They will review the plan when other plans are being updated, such as capital improvement project plans and comprehensive plan updates to ensure consistency.

The participating jurisdictions and Will County recognize the importance of effectively communicating with the public about the community's hazards and what they can do to be prepared and mitigate their threats. Continued public involvement is an important part of implementing, monitoring, and maintaining the *Will County County-Wide All Hazard Mitigation Plan*. Will County EMA has provided a forum to educate the public and solicit input, in order to effectively involve residents in the update and review of the plan, as members of the Planning Committee.

Will County EMA, with active participation of County departments, local jurisdictions, and organizations, will maintain and update the *Will County County-Wide All Hazard Mitigation Plan*. The update of this plan will occur every five years as mandated by DMA2K. The Hazard Mitigation Steering Committee will continue to solicit additional members and gather each year to assess the status of the mitigation actions. Public input will be solicited throughout the year through a variety of methods that include public meetings, website postings, and other means to provide a conduit to the community.

FEMA Mitigation Plan Review Tool

The *Will County County-Wide All Hazard Mitigation Plan* is designed to meet the requirements of DMA2K, while also developing a useable document to identify opportunities to alleviate the impact and/or consequence of hazards on all of the communities of Will County. To ensure that the plan meets the requirements of DMA2K, the Mitigation Project Team cross-referenced the All Hazard Mitigation Plan with FEMA's *Local Mitigation Plan Review Tool*. FEMA uses this tool to evaluate mitigation plans. In addition, the tool identifies where each plan element is located within the plan document. The review tool can also be used as part of an internal quality assurance procedure.

CHAPTER 2: WILL COUNTY COMMUNITY OVERVIEW

A community overview is presented to provide background information in order to put the risk assessment into perspective. The community overview also aids in the evaluation of proposed mitigation measures. To ensure the integration of the *Will County County-Wide All Hazard Mitigation Plan* with other County, jurisdictional, and emergency management planning documents, portions of this section originating from the *Will County Hazard Analysis*, were updated with recent changes within Will County and the participating jurisdictions and supplemented with information on hazard mitigation planning.

Historical Overview

The Will County area was inhabited over time by various native American Indian tribes as far back as 3,000 to 4,000 years ago. People were drawn to the area for its abundance of resources and accessibility to other parts of the country. A rich supply of hunting game, timber, fertile soil, and water sources met the needs of the early inhabitants and the old Sauk Trail along with the Des Plaines, DuPage, and Kankakee Rivers afforded routes for travel. The County was formed in 1836 from Cook and Iroquois Counties.

The County's name honors Dr. Conrad Will who was a member of the first Constitutional Convention and the Illinois Legislature until his death in 1835. Will County included an area north of the Kankakee River, now part of Kankakee County, but its present boundaries have remained as established in 1852. It was originally divided into ten election districts and seventeen road districts and now consists of twenty-four townships.

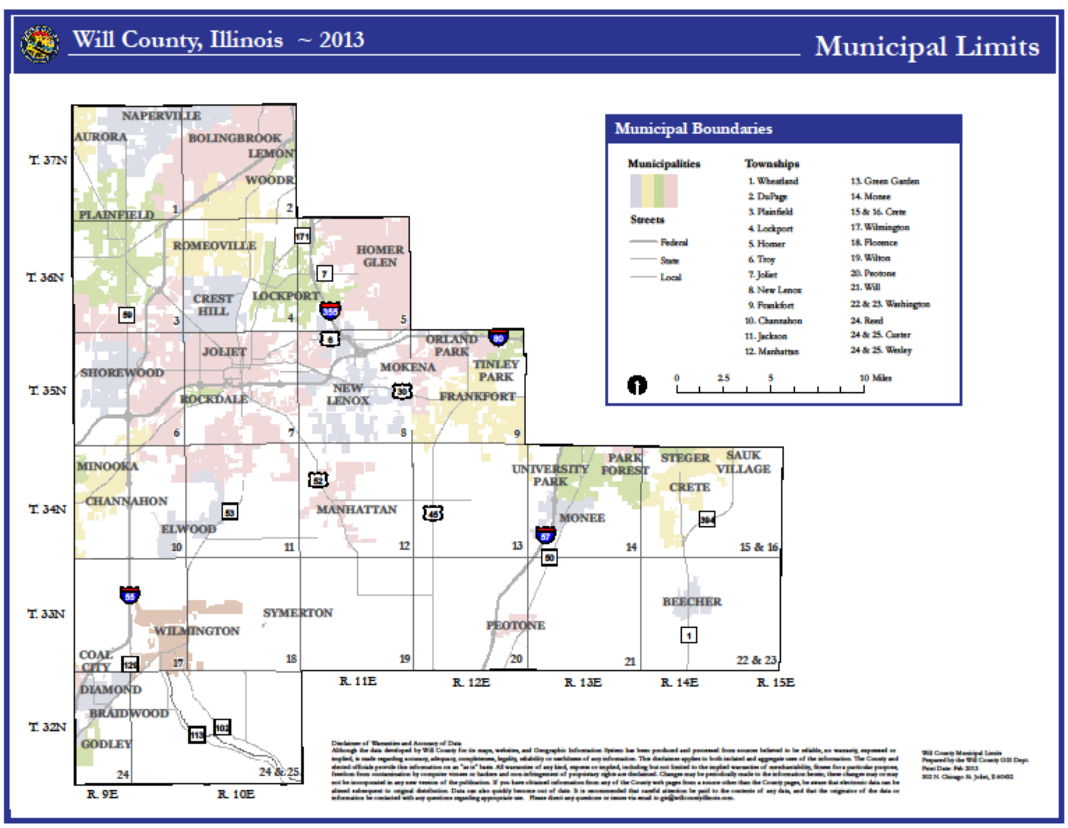
Will County Municipalities

Will County consists of 37 municipalities that range from small farmland communities to large suburban cities. Several of these municipalities cross Will County's jurisdictional boundaries into neighboring counties.

Will County's Municipalities:

City of Aurora*
Village of Beecher
Village of Bolingbrook
Village of Braceville*
City of Braidwood
Village of Channahon
Village of Coal City*
City of Crest Hill
Village of Crete
Village of Diamond*
Village of Elwood
Village of Frankfort
Village of Godley*
Village of Homer Glen
City of Joliet
Village of Lemont*
City of Lockport
Village of Manhattan
Village of Minooka*
Village of Mokena
Village of Monee
City of Naperville*
Village of New Lenox
Village of Orland Park*
Village of Park Forest*
Village of Peotone
Village of Plainfield
Village of Rockdale
Village of Romeoville
Village of Sauk Village*
Village of Shorewood
Village of Steger*
Village of Symerton
Village of Tinley Park
Village of University Park*
City of Wilmington
Village of Woodridge*

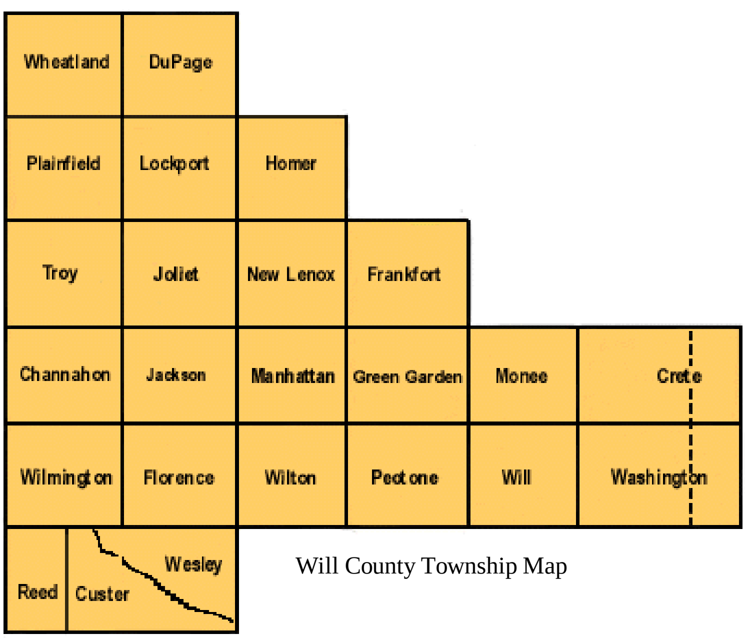
* Jurisdictions that border or have only a portion of their corporate limits within Will County



Geography and Climate

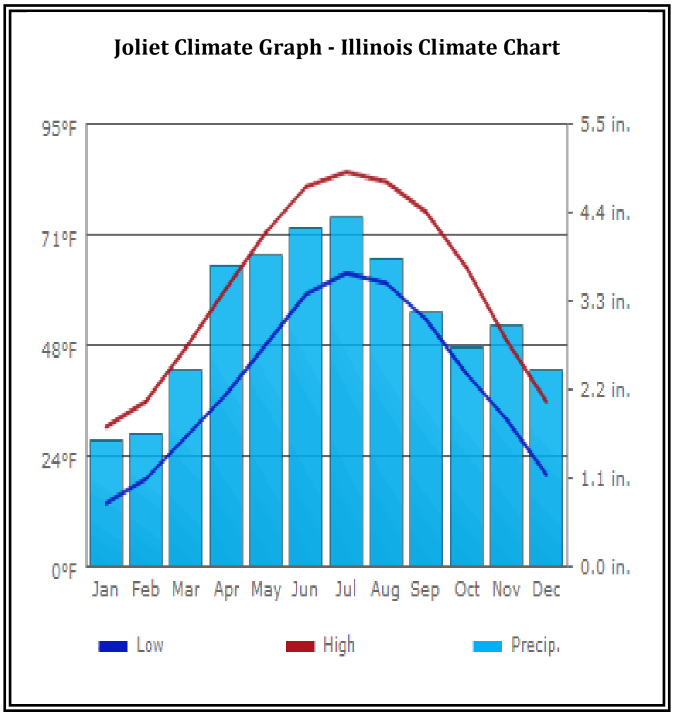
Will County, covering an area of 846 square miles, is one of Illinois' 102 counties. The County is part of the Chicago Metropolitan area, located in northeastern Illinois. Joliet, the county seat, is located approximately forty miles southwest of Chicago at an altitude of approximately 600 feet above sea level. The continental glaciers that covered Illinois thousands of years ago created the relatively flat terrain. As the Wisconsonian, the last glacier in Illinois, retreated and melted, the lakes and rivers that were important to the County's early inhabitants were formed. Today, water transportation remains important for the shipment of goods as the County's three main rivers: Des Plaines, DuPage, and Kankakee. These rivers run along the Chicago Sanitary and Ship Canal and Illinois and Michigan (I&M) Canal and provide a connection between the Great Lakes and Gulf of Mexico.

After glaciation, prairies formed over most of Illinois. The morainal and Grand Prairie sections predominated in Will County. The windblown silt deposited during glacial retreat and prairie vegetation created a mollisol or dark-colored soil found in the northern half or two-thirds of Illinois. This type of soil is conducive to the growing of corn, oats, soybean, wheat, and hay that are grown by today's farmers.



Will County Township Map

The area experiences a humid continental climate with hot summers and cold winters. Three air masses influence the County's climate. Generally in the winter, cold, dry air flows down from Canada. The summer months experience warm, very humid air from the Gulf of Mexico. Dry, warm air from the Pacific Ocean occurs especially in the fall.



Maximum temperatures in the summer average 85° F in July, but temperatures have been known to reach into the 100's. Minimum temperatures in the winter average 12° F in January; however, lows have occurred in the –20's. Humidity in the summer and wind in the winter intensify the problems of extreme temperature that endanger the population. Average rainfall for the area is 35.8" and average snowfall is 38.6". The length of the growing season is approximately 165 days with the last spring frost occurring around May 1st and the first fall frost occurring near October 15th of each year.

Will County: Temperature - Precipitation - Sunshine												
	Jan	**Feb**	**March**	**April**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**
Average high in °F	32	34	43	55	65	75	81	79	73	61	47	36
Average low in °F	18	20	29	40	50	60	66	65	58	47	34	23
Avg. precipitation - inch	1.85	1.61	2.76	3.03	3.74	4.06	3.39	3.15	2.72	2.8	2.2	1.89
Days with precipitation	10	10	12	13	12	11	9	8	8	7	10	10
Hours of sunshine	126	142	199	221	274	300	333	299	247	216	136	118

Climate conditions have effects on human health and safety. Temperature extremes and storms are responsible for deaths and health problems. Each year, 20 to 30 deaths in Illinois are attributed to floods, winter storms, tornadoes, and lightning.

Heat and cold waves are other climate hazards associated with high death tolls. Illinois experienced two of its most deadly heat waves during the 1990s. The 1995 heat wave, the deadliest on record, led to 753 Illinois deaths. That heat wave and another in 1999 caused major power outages in the Chicago metropolitan area. Annually, 74 deaths are attributed to heat and 18 deaths are attributed to cold, far exceeding deaths due to tornadoes, lightning, and floods.

Flooding is the single most damaging weather hazard in Illinois. Ever-increasing heavy precipitation since the 1940s has led to increased flood peaks on Illinois' rivers. Flood losses recorded in the National Oceanic and Atmospheric Administration's (NOAA) Nation Climatic Data Center (NCDC) database exceeded $5.5 billion in Illinois between 1993 and 2012. Since 1965, flooding was either the main or a significant contributing factor for 32 out of the 52 Presidential Disaster Declarations declared in Illinois.

Climatic Controls

Five factors control the continental climate of Illinois: sun, weather systems, topography, urban areas, and Lake Michigan. Two major controls are latitude (reflecting the amount of solar input) and weather systems (air masses and cyclonic storms). The effects of topography, Lake Michigan, and urban areas are of lesser significance because they influence local climate conditions, rather than conditions statewide.

Climatic Controls	
Sun	• Primary energy source for virtually all weather phenomena, in large part, determines air temperatures and seasonal variations • Solar energy is three to four times greater in early summer than in early winter at Illinois' mid-latitude location, which results in warm summers and cold winters when combined with the state's inland location
Weather Systems	• Second major factor affecting the state's climate • Create wide variety of weather conditions that occur almost daily as a result of varying air masses and passing storm systems • Polar jet stream often is located near or over Illinois, especially in fall, winter, and spring, and is the focal point for the creation and movement of low-pressure storm systems, characterized by clouds, winds, and precipitation • Settled weather associated with high pressure systems is generally ended every few days by the passage of low-pressure systems
Topography	• Shawnee Hills extend across southern Illinois and have elevations 500 to 900 feet higher than the surrounding terrain • This change in elevation is enough to increase annual precipitation by about 10 to 15 percent
Urban Areas	• Buildings, parking lots, roads, and industrial activities make the urban climate noticeably different than that of surrounding rural areas • Chicago tends to be warmer by 2°F, on average, especially at night • Also enhance summertime precipitation downwind of the city and cause changes in humidity, cloudiness, wind speed and direction
Lake Michigan	• Influences the climate of northeastern Illinois, especially Chicago • Large thermal mass of the lake tends to moderate temperatures, causing cooler summers and warmer winters • Major benefit is cool lake breezes that provide some relief from summer heat • Also tends to increase cloudiness in the area and suppress summer precipitation • Winter precipitation is enhanced by lake-effect snows that occur when winds blow from the north or northeast • Winds allow air to pass over the relatively warm lake, boosting storm system energy and water content, leading to increased snowfall

Source: Illinois Climate Atlas. S. A. Changnon, J. R. Angel, and K. E. Kunkel. Illinois State Water Survey, Champaign, Illinois.

Illinois Temperature

Average annual temperatures range from 48°F (north) to 58°F (south), with highs ranging from 57°F (north) to 67°F (south). Average winter highs range from the 30s (north) to the mid-40s (south), while average lows range from the teens (north) to the upper 20s (south). Average summer highs are in the 80s, while lows are in the 60s across the state. Both spring and fall have more moderate temperatures. Average spring highs range from 57°F (north) to 67°F (south), while average lows range from 36°F (north) to 48°F (south). Average fall highs range from 60°F (north) to 70°F (south), while average lows range from 40°F (north) to 48°F (south).

Northern Illinois averages 10 days at or above 90°F (north) compared to just over 40 days (south). Days at or above 100°F are quite rare, occurring about every other year (north) and 2 days annually (south). Illinois averages 140 days at or below 32°F (north) but only 80 such days (south). Days at or below 0°F range from 16 days annually (north) to 2 days (south).

Average annual heating-degree days range from 70 days (north) to 40 days (south). Average annual cooling-degree days range from 80 days (north) to 160 days (south). The base temperature used for both heating-degree and cooling-degree days is the same (65°F).

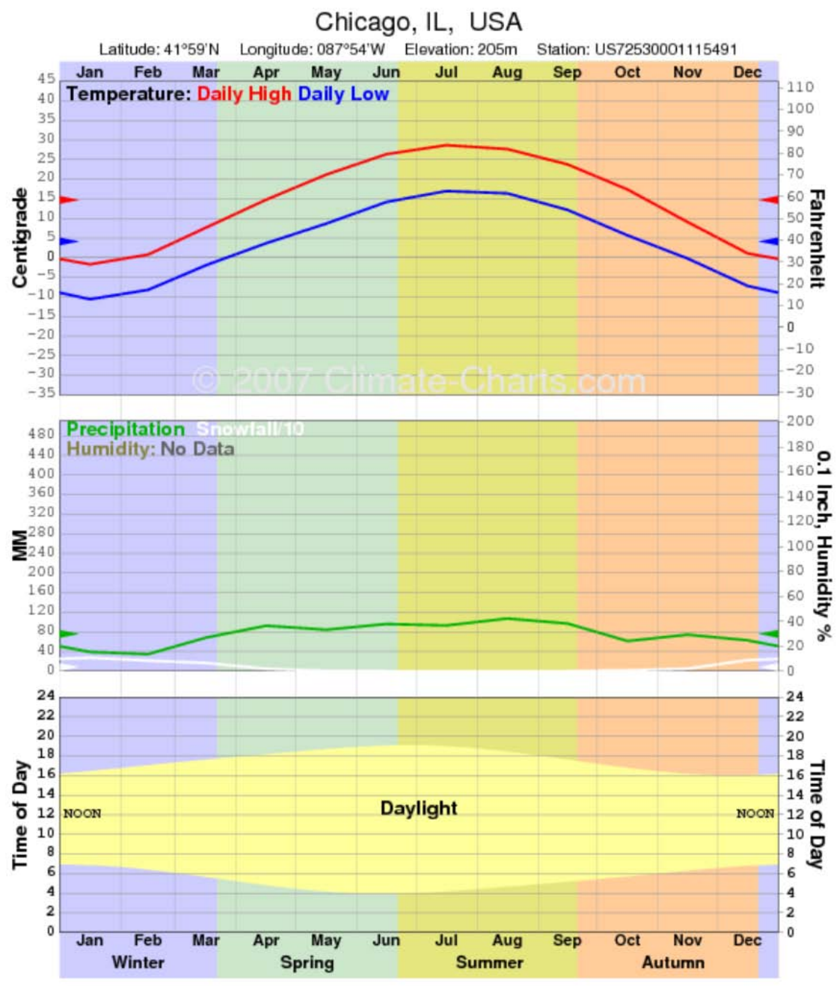
The average length of the frost-free growing season in Illinois ranges from 160 days (north) to more than 190 days (south). Average dates of the last occurrence of 32°F in spring range from April 28 (north) to April 7 (south), while the average dates of the first occurrence of this temperature in fall range from October 7 (north) to October 21 (south), and about October 14 near Lake Michigan, including the Chicago area, due to relatively warm waters of the lake.

The highest and lowest temperatures ever reported in Illinois were 117°F in East St. Louis on July 14, 1954, and -36°F in Congerville on January 5, 1999.

Precipitation

Average precipitation exceeds 48 inches per year (south), compared to less than 32 inches (north). Snowfall distribution is just the opposite, with averages of 36 inches per year in the north to less than 10 inches in extreme southern Illinois. Winter snowfall is heaviest in the Chicago area, enhanced by lake-effect snows from Lake Michigan. Variability in precipitation also extends over time. There have been major multi-year droughts in the 1930s and 1950s and major, prolonged wet periods during the 1970s and 1980s. May and June are typically the wettest months, and January and February are the driest. Each year, Illinois has rainstorms producing 40 or more flash-floods each with 4 to 8 inches of rainfall in a few hours in localized areas.

The average number of days with measurable precipitation ranges from 110 days (north) to just under 100 days (south). The number of days with an inch or more of precipitation ranges from 8 days (north) to 13 days (south), and the number of days with an inch or more of snow ranges from 12 days (north) to 4 days (south). Days with 6 inches or more of snow are infrequent, ranging from once per year (north) to once in three years (south). Typical dates of the first inch of snow range from November 20th (Chicago area) to December 20th (south). Typical dates of the last inch of snow range from March 26 (north) to March 5 (south). The average number of days with a measurable snow depth (1 inch or more) ranges from 60 days (northwest) to only 10 days (southwest).



Available from: http://www.climate-charts.com/Locations/u/US72530001115491.php

Precipitation records for Illinois include:

- Greatest 24-hour rainfall was 16.94 inches at Aurora on July 17-18, 1996
- Greatest one-year precipitation was 74.58 inches at New Burnside in 1950
- Greatest 24-hour snowfall was 37.8 inches at Astoria on February 27-28, 1900
- Greatest winter snowfall was 105.1 inches at Antioch in 1978-1979.

Severe Weather

Illinois experiences about 29 tornadoes annually. Peak months are April-June (63 percent of the total), but tornadoes have occurred in all months. Although Illinois averages four tornado-related fatalities per year, the number varies widely from year to year.

Thunderstorms account for 50-60 percent of annual precipitation and are quite common in Illinois with an average of 60 storms (far northeast) to 80 storms (southwest). Nearly half of all thunderstorm days occur during the June-August period. Similarly, the average number of cloud-to-ground lightning strikes per square mile ranges from 5 strikes (northeast) to more than 11 strikes (southwest). Some thunderstorms produce hail, and annual average hail-days vary from 3.3 days (southwest) to less than 1.8 days (northeast).

Climate and the Economy

Major businesses in Illinois are highly climate sensitive. Crop yields are dependent upon climate conditions because irrigation generally is not used. Illinois serves as the nation's center for air and surface transportation. With the nation's second busiest passenger airport (O'Hare) and the rail hub of the nation at Chicago, Illinois also is the heart of the nation's trucking industry. Each form of transportation is influenced by weather and climate extremes, and resulting delays in shipments are a major problem for manufacturers in Illinois.

Vegetation

Will County is located at the northeastern edge of the Tall Grass Prairie biome. The area was historically dominated by prairie and scattered woodlands, with wetlands associated with depressions and riverine systems. Much of the original vegetative communities of Will County are no longer present. The County is now made up primarily of agricultural land with various urban and suburban communities. Remnants of pre-settlement vegetation can still be found in the various Will County Forest Preserve District preserves and greenways, Illinois State Parks, and Illinois Nature Preserves located within the County.

Rivers

Three major river corridors are located within Will County; these corridors are associated with the DuPage River, the Kankakee River, and the Des Plaines River. Various creeks feed into the three main rivers, including Forked, Manhattan, Pike, Rock Run, Trim, Spring, Deer, Lily Cache, Grant, Thorn, Jackson, Prairie, Hickory, Sugar, and Plum Creeks.

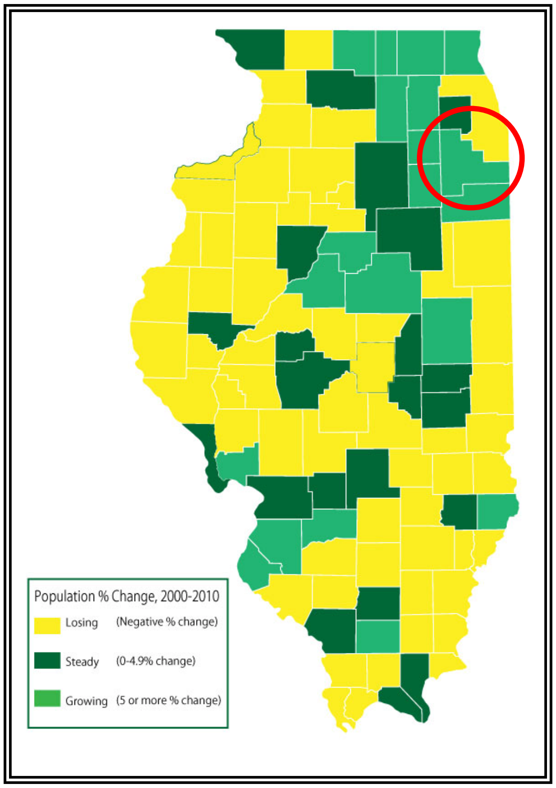
The DuPage River is 84 miles in length and travels through DuPage County and western Will County. The DuPage River is the largest tributary of the Des Plaines River and has two branches, the East Branch and the West Branch. The DuPage River enters Will County in Bolingbrook and travels south to Channahon where it joins the Des Plaines River and turns west, until they both join the Kankakee River to become the Illinois River.

The Kankakee River enters Will County in the southwestern section of the County. It traverses west through the southwestern-most portion of the County. It eventually joins the Des Plaines River to form the Illinois River.

The Des Plaines River flows southward from Wisconsin until it becomes adjacent to the Chicago Sanitary and Ships Canal in Lockport Township. It traverses south adjacent to the Chicago Sanitary and Ships Canal and the I & M Canal, passes east of Romeoville, and turns southwest just south of Joliet. The Des Plaines River joins the Kankakee River just west of Joliet to form the Illinois River.

The stream corridors in Will County are important natural features and are protected by Will County's Stream and Wetland Protection Ordinance which prohibits development within 75 feet of streams. The *Will County Land Resource Management Plan, Open Space Element* states that "streams and river systems are corridors of exceptional significance for resource protection and preservation of important natural habitats in the county."

Land Use Patterns



Will County has a mixture of land uses that range from urban to rural areas. Will County is the second fastest growing county in Illinois. Due to this rapid growth, many changes are occurring within the County. Some of these changes are seen as progress, others are seen as infringements on the quality of life residents have experienced for many years. Over the years, changes in land use have been decided by the more than thirty different authorities in charge of planning and land use regulation. On April 18, 2002, the County Board approved a new *Land Resource Management Plan* (LRMP).

With experts anticipating the population to increase by 60% by 2020 and the possibility of a new airport being built in the southern portion of the County, community members have come to realize the importance of the development of a regional plan that coordinates the management of land use within the County. The *Will County Illinois Land Resource Management Plan* provides the County and local authorities with a framework for the form and shape of future growth. The idea of the plan is to identify the County as a leader on County-wide land use issues. It is also to assist local authorities with the site-specific issues of growth while supporting open space, farms, and environmentally sensitive land that has characterized Will County over the years.[1]

Currently, there are over 500,000 acres of land in Will County. Approximately 100,000 acres are developed for non-agricultural use. Almost 300,000 acres are used for agricultural purposes with the remaining 100,000 acres vacant. This provides land beyond expected future demands. Urban areas are presently found in the northern half of the County. Joliet, the county seat, is the largest city in Will County. Other urban centers located in the northern townships are Plainfield, Lockport, New Lenox, Mokena, and Frankfort along with Monee and Crete found in the most eastern townships. The City of Naperville and the Village of Bolingbrook are urban centers; however, their boundaries span both Will County and DuPage County.

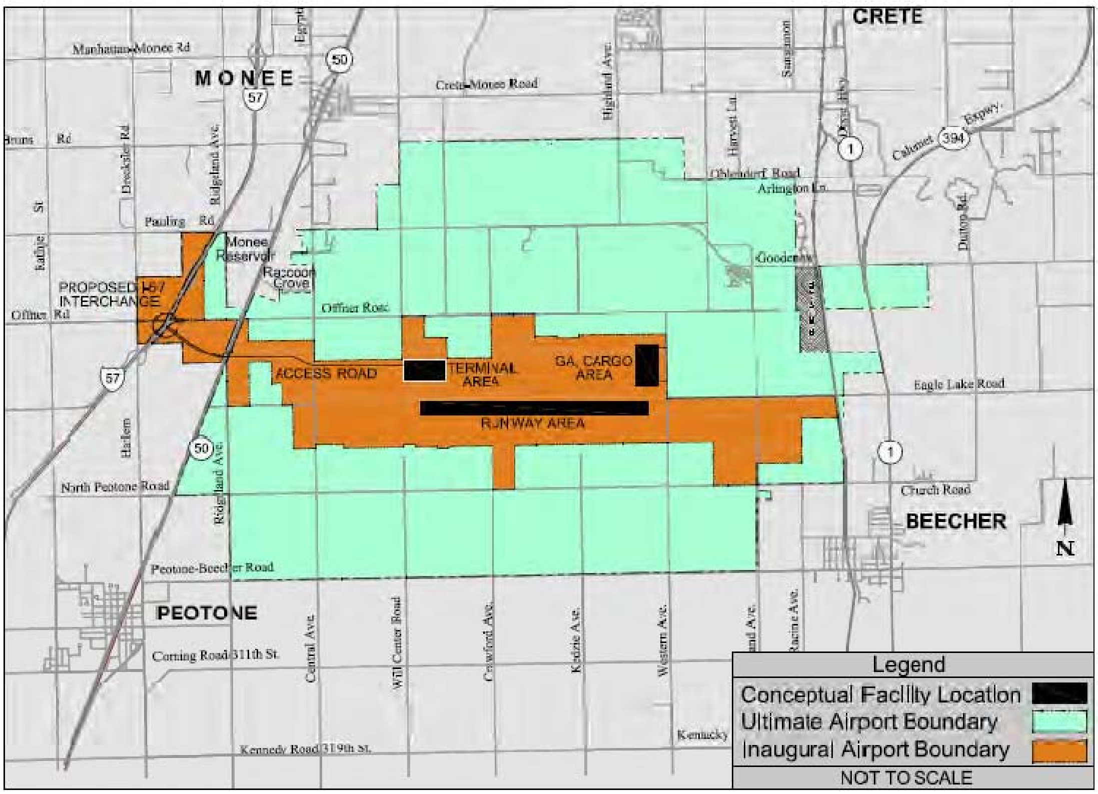
The cities are located near major transportation corridors (I-55, I-80, I-57, freight and commuter trains, regional buses, and waterways) allowing businesses and residents convenient access to shipping, work, shopping, and entertainment. Because of this convenience and availability of jobs in the Chicago Metropolitan area, all of these communities are now encountering rapid growth that is expected to continue into the coming decades. To preserve open space and agricultural land use, the County's land use plan encourages future growth to be concentrated in existing urban areas. The plan recommends that development should occur in a logical and rational pattern to make effective use of existing infrastructure and avoid "sprawl" or "leapfrog" patterns.

The rural areas are typified by agricultural uses, farm homesteads, and agricultural service businesses. Non-farm homes are generally built on larger lots without municipally oriented services such as water and

[1] The *Will County, Illinois Land Resource Management Plan*, April 18, 2002. http://willcountylanduse.com/document/policy-gateway.

sewer. Though there are farms scattered in between the cities and developments in northern Will County, rural development predominates in the southern half of the County.

The County's land use plan indicates that the rural development and open space form is a pattern that is desirable and one that should be preserved. The difficulty is to balance the demands for growth with the need to maintain agricultural viability and rural culture. Should the South Suburban Airport become a reality, the demand for growth in the southeast sector of the County will be intensified. This new airport will help to alleviate the congestion at Chicago's two airports, but it will dramatically impact the area within the surrounding ten miles of the proposed new facility. Thus, the time is now for the County and local authorities to work together to prepare a plan that will meet the needs of the area while preserving the rural development form and property rights of farmers and agricultural businesses.

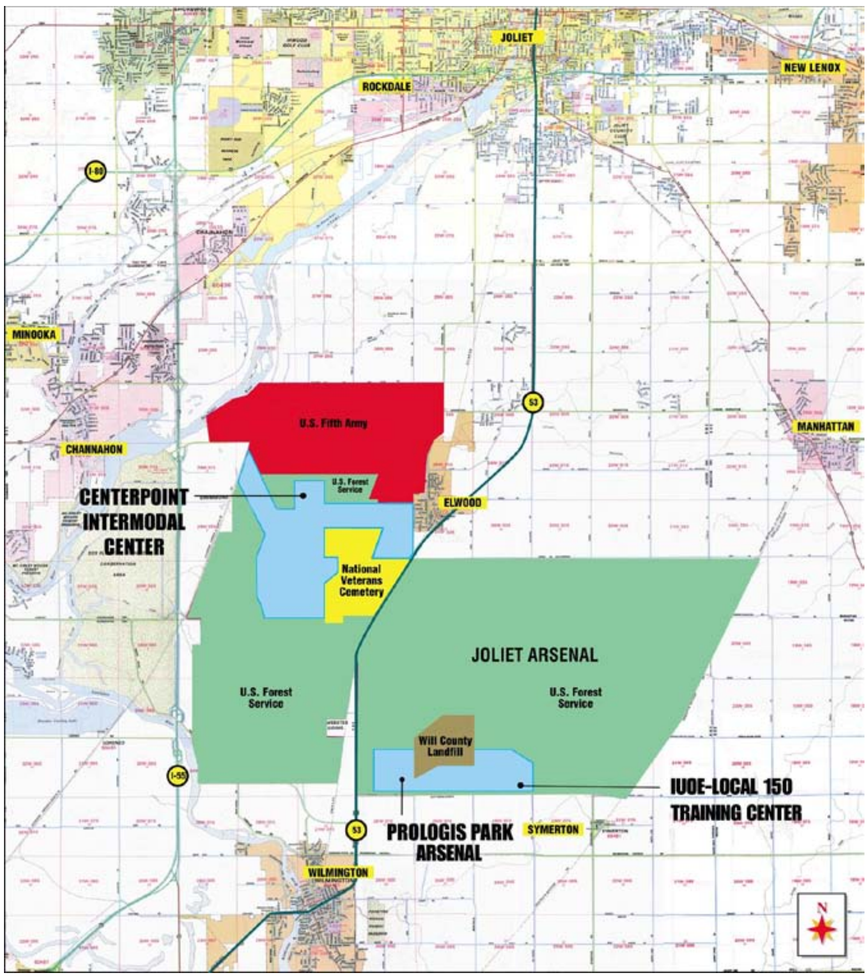


Proposed configuration of the South Suburban Airport.

In the mid 1990's, federal and state law created a special district to re-utilize land (24,000 acres) formerly occupied by the Joliet Army Ammunition Plant (JAAP). Four distinct land uses were created. The first is a new national cemetery (Lincoln National Cemetery), the second is the preservation of prairie (Midewin National Tallgrass Prairie), another is a Will County landfill (Prairie View Recycling and Disposal Facility), and last are two industrial developments (Deer Run Industrial Park and the Island City

Industrial Park). All four uses are endorsed by the Will County's land use plan. The development preserves open space while providing important economic development.

Included in the industrial development is an intermodal facility that is expected to ship between 1.7 and 4.6 million cargo containers and create 8,000 jobs. The recycling and disposal facility anticipates twenty to twenty-three years of operation that will accept 14 million tons of waste excluding the waste from the former arsenal site. This development suits the use of this land while utilizing existing infrastructure and respecting the natural landscape.



Transportation Network

As in the past, Will County's transportation infrastructure is essential to its economic well being and quality of life. Being close to Chicago has led Will County to develop an intricate and varied transportation system for the conveyance of raw materials, finished goods, workers, and tourists in and out of Chicago and its metropolitan area. It consists of roads, commuter and freight rail services, regional buses, waterways, and bikeways that transport goods and people. Because transportation is so important to the County, the County has adopted a *2030 Transportation Framework Plan*.

The concept of the plan stresses the relationship between land use policy and transportation facilities and service. It identifies the strength and weaknesses of the current infrastructure, links transportation with land-use patterns, anticipates transportation needs for the coming decades, and provides recommendations for solving problems, meeting needs, and addressing transportation expansion within the County. As the County experiences growth, particularly in the north and central sections of the County, improvements in the current transportation infrastructure and new transportation routes will be necessary to accommodate the increase in population, businesses, and industries.

There are three major travel corridors within Will County: first, a northeasterly flow to and from Chicago from the northwestern sections of the County; second, a north-south flow to and from Chicago from the central and eastern sections of the County; and third, a north-south inter-suburban flow between Will and DuPage Counties that provide work commuting routes.

Buildings

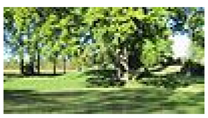
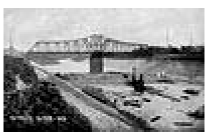
The largest metropolitan area within Will County is Joliet, the County seat. Joliet possesses both a government center and a rich cultural heritage. The central downtown area is home to both city and County government services; Joliet City Hall and the Will County Courthouse are located in the central downtown area. In addition to government services, Joliet is home to the Rialto Square Theatre, which is listed on the National Register of Historic Places and is considered by many to be one of the most beautiful theaters in the United States. Also located in Joliet, the Jacob Henry Mansion is a historic landmark which is used for special events.

Historic Sites

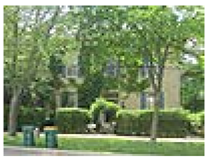
Will County has many historic sites located within the County that have been preserved. Currently, Will County is home to 34 properties/structures listed on the National Register of Historic Places, with an additional 19 sites identified as being eligible for listing.[2]

[2] http://www.nps.gov/nr

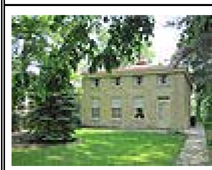
***Table 1: National Historic Register Properties within Will County*[3]**

	Name	Location
	Alternate Route 66, Wilmington to Joliet	Illinois Route 53 between Wilmington & Joliet
	Brandon Road Lock & Dam Historic District	1100 Brandon Road Joliet
	Briscoe Mounds	Front Street along the DesPlaines River Channahon
	Chicago Sanitary & Ship Canal Historic District	Illinois Waterway miles 290.0 – 321.7
	Christ Episcopal Church	75 W. Van Buren St, Joliet
	Downtown Peotone Historic District	East side of N 1st St & both sides of N 2nd Street roughly bounded to the S by the alley S of Main Street & to the N by North St. Peotone
	Eagle Hotel	100-104 Water St, Wilmington
	Fitzpatrick House	Route 53 Lockport

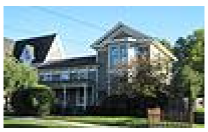
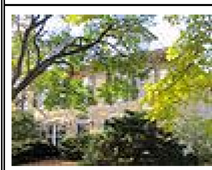
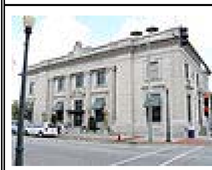
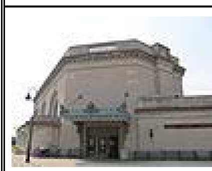
3 http://www.illinois.gov/ihpa/Preserve/SiteAssets/Pages/Places/National%20Register%20Properties%20in%20Illinois.pdf

National Historic Register Properties within Will County		
	Name	**Location**
	Flanders House	405 W. Main Street Plainfield.
	Ron George Round Barn	NE of Romeoville off US 66 Romeoville
	John Heck House	1225 S. Hamilton Lockport
	Jacob H. Henry House	20 S. Eastern Ave Joliet
	Illinois & Michigan Canal	7 miles SW of Joliet on U.S. Route 6 in Channahon State Park Joliet
	Joliet YMCA	215 N. Ottawa Street Joliet
	Joliet East Side Historic District	Between Washington and Union Sts, 4th and Eastern Avenues Joliet
	Joliet Municipal Airport	4000 W. Jefferson Street Joliet
	Joliet Steel Works	927 Collins Street Joliet

National Historic Register Properties within Will County

	Name	Location
	Joliet Township High School	201 E. Jefferson Street Joliet
	Louis Joliet Hotel	22 E. Clinton Street Joliet
	Lockport Historic District	Between 7th and 11th Sts and Canal and Washington Steets Lockport
	Lockport Lock, Dam & Power House Historic District	2502 Channel Drive Lockport
	McGovney-Yunker Farmstead	10824 LaPorte Road Mokena
	Robert Milne House	535 E. 7th Street Lockport
	Peotone Mill	433 W. Corning Avenue Peotone
	Plainfield Halfway House	503 Main Street Plainfield

National Historic Register Properties within Will County

	Name	Location
	Rubens Rialto Square Theater	102 N. Chicago Street Joliet
	Hiram B. Scutt Mansion	206 N. Broadway Joliet
	Small-Towle House	515 County Road Wilmington
	Standard Oil Gasoline Station	600 W. Lockport Plainfield
	Stone Manor	SE of Lockport Lockport
	U S Post Office	150 N. Scott Street Joliet
	Union Station	50 E. Jefferson Street Joliet
	Upper Bluff Historic District	Between Taylor, Center and Campbell Sts and Raynor Avenue Joliet
	Will County Historical Society Headquarters	803 S. State Street Lockport

Additionally, the Will County Land Use Department maintains a register of historic places. Below are the places that are considered Historic Landmarks on this register. Additional information can be located at: http://willcountylanduse.com/historic-preservation/will-county-local-landmark-program.

Table 2: Will County Register of Historic Landmarks

Name	Location
16th Street Bridge, circa 1899	Lockport Township
David Aldrich House	City of Wilmington
John C. Baker Barn, circa 1898	Manhattan Township
Beecher Cemetery & Mausoleum, circa 1913	Beecher Township
Beecher Railroad Depot, circa 1872	Village of Beecher
Boy Scout Cabin	Village of New Lenox
Rodney Bowen House	City of Wilmington
Brown Cemetery	Custer Township
Brown Church Cemetery	Jackson Township
Dickinson General Store	Village of New Lenox
District 117 Paton School	Manhattan Township
District 121 Schmuhl School	New Lenox Township
Division Street Bridge across the Des Plaines River	Lockport Township
James Ducker House	Village of Mokena
John Fiddyment Home, circa 1840s	Lockport Township
Patrick Fitzpatrick House, circa 1842	Lockport Township
Fred Francis 4-H Field	Village of New Lenox
William Gooding Home	Lockport Township
Friedrich Gottlieb Seggerbruch Homestead	Crete Township
German Baptist Society Cemetery, circa 1860	Green Garden Township
Joliet Works, US Steel, Koppers Coke Oven Plant	Joliet Township
Christian Krohn House	Will Township
Landon’s Store	Unincorporated Ritchie
John Lane Monument, circa 1916	Homer Township
Oliver Lovell Farmstead	Florence Township
New Lenox/Haven Grade School	Village of New Lenox
Niver-Pickel-Walsh Farm, circa 1850	Plainfield Township
North Providence Ridge Cemetery	Jackson Township

Ogren-Reed House	Village of New Lenox
Old Brick Tavern Monument	New Lenox Township
Paton School, circa 1860	Manhattan Township
H.A. Rathje Mill, circa 1872	Village of Peotone
Riegel Farm	Village of University Park
Ritchey United Methodist Church	Wesley Township
Benjamin F. Russell House	Village of Homer Glen
John Salisbury House	Village of New Lenox
Solder's Widow's Laundry House	Wilmington Township
Small-Towel House	Wilmington Township
Springbanks Road Bridge, circa 1912	Plainfield Township
Carl Wilhelm Steiber House	Crete Township
William Tilsy Barn	Village of Homer Glen
Union Burial Cemetery, circa 1852	Frankfort Township
Wabash Railroad Depot	Wesley Township
Wesley Township Hall, circa 1872	Village of Peotone
Wheatland Cemetery	Wheatland Township
Wheatland United Presbyterian Church and Cemetery	Wheatland Township

Transportation

Roads: The highway system consists of four interstate highways that include I-55, I-57, I-80, and I-355. Interstates 55 and 80 intersect in Joliet, the county seat, providing high accessibility. The state highways include IL 1, 7, 45, 50, 53, 59, and 394 along with U.S. Routes 6, 30, and 52. Fifty-six county highways exist to provide service between U.S. and state highways. Township roads serve the needs of the farming community and municipal streets serve local and through traffic within a city or village.

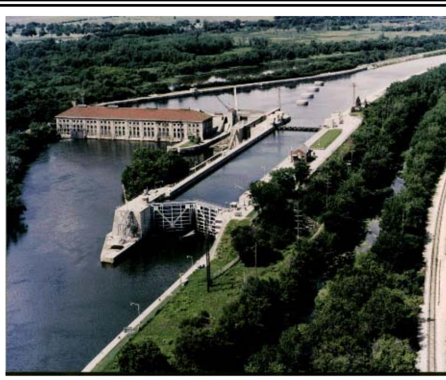
The *Will County 2030 Transportation Framework Plan* identified the fact that substantial growth is forecasted for Will County, this growth will require transportation improvements. The plan makes specific suggestions for regional interstate, major roadway, arterial streets, and intersection realignments to accommodate this growth.[4]

[4] Barton-Aschman Associates, *Will County 2030 Transportation Framework Plan,* March 2009. http://willcountylanduse.com/resource/document/2009-transportation-plan

Rail, Bus, and Non-motorized Transportation: Three commuter rail lines connect Will County to downtown Chicago: Metra Electric from University Park, Metra Heritage Corridor from Joliet through Lockport, and Metra Rock Island District from Joliet through New Lenox and Mokena. There is a need for Metra Commuter Rail improvements in the Heritage Corridor, Rock Island District, Southwest Service, Electric district, and Southeast Service lines to accommodate the growth that is forecasted for Will County.[5] In addition, Amtrak provides interstate passenger train travel. Bus service is provided through four types of transit service by the Pace System: traditional fixed route, limited express bus, dial-a-ride, and custom service. The County region has very limited non-motorized transportation in the form of bikeways and pedestrian paths.

Freight rail is also important to the economy of Will County. As with road and commuter rail systems, freight rail systems lead in and out of the center of Chicago. Rail shipments from and to Illinois in 1994 measured over 120 billion tons and were comprised of coal, mixed freight, food products, farm products, and chemicals.

Waterways: The Illinois water system provides additional economic value to Will County. The Des Plaines River and Chicago Sanitary and Ship Canal cross through Will County connecting Chicago and the Great Lakes to the Illinois River that flows south to the Mississippi River and eventually leads into the Gulf of Mexico. In 1999, tonnage of commodities shipped to, from, and within the state totaled over 100 billion with a value of $16.5 billion. Goods shipped on the waterways consist of coal, petroleum, aggregates, grain, chemicals, ores, minerals, iron, and steel. This transportation system faces the problem of delays to commercial navigation traffic due to limited lockage capacity and increasing traffic. There are two navigation locks in Will County. Lock chambers throughout the state are over 70 years old and were built to accommodate 600-foot tows. Today's tows are typically 1,110 feet in length necessitating double lockages. Thus, their passage requires more time and money.



Lockport Lock, Dam, & Powerhouse

Airports: A number of general aviation airports exist within the County: Joliet Park District, Lewis University, Howell Airport, Clow International Airport, and numerous small, privately held airports are

[5] Barton-Aschman Associates, *Will County 2030 Transportation Framework Plan,* March 2009. http://willcountylanduse.com/resource/document/2009-transportation-plan

located within the County. In addition to local airports, there is easy accessibility to Chicago's O'Hare International and Midway Airports. Plans are being debated for a South Suburban Airport which would be located in the County's Peotone area and would demand additional infrastructure to support transportation needs and area growth that would inevitably result.

Population Characteristics

It is important to examine the population characteristics since densely populated areas typically experience the majority of destruction during a disaster. Further, growing communities offer opportunities to identify additional mitigation measures. Between 1990 and 2010, Will County's population grew by over 320,000 people, nearly doubling its population in just twenty years. Approximately 85% of the County's population lives in the northern townships of Wheatland, DuPage, Plainfield, Lockport, Homer, Troy, Joliet, New Lenox, and Frankfort. Accordingly, it is also where the major urban areas are concentrated and the most growth is being experienced. The remaining townships, with the exception of Monee and Crete, are more rural in their characteristics. The age distribution throughout the County population is 29% for under 18 years old, 61.6% for 18 to 64 years, and 9.32% for ages 65 years and older.

Growth: Census statistics show that Will County is the second fastest growing County in the State of Illinois. The County increased in population from just over 350,000 in 1990 to over 677,000 in 2010. In 2012, estimates placed the County's population at 682,518. Estimated population totals for Will County will reach 1,215,818 by 2030. The townships that may expect to see significant growth by 2030 are DuPage, Frankfort, Homer, Monee, New Lenox, Plainfield, Troy, and Wheatland. Rapid employment growth will be seen in DuPage, Troy, Frankfort, Monee, and Crete Townships. Should the proposed South Suburban Airport be built, higher growth in population and employment will occur in Monee, Crete, Peotone, Will, and possibly Green Garden and Washington townships.

Gender, Age, and Race: The population of the County is almost equally divided between male and female. The median age is 33 years for the County, but a median between three to eight years higher is seen in the more rural townships. County-wide, the population is predominantly white, 82%, with more diverse populations found in the townships of Wheatland, DuPage, Lockport, Troy, Joliet, Monee, Crete, and Wesley. Blacks or African Americans represent 11% of the County population and Hispanics or Latinos total 15%.

Language: English is the predominant language spoken at home throughout the County (88% of the population five years and over). Spanish (7%), Indo-European (3.2%), and Asian and Pacific Island

(1.4%) were the other predominant languages spoken at home. Those who speak English less than "very well" represent 4.6% of the County population five years and over. Individual townships have fairly similar statistics with the exception being Joliet, Will, and rural townships.

In Joliet Township, English only is spoken at home in 80.3% of the population five years and over. The rural townships tend to have an English only rate of approximately 95% with Spanish and Indo-European being evenly split with a rate of approximately 2% each. These townships also have a lower rate, roughly 1%, of the population that does not speak English well.

Special Needs: Based on the 2000 census, there are approximately 57,900 people disabled within the County's population. Of the people ages five to twenty years, 5.8% (1.5% of the total County population) are disabled. The population of twenty-one to sixty-four years of age has a 12.3% disabled rate (7% of the total County population). Last, 38.4% (3% of the total County population) of the County's people sixty-five and older are disabled. This pattern of distribution is consistent throughout most of the townships. Lower rates of disability are seen in Wheatland Township's population of five to twenty years (3.9%) and New Lenox and Frankfort Townships' sixty-five years and over population (31.8%, 30.2% respectively). Joliet Township has a higher rate of disability (21.8%) in its twenty-one to sixty-four years population.

Economics can also impact the ability to respond during a disaster. Poorer residents may not have the resources to stockpile supplies for a disaster or evacuate following a disaster. In 2003, 6% of Will County residents were living in poverty. Five percent of all families and 17% of families whose head of household was female had income levels below the poverty level (U.S. Census, 2003 estimate).

Economic Characteristics: Again, location is essential to Will County's economic success. Will County is proximate to Chicago, one of the nation's major cities. O'Hare and Midway Airports, four interstate highways, railways, and waterways provide access for goods, services, and workers to move in and out of Chicago. In addition, there are over ninety business parks with available space for businesses, low real estate property taxes, and many varied choices in housing. Will County has a labor force of over 250,000 people that includes skilled labor. Of the people age twenty-five years and older, 90.2% are high school graduates and 31.3% have bachelor degrees or higher. Add to that, the County's central location in a metropolitan area allows businesses to draw from a six-county labor force of 4.3 million people.

Range of Entities: Business entities encompass manufacturing, retail, professional service, education services, health care, real estate, and a growing entertainment industry. Major employers include Presence Saint Joseph Medical Center, Harrah's Joliet Casino and Empress Casino Joliet Corp., Will

County Government, Caterpillar, Inc., Federal Signal Corporation, Joliet Public School District #86 and Joliet Junior College District #525, ComEd and Exelon Company, T.J. Lambrecht Construction, and CITGO Petroleum Corporation.

Manufacturing sales in 1997 were over $7.5 billion with chemical, machinery, and computer and electronic product manufacturing predominating. Wholesale trade produced almost $4 billion in sales composed of durable goods such as motor vehicle and motor vehicle parts, lumber, metal service centers, machinery and equipment. Wholesale non-durable goods include grains, plastic materials, petroleum products and bulk stations, and beer. Total retail sales in 2001 were approximately $4.3 billion. Retail trade sales reached over $3 billion with motor vehicle and parts dealers, building material dealers, food and beverage stores, gasoline stations, health and personal care stores, and general merchandise stores prevalent. Professional services produced over $285 million in receipts in the form of architectural and engineering, legal, accounting, computer systems, management consulting, scientific and technical services. Healthcare produced almost $400 million in receipts and education receipts reached almost $10 million. The entertainment industry receipts for 1997 were over $385 million. Performing arts, gambling boats, recreation sports, ballpark, and racetracks are a rapidly growing industry attracting large numbers of people to the County as workers and spectators.

With almost 300,000 acres of farm land in Will County, there are just over 500 full time farms averaging 323 acres. The County's climate and soil support a variety of agricultural commodities such as grains, hay, fruits, vegetables, cattle, swine, sheep, and poultry. Market value of agricultural products sold is over $107 million consisting of crop sales (92%) and livestock sales (8%). Similar to Illinois' total production, corn (17 million bushels) and soybeans (4.6 million bushels) are the primary crops produced and swine (42,557 sold) the main livestock sold. The County's transportation system allows easy shipment of crops and livestock for processing and export.

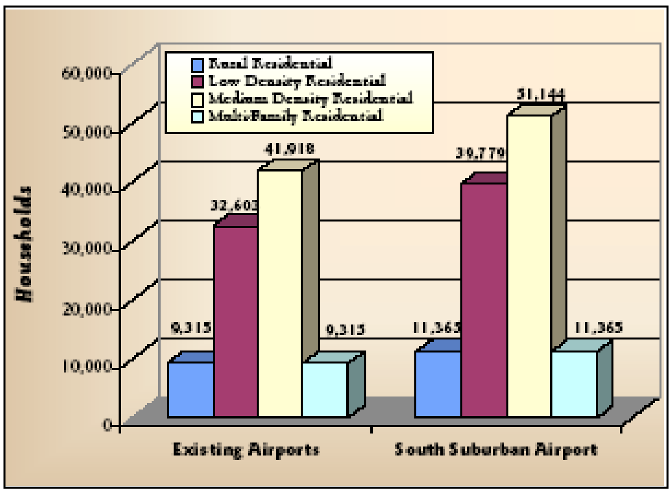
Earnings: Per capita, personal income in 2000 was $26,664 and ranked 20th in the state, representing 84% of the state's average of $31,856. Median household money income was just over $62,000. Earnings by persons employed in Will County increased from $5.6 billion in 1999 to over $6 billion in 2000 with the largest industry being services, 23.6% of earnings; state and local government, 14.7%; and construction, 14.0%. There are over 175,000 housing units with a median value of $154,300 of which 83.1% are owner occupied. The unemployment rate as of 2001 was 5.4% and approximately 4.9% of the County's population lives below the poverty level.

Taxes: Various tax structures are applied to business, personal income, and property within Will County. Federal and state income taxes are applied to personal and corporate income, but no local personal or corporate income taxes exists. A state sales tax of 6.25% is applied to tangible personal property with local sales tax rates varying from 0 to 2.5%. The state imposes a utility tax on electricity and natural gas supplies, and some local governments also collect a utility tax. Local governments are authorized to collect property taxes on real property that is assessed at 33.4% of market value. The typical tax rate per $100 of assessed value is $6.62.

Incentives: Along with the application of federal, state, and local taxes, a number of tax incentives are applied to promote development and expansion of businesses and rejuvenate economically distressed areas. As an example, Joliet, Lockport, and Rockdale are part of the DesPlaines River Valley Enterprise Zone that provides ten-year property tax abatement and other tax incentives on all real improvements that increase the assessed valuation of property. Other forms of incentives to encourage business development, expansion, modernization, and competitive improvement include participation loan programs, industrial training programs, industrial revenue bonds, environmental bonds, venture funds, tax increment financing (TIF), block grants, and various Small Business Administration (SBA) assistance programs. These assistance programs are provided by federal, state, and local sources.

Growth Resources: Encouraging growth, a number of organizations provide business development resources to expand the economy within the County. To name a few, Will County Center for Economic Development provides information and assistance in locating or expanding businesses in Will County. The Illinois Department of Commerce & Community Affairs is the state's economic development agency that provides programs and services designed to help Illinois businesses thrive in the global economy. The Will Economic Network is a county-wide consortium which ensures the highest level of cooperation between the public and private sectors assisting businesses to locate, grow, and prosper in Will-. The Joliet Arsenal Development Authority oversees the redevelopment of the former Joliet Army Ammunition Plant property. City Center Partnership also provides programs and incentives to help new and expanding businesses. Another business development resource is the Three Rivers Manufacturer's Association that serves the needs of local manufacturers in Will and Grundy counties. The assistance and resources that organizations like these provide make the area attractive to businesses looking to develop or expand.

Future: What the economic future holds for Will County can only be estimated. The Chicago metropolitan area continues to grow outward into the surrounding counties. Of these collar counties, Will County is expected to be the fastest growing. It is forecasted that the area as a whole will grow by 25% while Will County is expected to grow over 60% within the next twenty years. This means that potentially 180 square miles of new land could be developed over this time frame. Most of this land would be used for residential purposes with some used for business and industrial use. The building of the South Suburban Airport is a factor that will have the greatest effect on the County's growth. If it is built, there will be a large demand for services, infrastructure, workers, housing, schools, etc. to support its function. This additional source for transportation of goods and people will increase the rate of business development. This means there will be more people and property to protect from hazards, more technology and businesses that may present a hazard, and more people and businesses that could attract or be affected by societal hazards. Assessing the risks, planning, mitigating hazards, and preparing for emergencies will remain essential activities to ensure the safety of Will County's residents.



Twenty Year Household Forecasts 2000-2020

Essential Government Services

There are many community service organizations needed to effectively carry out the emergency management plan in the event of an occurrence. Local law enforcement, fire departments, and emergency medical services (EMS) are called first when an emergency occurs. Hospitals care for the sick and injured.

Law Enforcement: Law enforcement's role is to safeguard lives and property, enforce the law, and maintain order. Within Will County, there is a County sheriff's office, thirty-four municipal police departments, four special district police departments, four railroad police departments, and two university police departments. The Illinois State Police also maintains a station north of Joliet.

Fire Protection and Emergency Medical Service: Municipal fire departments and local fire districts safeguard lives and protect property by containing fires and responding to accidents or other emergencies. The larger communities in Will County have full-time fire department staffs. The smaller communities have volunteer staffs that respond when an emergency occurs. There are also several special fire departments maintained by the major oil and chemical companies. EMS is responsible for immediate medical attention. There are over twenty local EMS units within the County and several private or corporate EMS units serving the community. For care beyond first aid, Will County has two hospitals, Presence Saint Joseph Medical Center and Silver Cross Hospital and Medical Center located in Joliet.

The Will County Health Department is another agency providing important services to the public, not only in the event of an emergency, but also everyday. They provide comprehensive public health programs and primary health care and dental service for medically underserved residents. More than 300 agency professionals work to prevent disease and promote a healthy environment for the growing County's residents. Throughout an emergency, public health consequences are evaluated, findings are reviewed, and affected people are debriefed. The department provides epidemiological follow-up of a population suffering a known, clearly defined health effect in association with a clear-cut cause. Public health also supports the provision of health care, evacuation of patients, hospital care coordination, public health information, victim identification, and mortuary services. Emergencies may include, among others, hazardous chemicals, contaminated food or water, infectious/communicable disease, floods, tornadoes, or radiation exposure.

Schools: Will County currently has 29 school districts under the jurisdiction of the Will County Regional Office of Education. This office oversees 19 elementary districts, three high school districts, and seven unit districts.[6]

Additionally, there are other school districts located within the County that may come under other jurisdictions because their district boundaries are of a multi-county nature. High School Districts located within Will County include Beecher, Channahon, Crete Monee, Joliet Township, Lincoln Way, Lockport Township, Naperville, Peotone, Plainfield, Reed Cluster (Braidwood), Valley View (Romeoville and Bolingbrook), and Wilmington.

Elementary School Districts located in Will County include Beecher, Braidwood, Chaney Monge, Channahon, Crete-Monee, Elwood, Fairmont, Frankfort, Homer, Joliet, Laraway, Ludwig-Reed-Walsh, Manhattan, Milne-Kelvin Grove, Mokena, Naperville, New Lenox, Peotone, Plainfield, Richland,

[6] http://www.willroe.org/index.php/schools-districts/school-directory

Rockdale, Summit Hill, Taft (Lockport), Troy, Union, University Park, Valley View, Will County, and Wilmington. A map of the school district boundaries within Will County can be found at:

http://www.willroe.org/index.php/schools-districts/school-district-maps.

Non-Essential Government Services

Will County has a rich and diversified offering of publicly owned recreational facilities located throughout the County. There are also several Illinois state parks located in the County. Channahon State Park is the official trailhead for the I&M Canal State Trail. The I&M Canal State Trail is made up of 61 miles of multi-purpose trail that ends at LaSalle/Peru. The Des Plaines Fish and Wildlife Area in Wilmington offers fishing and hunting opportunities, as well as an 80-acre nature preserve. Additionally, the State of Illinois recognizes 17 dedicated nature preserves in Will County. A dedicated nature preserve is designed to preserve the natural features of the land; nature preserves do not necessarily allow public access but most do. Only high quality natural areas qualify for this designation.

Will County Dedicated Nature Preserves[7]

Name	General Location
Braidwood Dunes and Savanna	Braidwood
Dellwood Park West	Lockport
Goodenow Grove	Crete
Grant Creek Prairie	Wilmington
Hitts Siding Prairie	Wilmington
Kankakee River	Kankakee
Lake Renwick Heron Rookery	Plainfield
Lockport Prairie	Lockport
Long Run Seep	Lockport
Messenger Woods	New Lenox
O'Hara Woods	Romeoville
Raccoon Grove	Monee
Romeoville Prairie	Romeoville
Sand Ridge Savanna	Braidwood
Thorn Creek Woods	Park Forest
Vermont Cemetery Prairie	Aurora
Wilmington Shrub Prairie	Braidwood

There are two federally-owned parks located within Will County. The I & M Canal National Heritage Canal is operated by the National Park Service and serves to maintain the historic and cultural heritage associated with what was originally a 97-mile canal from the Chicago River to the Illinois River. Today, the Park Service offers a variety of recreational and interpretive services for visitors. The U.S. Forest Service operates the first tallgrass prairie in the United States, Midewin National Tallgrass Prairie. Established in 1996, this 15,454-acre property once belonged to the Joliet Army Ammunition Plant. Today, it is being restored to tallgrass prairie and is dedicated to conserving, restoring, and enhancing natural habitat. A significant number of threatened and endangered species are located at Midewin. More information may be found at www.fs.fed.us/mntp.

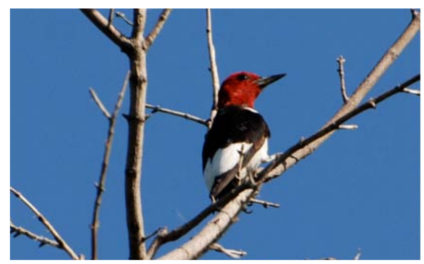
[7] http://www.reconnectwithnature.org/preserves-trails/preserves-and-trails.asp

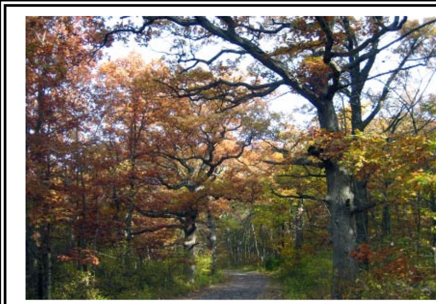
The County also owns and operates a variety of open-space parcels through the Will County Forest Preserve District. The County currently has 30 forest preserves.

Will County Forest Preserves	**General Location**
Braidwood Dunes and Savanna Nature Preserve	Braidwood
Colvin Grove Preserve	Joliet
Evans-Judge Preserve	Wilmington
Forked Creek Preserve - Ballou Road Access	Wilmington
Forked Creek Preserve - Butcher Lane Access	Wilmington
Forked Creek Preserve - Forsythe Woods	Wilmington
Goodenow Grove Nature Preserve	Beecher
Hadley Valley - Bruce Road Access	Homer Glen
Hadley Valley - Gougar Road Access	Joliet
Hadley Valley - Route 6 Access	Joliet
Hammel Woods - Crumby Recreation Area	Shorewood
Hammel Woods - DuPage River Access	Shorewood
Hammel Woods - Route 59 Access	Shorewood
Hickory Creek Preserve - Hickory Creek Barrens	New Lenox
Hickory Creek Preserve - Hickory Creek Junction	Mokena
Hickory Creek Preserve - LaPorte Road Access	Mokena
Hunters Woods	Frankfort
Isle a la Cache	Romeoville
Joliet Iron Works Historic Site	Joliet
Keepataw Preserve	Bolingbrook
Lake Chaminwood Preserve	Minooka
Lake Renwick Preserve - Copley Nature Park	Plainfield
Lake Renwick Preserve - Heron Rookery Nature Preserve	Plainfield
Lake Renwick Preserve - Turtle Lake Access	Plainfield
Lambs Woods	Lockport
Laughton Preserve	Wilton Center
Lockport Prairie Nature Preserve	Lockport
Lower Rock Run Preserve - I&M Canal Access	Joliet
Lower Rock Run Preserve – McClintock Road Access	Joliet
McKinley Woods - Frederick's Grove	Channahon
McKinley Woods - Kerry Sheridan Grove	Channahon
Messenger Marsh	Homer Glen
Messenger Woods Nature Preserve	Homer Glen
Monee Reservoir	Monee
O'Hara Woods Preserve	Romeoville
Prairie Bluff Preserve	Lockport
Raccoon Grove Nature Preserve	Monee
Riverview Farmstead Preserve	Naperville
Rock Run Preserve - Black Road Access	Joliet
Rock Run Preserve - Paul V. Nichols Access	Joliet
Rock Run Rookery Preserve	Joliet
Runyon Preserve	Lockport
Sauk Trail Reservoir	Joliet
Sugar Creek Preserve	Joliet
Teale Woods Preserve	Joliet
Theodore Marsh	Crest Hill
Thorn Creek Woods Nature Preserve	Park Forest
Vermont Cemetery Preserve	Naperville
Veterans Woods - Roy F. Hassert Grove	Bolingbrook
Veterans Woods - Traders Corner	Romeoville
Whalon Lake	Naperville
Wolf Creek Preserve	Naperville

Will County Trails	
Name	**General Location**
Centennial Trail/I&M Canal Trail	Joliet
DuPage River Trail	Shorewood/Naperville
Hickory Creek Bikeway	New Lenox/Mokena
Joliet Junction Trail	Crest Hill/Joliet
Lake Renwick Bikeway	Plainfield
Old Plank Road Trail	Joliet, New Lenox, Frankfort, Matteson, & Park Forest
Plum Creek Greenway Trail	Crete
Rock Run Greenway Trail	Crest Hill/Joliet
Spring Creek Greenway Trail	New Lenox/Homer Glen
Wauponsee Glacial Trail	Joliet, Manhattan, Symerton, & Custer Park

Will County Forest Preserves – Unimproved	
Name	**General Location**
Alessio Prairie	Crest Hill
Birds Junction Marsh	Shorewood
Black Walnut Creek Preserve	Crete Township
Briscoe Mounds	Channahon
Caton Farm Preserve	Joliet
Deer Creek Preserve	Crete Township
Donohue Grove Preserve	Wilmington/Wesley Township
DuPage River Confluence Preserve	Naperville/Bolingbrook
Fiddyment Creek Preserve	Homer Glen
Hastert-Bechstein Preserve	Channahon
Huyck's Grove Preserve	Peotone/Wilton Township
Jackson Creek Preserve	Frankfort/Green Garden Township
John Wesley Preserve	Wilmington/Wesley Township
Kankakee Sands Preserve	Braidwood
Kraske Preserve	Crest Hill
Lake of the Woods Preserve	Shorewood
Lily Cache Wetlands	Romeoville
Lockport Loop Trail	Lockport
Lockport Prairie East Preserve	Lockport
Moeller Woods Preserve	Crete Township
Plum Valley Preserve	Crete Township
Plum Valley Ravines	Crete Township
Potawatomi Woods Preserve	New Lenox
Prairie Creek Preserve	Manhattan Township
Romeoville Prairie Nature Preserve	Romeoville
Sand Ridge Savanna Nature Preserve	Wilmington/Custer Township
Thorn Creek Headwaters Preserve	Steger-Park/Monee Township
Thorn Grove Preserve	Steger/Crete Township
Vincennes Trail	Beecher/Crete Township
Walnut Hollow	Joliet Township
Wayne Lehnert Preserve	Peotone Township
Wolf Creek Preserve	Naperville





The Will County Forest Preserve provides miles of trails for hiking, bicycling, in-line skating, equestrian, jogging, and cross country skiing. Maps of these trails can be found at http://www.reconnectwithnature.org/preserves-trails and include the Old Plank Road Trail, I & M Canal Trail, Hickory Creek Bikeways, Rock Run Trail, Lake Renwick Bikeway, and the Waubonsee Glacial Trail.

A number of municipal recreation departments and independent park districts operate throughout Will County. These park districts offer a variety of services, including recreational opportunities, fitness classes, and enrichment classes. Recreation departments and park districts are operated in and near the communities of Bolingbrook, Channahon, Crete, Elwood, Frankfort, Joliet, Lemont, Lockport Township, Manhattan, Mokena, Naperville, New Lenox, Plainfield, Romeoville, and Shorewood.

There is one privately owned facility that was developed for public use in Will County that deserves to be mentioned. The Chicagoland Speedway and Route 66 Raceway make up the Joliet Motor Sports Complex, the largest sporting facility in Illinois. This facility is a multi-purpose motor sports complex that provides for a variety racing types, including NASCAR.[8] It is reported to be a world-class racing facility.

Utilities

Utilities provide power needed by homes and businesses to operate. Commonwealth Edison (ComEd) is one of the nation's largest electric utilities with $15 billion in revenues and five million people as a customer base. Their Community and Economic Development Team work with businesses to provide in-depth site selection information, critical utility analysis, and access to Illinois business resources.

Nuclear Power: Nuclear power is an important source for generating electricity and accounts for 49.6% of Illinois' electricity source. Braidwood Nuclear Power Station is a two-unit nuclear generating facility, located within Will County, twenty-two miles southwest of Joliet. Dresden Nuclear Generating Station is located in Grundy County outside of Morris, but its ten-mile emergency planning zone includes part of the southwest area of Will County.

A benefit of nuclear power are clean air, as no harmful gases are emitted into the environment by the process. The concern, of course, is radiation exposure that may occur either as a result of an accident or

[8] http://www.chicagolandspeedway.com/?homepage=true

sabotage. Thus, careful security measures and emergency management planning for these facilities are necessary to ensure the safety of the public.

Natural Gas: Nicor Gas, also one of the largest providers in its industry with a customer base of 2 million, has provided natural gas service in northern Illinois for over 45 years. Their service area covers roughly 17,000 square miles and supports more than 29,500 miles of gas main. Nicor has connections to seven interstate pipelines, is accessible to all major gas producing areas in the County, and has an extensive system of underground gas storage. Flexible rates, options to choose alternate commodity suppliers, a competitively priced gas commodity, and reliable delivery allow customers to depend on Nicor Gas.

Telecommunications: SBC is a global company providing telecommunications services that include local and long distance telephone, cellular, paging, and internet capabilities. SBC serves a thirteen state region and has invested over $4 billion in infrastructure throughout Illinois over the last four years. They connect over 2 billion local telephone calls and handle 4.5 million installations a year.

Community Vulnerability

The activities and businesses that attract people to live and work in Will County and bring economic stability to the area also present hazards that put the population at risk. Relating to the concerns that arise from the use of utilities, hazards exist from the operation of the many chemical companies located in the County. Petroleum refineries and product manufacturing, paper, soap and cleaning compounds, and plastics and rubber manufacturing all utilize or produce materials that pose fire, toxin, or explosion risks that can injure people and damage property and the environment. These hazardous occurrences can occur on site or while the materials or products are being transported by truck, rail, or boat. To balance the economic benefit to the County with the hazards of chemical production, adequate safety measures must be in place to protect workers and the surrounding population.

On a daily basis, the primary purpose of school facilities is education. Thirty-three public school districts operate within Will County, in addition to a number of private schools, educating students who attend kindergarten through twelfth grade. One junior college and three four-year colleges operate within the boundaries of the County. These facilities serve the important daily function of education, but they can also act as a resource for emergency management by utilizing the school facilities for community centers in the event of an occurrence.

Community centers may be needed to accommodate the population displaced by evacuation, to act as a medical center, or to house emergency personnel coming to assist from outside the County. These facilities can also be the target of the many hazards facing the County. Because of the number of students and faculty concentrated within a facility, emergency management must be prepared to handle high numbers of injuries or deaths should the facility be damaged during an occurrence. Tornadoes, fires, heating equipment explosions, food poisoning, bomb threats, or terrorist type attacks are all potential disasters that must be prepared for through emergency management.

A growing aspect of the County's economy is the entertainment industry. Historic sites, theaters, park district facilities, hunting, fishing, boating, and golf are many of the leisure activities enjoyed by residents of Will County. New to the County are casino boats, motor sports complexes, and a baseball park which attract local community members and people from the surrounding Chicago metropolitan area. Economically these entertainment centers bring added revenue from ticket sales, restaurants, and hotel services. But like the schools, there are security issues that must be addressed to protect the hundreds or thousands of people attending events from the effects of natural, technological, and societal hazards. Preparations must be in place to effectively manage any emergencies that may occur.

Profile Summary

Understanding the geography, activities, population characteristics, economy, and community services is important to identifying the hazards facing a community, perceiving the effects hazards will have on people and property, determining the vulnerability of the population, and surmising the probability that an eemrgency will occur. This information base provides the backdrop for assessing the hazards that should be addressed for the protection and well being of the community. The preparation of the hazard analysis is part science but also part art. Facts are combined with experience, perceptions, priorities, and culture to identify and develop a ranking of the hazards to be used for emergency planning.

Keep in mind that community characteristics continually change and a key element of Will County's future is growth. Thus, the hazard analysis is not a static process. As changes occur, the hazard analysis will need to be re-evaluated and modified to address the changing needs of the County.

Significant Future Development Plans

It is important for the *Will County County-Wide All Hazard Mitigation Plan* to be incorporated into other County plans. The following is a discussion of Will County's development initiatives. Hazard mitigation should be incorporated wherever feasible.

Land Resource Management Plan

The Will County Land Resource Management Plan was developed to establish a framework which allows local communities to work with regional entities in order to allow for carefully planned land development and management during Will County's projected growth. The following priority issues were identified in the plan:

- Regional coordination among various government entities,
- The need for regional open-space and agricultural protection,
- The need for environmental protection,
- The quality and timing of new development,
- Automotive transportation needs,
- Promoting a compact (non-sprawled) form of development,
- Housing density and variety, and
- Non-automotive transportation needs.

The Land Resource Management Plan identifies goals and strategies to fulfill the priority issues identified. Additionally, the plan provides use concepts that provide guidance to local communities on how to manage land use by such categories as development, open space, transportation, historic preservation, and stormwater management.

A Forms & Concepts Handbook accompanies the Land Resource Management Plan, in which regional development forms should be promoted. Development use concepts are provided to guide local communities in assessing specific development proposals to see if they fit with the community's land use form. Specific development forms discussed in this handbook are:

- Rural areas
- Hamlets
- Towns
- Urban communities
- Suburban communities
- Interstate access locations
- Former Joliet Army Ammunition Plant area, and

- South Suburban Airport.

Specific development use concepts designed to protect the chosen development form are provided in the handbook. These development use concepts include:

- Agriculture,
- Conservation design,
- Conventional residential suburban,
- Traditional residential,
- Multi-family complex,
- Employment campuses,
- Regional commercial,
- Mid-scale commercial,
- Neighborhood commercial,
- Free standing industry and office, and
- Projects of regional impact.

An Open Space Element handbook also accompanies the *Land Resource Management Plan*. This handbook promotes initiatives for managing development in high priority areas to create greenway corridors as well as create large preserves for the protection of biodiversity. This handbook also provides criteria for identifying land for inclusion in the open space system.

Will County 2030 Transportation Framework Plan

The *Will County 2030 Transportation Framework Plan* is the outcome of a collaborative effort among municipalities, townships, and regional agencies. The plan was written to guide transportation improvements through the year 2030 for all modes of transportation, including roads, public transportation, railroads, bikeways, pedestrian, equestrian, and airport transportation.

The Transportation Framework Plan identified the fact that substantial growth is forecasted for Will County; this growth will require transportation improvements. DuPage, Wheatland, Homer, Lockport, New Lenox, Frankfort, Plainfield, Monee, and Crete were identified as the townships predicted to experience the greatest amount of growth and in need of the greatest amount of transportation improvements. Will Township will also experience significant increases in transportation needs if the South Suburban Airport is built. Continued growth in the east, southwest, northwest and west central areas will require improved Metra commuter train service.

The Transportation Framework Plan makes specific suggestions for roadway improvements, including major roadways, arterial streets, and intersection realignments. Additionally, specific recommendations are made for regional arterial improvements, corridor studies, Metra commuter rail improvements, and Pace bus system improvements.

Will County Stormwater Management Plan

The *Will County Stormwater Management Plan* represents a coordinated effort on the part of Will County and its municipalities to manage issues as they pertain to floodplain and stormwater management. Planning activities are coordinated through the Will County Stormwater Management Planning Committee. The Committee focuses on existing stormwater management programs as well as issues related to future development. A major focus area is the adoption of a county-wide stormwater ordinance to ensure consistency of approach and to coordinate stormwater issues that extend beyond political boundaries. The reduction of risk brought about by flooding is an important goal of the Stormwater Management Plan and the Stormwater Management Planning Committee.

CHAPTER 3: ALL HAZARD RISK ASSESSMENT SUMMARY

Will County EMA has been proactive in identifying risks. In 2003 and 2004, Will County EMA first published several hazard and vulnerability assessments including the *Will County Hazard Analysis, Will County Terrorism Vulnerability Assessment* (not for Public Distribution) and the *Will County Terrorism Vulnerability Assessment of Critical Infrastructure Results* (not for Public Distribution). Will County EMA recognizes that the assessment and analysis of vulnerability to the County is a definitive measure of the risk associated with each individual hazard.

In order to effectively and efficiently integrate existing documents and operations, the updated 2013 *Will County Hazard Analysis* has been incorporated into the *Will County County-Wide All Hazard Mitigation Plan*. This allows Will County to identify mitigation objectives, strategies, and actions that address all of Will County's risks. *The Will County Terrorism Vulnerability Assessment* and the *Terrorism Vulnerability Assessment of Critical Infrastructure Results* were not incorporated into this document due to the sensitive information that is contained in these reports.

Will County developed a hazard risk assessment in 2003. This document was updated in 2008, as part of the All-Hazard Mitigation Plan. Using this assessment as a baseline document and incorporating new data that encompasses the years 2008-2013, the Will County planning team updated and re-developed a comprehensive all-hazard risk assessment that thoroughly analyzed the County's natural, technological, and societal hazard risks. The planning team re-evaluated and updated the following elements in the previously developed risk assessment: hazard identification, inventory of community assets vulnerable to the hazards, hazard events profile, magnitude, history, probability, impacts, flood insurance claims, repetitive losses, and future development trends. The committee decided to utilize the rating system identified in the original 2008 plan.

The 2013 *Will County Hazard Analysis* utilizes a formal, structured procedure to develop mitigation and emergency operation plans. The Federal Emergency Management Agency (FEMA) has developed a process for assessing and evaluating hazards. Will County chose this process in order to reduce inconsistencies and promote a common base for completing the analysis by defining criteria and providing a scoring system. Four criteria were used to describe and assess the potential hazards; the four criteria include:

- History – past record of occurrences of the specified hazard. It is a guide of what has occurred in the past but is not a guarantee of what may occur in the future.
- Vulnerability – pertains to the people that might be killed, injured, or contaminated and to property that might be destroyed, damaged, or contaminated due to the occurrences of a specified hazard.
- Maximum Threat – consists of the impacts from a 'worst case' scenario of a specified hazard and is where the greatest impact to people and property is expected and assessed.
- Probability – refers to the likelihood of the occurrence of a specified hazard. It is expressed as the number of chances per year that an event of a specific intensity will occur.

Each of the four criteria is given a weighting factor as one criterion can be judged to be more important than another:

History	2 points
Vulnerability	5 points
Maximum Threat	10 points
Probability	7 points

Each of the four criteria were evaluated and given a description of the likelihood or impact of the event. The descriptive terms used were low, medium, and high. Each of the three descriptive terms is given a numerical value:

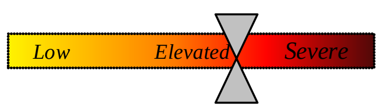
Low	1 point
Medium	5 points
High	10 points

The composite score for each hazard is calculated by multiplying the descriptive numerical value assigned to each weighted criterion score. Each weighted score is summed to determine the hazards composite score.

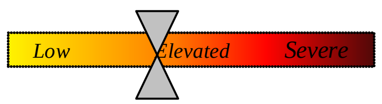
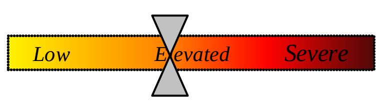
The following is a list of the natural, technological, and societal hazards investigated, while a summary of the 2013 *Will County Hazard Analysis* is shown on the following pages.

Natural Hazards	**Technological Hazards**	**Societal Hazards**
Tornado	Infrastructure Failure	Terrorist Attack
Winter/Ice Storm	Hazardous Materials – Fixed Site	Enemy Attack
Thunderstorm	Hazardous Materials – Transportation Accident	Public Health
Flood	Non-Hazardous Materials – Transportation Accident	Civil Disturbances
Earthquake	Nuclear Power Plant Accident	
Drought	Pipeline Rupture	
Flash Flood	Fire	
Extreme Heat	Dam Failure	
Ice Jams	Subsidence	

NATURAL HAZARD RISK SUMMARY

Hazards and Risk Rating	Hazard Assessment	Location	Extent	Hazard Rating and Score: History	Hazard Rating and Score: Vulnerability	Hazard Rating and Score: Maximum Threat	Hazard Rating and Score: Probability	Overall Hazard Rating and Score	Most Severe Historical Events
Winter / Ice Storms 	A winter storm is considered to be severe when 6+ inches of snow have fallen within a 48 hour period. Winter and ice storms can cause widespread damage and disruption. Heavy snow or ice can paralyze transportation systems, cause automobile accidents, strand vehicles, and damage building roofs. Ice can incapacitate an area and damage vegetation, buildings, and utilities.	County-Wide	High	High	High	Med	High	**High**	Will County has experienced almost 46 snow and ice events since 1995. Illinois has experienced a severe winter storm each winter for over a century and experiences an average of 2.5 severe storms per year.
				20	50	50	70	190	
Flood 	As lands become more developed, the risk and economic losses from flooding have increased. The effects of a flood can be devastating. Damages to buildings, facilities, utilities, businesses, and farmland can be expected within the floodway. Debris generated from the flood can hinder the community and damage property.	Select areas: Des Plaines River, I & M Canal, Kankakee River, etc. See hazard map for details.	High	High	Med	Med	High	**High**	The Des Plaines River and its tributaries (Hickory and Spring Creeks) have caused an average annual loss of over $100,000 to the urban areas of Will County. Will County has been declared a Presidential Disaster area in 1974, 1981, 1985 1996, 2008, and 2013 due to flooding. One of Will County's greatest floods which occurred along the Des Plaines River in 1996.
				20	25	50	70	165	
Tornado 	Tornados are short lived, but have the potential of destroying everything in their path. Most tornados have a 3-stage life cycle where they develop, mature, and dissipate. A tornado can occur at any time of the year requiring the County to be prepared at all times. Illinois averages 29 tornados per year; however, 105 tornados were reported on 1998 and 107 in 1974. Since 1954, Will County has averaged one recorded tornado per year.	County-Wide	High	High	High	Med	High	**High**	November 17, 2013: F2 tornado, injured 5. August 15, 1993: F2 tornado caused $1 million in damage and injured 2. August 28, 1990: F5 tornado caused 29 deaths, 350 injuries, and $244 million in damages. May 9, 1988: F2 tornado caused $1+ million and injured 3. April 27, 1984: F3 tornado caused $2.5 million in damage, killed 1, and injured 5. April 6, 1972: F2 tornado caused $750k in damage, killed 1, and injured 22. November 12, 1965: F2 tornado caused $25 million in damage, killed 2, and injured 90. April 23, 1961: F3 tornado caused $2.5 million in damage, injured 4.
				20	50	50	70	190	

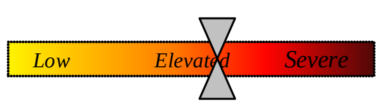
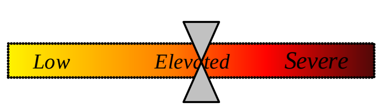
NATURAL HAZARD RISK SUMMARY

Hazards and Risk Rating	Hazard Assessment	Location	Extent	Hazard Rating and Score: History	Hazard Rating and Score: Vulnerability	Hazard Rating and Score: Maximum Threat	Hazard Rating and Score: Probability	Overall Hazard Rating and Score	Most Severe Historical Events
Extreme Heat 	Prolonged periods of extreme heat and humidity have a deleterious effect upon a community, particularly the elderly and those who cannot afford cooling capabilities. Heatstroke and heat exhaustion are more intense in urban areas. Other effects of extreme heat are water shortages, fire hazards, excessive demands for energy, damaged crops, and danger to livestock.	County-Wide	Moderate	High 20	Low 5	Low 10	High 70	**Medium** 105	See page 4-107.
Earthquake 	There are thousands of earthquakes in the US each year, but most are so small in magnitude that they are barely noticed. Some of the most violent earthquakes have occurred in the central US. The New Madrid Fault Zone runs from Cairo, Illinois to Memphis, Tennessee. Will County would be affected indirectly from a large New Madrid Earthquake. The Sandwich Fault zone is located in northern Illinois and extends into Will County.	See Hazard Map	Low	Low 2	Low 5	High 100	Low 7	**Medium/ Low** 114	August 20, 1804 - An estimated 4.5 magnitude earthquake shook the southern Lake Michigan area. May 26, 1909 - an estimated 5.1 magnitude occurred in northern Illinois. The exact location isn't known, but the greatest shaking occurred in and near Aurora. December 29, 1985 - an estimated 3.0 magnitude occurred in northern Illinois, 31 miles outside of Chicago June 24, 2004 a 4.2 magnitude earthquake occurred near Ottawa, IL. February 10, 2010 at 3.8 magnitude earthquake occurred near Lily Lake in Kane County.
Thunderstorm 	Severe thunderstorms are weather systems accompanied by strong winds, lightning, heavy rain, and possibly hail and tornados. Thunderstorms can fall into 4 categories: Single-cell storms, multi-cell cluster storms, multi-cell line storms, and super cell storms. Super cell storms are the most severe and cause extensive damage and threat to life.	County-Wide	High	High 20	Med 25	Med 50	High 70	**High** 165	Will County has experienced over 100 severe Thunderstorms and high wind since 1996.

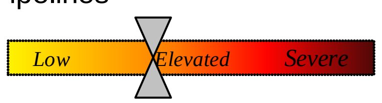
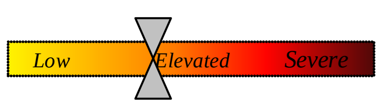
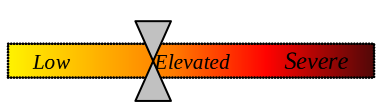
NATURAL HAZARD RISK SUMMARY

Hazards and Risk Rating	Hazard Assessment	Location	Extent	Hazard Rating and Score				Overall Hazard Rating and Score	Most Severe Historical Events
				History	Vulnerability	Maximum Threat	Probability		
Drought Low Elevated Severe	A drought is a period of drier-than-normal conditions that results in water-related problems. The amount of precipitation at a particular location varies from year to year but, over a period of years, the average amount is fairly constant. Drought typically impacts crops resulting in low yields and economic losses.	County-Wide, greatest impacts to agricultural areas	Moderate	High	Low	Med	Med	**Medium**	Summer of 2005 - Will County farmers suffered extreme financial losses as a result of the drought as their crops continue to fail. Will County declared an Agriculture Emergency and requested the State of Illinois through its Emergency Management Agency and Department of Agriculture to assist in recovery efforts.
				20	5	50	35	110	
Flash Flood Low Elevated Severe	Flash floods are a result of torrential rainfall over a short period of time, a sudden release of water from a dam or lock failure, or breakup of an ice jam.	Select areas: Des Plaines River, I & M Canal, Kankakee River, etc. See hazard map for details.	Moderate	High	Low	Low	High	**Medium**	Will County has experienced almost 60 incidents of Flood and/or flash flooding since 1996 with six Federal disaster declarations. See pages 4-74 to 4-76.
				20	5	10	70	105	
Ice Jam Low Elevated Severe	Ice jams develop when mild temperatures occur in a location with deep snow cover and frozen rivers. Large chunks of ice accumulate near river obstructions (i.e. bridges, dams) which cause flooding to the surrounding area.	Select areas: Des Plaines River, I & M Canal, Kankakee River, etc. See hazard map for details.	Moderate	High	Low	Low	High	**Medium**	The Kankakee River in the Wilmington areas has been the most prevalent area where ice jams occur. See page 4-65.
				20	5	10	70	105	

TECHNOLOGICAL HAZARD RISK SUMMARY

Hazards and Risk Rating	Hazard Assessment	Location	Extent	Hazard Rating and Score				Overall Hazard Rating and Score	Most Severe Historical Events
				History	Vulnerability	Maximum Threat	Probability		
Infrastructure Failure 	Will County citizens are dependent on a functional public and private utilities to provide essential services (power, heating, water, sewage disposal, storm drainage, communications and transportation). Failure can occur within a distribution system or be caused by external factors such as severe storms or fires.	County-Wide	High	High 20	High 50	High 100	Med 35	**High** 205	Not provided in the 2013 Will County Hazard Analysis
Hazardous Materials Release: Fixed Site 	Will County has many oil refineries, chemical manufacturers, and other businesses that use hazardous materials in their processing. Chemicals and materials in use vary in toxicity. A small release of many of these chemicals may have little effect on the surrounding environment; however, the release of some chemicals or radioactive materials could have long lasting affects.	Industrial and Commercial Districts - over 300 facilities are reported on EPA's Toxic Release Inventory.	High	High 20	Low 5	Med 50	High 70	**Medium** 145	See page 4-117
Nuclear Power Plant Accident 	There is one nuclear power plant located in Will County. There is also one nuclear power plant that is located in a neighboring county, but in close proximity of Will County. Nuclear power plants are regulated by the US NRC and have posed stringent rules during design, construction, and operation to ensure the public's safety.	The plume emergency planning zone - encompasses a 10-mile radius of the facilities. The ingestion emergency planning zone that encompasses a 50-mile radius.	High	Low 2	Med 25	High 100	Low 7	**Medium** 134	No local historical events have occurred

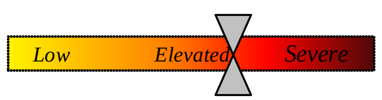
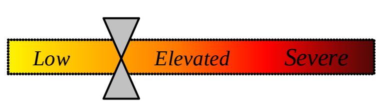
TECHNOLOGICAL HAZARD RISK SUMMARY

Hazards and Risk Rating	Hazard Assessment	Location	Extent	Hazard Rating and Score: History	Vulnerability	Maximum Threat	Probability	Overall Hazard Rating and Score	Most Severe Historical Events
Pipelines 	The most common material carried by pipelines is petroleum, crude oil, propane, ammonia, kerosene, and natural gas. The release of material can be caused by pipe failure due to age or breakage during excavation activities can result in explosion, fire, pollution, or loss of essential utilities.	County-Wide	Moderate	Med	Med	Low	High	**Medium**	See page 4-132
				10	25	10	70	115	
Transportation: Hazardous Materials Release 	Thousands of hazardous materials are shipped on a daily basis through local communities by all modes of transportation. Will County has an extensive network of rail and highways, as well as barge traffic. Accidents can be usually handled by local emergency services, but some accidents may spread to surrounding communities. Statistically, most hazardous material accidents are caused by some type of human error and rarely by mechanical failure of a carrying vessel.	County-Wide	Moderate	High	Low	Low	High	**Medium**	See page 4-117
				20	5	10	70	105	
Transportation: Non-Hazardous Material Release 	Motor vehicles, airplanes, trains, or boats are all subject to the risk of accidents. These accidents can occur anywhere within the transportation system because of the driver's error, mechanical failure, poor weather conditions, or sabotage. Though accidents are normally not considered disasters, the results of an accident can be of severe magnitude.	County-Wide	Moderate	High	Low	Low	High	**Medium**	See page 4-139
				20	5	10	70	105	

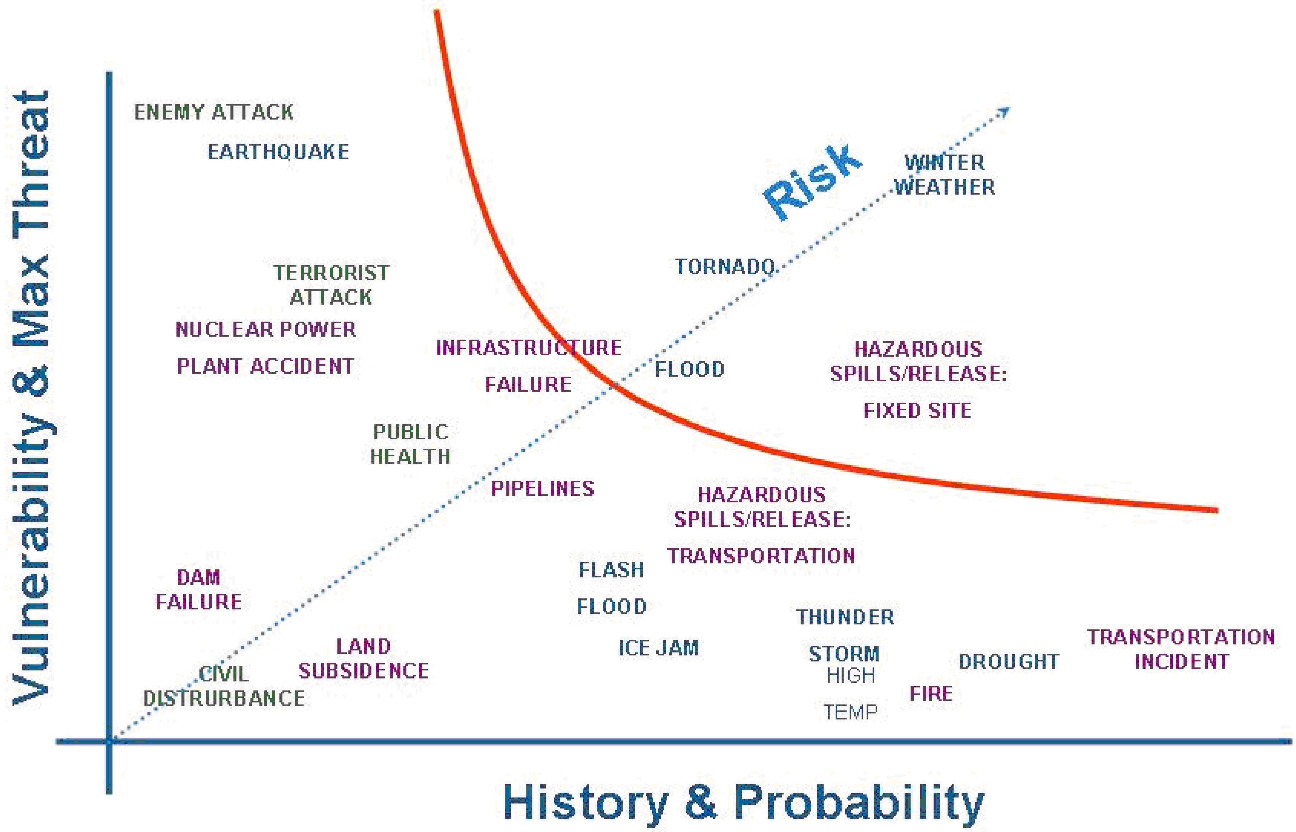
TECHNOLOGICAL HAZARD RISK SUMMARY

Hazards and Risk Rating	Hazard Assessment	Location	Extent	Hazard Rating and Score				Overall Hazard Rating and Score	Most Severe Historical Events
				History	Vulnerability	Maximum Threat	Probability		
Fire *Low Elevated Severe*	Fire is an occurrence of uncontrolled burning which results in major structural damage to residential, commercial, industrial, institutional or other types of property.	County-Wide, greatest impacts to agricultural areas	Low	High	Low	Low	Med	**Medium**	See page 4-146
				20	5	10	35	70	
Dam Failure *Low Elevated Severe*	Dams usually fail as a result of the secondary effects of storms. A flood that is caused by the breach of a dam may be of greater magnitude than floods originating from the runoff of rainfall or snowmelt.	Select areas: Des Plaines River, I & M Canal, Kankakee River, etc. See hazard map for details	Low	Low	Low	Low	Low	**Low**	See page 4-153
				2	5	10	7	24	
Land Subsidence *Low Elevated Severe*	Land subsidence, which is a decline in land-surface elevation caused by removal of subsurface support, can result from natural and human activities. Subsidence poses a greater risk to property than life. Subsidence can cause cracking of buildings, utility failure, and road collapse.	County-Wide	Low	Low	Low	Low	Low	**Low**	Not provided in the 2013 Will County Hazard Analysis
				2	5	10	7	24	

SOCIETAL HAZARD RISK SUMMARY

Hazards and Risk Rating	Hazard Assessment*	Location	Extent	Hazard Rating and Score: History	Hazard Rating and Score: Vulnerability	Hazard Rating and Score: Maximum Threat	Hazard Rating and Score: Probability	Overall Hazard Rating and Score	Most Severe Historical Events
Terrorist Attack 	Terrorists consist of international, domestic, left or right-wing, special interests, anarchists or neo-fascists. Terrorists typically target infrastructure that are more critical to daily operations and are hard to restore to service.	Select potential targets throughout Will County	High	Low	High	High	Med	**High**	Specific threats of terrorism have not been made against any critical infrastructure within Will County; however, Federal officials have issued warnings of potential attacks against chemical, oil/power, and agricultural industries.
				2	50	100	35	187	
Enemy Attack 	Enemy attack is any hostile action taken against the United States by foreign forces that result in the destruction of military and/or civilian targets. The threat of nuclear, chemical, and biological weapons is worrisome as their development and delivery systems are improved by Third World nations.	County-Wide	High	Low	High	High	Low	**High**	There has not been an enemy attack on the continental United States in the past century.
				2	50	100	7	159	
Public Health 	Major epidemics are uncommon but still exist as a threat. Though diseases that were life threatening years ago are now under control, unexpected sources of infection do occur and can spread before the source of the problem can be contained.	County-Wide	Low	Low	Med	Med	Low	**Medium/ Low**	Up through the early 1900's there was significant risk from diseases such as tuberculosis, typhoid fever, poliomyelitis, and measles. The West Nile virus was first documented in Illinois in 2001. By the end of 2002, 18 of the confirmed cases were in Will County. Non-pharmacological & immunization measures were implemented for H1N1 in spring of 2009 with Mass immunization beginning 10/2009.
				2	25	50	7	84	
Civil Disturbance 	Civil disturbances are incidents that intend to disrupt a community to the degree that police intervention is required to maintain public safety. The threat from a disturbance varies by the type, severity, and range of the event.	County-Wide	Low	Low	Low	Med	Low	**Low**	Not provided in the 2013 Will County Hazard Analysis
				2	5	50	7	64	

A graph summarizing each hazard's risk to Will County is provided below. The risk to Will County was determined by the history and probability of the hazard in relation to the hazard's vulnerability and maximum threat.



Hazard Loss Modeling

To supplement the impact analysis and risk determination, a hazard loss model and analysis was performed for select scenarios for natural, technological, and societal hazards. The scenarios selected were based on historical occurrences of disasters, availability of data, and the severity of the hazard risk. The hazard loss analysis process utilized Hazards U.S. – Multi-hazard (HAZUS-MH) modeling, GIS analysis, and available historical disaster data and information to conduct quantitative analysis to estimate the loss due to the selected natural, technological and societal hazard events. HAZUS-MH is a powerful risk assessment software program for analyzing potential losses from floods, hurricane winds and earthquakes. In HAZUS-MH, current scientific and engineering knowledge is coupled with the latest

Geographic Information Systems (GIS) technology to produce estimates of hazard related damage before, or after, a disaster occurs.

The analysis reports obtained from the HAZUS-MH model includes the following:

- Estimation of the losses to structures and contents
- Estimation of the losses to structure use and function
- Projection of human losses
- Estimation of the primary direct and indirect loss

The HAZUS-MH and GIS analysis was used to determine which individual assets were vulnerable to the largest potential losses; by adding the structure loss, content loss, and function loss for each asset to determine the total loss. This process produced the following:

- Calculation of the losses to each asset
- Calculation of the estimated damages for each hazard event
- Creation of a map that shows a composite of the areas of highest loss

Many of the human-induced hazards provide some unique implications for loss estimation because these events can take place with different magnitudes, in any location, at any time, and under various circumstances. Because the characteristics of many of the human-induced events are not definitive, a generalized loss analysis was conducted. The following scenarios were assessed and analyzed utilizing GIS data and HAZUS-MH modeling.

- Overbank Flooding Event of Will County Stream and River Reaches.
- A F4 Plainfield Tornado.
- A 5.3 magnitude earthquake in DuPage County. This was the largest historical earthquake in the Chicago area.
- A hazardous materials release from a large industrial facility.
- A hazardous materials release from a transportation incident.
- A terrorist bombing with a similar magnitude of that of the 1995 Oklahoma City bombing.

The Hazard Loss Modeling findings and reports are provided in Appendix B.

Scenario Summaries

Overbank Flooding Event of Will County Stream and River Reaches

The FEMA Flood Insurance Rate Maps (FIRM) indicate that a large area of Will County's built environment is within the Base Flood Elevation. The Base Flood Elevation (BFE) is defined as the area that has a 1% chance of flooding in any given year. HAZUS-MH Flood Risk Module would be utilized for modeling riverine flooding of Will County's stream and river network.

F4 Plainfield Tornado

GIS Analysis was utilized to determine the impacts of the 1990 Plainfield Illinois F4 tornado that skipped through Will County during mid afternoon. Although the track of this tornado was identified, detailed information on the area damaged could not be determined. Will County GIS data was utilized to determine structures identified within the damage areas. The potential loss of a F4 tornado traveling a similar path as the 1990 F4 tornado was projected based on today's built environment and in today's economy.

5.1 Magnitude Earthquake in DuPage County, Illinois

This was the largest historical earthquake in the Chicago area. HAZUS-MH Earthquake Risk Module provides estimates of damage and loss to buildings, essential facilities, transportation and utility lifelines, and population based on scenario or probabilistic earthquakes. In addition, the Earthquake Risk Module estimates the debris generated, fire, casualties, and shelter requirements following the disaster. Based on consultation with the Illinois State Geologic Survey, the May 26, 1909 earthquake that occurred near Aurora, Illinois is the best scenario to model with the limitations on available data. Although this earthquake was a 5.1-magnitude, limitations of the HAZUS-MH model does not provide accurate information for those earthquakes less than a magnitude 5.5. Therefore, this earthquake analysis assumes that this historical earthquake had a magnitude of 5.5. Due to information constraints on soil types, the analysis of a larger earthquake generated from the New Madrid Fault could not be conducted.

Hazardous Materials Release: Fixed Facility

The U.S. EPA's ALOHA (Areal Locations of Hazardous Atmospheres) model was utilized to assess the area of impact for a chlorine release at a large industrial facility located southwest of Joliet near Arsenal

Road and Interstate 55. Chlorine is a common chemical that is used in industrial operations and can be found in either liquid or gas form. For this scenario, moderate atmospheric and climatic conditions with a slight breeze from the west were assumed. The target area of Arsenal Road and I-55, "Joliet Arsenal Hub", was chosen due to its large industrial facilities, rail and truck hubs, and the presence of a large number of large quantity hazardous material generators.

Hazardous Materials Release: Transportation Incident

The U.S. EPA's ALOHA (Areal Locations of Hazardous Atmospheres) model was utilized to assess a chlorine release from a barge at a large transportation hub southwest of Joliet at US Route 6, Interstate 55, and the Des Plaines River. Rail, truck tankers, and barges commonly haul chlorine, as well as other hazardous materials, to and from facilities. For this scenario, moderate atmospheric and climatic conditions with a slight breeze from the west were assumed. The target area of the US Route 6, I-55, and Des Plaines River was chosen due to its heavy barge traffic, large rail and truck hubs, as well as the presence of a large number of large quantity hazardous material generators.

Terrorist Bombing

GIS Analysis was utilized to determine the impacts of a bombing near a critical infrastructure of Will County with a similar magnitude of the April 19, 1995 Oklahoma City Bombing. In the Oklahoma City Bombing, a Ryder rental truck was loaded with approximately 5,000 pounds of ammonium nitrate fertilizer and detonated outside of the Murrah Federal Building. The explosion generated a pressure blast of 500,000 psi, destroyed one-third of the Murrah Federal Building, and created a crater thirty feet wide and eight feet deep. The Will County target analyzed in this hazard modeling is the Will County Court House.

Limitations

The analysis of hazards is complicated by a number of factors including laws, customs, ethics, values, attitudes, political preferences, and complex infrastructures and built environment. A hazard analysis provides a wealth of valuable information that is essential for identifying goals, prioritizing actions, planning and preparedness, and recovering and mitigating future hazards.

The assessment of data and identifying the risk to a community is not a hard science. It is difficult to predict hazard impacts, and conclusions are not absolute. The perception of what constitutes a risk and a judgment of its impact can differ from individual to individual. The changing natural, built, or societal environments can have a significant affect on each hazard assessment. A hazard risk assessment does provide a guide to evaluate Will County's risks and guides the Will County EMA to perform their mission of protecting the County. For this reason, it is important to periodically update and improve the County's Risk Assessment with best available data.

Regional All Hazards Risk Assessment Project

FEMA provides funds to the Illinois-Indiana-Wisconsin (IL-IN-WI) Combined Statistical Area (CSA) under the Regional Catastrophic Preparedness Grant Program (RCPGP). The purpose of the RCPGP is to support preparedness efforts of local jurisdictions, spanning multiple states, in planning for catastrophic events or disasters. An initiative under the RCPGP was the Regional All Hazards Risk Assessment Project. Will County Emergency Management Agency was a member of this subcommittee whose mission was to plan for and mitigate catastrophic and routine incidents.

The project completed in July, 2013, provided Will County with two analysis tracks. The first was an assessment of the capabilities of the County to implement the 31 Core Capabilities described in the National Preparedness Goal. The other was software called System-wide Multi-hazard Risk Tool (SMRT) utilized to conduct risk analysis. SMRT was used for the regional assessment of chosen hazards: tornados, extreme heat, pandemic, blackout, and terrorism.

The Core Capability assessment and SMRT software tool will enhance the County's ability to analyze risk and improve planning to address the hazards faced by the County. The SMRT software will be used to re-evaluate the hazard analysis in an effort to obtain consistent and objective data. The Core Capability assessment establishes a baseline for preparedness from which training and resource needs can be identified and improved. Along with the regional risk assessment completed under the project, the data generated from these tools will help to develop a county-wide Threat and Hazard Identification Risk Assessment (THIRA) which will lead to improved mitigation planning.

CHAPTER 4: HAZARD PROFILES AND VULNERABILITY ASSESSMENT

The following profiles include not only natural hazards but also technological and societal hazards that have the potential to affect Will County. The location of Will County is a factor in many of the hazards that face the County. Being located in the Midwest, the County is subject to extreme changes in climate. During the spring through fall seasons, the County experiences many thunderstorms. These storms can be quite severe and bring with them the damaging effects of wind, lightning, hail, and flood. Will County is also located in the section of the United States that experiences the most tornado activity. The worst tornado to hit the County occurred in 1990. The summer months can also bring high temperatures which may lead to periods of drought and its damaging effect on crops and water supply. As the seasons change to winter, the temperature can change to extreme cold and along with this cold often comes snow, ice, more wind, and more flooding. These winter storms can knock down the power supply and bring travel routes to a close.

The location of Will County is also the reason for many of the technological and societal hazards that the County may experience. Being proximate to Chicago, Will County is the hub for many transportation systems that lead into the Chicago area. Interstate highways, railways, bus routes, waterways, pipelines, and airports are systems that transport raw materials, finished products, and people in and out of the County. These transportation systems encourage the development of business enterprises which bring in materials to produce products utilized throughout the country and the world.

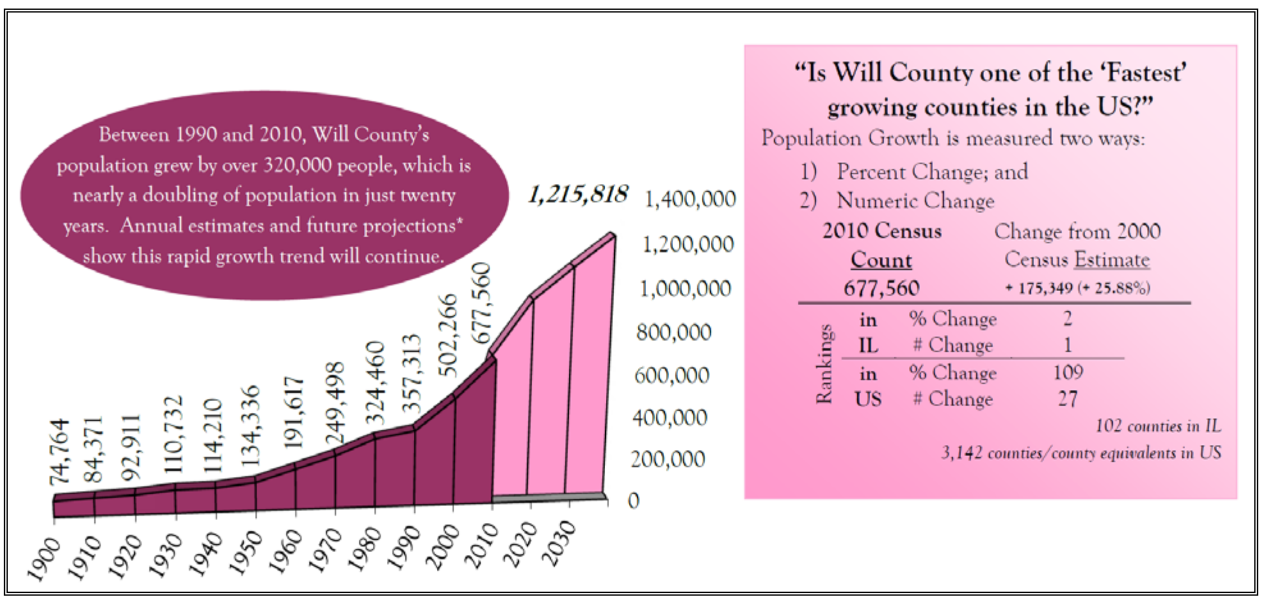
Along with these transportation systems and entities of commerce come risks. Some of the chemicals used in manufacturing and agriculture have hazardous effects on people and the environment. As these chemicals are transported or processed, there is the potential for spills, fire, explosion, and harmful contamination. Nuclear power plants utilize fuel that can have damaging effects for generations should it be released during transportation or a plant accident. Though technological advances have helped to make Will County prosperous, the potential for harm must be addressed through programs of preparedness.

Again, the location of Will County plays a part in societal hazards. The ease of transportation, the growing job market, and the mix of urban and rural lifestyles attract people to work and live in Will County. The spread of the Chicago metropolitan area also has an effect on the County's society as it spills into Will County. As more people come to live in Will County, urban areas develop bringing in more business, manufacturing, retail shopping, and entertainment venues. Growth in urban areas brings with it an increase in potential for civil disturbance and public health issues. Growth in business and housing, along with the proximity to Chicago, increase the potential for terrorist and enemy attack. Nuclear power plants, refineries, large entertainment venues, an army training center, and the nearness of Chicago, all make Will County attractive as a target for terrorists and our enemies. An attack in Will County would bring the attention that terrorists seek and produce damage that could impact other areas of our country.

Each of the following hazard profiles provides a summary of their characteristics, the risk that they pose, and the vulnerabilities of the County that require the attention and planning of first responders and supporting agencies to protect the welfare of the public of Will County.

Future

What the economic future holds for Will County can only be estimated. The Chicago metropolitan area continues to grow outward into the surrounding counties. Of these collar counties, Will County is expected to be the fastest growing. It is forecasted that the area as a whole will grow by 25% while Will County is expected to grow over 50% within the next twenty years. This means that potentially 180 square miles of new land could be developed over this time frame. Most of this land would be used for residential purposes with some used for business and industrial use.



Source: Will County Land Use Department

The building of the South Suburban Airport is a factor that will have the greatest effect on the County's growth. If it is built, there will be a large demand for services, infrastructure, workers, housing, schools, etc. to support its function. This additional source for transportation of goods and people will increase the rate of business development. This means there will be more people and property to protect from hazards, more technology and businesses that may present a hazard, and more people and businesses that could attract or be affected by societal hazards.

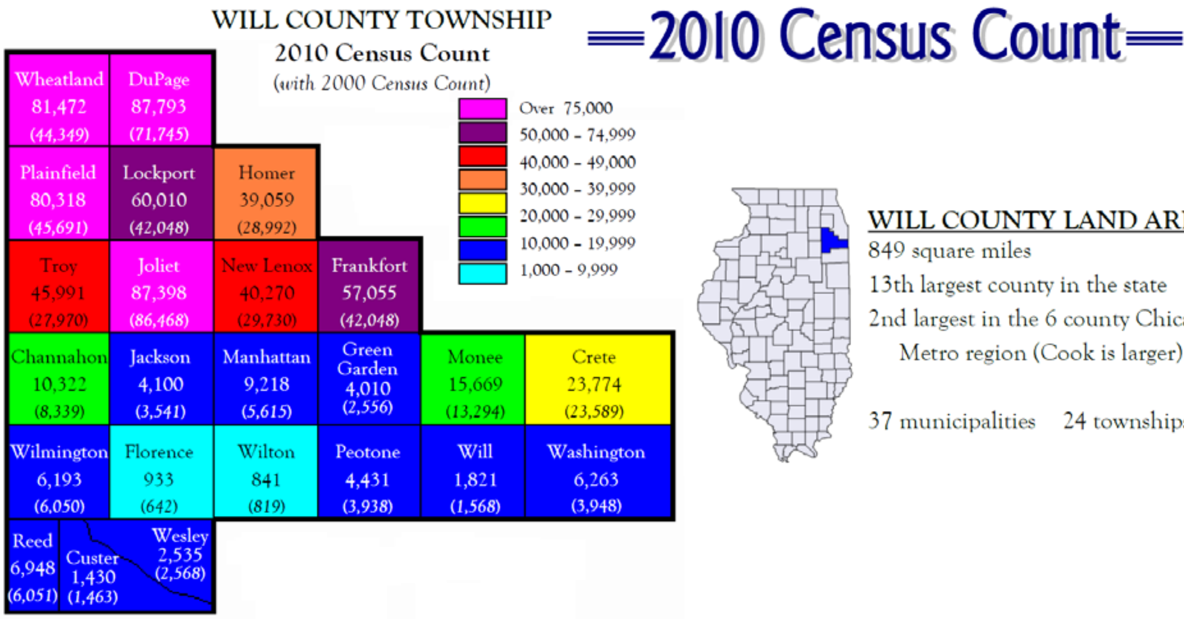
Assessing the risks, planning, mitigating hazards, and preparing for emergencies will remain essential activities to ensure the safety of Will County's residents. Routine updating of demographic data and careful tracking of hazards will be important and will require a coordinated effort of all agencies and municipalities responsible for a proactive approach through mitigation planning within Will County. The information concerning changes in hazards and risks and their impact on the County's population and assets will be critical in maintaining and updating mitigation plans.

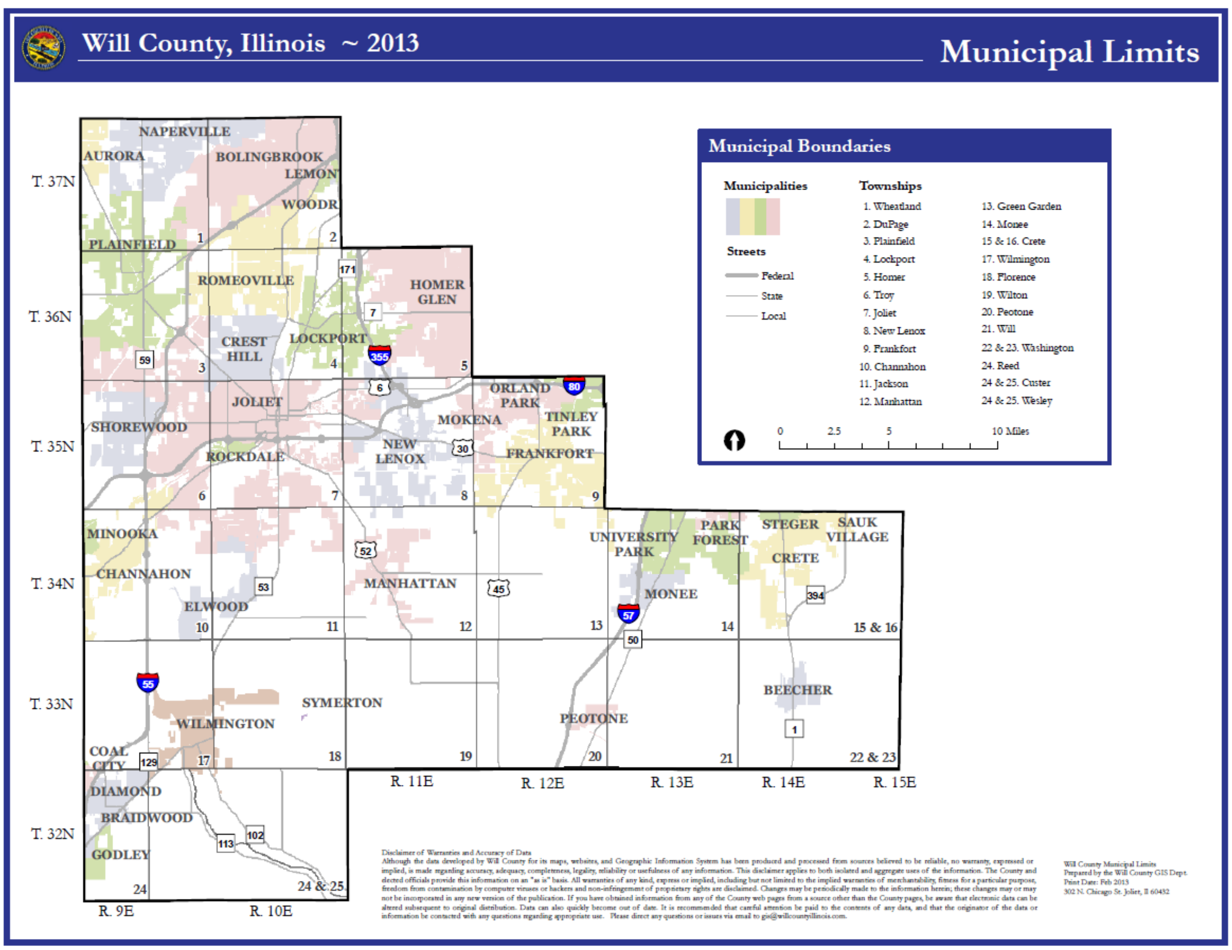
Will County Major Occupation Workforce (Source: EMSI 2012 & 2013.4 Class of Worker)	
Sales & Related	39,571
Government (2012)	33,802
Office & Admin. Support	31,859
Retail Trade (2012)	31,762
Healthcare & Social Assistance (2012)	27,466
Transportation & Material Moving	22,825
Manufacturing (2012)	21,246
Education, Training & Library	20,326
Food Prep. & Serving	18,065
Management	16,874
Production	15,851
Construction	14,109
Professional, Scientific & Technical Services	13,813
Wholesale Trade (2012)	13,725
Business & Financial	13,542
Personal Care & Service	13,376
Real Estate & Rental	9,904
Building, Grounds Cleaning & Maintenance	9,438
Installation, Maintenance & Repair	9,045

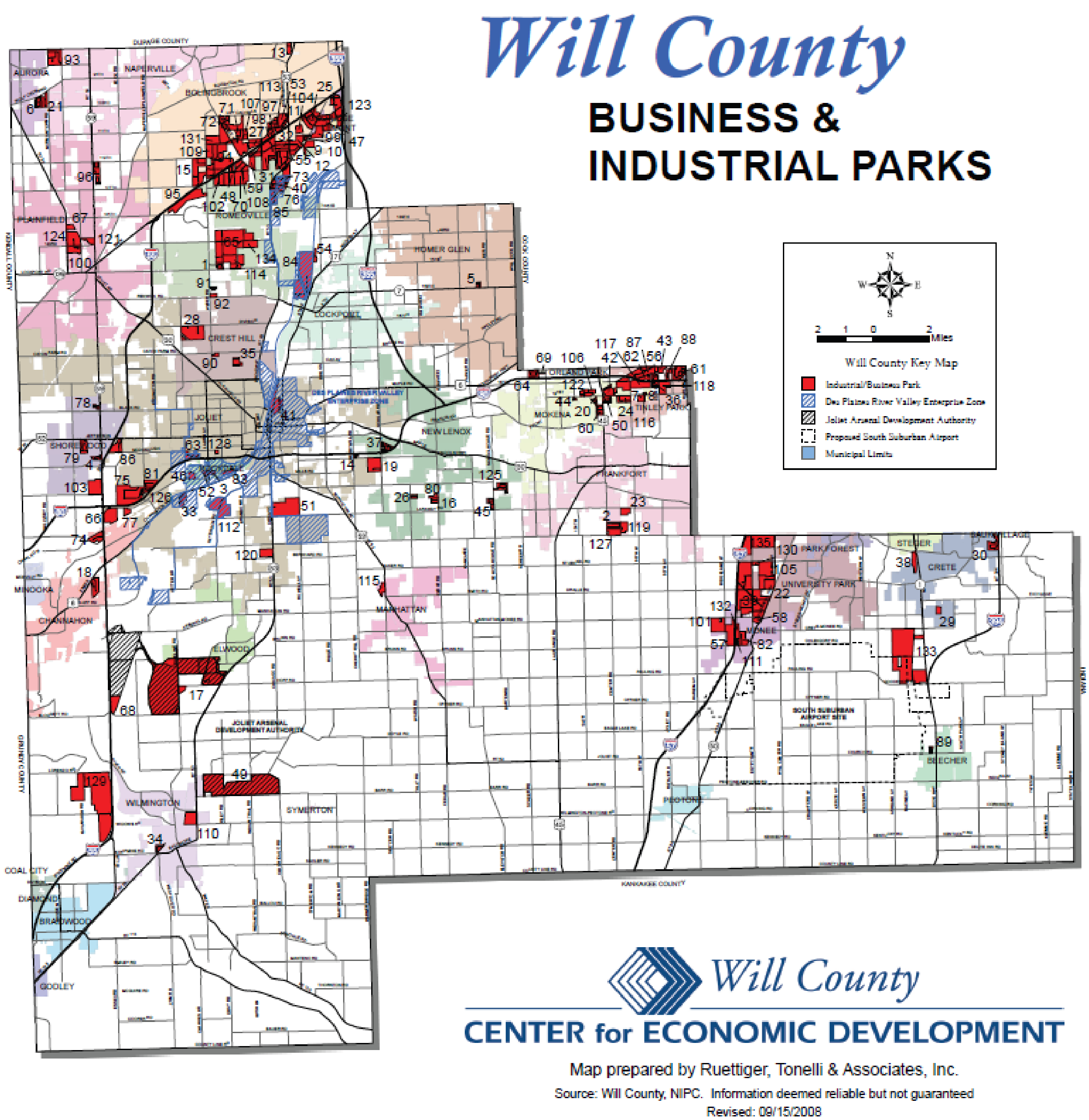
County Assets

Will County's assets lie in its people, institutions, businesses, infrastructure, land, and natural resources. The reason for conducting preparedness plans, such as this mitigation plan, is to evaluate the impact of hazards on these assets and to determine effective methods to protect people and property. The following charts and graphs summarize these assets.

Township Populations and Estimated Housing Units per Township (Source: U.S. Census Bureau 2010)			
Township	**Land Area (sq. mi.)**	**Total Population**	**Total Housing Units**
Channahon	35.7	10,322	3,486
Crete	44.4	23,744	10,286
Custer	26.4	1,430	612
Du Page	36.8	87,793	28,861
Florence	36.5	933	370
Frankfort	36.8	57,055	19,720
Green Garden	36.7	4,010	1,362
Homer	36.1	39,059	13,418
Jackson	36.1	4,100	1,610
Joliet	36.1	87,398	32,617
Lockport	36.6	60,010	22,016
Manhattan	36.9	9,218	3,199
Monee	35.9	15,669	6,182
New Lenox	35.9	40,270	13,721
Peotone	36.3	4,431	1,728
Plainfield	35.2	80,318	25,333
Reed	18.0	6,948	3,259
Troy	35.4	45,991	17,522
Washington	44.7	6,263	2,404
Wesley	28.5	2,241	891
Wheatland	35.8	81,472	25,075
Will	36.2	1,821	700
Wilmington	36.0	6,193	2,811
Wilton	36.3	841	318
Source: 2010 U.S. Census Bureau			


WILL COUNTY TOWNSHIP
2010 Census Count
(with 2000 Census Count)
2010 Census Count
Wheatland 81,472 (44,349)
DuPage 87,793 (71,745)
Plainfield 80,318 (45,691)
Lockport 60,010 (42,048)
Homer 39,059 (28,992)
Troy 45,991 (27,970)
Joliet 87,398 (86,468)
New Lenox 40,270 (29,730)
Frankfort 57,055 (42,048)
Channahon 10,322 (8,339)
Jackson 4,100 (3,541)
Manhattan 9,218 (5,615)
Green Garden 4,010 (2,556)
Monee 15,669 (13,294)
Crete 23,774 (23,589)
Wilmington 6,193 (6,050)
Florence 933 (642)
Wilton 841 (819)
Peotone 4,431 (3,938)
Will 1,821 (1,568)
Washington 6,263 (3,948)
Reed 6,948 (6,051)
Custer 1,430 (1,463)
Wesley 2,535 (2,568)
Over 75,000
50,000 - 74,999
40,000 - 49,000
30,000 - 39,999
20,000 - 29,999
10,000 - 19,999
1,000 - 9,999
WILL COUNTY LAND AREA
849 square miles
13th largest county in the state
2nd largest in the 6 county Chicago Metro region (Cook is larger)
37 municipalities 24 townships


Will County, Illinois ~ 2013
Municipal Limits
Municipal Boundaries
Municipalities
Streets
Federal
State
Local
Townships
1. Wheatland
2. DuPage
3. Plainfield
4. Lockport
5. Homer
6. Troy
7. Joliet
8. New Lenox
9. Frankfort
10. Channahon
11. Jackson
12. Manhattan
13. Green Garden
14. Monee
15 & 16. Crete
17. Wilmington
18. Florence
19. Wilton
20. Peotone
21. Will
22 & 23. Washington
24. Reed
24 & 25. Custer
24 & 25. Wesley
0 2.5 5 10 Miles
NAPERVILLE
AURORA
BOLINGBROOK
LEMONT
WOODRIDGE
PLAINFIELD
ROMEOVILLE
HOMER GLEN
CREST HILL
LOCKPORT
JOLIET
ORLAND PARK
MOKENA
TINLEY PARK
SHOREWOOD
NEW LENOX
FRANKFORT
ROCKDALE
MINOOKA
UNIVERSITY PARK
PARK FOREST
STEGER
SAUK VILLAGE
CHANNAHON
CRETE
MANHATTAN
MONEE
ELWOOD
SYMERTON
BEECHER
WILMINGTON
PEOTONE
COAL CITY
DIAMOND
BRAIDWOOD
GODLEY
T. 37N
T. 36N
T. 35N
T. 34N
T. 33N
T. 32N
R. 9E
R. 10E
R. 11E
R. 12E
R. 13E
R. 14E
R. 15E

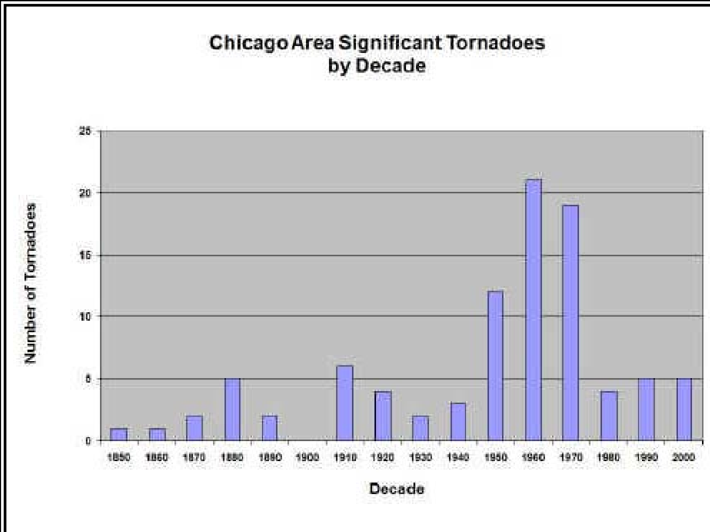

Will County
BUSINESS &
INDUSTRIAL PARKS
Will County Key Map
Industrial/Business Park
Des Plaines River Valley Enterprise Zone
Joliet Arsenal Development Authority
Proposed South Suburban Airport
Municipal Limits
Will County
CENTER for ECONOMIC DEVELOPMENT
Map prepared by Ruettiger, Tonelli & Associates, Inc.
Source: Will County, NIPC. Information deemed reliable but not guaranteed
Revised: 09/15/2008

Township	Structures Vulnerable to All Hazards by Type and Value								
	Residential	Residential Value ($)	Commercial	Commercial Value ($)	Industrial	Industrial Value ($)	Agriculture	Agriculture Value ($)	Value Total ($)
Channahon	3,878	675,868,992	102	40,922,355	227	1,453,341,177	114	7,138,371	2,177,270,895
Crete	10,089	1,101,782,532	481	163,047,126	63	38,257,407	622	53,302,122	1,356,389,187
Custer	569	88,165,206	16	3,077,085	9	2,984,784	378	26,674,344	120,901,419
DuPage	27,053	5,017,542,087	675	1,015,605,807	789	2,902,293,444	55	3,622,071	8,939,063,409
Florence	377	48,952,410	6	2,090,931	8	20,357,517	320	42,606,090	114,006,948
Frankfort	21,281	5,263,794,348	1,318	1,021,057,305	592	431,220,501	209	19,713,603	6,735,785,757
Green Garden	1,449	369,203,754	18	13,041,411	32	829,959	777	107,640,324	490,715,448
Homer	14,685	3,653,316,654	349	378,555,435	91	27,576,231	368	38,886,186	4,098,334,506
Jackson	1,799	243,103,104	79	38,884,005	128	286,755,189	366	46,125,036	614,867,334
Joliet	28,313	2,266,532,601	2,420	981,284,967	444	210,605,247	230	38,945,043	3,497,367,858
Lockport	21,589	2,838,530,742	1,002	468,281,307	528	437,229,783	184	16,858,059	3,760,899,891
Manhattan	4,603	650,654,550	139	43,044,960	59	58,081,407	524	61,677,771	813,458,688
Monee	5,318	589,369,335	252	127,124,805	196	457,120,284	413	43,533,549	1,217,147,973
New Lenox	15,373	3,421,590,378	417	336,463,518	619	335,405,094	271	19,874,829	4,113,333,819
Peotone	1,485	223,927,461	133	42,053,043	26	8,822,277	531	53,656,233	328,459,014
Plainfield	27,537	4,504,442,883	905	697,411,857	135	77,626,905	142	13,063,140	5,292,544,785
Reed	3,783	390,201,933	99	21,132,120	75	1,428,096,942	122	3,925,611	1,843,356,606
Troy	18,520	2,835,744,486	759	825,802,518	279	365,672,808	194	20,885,514	4,048,105,326
Washington	2,740	336,374,319	121	44,249,208	30	11,833,752	874	88,751,451	481,208,730
Wesley	1,235	106,500,036	3	742,764	9	5,417,871	357	32,386,674	145,047,345
Wheatland	27,007	8,253,544,446	380	502,419,507	364	184,579,290	178	21,583,461	8,962,126,704
Will	350	50,518,992	29	10,570,215	69	5,739,555	608	49,488,759	116,317,521
Wilmington	2,344	302,154,084	368	98,760,807	6	42,946,374	170	14,310,993	458,172,258
Wilton	175	30,691,350	3	550,299	-	-	541	51,710,448	82,952,097
Will County TOTALS:	241,552	43,262,506,683	10,074	6,876,173,355	4,778	8,792,793,798	6,275	876,359,682	59,807,833,518

TORNADOES

Hazard Characterization

A tornado is defined as a local atmospheric storm of short duration composed of winds rotating at very high speeds, usually moving in a counter-clockwise direction. It is visible as a vortex, a whirlpool-like column of winds rotating around a hollow cavity in which centrifugal forces produce a partial vacuum. Conditions leading to tornadoes often result in other dangerous storm activities such as severe thunderstorms, high winds, lightning, hail, and heavy rain. Tornado formation requires the presence of air layers that differ in temperature, moisture, density, and wind flow. The rotary winds twist and rip at structures and the tornado's central vacuum creates explosive pressure changes. Tornadoes, one of nature's most violent storms, tend to be short-lived but intensely menacing. They have the potential to destroy everything in their path and pose a significant threat to life.



National Weather Service: Chicago, IL Weather Forecast Office

Most tornadoes have a three-stage life cycle where they develop, mature, and dissipate. The average path of a tornado is approximately one-eighth mile wide and three miles long with a wind speed of forty or more miles per hour; however, tornadoes have been recorded that have traveled a path over one mile wide and almost three-hundred miles long. Frequency of tornadoes varies by season, but in Illinois, most occur from April through July during the late afternoon usually when there is warm, humid, and unsettled weather. Of the 1,200 tornadoes that occur in the United States each year, roughly 3% result in casualties. Improved warning systems have drastically reduced tornado related deaths since the 1950's.

Tornado intensities have been measured by the Fujita Damage Scale which rates tornadoes based on damage caused and not size of storm. The scale ranges from F1 to F12; however, no tornadoes have measured over F5.

Weak tornadoes (F0-F1):

- Represent 80% of all tornadoes with less than 5% of tornado deaths.
- Their time span ranges from one to over ten minutes long.
- They can have a path length of up to three miles and a wind speed of 60 to 115 miles per hour.

Strong tornadoes (F2-F3):

- Comprise 19% of all tornadoes with less than 30% of tornado deaths.
- Their time span is 20 minutes or longer, their path length is in excess of 15 miles.
- Their wind speeds range from 110 to 205 miles per hour.

Most unusual are the violent tornadoes (F4-F5):

- They represent 1% of all tornadoes but constitute 70% of all tornado deaths.
- Violent tornadoes last an hour or longer, have a path length in excess of 50 miles.
- They have recorded wind speeds of over 200 miles per hour.

The Fujita scale has been in use for 42 years. It has been a useful tool for categorizing tornadoes; however, the scale's primary limitations are a lack of damage indicators, no account of construction quality and variability, and no definitive correlation between damage and wind-speed. Researchers, building on the original Fujita Scale, developed the Enhanced Fujita Scale to overcome these limitations. This new scale is still a set of wind estimates (not measurements) based on damage. It uses three-second gust estimates at the point of damage based on a judgment of 8 levels of damage to 28 indicators. The use of the Enhanced Fujita Scale began in 2007.

ENHANCED FUJITA SCALE		
CATEGORY	**3 SECOND GUST (mph)**	**EFFECTS**
EF0	65 – 85	Light damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
EF1	86 – 110	Moderate damage. Roofs severely stripped: mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken
EF2	111 – 135	Considerable damage. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	136 – 165	Severe damage. Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	166 – 200	Devastating damage. Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
EF5	> 200	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (109 yd); high-rise buildings have significant structural deformation; incredible phenomena will occur.

History

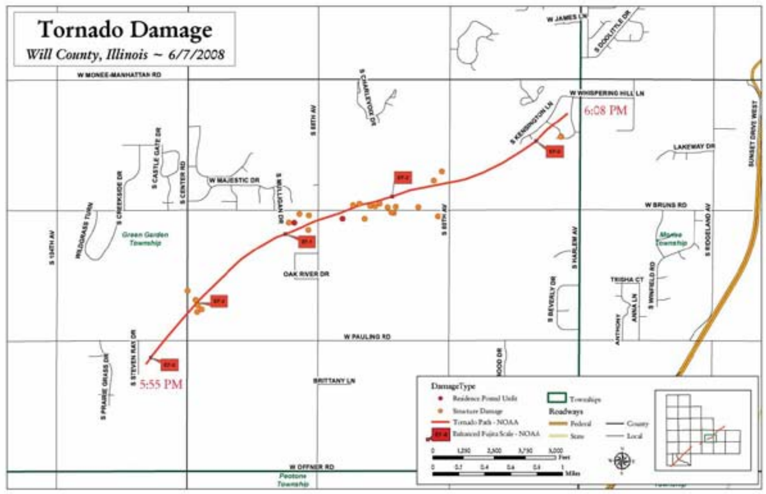
Statewide, Illinois is ranked high in terms of the number of tornadoes and tornado impacts (damages, deaths, and injuries). In fact, Illinois has experienced some of the worst tornadoes in U.S. history. The infamous Tri-State tornado occurred on March 18, 1925, passing through southern Missouri, Illinois, and Indiana, leaving 695 dead and 2000 injured. The Mattoon tornado of May 26, 1917, left 101 dead and 638 injured.

Will County has experienced sixty tornadoes since 1950 or roughly an average of one tornado per year. Most have been weak tornadoes over this time period, ten have been strong storms, and one was a violent F5. The strong storms that have occurred over the years have also impacted the lives and property of the County's citizens.

IMPACT OF TORNADOES ON WILL COUNTY
(Source: National Climatic Data Center / WC EMA)

Location	Date	Magnitude	Deaths/ Injuries	Property Damage	Federal Declaration
Peotone	05/18/1883	F2	2 Injured		
Channahon	06/10/1890	F2			
Manhattan	05/26/1917	F4	3 Dead 60 Injured		
Channahon/ Romeoville	03/28/1920	F4	20 Dead 300 Injured		
Braidwood	04/07/1948	F3	1 Injured		
Joliet	08/15/1858	F2			
Will County	04/16/1960	F1		$3 K	
Will County	07/02/1960	F1		$250 K	
Will County	04/23/1961	F3	4 Injured	$2.5 M	
Will County	09/22/1961	F1		$25 K	
Will County	11/12/1965	F2	2 Dead 90 Injured	$25 M	
Will County	04/25/1967				DR-227
Will County	06/10/1967	F1		$25 K	
Will County	06/30/1969	F1		$250 K	
Will County	04/06/1972	F2	1 Dead 22 Injured	$750 K	
Joliet	07/17/1972	F3			
Will County	07/27/1973	F1		$25 K	
Will County	06/30/1977	F0		$28 K	
Will County	06/25/1978	F1	1 Dead	$253 K	
Will County	06/29/1979	F0	1 Injured	$25 K	
Will County	04/03/1982	F0		$250 K	
Will County	04/27/1984	F3	1 Dead 5 Injured	$2.5 M	●
Will County	06/13/1984	F1		$500 K	
Wilmington/ New Lenox	04/05/1988	F2			
Will County	05/08/1988	F1	4 Injured	$750 K	
Will County	05/09/1988	F2	3 Injured	$1 M	
Will County	08/28/1990	F5	29 Dead 350 Injured	$250 M	DR-878
Will County	03/27/1991	F3	7 injured	$50 M	
New Lenox	08/15/1993	F2	2 Injured	$1 M	
Beecher	04/26/1994	F1		$100 K	
Plainfield	06/02/1995	F0		$2 K	
Mokena	07/18/1997	F1	2 Injured		
Plainfield	08/25/2001	F0			
Joliet/ Wilmington	05/30/2003	F1		$60 K	
Joliet/ Beecher	04/20/2004	F1		$5 M	DR-1513
Plainfield	04/26/2007	EF0		$100 k	
Bolingbrook	08/05/2007	EF0		$40 K	
Godley/ Wilton Center/ Monee	06/07/2008	EF2	6 Injured	$6.55 M	
Plainfield	08/04/2008	EF1		$500 K	
Peotone	10/26/2010	EF2	2 Injured	$500 K	
Wilton Center	06/12/2013	EF0		$35K	
Will County	11/17/2013	EF2	3 Injured	TBD	DR-4157

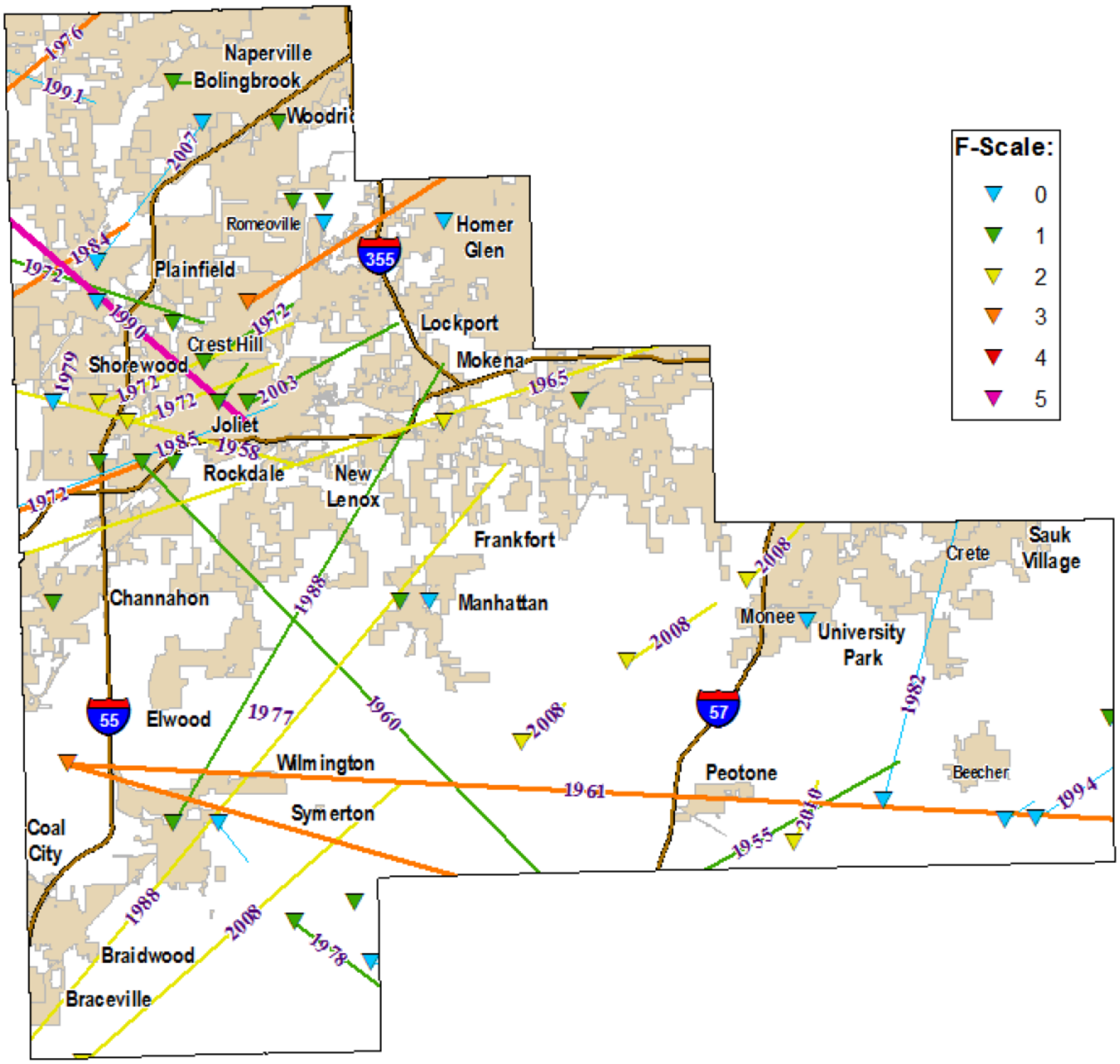
Though there are no absolutes and you can see from the table of Impact of Tornadoes on Will County that tornadoes can occur at any time of year, but are more likely to happen between 3PM and 7PM during April, May and June. Each occurrence has the potential of being an EF5 tornado with a detrimental impact on the lives and economic factors of the community. Thus, it is important to have an understanding of how tornadoes occur, how to educate and notify the public of their impending occurrence, and how to prepare and recover from the storm.



The most important mitigating factor is advanced warning which does not prevent property damage but does save lives. The Emergency Alert System (EAS) is a national system used by state and local governments to disperse emergency information by connecting the agencies with media and broadcasting stations. Along with the EAS, Will County Emergency Management Agency (WCEMA) also monitors the State EOC's State Primary station (45.44 MHZ) and the National Weather Service's (NWS) NOAA weather radio (162.425 MHZ) out of Chicago. The NWS monitors atmospheric conditions and issues a Tornado Watch when formation of a tornado is possible. When a tornado is sighted, the NWS issues a Tornado Warning identifying the tornado's location, direction it is moving, and speed.

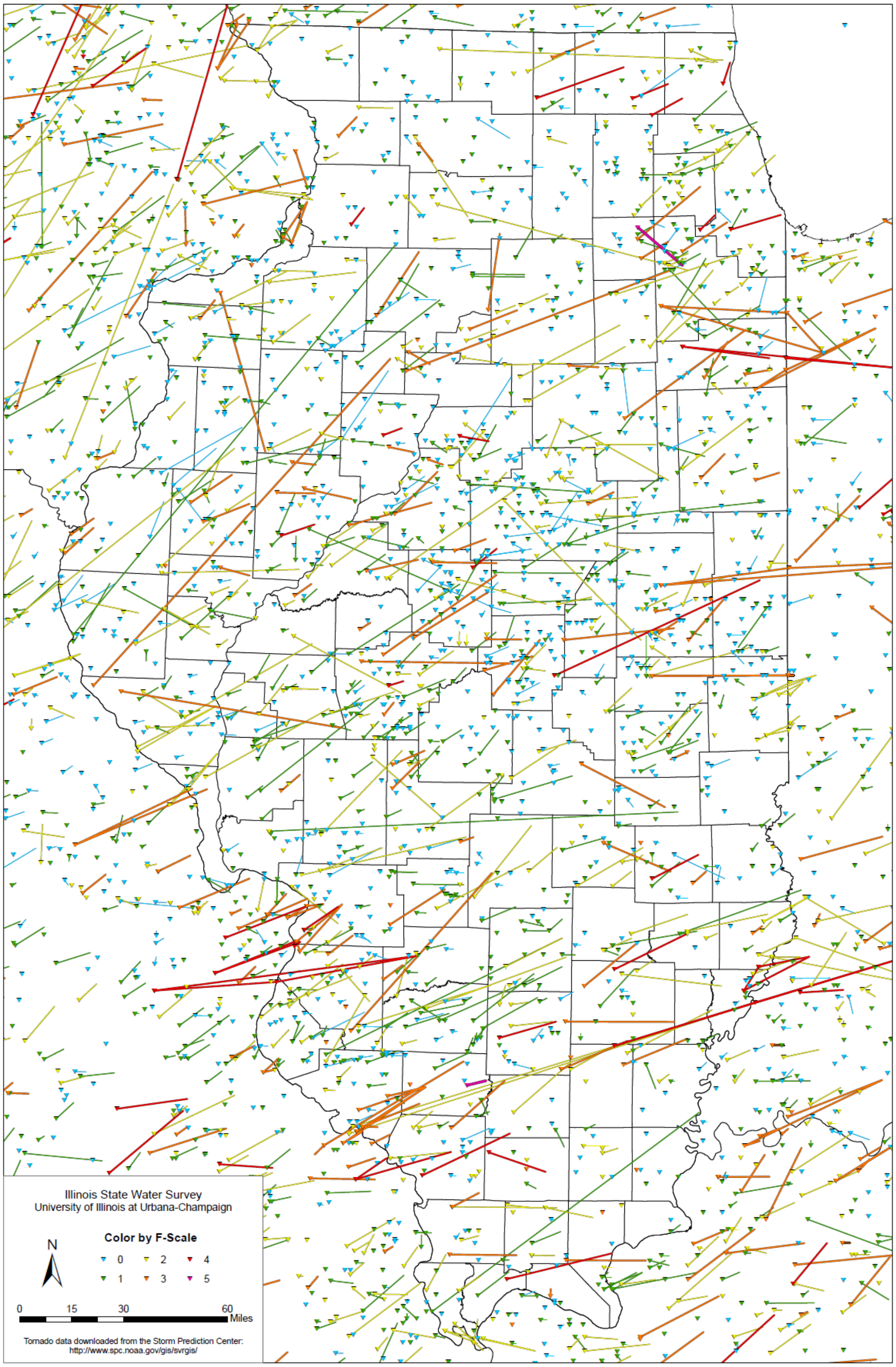
Will County has outdoor warning sirens and an enhanced emergency alert system used to notify registered public that an emergency exists through email, pagers, cell phone text message, or voice message on home phones. These various information sources are used to create a web of redundancy. This system of cross monitoring protects the public should one notification mode fail to forward the information.   Tornado preparedness information is listed on the WCEMA website. Because tornadoes are so prevalent within the County, everyone must be prepared for the potential hazard so that they can respond promptly and efficiently.

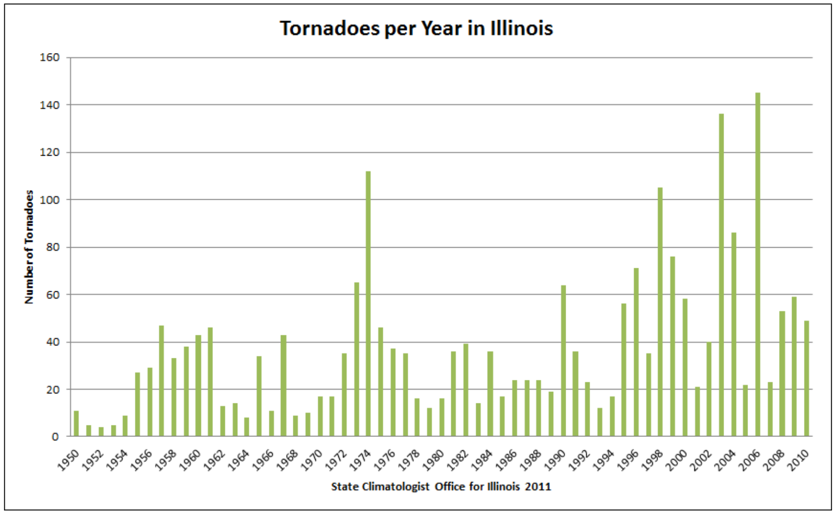
Will County Tornadoes: 1950 to 2010

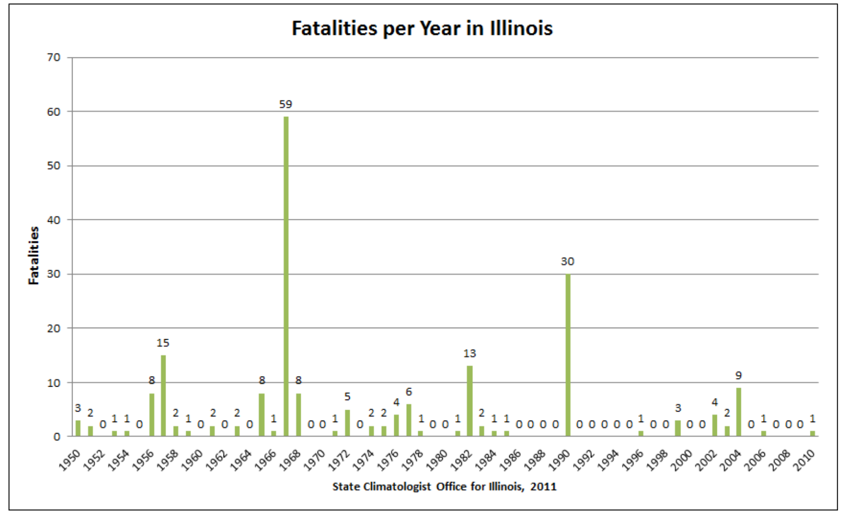


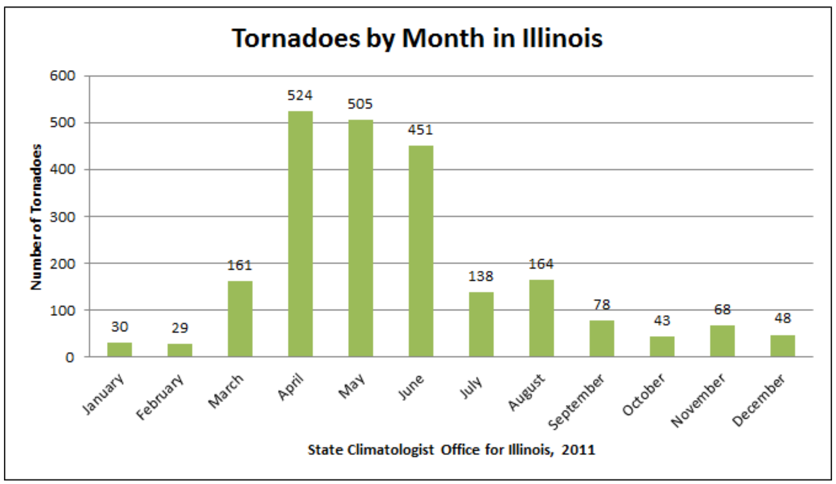
Source: NWS SPC GIS Data Site – http://spc.noaa.gov/gis/svrgis

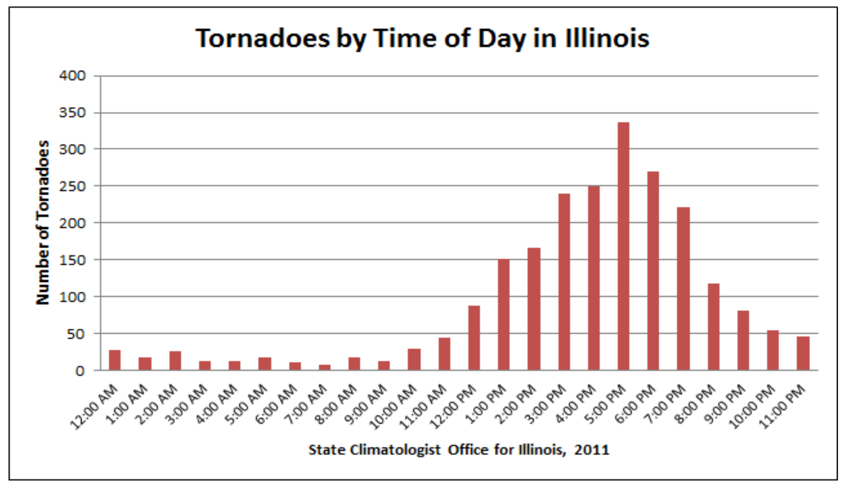
Tornado tracks and touchdowns, 1950-2010





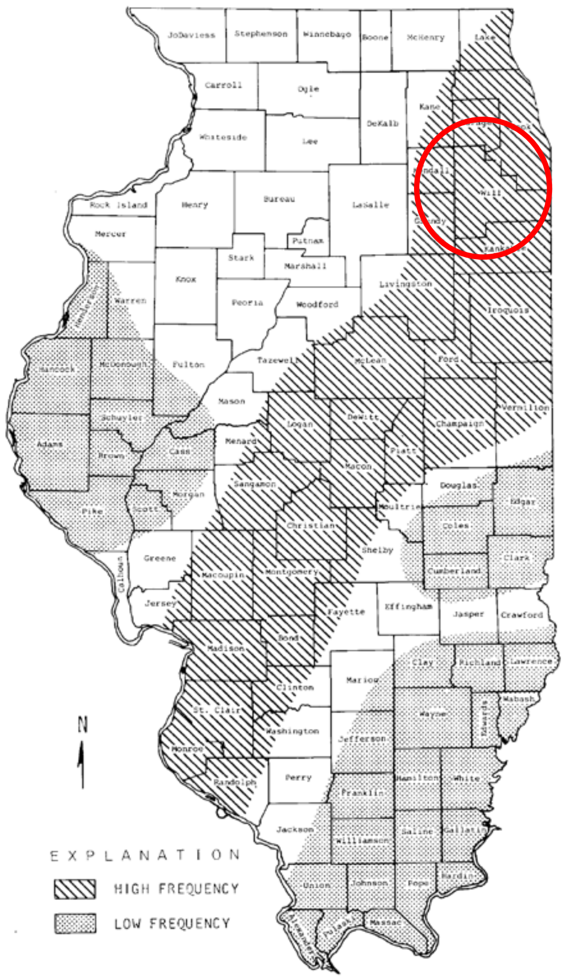




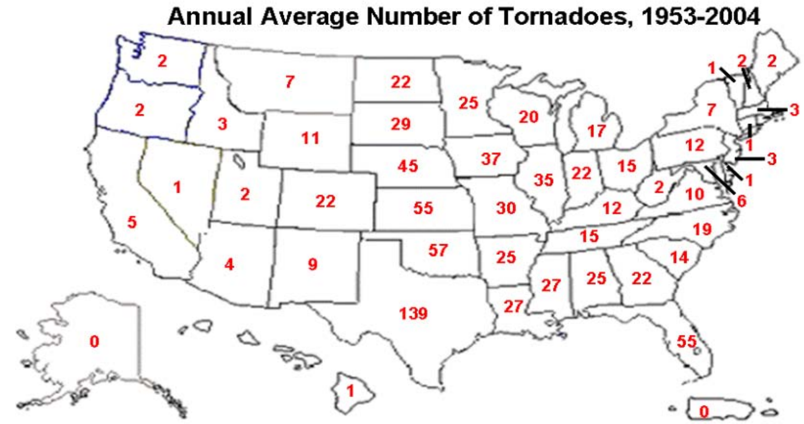


Source: Tornado Plots for Illinois, Illinois State Water Survey

Areas of Relative Tornado Frequency in Illinois



Available from: http://www.sws.uiuc.edu/pubdoc/C/ISWSC-103.pdf

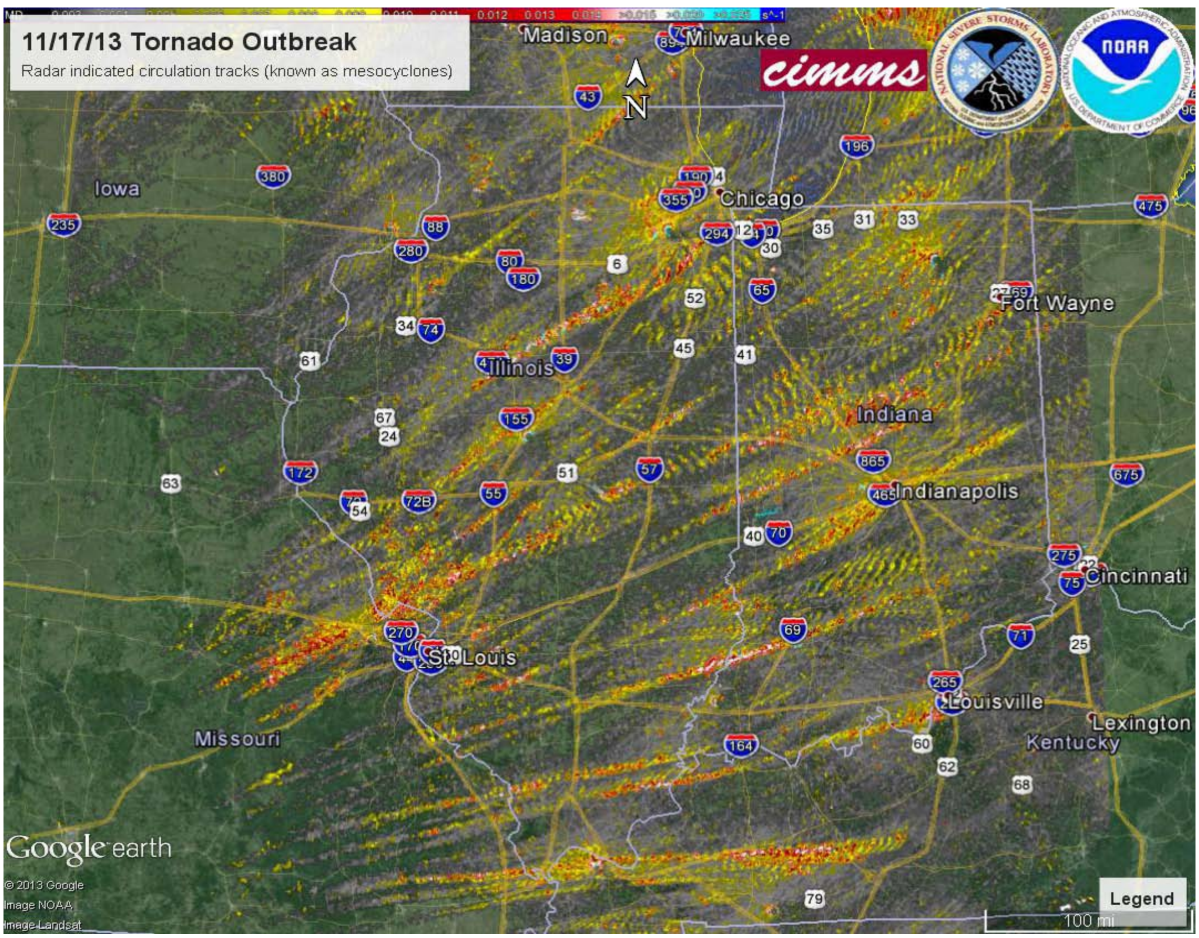


Available from: http://www.ncdc.noaa.gov/img/climate/research/tornado/avgt5304.gif

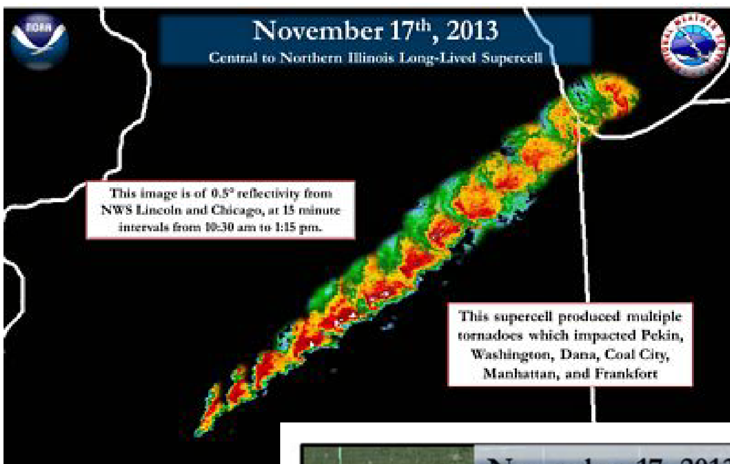
Source: AccuWeather.com

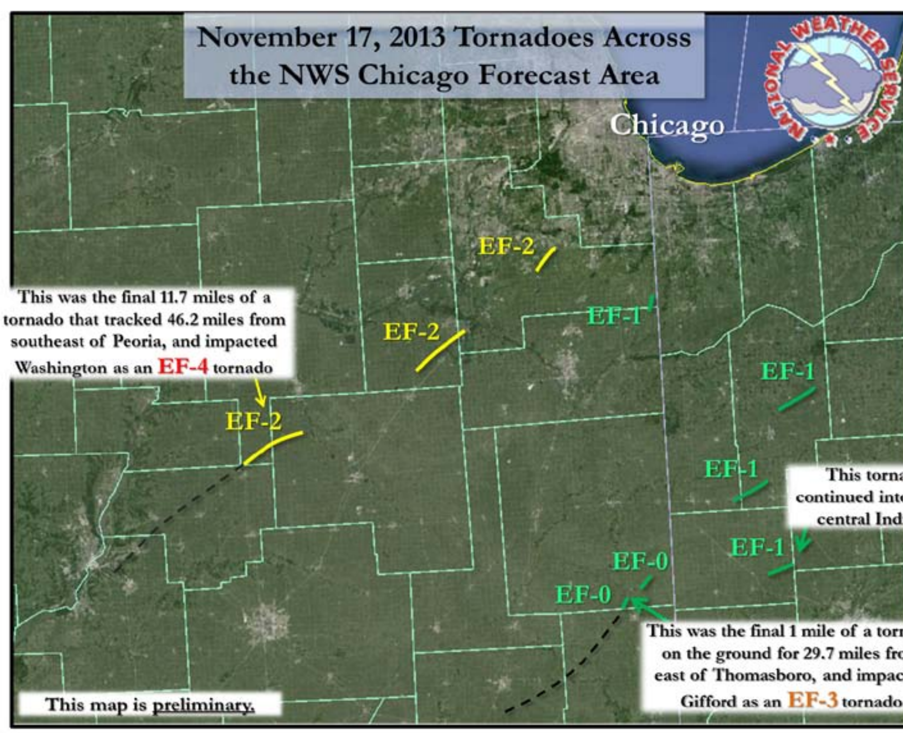
Severe Storms and Tornado – November 17, 2013
Federal Disaster Declaration #4157
Individual Assistance - $23,397 (76 referrals)
Public Assistance - unavailable

The potential for severe weather was detected several days in advance. As early as Thursday morning, November 14, most of central and southeast Illinois was included in the severe weather outlook for Sunday. At that range, areas are highlighted if there is at least a 30% chance of receiving severe weather. The outlook from late Saturday morning, indicated a 45% chance of severe weather over much of the Midwest and a 10% chance of seeing significant severe weather (defined as either tornadoes of at least EF-2 strength, winds of 75 mph, hail of at least 2" in diameter, or any combination thereof) within 25 miles of any given point.

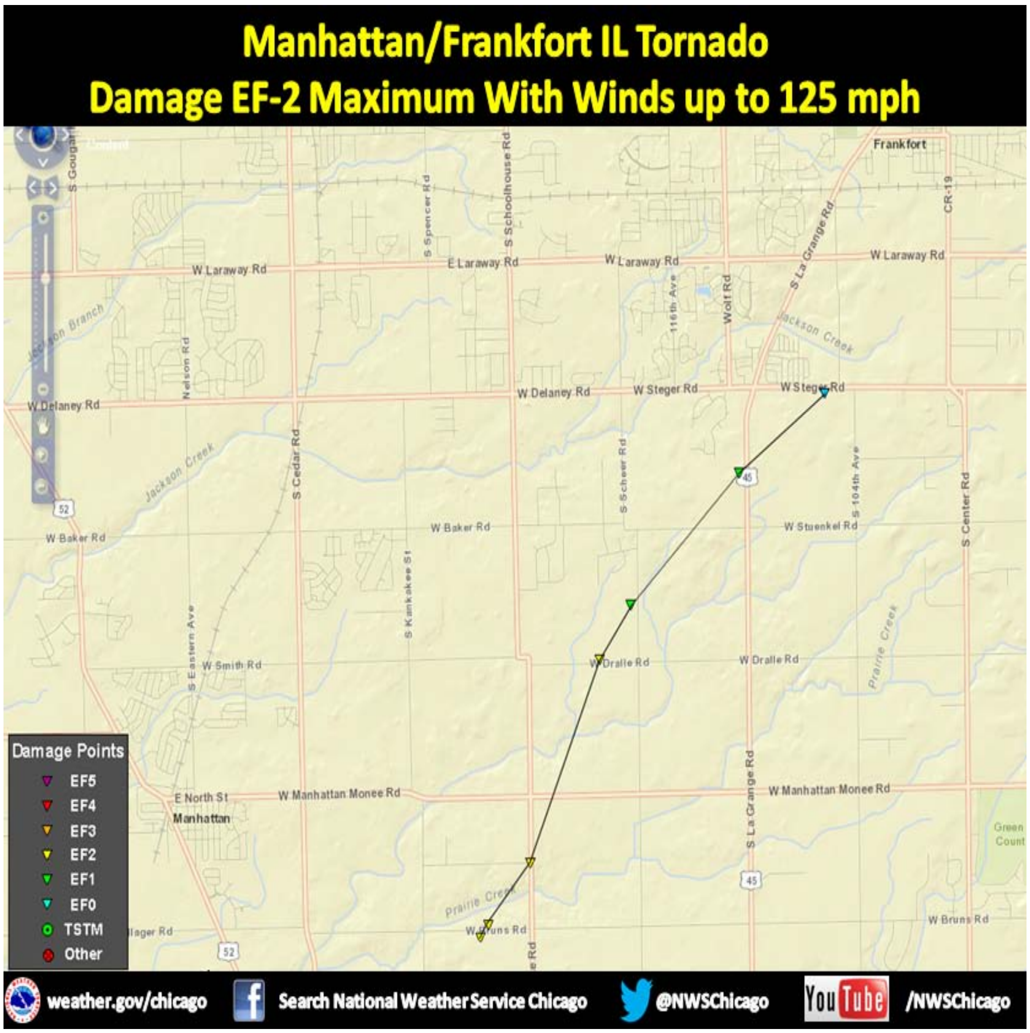


Around midnight Sunday morning, the outlook from the Storm Prediction Center highlighted eastern Illinois as being in a "high risk" of severe weather and by the 7 am update, expanded it further west to near I-55. At 8:40 am, Tornado Watch #561 was issued for most of Illinois. SPC declared this as a "Particularly Dangerous Situation" (PDS) watch, meaning there was a threat for several intense, long-track tornadoes, potential for many reports of large hail over 2 inches in diameter, and damaging wind gusts potentially in excess of 80 mph. The NWS offices in Lincoln, Chicago, Milwaukee, Davenport, and St. Louis participated in a conference call with SPC around 8:30 am to discuss the issuance of this watch.

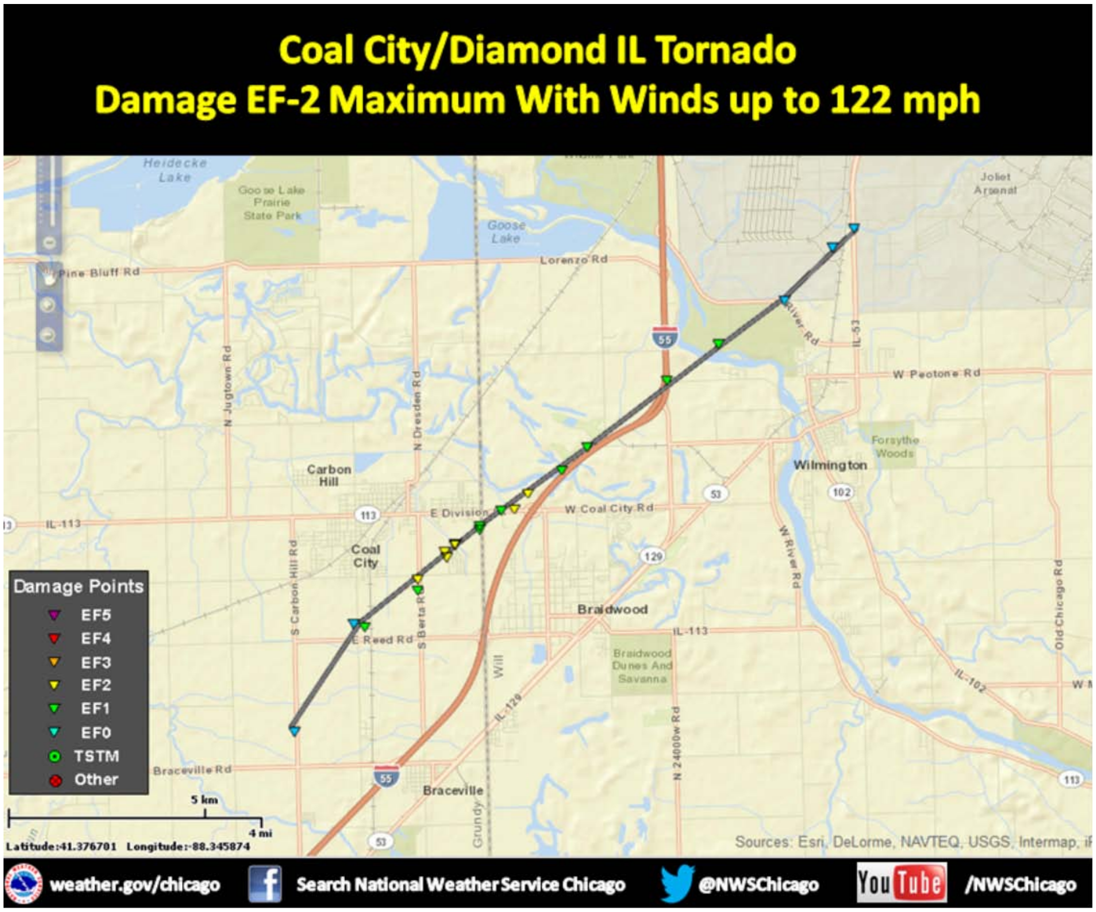




The severe storms and tornadoes left significant damage in Diamond and the area from Manhattan to Frankfort. Fifteen Illinois counties, including Will County, were granted federal disaster declarations on November 26, 2013. Local, State and Federal agencies are currently working to assess the damage incurred from the storms.



Source: National Weather Service Weather Forecast Office



Source: National Weather Service Weather Forecast Office

Plainfield Tornado – August 29, 1990
Federal Disaster Declaration #878
Public Assistance - $6,053,773
Individual Assistance – unavailable

The Plainfield F5 storm occurred August 28, 1990, causing damage predominantly in the Plainfield area. Before the tornado developed, the severe thunderstorm produced wind gusts in the 80-100 mph range. The F5 tornado was on the ground for over 16 miles, touching down first near Oswego and lifting 20 minutes later in Joliet. It killed twenty-nine people, injured 350 people, and caused damages of $250 million. Developing beyond the usual tornado season, this fast forming and deadly storm caught everyone off guard. The storm was a testament that tornadoes can occur any time of year. It also provided valuable information to the County and local agencies allowing improvement in preparedness, response, and recovery plans.

The Plainfield Tornado challenged both meteorologists and citizens in terms of tornado preparedness. Substantial safety measures were enacted in the years following the tornado; among these are frequent and regular tornado drills performed in schools. The development of Next Generation Radar (NEXRAD) contributes greatly to the ability of meteorologists to recognize tornadic activity. NEXRAD contained the ability to detect the wind speed and direction inside the storm. The ability to see rotation inside a storm on both the microscale (tornadic) and mesoscale (supercellular) measurements has allowed forecasters to issue severe thunderstorm and tornado warnings in more timely fashion and with a higher probability of detection.

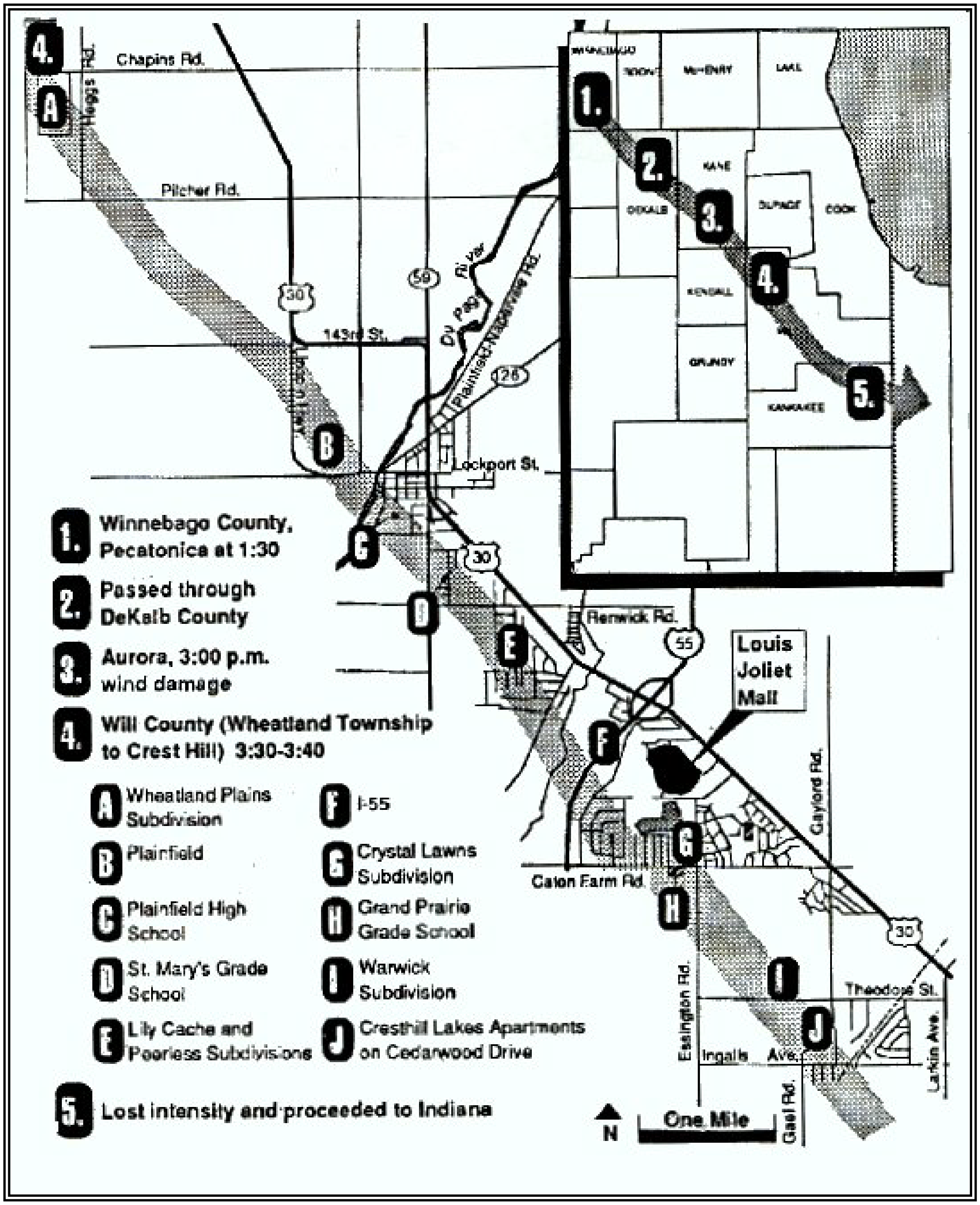
Damage Path of the Plainfield Tornado, August 28, 1990

Tornado Damage in Plainfield

Damaged Plainfield High School

AUGUST 29, 1990 - TORNADO DAMAGE ASSESSMENT		
Township	**Structure Type**	**Estimated Amount**
Wheatland	Residential	$5,200,000
Plainfield	Residential – 915 Homes	61,500,000
	Commercial	3,000,00
	High School Administrative Building Grade School	60,000,000
	Church & Private School	6,000,000
Troy	Condos – 19 units	685,000
	Apartments – 3 buildings	5,000,000
Joliet	Residential – 35 homes	2,225,000

PATH OF 1990 PLAINFIELD TORNADO



Mitigation Measures

With the number and intensity of tornadoes that have occurred in Will County, it is important to look at measures that can be taken to mitigate the impact of tornadoes on communities.

- Safe rooms were one action item that participants discussed. The expense to retrofit existing structures can be prohibitive, but the County and communities can encourage the construction and use of safe rooms in new construction.
- Through building codes, wind resistant construction and materials can be encouraged to make structures more resistant to wind storms. Communities adopting international building code standards are listed in Chapter 5, page 5-10.
- Forecasting of severe weather by the National Weather Service (NWS) continues to improve providing timely alerts advising the public to take cover. The County has been working together with the NWS, the U.S. Geological Survey, GIS, web-developers, and others to electronically link monitoring systems and use the latest communication tools to improve forecasting and alert systems in order to provide the public with real-time storm information.
- The County and communities have been distributing education materials on the dangers of severe weather and how to prepare through websites, social media, newsletters, news media, and community events. Some sources of preparedness materials include FEMA, American Red Cross, Illinois EMA, CDC, and Illinois Department of Public Health (IDPH).

Risk Characterization

A tornado can occur at any time of the year requiring the County to be prepared at all times. Since 1950, Illinois has averaged 37 tornadoes per year; however, 105 tornadoes were reported in 1998 and 107 in

1974. At least 24 tornadoes were reported during the storms of November 17, 2013. Out of all of the counties within Illinois, Will County has been ranked as one of the top counties in the state affected by tornadoes.

Due to the destructive nature of tornadoes and wind, these events impact human life, health, and public safety. Community-wide impacts include: utility damage and outages, infrastructure damage (transportation and communication systems), structural damage, and damaged or destroyed critical facilities. Tornadoes can also cause severe transportation problems and make travel extremely dangerous.

Impact: High

Damage to Buildings

Although tornadoes strike at random, making all buildings vulnerable, three types of structures are more likely to suffer damage:

- Mobile homes
- Homes on crawlspaces (more susceptible to lift)
- Buildings with large spans, such as airplane hangers, gymnasiums and factories

Structures within the direct path of a tornado vortex are often reduced to rubble. However, structures adjacent to the tornado's path are often severely damaged by high winds flowing into the tornado vortex, known as inflow winds. It is here, adjacent to the tornado's path, where the building type and construction techniques are critical to the structure's survival. Tornado impact to buildings is high.

Critical Facilities

Because a tornado can hit anywhere in the County, all critical facilities are susceptible to being hit. Schools are a particular concern for two reasons:

- They have large numbers of people present, either during school or as a storm shelter.
- They have large span areas, such as gyms and theaters.

The 1990 Plainfield tornado was an unfortunate example of this. It struck the Plainfield High School, Grand Prairie Elementary School, St. Mary Immaculate Church, and the gymnasium to the Church's elementary school. Cost to repair the two public schools was estimated at up to $35 million. The cost for the church and its school was $5 million. Other large span buildings were also affected in 1990. In addition to the schools and their gyms, hangers at the Aurora Airport and Joliet's Essington Road Fire Station were damaged.

Health and Safety

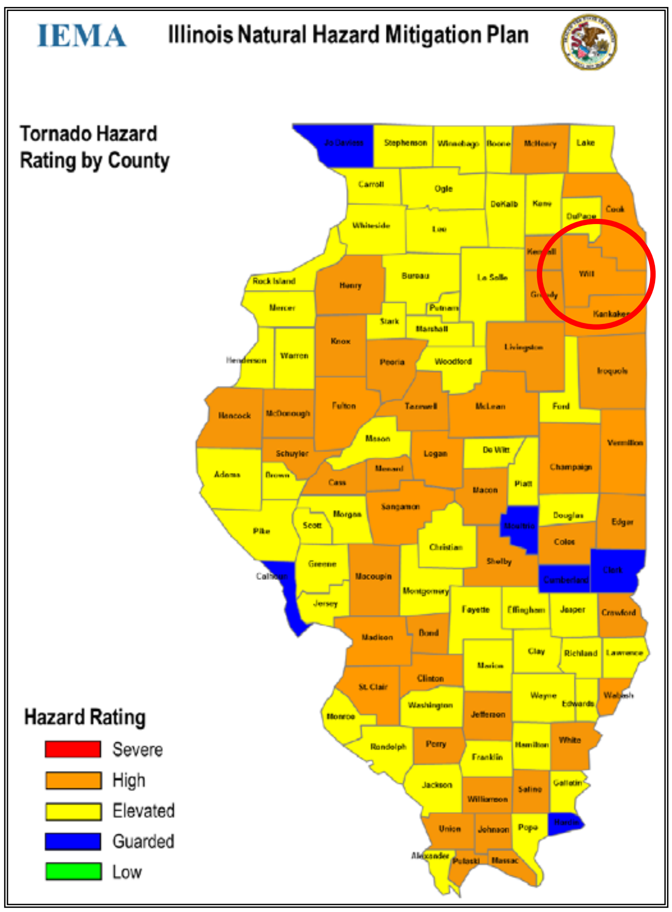
The numerous deaths and injuries incurred by tornadoes since the 1950's give testament to the threat Will County's population faces from tornadoes. Flying debris, collapsing structures, or being swept away by wind are just a few of the elements that may cause death or injury. Following a tornado, damaged buildings are a potential health hazard due to instability, electrical system damage, and gas leaks. Sewage and water lines may also be damaged. However, these problems would be localized. Impact upon people is high.

Economic Impact

The major impact of a tornado on the local economy is damage to businesses and infrastructure. A heavily damaged business, especially one that was barely making a profit, often has to be closed. The post-disaster damage report stated that at least 50 businesses were destroyed by the 1990 tornado.

Infrastructure damage is usually limited to above ground utilities, such as power lines. The 1990 tornado knocked out two 345,000 volt transmission towers, leaving 65,000 Com Ed customers without power. Damage to phone lines left 14,000 customers without service. Damage to utility lines can usually be repaired or replaced relatively quickly.

Damage to roads and railroads is usually localized. If it can't be repaired promptly, alternate transportation routes are usually available. Transportation was disrupted when highways were closed during the August, 1990, storm due to high winds and debris.



Public expenditures include search and rescue, shelters, transportation systems, and emergency protection measures. The large expenses are for repairs to public facilities and clean-up and disposal of debris. Most public facilities are insured, so the economic impact on the local treasury may be small. Clean-up and disposal can be a larger problem, especially with limited landfill capacity near the damage site. Preliminary damage assessments for public expenditures after the 1990 tornado totaled $4 million, 2/3 of that for debris clearance.

Future Occurrences

With 60 occurrences of tornadoes in Will County over the last 63 years, the likelihood of another tornado occurrence is approximately 95% in any given year. Tornadoes, like other climatological hazards, are not bound to a particular path or location; therefore, all jurisdictions within Will County have the same probability of being struck. The *2013 Illinois Natural Hazard Mitigation Plan* rates the tornado hazard for Will County as high.

TORNADO PROBABILITY		
Type	**Number of Occurrences Since 1950**	**Annual Mean**
Tornadoes	60	.95

WINTER / ICE STORMS

Hazard Characterization

The National Weather Service refers to Winter Storms as the *Deceptive Killers* because most deaths are indirectly related to the storm. Instead, people die in traffic accidents on icy roads and of hypothermia from prolonged exposure to cold. A winter storm is considered to be severe when:

- Six or more inches of snow have fallen within a forty-eight hour period;
- A snow storm has produced conditions, such as high winds, leading to property damage, death, or injuries regardless of the amount of snowfall;
- There is a glaze storm in which ten percent of the cooperative U.S. Weather Bureau substations in Illinois have reported glaze; or
- There is a glaze storm in which property damage, deaths, or injuries have occurred.

Snow and ice are threats to most of the U.S. during the northern hemisphere's winter, which begins December 21st and ends March 21st. During the early and late months of the winter season, snow becomes warmer, giving it a greater tendency to melt on contact or stick to the surface. The beginning and end of the winter season also brings a greater chance of freezing rain and sleet.

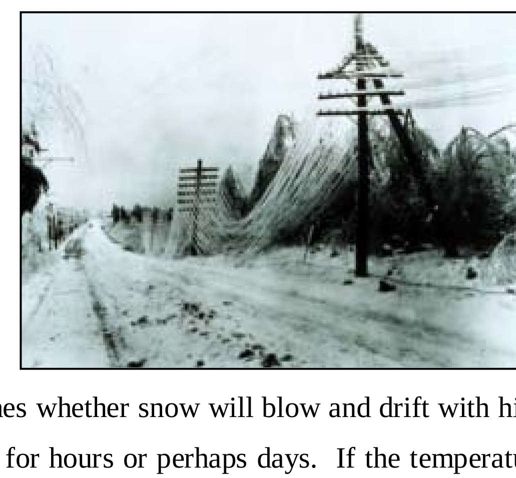
There are many ways for winter storms to form, but certain key ingredients are needed. First temperatures must be below freezing in the clouds and near the ground. There must be a source of moisture in the form of evaporating water. Severe winter storms are fueled by strong temperature gradients and an active upper-level cold jet stream. When you hear the term "severe winter storm warning", freezing temperatures, heavy snowfall, or freezing rain come to mind. There are three categories of winter storms:

Blizzard:	This is the most dangerous of all winter storms. A blizzard combines low temperatures, heavy snowfall, and winds of at least 35 miles per hour, reducing visibility to one-quarter mile or less for at least three hours.
Heavy Snow Storm:	Will produce six inches or more of snow in 48-hours or less.
Ice Storm:	Occurs when moisture falls and freezes immediately upon impact. Ice storms occur when cold air at the surface is overridden by warm, moist air at higher altitudes.

Winter and ice storms can cause widespread damage and disruption. Heavy snow or ice can paralyze transportation systems, cause automobile accidents, strand vehicles, damage building roofs, interrupt communication and electrical power service, adversely affect business continuity, or cause people to have heart attacks while shoveling heavy snow. Snow, along with high winds and extreme cold, can incapacitate the entire affected area. Temperature and wind produce a "wind chill factor" which applies only to people and other living things. Wind chill is based on the rate of heat loss from exposed skin. As wind increases, heat is carried away from the body at an accelerated rate that drives down the body temperature. Wind chill measures how cold the wind makes exposed skin feel and helps to predict the likelihood for frostbite or hypothermia.

Ice or glazing can also incapacitate an area and damage vegetation, buildings, and communication systems by downing utility lines and poles. Secondary effects of winter/ice storms are flooding, electrocution from downed power lines, or freezing to death when isolated or trapped by blizzard conditions. These storms also result in extensive damage because they can persist over longer periods of time than all other forms of severe weather. Winter/ ice storms cause devastating damage and pose a dangerous threat to life by shutting down normal day-to-day operations.

The amount and extent of snow or ice, air temperature, wind speed and event duration are characteristics of a severe winter storm. All of these combine to determine the severity of the storm.



Snow Storm: If melted, an inch of snow falling at 32 degrees contains twice the amount of water as an inch of snow falling at 10 degrees. This relationship determines whether snow will blow and drift with high winds that make conditions hazardous for hours or perhaps days. If the temperature is near freezing when snow falls, it rarely drifts. As the temperature falls farther from the freezing mark, then snow is lighter and more prone to blow and drift.

Ice Storm: Factors in how much damage will occur are the amounts of rain causing icing to take place, the strength of the wind, and whether or not the storm strikes an urban or rural area.

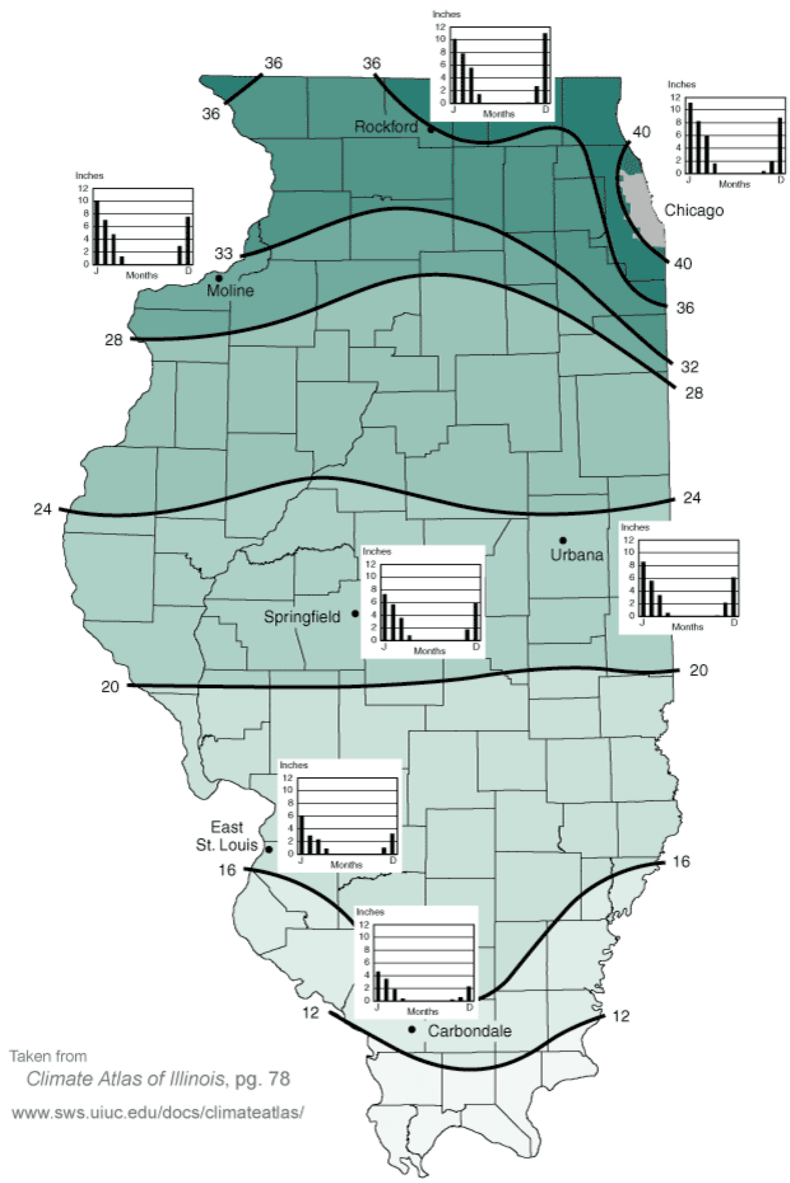
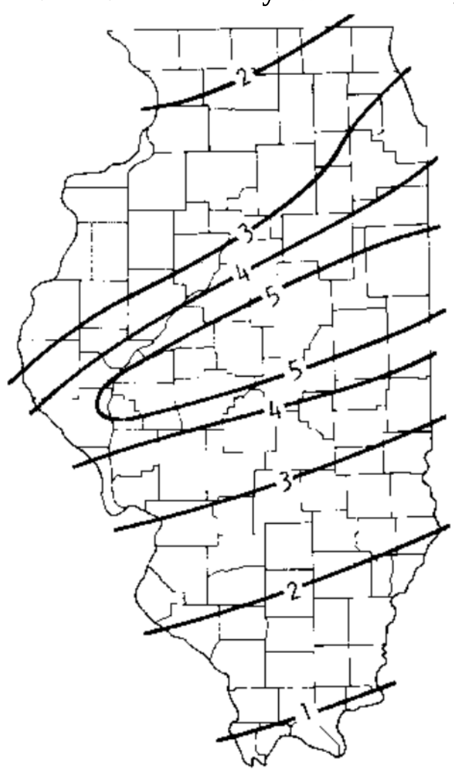


Figure 3-32. Average annual snowfall (inches), 1971-2000.

TERMS USED BY WEATHER FORECASTERS	
Freezing Rain	Rain that freezes when it hits the ground, creating a coating of ice on roads, walkways, trees and power lines.
Sleet	Rain that turns to ice pellets before reaching the ground. Sleet also causes roads to freeze and become slippery.
Winter Storm Watch	A winter storm is possible in your area.
Winter Storm Warning	A winter storm is occurring, or will soon occur in your area.
Blizzard Warning	Sustained winds or frequent gusts to 35 miles-per-hour or greater and considerable falling or blowing snow (reducing visibility to less than a quarter mile) are expected to prevail for a period of three hours or longer.
Frost/Freeze Warning	Below freezing temperatures are expected.
Source: Are You Ready?, FEMA, H-34/September 2002	

Average Annual Number of Days with Freezing Rain (ice)



Available from:
http://www.sws.uiuc.edu/atmos/statecli/Winter/figure6.htm

History

Will County has experienced over forty winter storm events since 1993. Federal Emergency Declarations of severe winter storms in Will County have occurred three times:

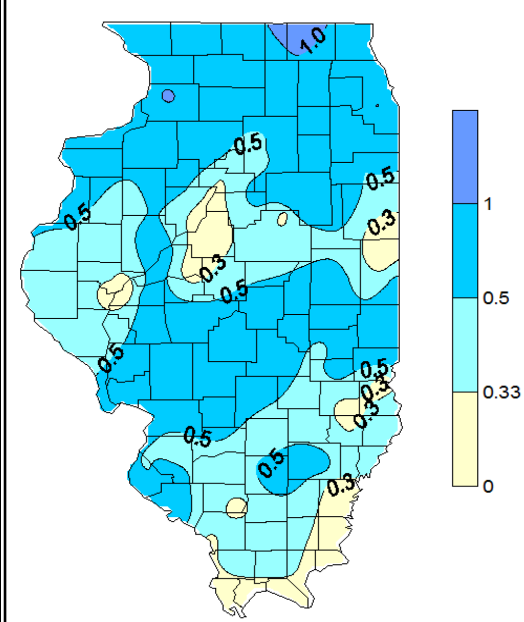
- January 16, 1979 with over $58 million in damages throughout Illinois
- January 8, 1999 with over $40 million in damages throughout Illinois
- January 17, 2001, with just under $23 million in damages throughout Illinois
- January 31 – February 3, 2011, approximately $250,000 damages in Will County

One of the worst winter storms to impact the State was on January 26-27, 1967, when as much as 23 inches of snow fell on Moline (Rock Island County) and the Chicago area, paralyzing O'Hare International Airport. Travel throughout Northern Illinois was curtailed and areas to the south experienced a glaze of ice which made travel virtually impossible until January 29, 1967. Fifty deaths were directly attributed to this storm.

Illinois has experienced a severe winter storm each winter for over a century and experiences an average of five severe storms per year during the November-April period. These storms may be those with only heavy snow, or with snow and ice mixed, or with ice (glaze) only. Although the average number of severe winter storms is five per winter, as many as 18 have occurred in one winter (1977-1978) and as few as two (1921-1922).

Severe winters are characterized by either extremely cold periods one to two months in duration, or by severe ice storms or heavy snowfalls occurring repeatedly over a period of six to twelve weeks. Ice storms tend to fill a 50-80 mile band between heavy snows to the north and rain to the south. Being in the northern portion of the state, Will County experiences an annual average of 140 days at or below 32°F and 36 inches of snow.

Average Number of Days with 6 or More Inches of Snowfall Per Winter 1971-2000



"0.33 days per winter" means one storm every 3 years, on average
"0.5 days per winter" means one storm every other year, on average

Source: Illinois State Water Survey, 2003

Winter Storm – January 8, 1999
Federal Emergency Declaration #3134
Public Assistance - $1,010,500

A winter storm struck portions of the Midwest on January 1 to 3, 1999, producing 9 to 22 inches of snow and northeast winds gusting to over 30 mph in the Chicago area. Soon after the snow ended, record low temperatures occurred on January 3rd and 4th with values of -20°F or lower. The governor of Illinois declared the entire state a disaster on January 4th. The worst impact was the storm's affect on transportation which was either halted or delayed for two to four days and the source of many accidents. Automobiles, trains, airplanes, boats, and snowmobiles were impacted. Issues that developed as a result of this winter storm included:

- County and municipalities incurred problems and high costs with snow removal – this proved to be the major share of public assistance.
- Major vehicle accidents occurred on roadways with deaths (1 in Will County) and injuries.
- Retail businesses closed, transportation of raw materials and finished goods were delayed, and schools closed.
- Stranded traveling motorists were housed in emergency shelters.
- Vehicles parked on city streets were buried as snow removal equipment tried to clear streets.
- Blood shortages occurred.

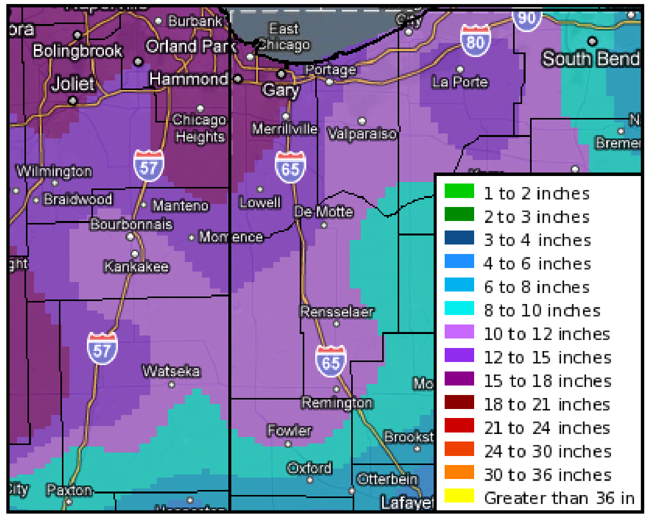
Fortunately, the storm was accurately predicted several days in advance allowing communities to prepare, was spread out over a long duration, and occurred on a long holiday weekend. Those factors helped mitigate the impact on transportation and commerce.

Severe Winter Storm and Snow – January 31 to February 3, 2011

Federal Disaster Declaration #1960

Public Assistance - $2,976,578

Northern Illinois and northwest Indiana were walloped by a powerful winter storm between January 31 and February 2, 2011. An initial period of light accumulating snow occurred from the evening of January 31st into the morning of February 1st, including lake effect snowfall over northeastern Illinois. From the afternoon of February 1st through the early morning of February 2nd, the snowstorm was accompanied by fierce winds, gusting to 50 to 60 mph and higher. The intense winds and heavy snow reduced visibility to near zero at times and produced widespread snowdrifts of 2 to 5 feet, and a few drifts of 10 feet or more.



Up to 18 inches of snow fell in Will County. This storm was classified as a blizzard, with sustained winds or frequent gusts of 35 mph or greater and severely reduced visibility for a prolonged period of time. Lightning was observed all across the region on February 1st and increased in frequency late that night.

Will County prepositioned cots throughout the County and anticipated that the assistance provided by the American Red Cross would be limited due to widespread difficult travel conditions. Most shelterees, in excess of 250, were rescued from stranded vehicles. Limited power outages occurred with small numbers of customers affected. The major issue was the clearing of roads being hampered by drifting snow and numerous abandoned vehicles.

The 2011 storm was also well forecasted. This allowed the County and communities to alert the public utilizing traditional news media along with website and social media tools. These communication tools were also used to provide the public with winter storm readiness tips. The advanced notice of the storm, better communications and planning, and better snow clearing techniques resulted in far less disruption. As a result, the number of stranded vehicles with this storm was much lower than the 1967 blizzard, but the photos and footage of the stranded vehicles on Lake Shore Drive have left an indelible imprint on the minds of many.

A major source for this information comes from the National Climatic Data Center (NCDC) which receives data from the National Weather Service (NWS). Following is the information collected for blizzards, cold/wind chill, extreme cold/wind chill, heavy snow, and ice storm. The following are additional winter events as defined by the NCDC.

Cold/Wind Chill	Period of low temperatures or wind chill temperatures reaching or exceeding locally/regionally defined advisory (typical value is -18°F or colder) conditions, on a widespread or localized basis.

Extreme Cold/Wind Chill A period of extremely low temperatures or wind chill temperatures reaching or exceeding locally/regionally defined warning criteria (typical value around -35°F or colder), on a widespread or localized basis.

IMPACT OF WINTER/ICE EVENTS ON WILL COUNTY (Source: National Climatic Data Center / WC EMA)						
Date	**Time**	**Type**	**Deaths**	**Injuries**	**Property Damage**	**Federal Declaration**
01/16/1979		Snow Storm				EM-3068
12/08/1995	12:00 PM	Winter Storm	0	0	0	
02/02/1996	12:00 AM	Cold/Wind Chill	3	0	0	
01/09/1997	12:00 AM	Winter Storm	0	0	0	
01/15/1997	06:00 AM	Winter Storm	0	0	0	
12/09/1997	06:00 PM	Heavy Snow	0	0	0	
01/09/1997	12:00 AM	Winter Storm	0	0	0	
01/15/1997	06:00 AM	Winter Storm	5	0	0	
12/09/1997	06:00 PM	Heavy Snow	0	0	0	
01/01/1999	07:00 PM	Heavy Snow	1	0	0	EM-3134
03/08/1999	05:00 PM	Heavy Snow	0	0	0	
01/19/2000	12:00 PM	Heavy Snow	0	0	0	
02/18/2000	03:00 AM	Heavy Snow	0	0	0	
12/11/2000	03:00 AM	Blizzard	0	0	0	EM-3161
01/30/2002	07:00 PM	Winter Storm	0	0	0	
03/02/2002	09:00 AM	Winter Storm	0	0	0	
01/23/2003	01:00 AM	Cold/Wind Chill	1	0	0	
03/04/2003	02:50 PM	Winter Storm	0	0	0	
01/04/2004	07:00 AM	Heavy Snow	0	0	0	
01/29/2004	06:00 PM	Cold/Wind Chill	0	0	0	
01/04/2005	07:00 PM	Heavy Snow	0	0	0	
01/21/2005	04:00 PM	Heavy Snow	0	0	0	
12/08/2005	05:00 PM	Winter Storm	0	0	0	
02/03/2007	06:00 PM	Extreme Cold/ Wind Chill	0	0	0	
02/06/2007	07:00 AM	Winter Storm	0	0	0	
02/13/2007	02:00 AM	Blizzard	0	0	0	
02/25/2007	04:00 PM	Winter Storm	0	0	0	

IMPACT OF WINTER/ICE EVENTS ON WILL COUNTY (Source: National Climatic Data Center / WC EMA)						
Date	**Time**	**Type**	**Deaths**	**Injuries**	**Property Damage**	**Federal Declaration**
12/01/2007	11:00 AM	Ice Storm	0	0	0	
12/15/2007	06:00 PM	Heavy Snow	0	0	0	
12/31/2007	01:00 AM	Heavy Snow	0	0	0	
12/15/2008	12:00 AM	Cold/Wind Chill	1	0	0	
12/18/2008	10:00 PM	Winter Storm	0	0	0	
12/21/2008	01:00 AM	Blizzard	0	0	0	
12/21/2008	07:00 AM	Extreme Cold/Wind Chill	0	0	0	
01/14/2009	01:00 AM	Winter Storm	0	0	0	
12/23/2009	10:00 AM	Heavy Snow	0	0	0	
12/30/2009	12:00 AM	Cold/Wind Chill	1	0	0	
01/15/2009	06:00 AM	Extreme Cold/Wind Chill	0	0	0	
01/07/2010		Winter Storm	0	0	0	
02/08/2010	10:00 PM	Winter Storm	0	0	0	
12/03/2010	12:00 AM	Cold/Wind Chill	2	0	0	
12/11/2010	02:00 PM	Winter Storm	0	0	0	
12/27/2010	06:00 PM	Cold/Wind Chill	1	0	0	
02/01/2011	01:00 PM	Blizzard	0	0	$250 K	DR-1960
01/12/2012	08:00 AM	Winter Storm	0	0	0	
01/20/2012	11:00 AM	Winter Storm	0	0	0	
02/28/2012	12:00 AM	Cold/Wind Chill	1	0	0	
03/05/2013	06:00 AM	Winter Storm		0	0	

Mitigation Measures

Actions that can be taken to mitigate the impact of winter storms include:

- The adoption and enforcement of building codes that ensure structural stability, address snow roof loads, and provide adequate insulation. Jurisdictions that have adopted the International Building Code (IBC) and International Residential Code (IRC) are listed in Chapter 5, page 5-10.
- Trees and other vegetation cause about 20% of all electric service interruptions. Preventive pruning around aerial power lines is vital to providing reliable electric service. ComEd, the electric provider in Will County, has a routine tree maintenance that keeps above ground power lines clear. This program includes tree trimming, tree removal and clearing storm-damaged trees

or tree limbs from power lines. Their vegetation management crews are trained in proper arboricultural pruning techniques, which meet the standards set by the American National Standards Institute (ANSI). ComEd is also upgrading overhead power lines with new overhead cables. The new cables are stronger, have a protective coating and are spaced closer together to help reduce power outages caused by severe weather, trees and wildlife. Additionally, overhead power lines are being replaced in some areas and with underground cable so customers experience fewer power outages.

- ComEd also employs smart grids that monitor the electric grid and respond to potential problems and interruptions and smart switches that automatically reroute electricity around problem areas so customers experience fewer and shorter power outages.
- A leading cause of death during winter storms is from automobile or other transportation accidents. Strategies to reduce accidents is planning for adequate road and debris clearing capabilities, using snow fencing to limit blowing and drifting of snow over critical roadway segments, and utilizing roadway heating technology to prevent snow/ice buildup.
- Public education about severe winter weather impacts and how the public can prepare is essential. Will County EMA and communities have ongoing public education for severe winter weather preapration through websites, social media, alert systems, traditional news media, and community events. Education outreach continues to improve as technology expands communication tool choices.
- Will County and the communities work with the American Red Cross to maintain a system of warming centers to protect vulnerable populations and people who become stranded on the roadways.

Risk Characterization

Impact: High

Damage to Buildings

Historically, roofs would collapse due to heavy snow loads, but most buildings are now constructed with low temperatures, snow loads, and ice storms in mind. With today's energy consciousness, buildings are much better insulated than they were 50 years ago. Winter storms do not have a major impact on buildings. Impact on buildings is low.

Critical Facilities

The major impacts of snow and ice storms on property are to utilities and roads. Power lines and tree limbs coated with heavy ice result in disrupted power and telephone service, often for days. Even small accumulations of ice can be extremely dangerous to motorists and pedestrians. Bridges and overpasses are particularly dangerous because they freeze before other surfaces. When transportation is disrupted, schools close, emergency services are delayed, some businesses close, and some government services are delayed. Impact on critical facilities is low.

Health and Safety

Winter storms bring the following two types of safety hazards:

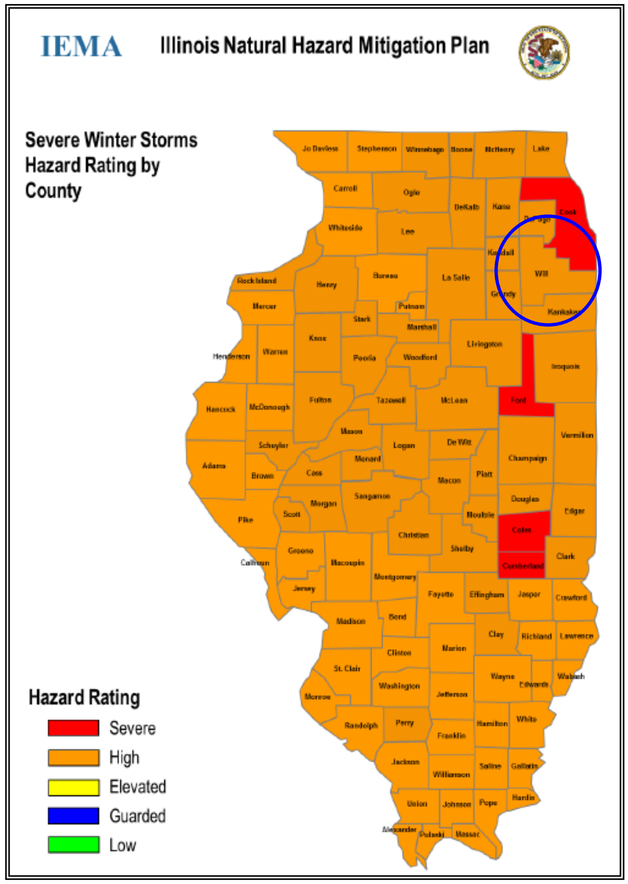
- Weather-related hazards, including hazardous driving and walking conditions and heart attacks from strenuous activity such as shoveling snow.
- Extreme cold, from the low temperatures, wind chill, and loss of heat due to power outages.

In the United States, the number of deaths peaks in midwinter and reaches a low point in late summer, but most deaths are not directly related to the weather. Certain populations are especially vulnerable to the cold, including the elderly, the homeless, and lower income families with heating problems. About 70% of the injuries caused by snow and ice storms result from vehicle accidents and 25% occur to people caught out in the storm. Extreme cold can result in people and animals suffering from frostbite and hypothermia. Frostbite is damage to tissue caused by the effects of ice crystals in frozen tissue. Extremities (hands, feet, ears, and nose) with more circulation difficulties are most frequently affected.

Hypothermia is the lowering of the core body temperature. It is “clinically significant” when the body temperature is below 95°F. Severe hypothermia occurs when the body’s temperature drops below 85°F, resulting in unconsciousness. If help does not come, death follows. Great care is needed to properly re-warm a person, even in mild cases. Health and safety impact is moderate.

Economic Impact

Loss of power means businesses and manufacturing concerns must close down. Loss of access due to snow or ice covered roads has a similar effect. There are also impacts when people cannot get to work, to school, or to the store. The cost of snow removal for winter events can be significant and difficult to budget for. Economic impact is moderate.



Future Occurrences

Based on weather patterns and past severe winter storm events, the probability of a winter storm is high for any given year. The *2013 Illinois Natural Hazard Mitigation Plan* rates the severe winter storm hazard for Will County as high and considers one-hundred percent of the population at risk from a severe winter storm in the State of Illinois.

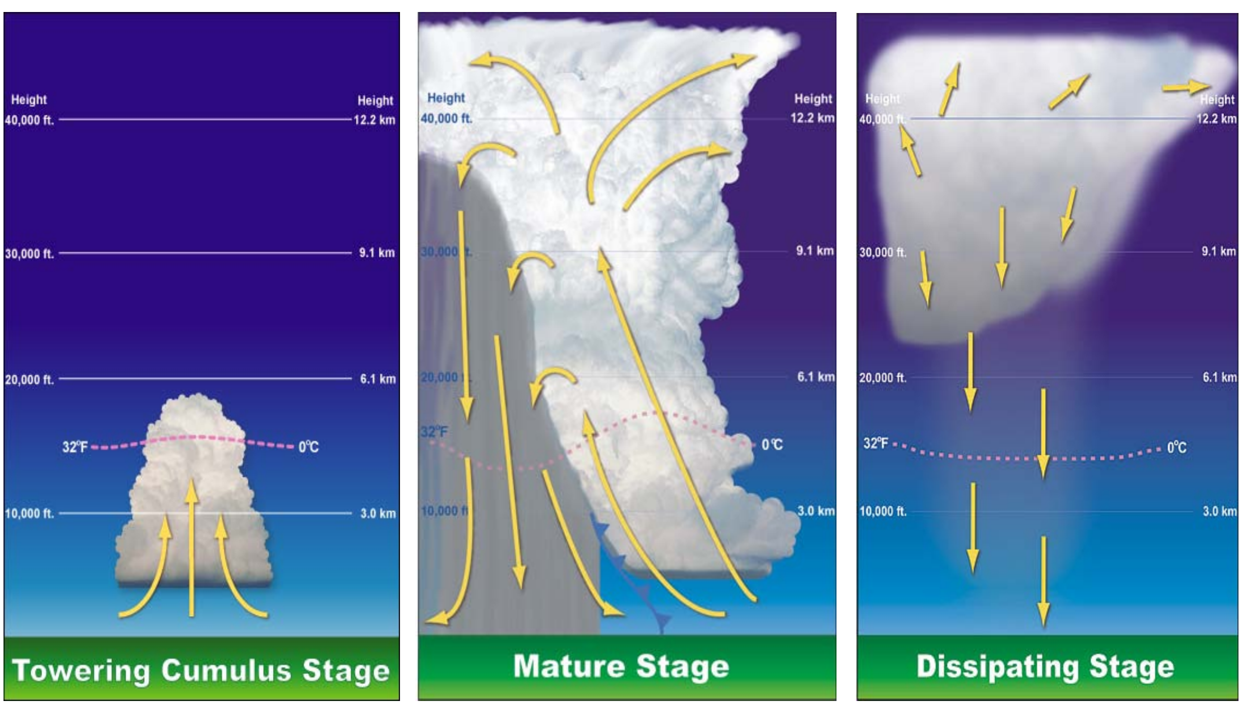
WINTER/ICE STORMS PROBABILITY		
Type	**Number of Occurrences Since 1995**	**Annual Mean**
Winter/Ice Storms, Cold or Extreme Cold/Wind Chill, Heavy Snow	46	2.5

THUNDERSTORM

Hazard Characterization

Severe thunderstorms are weather systems accompanied by strong winds, lightning, heavy rain, and possibly hail and tornadoes.

- They occur anytime of year, but more frequently during the warm spring and summer months.
- Thunderstorms typically only last thirty to forty minutes.
- They form when a shallow layer of warm, moist air meets up with a deeper layer of cool, dry air.
- All thunderstorms follow a three-stage life cycle.
  - The cumulus stage is the development period where the storm consists only of updrafts or upward moving air currents. The updrafts reach heights of 20,000 feet above ground.
  - The mature stage is the strongest and most dangerous stage of the storm cycle. Upward and downward moving air currents collide with precipitation resulting in the downdraft area. As the downdraft reaches the ground, it spreads out and forms a gust front where damaging winds may develop.
  - In the dissipating stage, excessive precipitation and downdrafts weaken the storm, gust fronts move away depleting the energy of the storm.

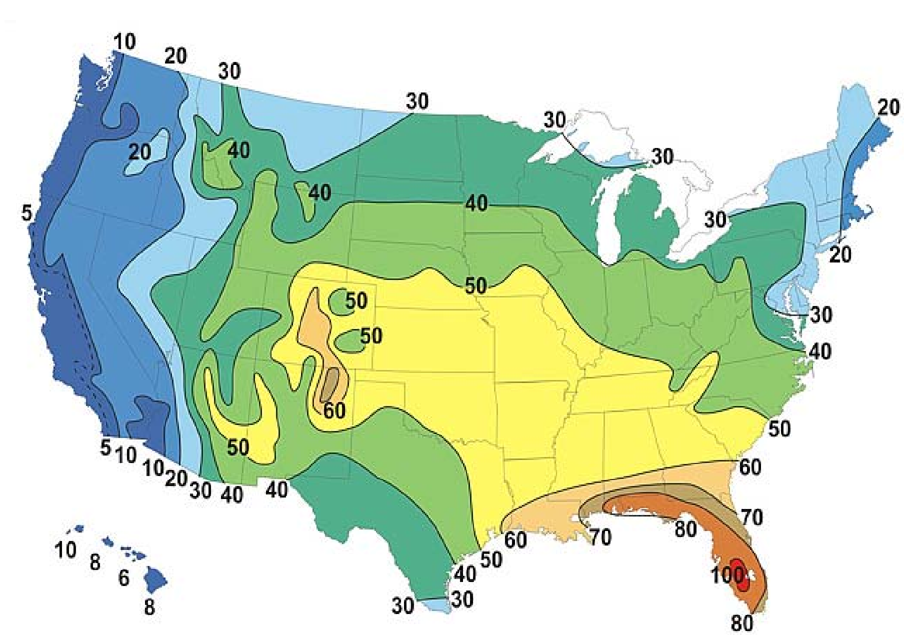


Thunder storms can fall into four categories. Singe-cell storms are typically weak, short-lived, and poorly organized. Multicell cluster storms are the most common type and are a cluster of cells moving as one unit. Multicell line storms are squall lines that have a long line of storms with a continuous gust front from the forward edge of the storm. Supercell storms have a single updraft, are very strong, and produce severe weather. Along with wind that can damage property, lightning also poses a serious hazard causing fire to property that is struck and serious injury or death to individuals who are struck.

Severe thunderstorms are most likely to happen in the spring and summer months and during the afternoon and evening hours but can occur year-round and at all hours. Thunderstorms can bring four hazards:

- Flooding,
- Lightning,
- High winds, tornadoes and microbursts, and
- Hail.

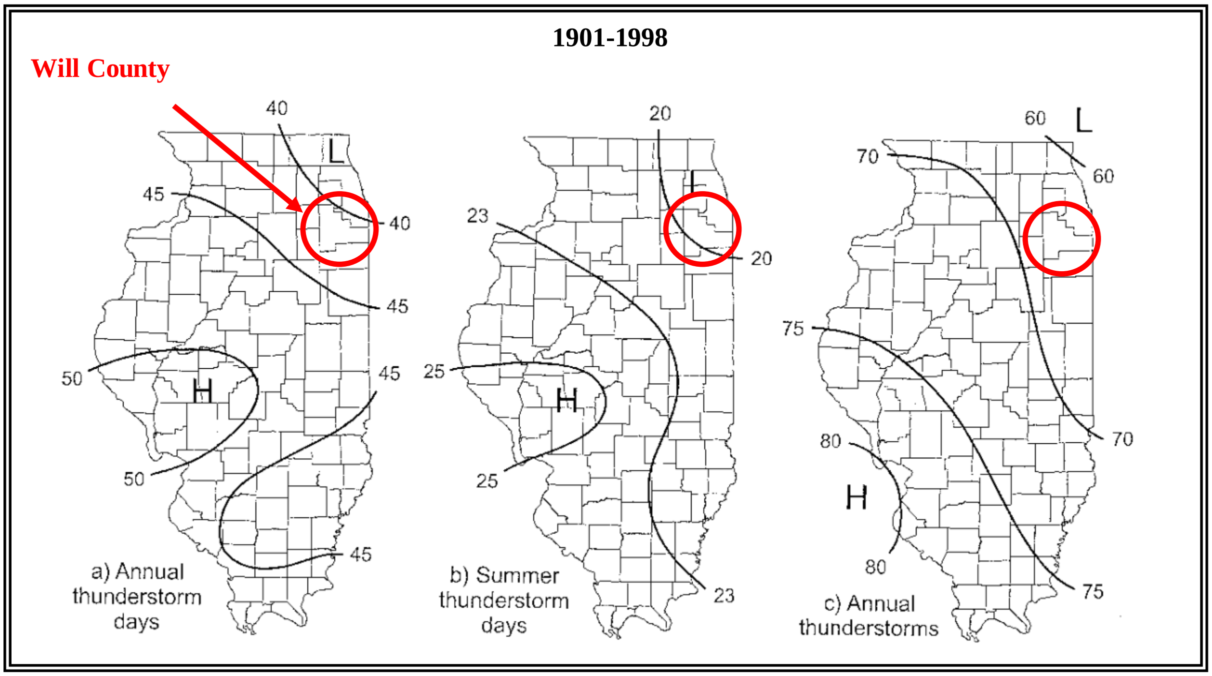
Average Number of Thunderstorm Days per Year in the U.S.



Source: National Weather Service

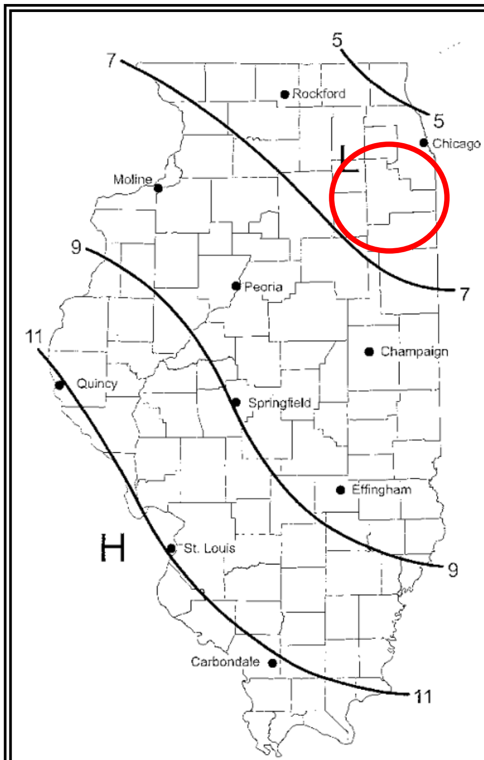
In Illinois, thunderstorms occur when there is a collision of moist, warm air moving north from the Gulf of Mexico with colder fronts moving east from the Rocky Mountains resulting in cold air overriding a layer of warm air causing the warm air to rise rapidly. Thunderstorms may occur singly, in clusters, or in lines. In the course of a few hours, it is possible for several thunderstorms to affect one location or a single thunderstorm to affect one location for an extended time. Thunderstorms typically are 15 miles in diameter and produce heavy rain anywhere from 30 minutes to an hour.

Of the estimated 100,000 thunderstorms each year, approximately 10 percent are classified severe. Severe storms either produce hail of at least three-quarters of an inch thick, have winds of 58 miles per hour or higher, or produce a tornado. In Illinois, severe thunderstorms are most likely to happen in the spring and summer and frequently occur in the late afternoon or evening. Thunderstorms can bring heavy rain, strong winds, hail, lightning and tornadoes. Thunderstorms can cause several types of damaging wind. A downward rush of cool descending air from a thunderstorm is a microburst.



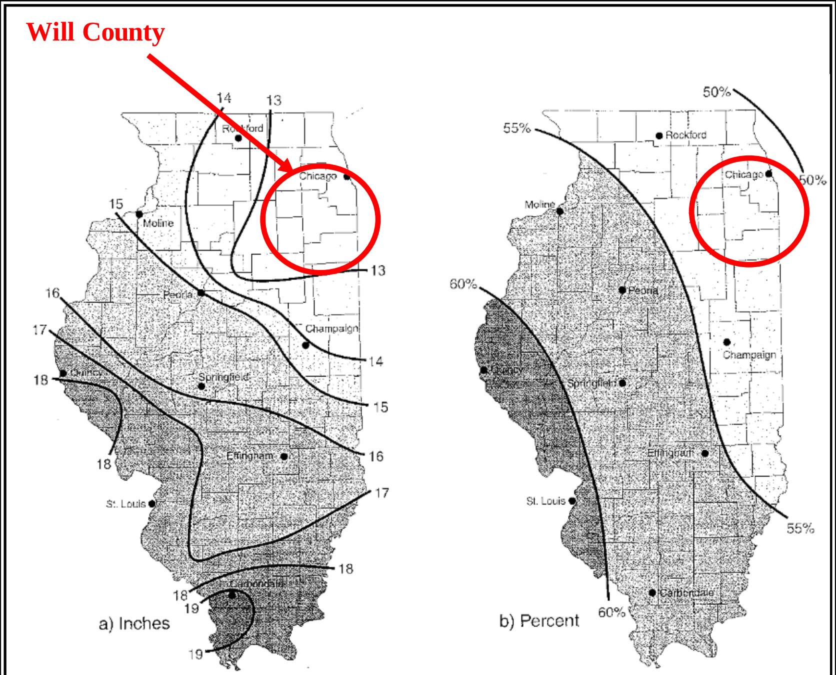
Lightning occurs during all thunderstorms and is an electrical discharge that results from the buildup of positive and negative charges. Lightning appears as a "bolt" when the buildup becomes strong with the flash of light occurring between the clouds and the ground. In a split second, the bolt of lightning reaches a temperature approaching 50,000 degrees Fahrenheit. Lightning has killed 29 people and injured hundreds more in Illinois since 1990. In 2001, Illinois ranked second in the United States for lightning fatalities. Thunder is the rapid heating and cooling of air near the lightning.

In addition to lightning, a thunderstorm can also produce hail which can be very destructive to plants/crops, animals and property causing nationally over a billion dollars in damage each year. Hail can be as small as a pea and as large as a softball. Most hail has a diameter smaller than a dime; however, there are records of hailstones weighing more than a pound. Hail rarely causes injuries, but it can cause millions of dollars in damages to crops, vehicles, and buildings.



Average annual cloud-to-ground lightning flashes per square mile, 1989-1996

These balls of ice begin as a large frozen raindrop. Super cooled water droplets hit ice crystals and freeze instantly. The hailstones grow as more and more droplets hit these ice balls and freeze as they fall through the clouds. As the hailstones reach the bottom of the clouds the wind updrafts may send the hail back up into the cloud to repeat the process and continue to grow. When the weight of the hailstones becomes too heavy to be supported by the updrafts, they fall out of the clouds. The very largest recorded hailstone was over 5.6 inches in diameter and weighed 26 ounces; however, large hail is usually less than two inches in diameter and most is smaller than a dime.



Average annual precipitation from thunderstorms (inches) and as percent of total annual precipitation

History

Will County has experienced over 200 severe storm events since 1950. Federal Emergency Declarations of severe storms in Will County have occurred five times:

- June 30, 1981, over $4 million in damages throughout Illinois
- March 29, 1985, almost $8 million in damages throughout Illinois
- July 25, 1996, almost $259 million in damages throughout Illinois
- April 23, 2004, almost $6 million in damages throughout Illinois
- August 23, 2007, over $230 thousand in damages throughout Will County

Although they do not receive as much recognition as tornado events, thunderstorm winds cause more damage year-to-year than tornadoes. In 1993 alone, Illinois experienced 38 events of thunderstorm winds which caused a minimum estimate of well over five million dollars in damage, while the 34 tornadoes caused a maximum of just over 1.5 million dollars. Seven severe thunderstorms traversed the State in June of 1993, creating most of this damage, but significant losses occurred in seven other months. In the 10-year period from 1981 to 1990, damage estimates from severe wind equaled or exceeded damages caused by tornadoes in five of the years. In addition, death tolls from severe winds exceeded tornado deaths for six of these years, and the number of injuries caused by severe wind was greater in three years (data from *Storm Data* publication, NOAA/NWS). The damages caused by high winds have been relatively consistent from year-to-year.

Nationwide it is estimated that 25 million cloud-to-ground lightning flashes occur each year, 1,000 people are injured, and 80 are killed with about $5 billion in economic impact resulting from lightning. According to Mr. Chris Miller, WCM, National Weather Service, Lincoln, IL, “Illinois experiences nearly 650,000 lightning strikes each year.” Illinois ranks high among the 50 states for lightning fatalities. Over the past 40 years, 96 people have been killed by lightning in Illinois. As a result, IEMA and the NWS have recently established the Lightning Safety Awareness Week as a public education project.

Hail occurs frequently in Illinois averaging 74 times a year or 3,951 times since 1950. There have been no deaths, but 23 injuries. Hail does extensive damage: property damage over $73 million and crop damage over $5 million in the last 53 years. The potential size of hail stones illustrate the damage they can cause. April 23, 1961, several six inch hail stones were reported in Kankakee, IL. While six inches is very unusual, 46 events had hail stones greater than three inches and in the 2-3 inch range.

IMPACT OF THUNDERSTORMS ON WILL COUNTY (Source: National Climatic Data Center / WC EMA)				
Year	**Number of Storms**	**Magnitude**	**Annual Damages**	**Federal Declarations**
1996	5	52-56 kts.	$45 K	
1997	5	50-61 kts.		
1998	6	50-68 kts.		
1999	3	50 kts.		
2000	3	50 kts.		
2001	7	50-57 kts.		
2002	1	50 kts.		
2003	11	50-65 kts.	$35 K	
2004	7	50-55 kts.		
2005	5	50-65 kts.	$103 K	
2006	8	50-65 kts.	$15 K	
2007	13	50-70 kts.	$234 K 1 Injured	08/23/2007 DR-1729
2008	5	50-83 kts.	$284 K	
2009	7	50-65 kts.	$48 K	
2010	9	50-70 kts.	$327.5 K	
2011	4	52-62 K	$6.5 K	
2012	4	50-76 kts.	$145 K 1 Injured	
2013 Partial	5	50-66 kts.	$841 K	

IMPACT OF LIGHTNING ON WILL COUNTY (Source: National Climatic Data Center / WC EMA)									
Location	**Date**	**Deaths**	**Injuries**	**Property Damage**	**Location**	**Date**	**Deaths**	**Injuries**	**Property Damage**
Joliet	07/07/1994	1	0	0	Plainfield	05/26/2008	0	0	$50 K
Plainfield	06/20/2000	0	0	20K	Plainfield	06/19/2009	0	0	$10 K
Joliet	06/25/2002	0	1	0	Joliet	07/24/2009	0	0	$50 K
Plainfield	03/30/2004	0	0	0	Monee	07/24/2009	0	0	$25 K
Joliet	03/30/2004	0	1	0	New Lenox	05/26/2010	0	0	$30 K
Lockport	03/30/2004	0	0	0	Crest Hill	05/31/2010	0	0	$10 K
Plainfield	03/30/2004	0	0	0	Joliet	05/31/2010	0	0	$5 K
Joliet	03/30/2004	0	0	0	Joliet	07/11/2010	0	0	$40 K
Wilmington	05/30/2004	0	0	0	Joliet	07/23/2010	0	0	$20 K
Joliet	05/30/2004	0	0	0	Beecher	05/22/2011	0	0	$300 K
Joliet	06/11/2004	0	0	0	Naperville	05/29/2011	0	0	$300 K
Elwood	06/11/2004	0	0	0	New Lenox	08/02/2011	0	0	$200 K
Joliet	03/12/2006	0	0	0	Joliet	06/29/2012	0	0	$105 K
Frankfort	04/02/2006	0	0	0	Monee	08/04/2012	0	0	$10 K
Channahon	07/27/2006	0	0	$25 K	Naperville	06/12/2013	0	0	$10 K
Mokena	07/27/2006	0	0	0	Plainfield	06/12/2013	0	0	$10 K
Joliet	08/10/2006	0	0	$100 K	Joliet	06/24/2013	0	0	$150 K
New Lenox	05/26/2007	0	0	$50 K					

IMPACT OF HAIL ON WILL COUNTY – Larger Than 1" (Source: National Climatic Data Center / WC EMA)								
Location	**Date**	**Mag.**	**Location**	**Date**	**Mag.**	**Location**	**Date**	**Mag.**
Will Co.	04/23/1961	3"	Mokena	04/26/1994		Plainfield	03/30/2005	1.75"
Will Co.	04/30/1962	1.25"	Monee	04/26/1994		Joliet	03/30/2005	1.75"
Will Co.	06/21/1968	1.5"	Mokena	06/13/1994	1.75"	Shorewood	03/30/2005	1.5"
Will Co.	05/29/1969	1.75"	Crete	04/12/1996	1.75"	Plainfield	03/30/2005	1.75"
Will Co.	09/17/1972	1.5"	Wilmington	04/12/1996	1.75"	Romeoville	03/30/2005	1.75"
Will Co.	06/27/1973	1.75"	Mokena	04/19/1996	1.75"	Joliet	03/30/2005	1.75"
Will Co.	05/16/1974	1.75"	Lockport, ,	05/16/1996	1.75"	Crest Hill	03/30/2005	1.5"
Will Co.	06/20/1979	1.75"	Monee	04/12/1996	1.75"	Plainfield	05/19/2005	1.75"
Will Co.	06/08/1981	1.75"	Lockport	04/12/1996	1.75"	Joliet	03/12/2006	1.75"
Will Co.	06/22/1984	2.75"	Wilmington	05/05/1997	1.75"	Frankfort	04/02/2006	1.5"
Will Co.	04/22/1988	1.75"	Peotone	07/18/1997	1.75"	Joliet	10/18/2007	1.75"
Will Co.	06/26/1989	1.75"	Wilmington	04/10/1999	1.75"	Joliet	04/03/2011	1.75"
Will Co.	07/07/1991	2.75"	Shorewood	05/18/2000	1.75"	Beecher	05/22/2011	1.75"
Will Co.	04/10/1992	1.75"	Joliet	05/18/2000	1.75"	Plainfield	06/04/2011	1.75"
Braidwood	08/01/1993	1.5"	Romeoville	05/28/2003	1.25"	Manhattan	06/04/2011	1.25"
Plainfield	04/26/1994	1.75"	Plainfield	07/15/2003	1.75"	Manhattan	06/04/2011	1.75"
Wilmington	04/26/1994		Romeoville	07/17/2003	1.25"	Park Forest South	06/30/2011	1.5"
Frankfort	04/26/1994		Joliet	04/20/2004	1.75"	Gooding Grove	09/03/2011	1.75"
Braidwood	04/26/1994		Plainfield	05/23/2004	1.75"	Shorewood	09/03/2011	1.25"
Braidwood	04/26/1994		Lockport	05/23/2004	1.75"	Plainfield	11/10/2012	1.5"

Risk Characterization

Impact: High

Damage to Buildings

As with tornadoes, mobile homes are at a high risk to damage from thunderstorms. Wind and water damage can result when windows are broken by flying debris or hail. Lightning can cause direct damage to structures (especially those without lightning protection systems) and can cause fires that damage forests and structures. Straight line winds will damage roofs, overturn or push mobile homes off foundations, push autos off the road and may destroy attached garages. Straight line winds are the leading cause of wind related damage. Although they do not receive as much recognition as tornado events, high winds cause more damage year-to-year than tornadoes.

Hail can inflict severe damage to roofs, windows and siding, depending on hailstone size and winds. The size of hailstones is a direct function of the severity and size of the storm. Significant damage does not result until the stones reach 1.5 inches in diameter, which occurs in less than half of all hailstorms.

Critical Facilities

Critical facilities are susceptible to the same damage and disruption from thunderstorms as other buildings. Emergency operations can be disrupted as thunderstorms and lightning affect radio communications and antennas are a prime target for lightning. To date, there is no record of critical facilities having incurred any damages due to severe storms. Damage to critical facilities is considered moderate.

Health and Safety

No special health problems are attributable to thunderstorms, other than the potential for tetanus and other diseases that arise from injuries and damaged property. Serious burns or death are the common outcomes when lightning strikes a human being. Overall health hazard: Low

The threat to life varies by the cause of death. Between 1995 and 2000, the NWS reported 20 people in Illinois were killed by flash floods, wind, and lightning resulting from thunderstorms. Hail rarely causes loss of life.

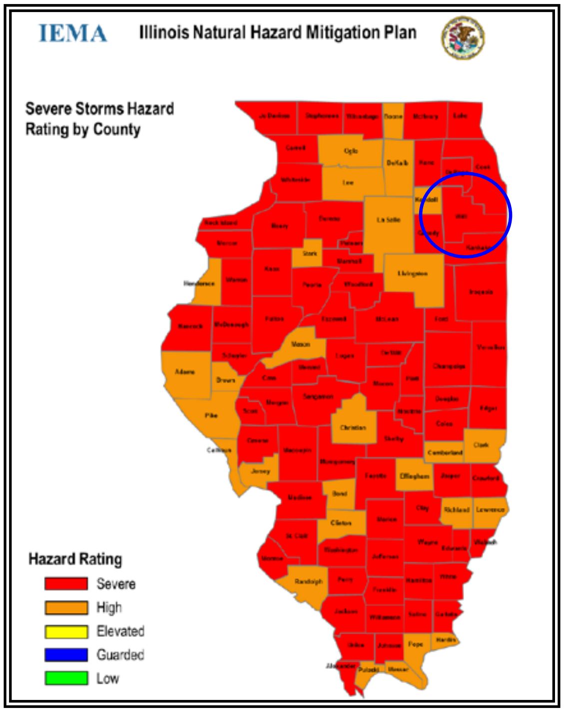
Lighting kills more people than tornadoes. Most lightning fatalities and injuries occur outdoors at recreation events and under or near trees. Most of these deaths can be prevented through safe practices. Much information has come out over the last 20 years about lightning safety, for example, before 1990, an average of 89 people were killed by lightning each year. By 2000, this number had dropped to 52.

Hail occurs frequently in Illinois averaging 74 times a year or 3,951 times since 1950. There have been no deaths, but 23 injuries.

Economic Impact

Thunderstorms can impact transportation and utilities. Airplanes have crashed when hit by downbursts or lightning. Automobiles and their windshields are subject to damage by hail. Power lines can be knocked out by lightning or knocked down by wind and debris. Lightning can also cause power surges that damage appliances, electronic equipment and computers. However, many buildings have lightning rods and back up power systems that can recover quickly. Cost of clean-up by towns can be extensive.

Future Occurrences



All counties are susceptible to severe storms. At any one time, it has been determined that over 25% of the County population might experience severe storms. This determination is supported by Mr. Chris Miller, WCM, National Weather Service, Lincoln, IL, as follows: "Damage from severe thunderstorms is usually on a much broader spatial scale in the state of Illinois. The past 49 years of data indicated that more than 11,000 reports of severe thunderstorm damage occurred (approximately 7,000 wind and 4,000 hail reports) in the state of Illinois. Approximately 80% of the severe thunderstorms are multicellular or a supercell hybrid, which are capable of producing damaging wind and/or large hail over approximately a 400 to 500 square mile area. The remaining severe thunderstorms are squall lines, which can produce damage over 100% of the affected counties. Thus, the vulnerability to severe thunderstorms should be high (greater than 25% of the population affected) in each county across Illinois." This is reinforced by a study done by Stanley Chagnon of Chagnon Climatologist, in his publication "*Thunderstorms Across the Nation - An Atlas of Storms, Hail, and Their Damages in the 20th Century*". This study indicated that in an analysis of thunderstorm caused catastrophes, Illinois ranked 4th in the United States in total thunderstorm catastrophes between 1949 and 1998."

The *2013 Illinois Natural Hazard Mitigation Plan* rates the severe storms hazard for Will County as severe.

SEVERE STORM PROBABILITY		
Type	**Number of Occurrences Since 1996**	**Annual Mean**
Thunderstorm & High Wind	109	6.4
Lightning	24	1.4
Hail	88	5.1

FLOOD, FLASH FLOOD and ICE JAMS

Hazard Characterization

Rivers and streams naturally overflow onto the lands adjacent to them. These lands, or flood plains, act as a natural reservoir and temporary channel for the excess water that dissipates over time. Flooding has only become a problem since people started to occupy the floodplains. The attractiveness of the level, fertile land of the floodplain has encouraged development despite the flood-prone nature of the area. However, as these lands have become further developed, it has given rise to an increasing public demand for protection from the economic losses caused by the inevitable flooding.

Flooding may not always be directly attributable to a river, stream or lake overflowing its banks. Rather, it may simply be the combination of excessive rainfall and/or snowmelt, saturated ground, and inadequate drainage. With no place to go, the water will find the lowest elevations – areas that are often not in a floodplain. That type of flooding is becoming increasingly prevalent, as development outstrips the ability of the drainage infrastructure to properly carry and disperse the water flow. Flooding also occurs due to combined storm and sanitary sewers that cannot handle the tremendous flow of water that often accompanies storm events. Typically, the result is water backing into basements, which damages mechanical systems and can create serious public health and safety concerns. Other cases involve the ponding of waters across roads or in other low-lying areas.

Except for fire, the most common hazard in the United States is flooding with thousands of incidents occurring each year from oceans, rivers, lakes, small streams, gullies, creeks, culverts, dry streambeds or low lying ground. The Federal Emergency Management Agency's (FEMA) standard definition of a flood is:

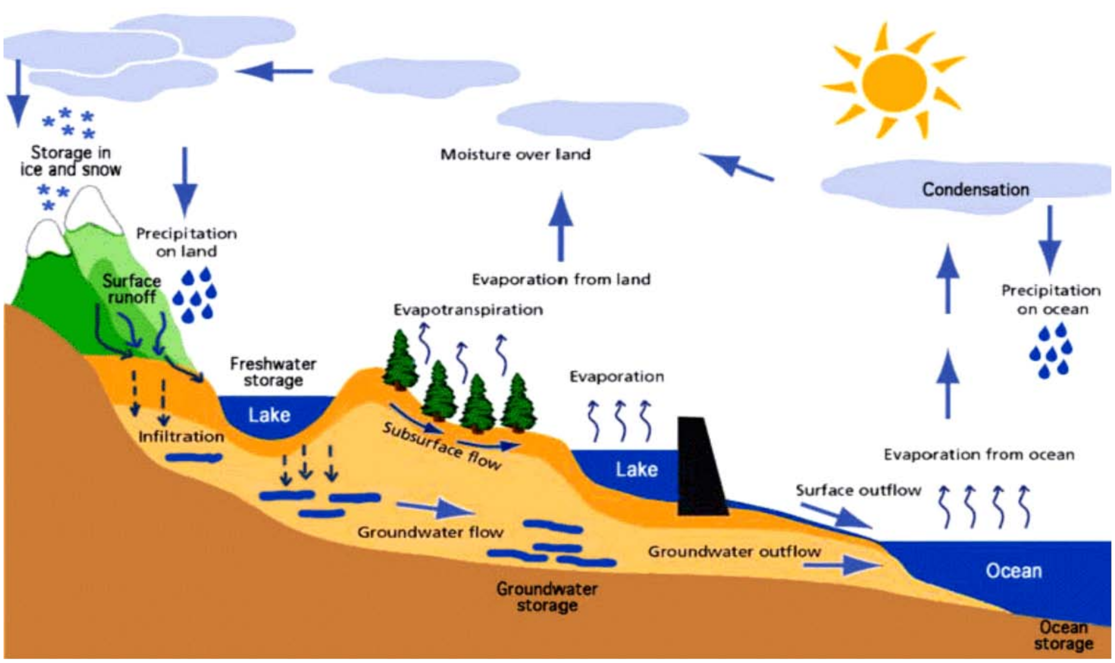
> "A general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties (at least one of which is the policyholder's property) from:
>
> - Overflow of inland or tidal waters; or
> - Unusual and rapid accumulation or runoff of surface waters from any source; or
> - Mudflow; or

- Collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood as defined above."

A simpler definition is too much water in the wrong place. Since water circulates from clouds to the soil to streams to rivers to the oceans and returns to the clouds, a scientific definition of a flood is an imbalance in the "hydrological system" with more water flowing through the system than the system can draw off.

Hydrologic Cycle

The hydrologic cycle begins with the evaporation of water from the surface of the ocean. As moist air is lifted, it cools and water vapor condenses to form clouds. Moisture is transported around the globe until it returns to the surface as precipitation. Once the water reaches the ground, one of two processes may occur: 1) some of the water may evaporate back into the atmosphere or 2) the water may penetrate the surface and become groundwater. Groundwater either seeps its way into the oceans, rivers, and streams, or is released back into the atmosphere through transpiration. The balance of water that remains on the earth's surface is runoff, which empties into lakes, rivers and streams and is carried back to the oceans, where the cycle begins again.



Summary of the Hydrologic Cycle

There are many factors that contribute to the flooding of a river or stream. These factors are an abnormally heavy rainfall, the melting of packed snow, the simultaneous arrival of flood crests from major tributaries, the formation of ice jams which block the river flow, inadequately designed storm water systems, and the creation of hydrologic structures (i.e. dams and levees) which are prone to failure and either cause an incident or aggravate an already existing one. Primarily, floods do occur in the springtime but can occur any time of the year.

Types of Floods

Riverine Floods:	Develop slowly, sometimes over a period of days or weeks.
Flash Floods:	Develop quickly, sometimes in just a few minutes. Usually flash floods are the result of intense storms dropping large amounts of rain within a brief period.
Ice Jam Floods:	Jammed ice creates a dam across the channel over which the water and ice mixture continues to flow causing more jamming to occur. Backwater upstream from the ice dam may rise rapidly and overflow the channel banks. When the ice dam fails, flooding occurs releasing the water stored behind the dam.
Overland Floods:	Occurs outside a defined river or stream (e.g. ponding in a low lying area).
Aquifer Flood:	Water is expelled from a subterranean geologic formation to the surface causing flooding in the immediate area.
Subterranean Flood:	Water floods into tunnels that are normally dry.
Structure Failure:	Online structure or levee fails.

Most riverine flooding occurs in early spring and is the result of excessive rainfall and/or the combination of rainfall and snowmelt. Ice jams are also a cause of flooding in winter and early spring and can cause dangerous flash flooding to occur if the ice suddenly gives way. Severe thunderstorms may cause flooding during the summer or fall, although these are normally localized and have more impact on watercourses with smaller drainage areas.

The effects of a flood can be devastating and floods are probably the most pervasive of all natural hazards in the U.S. Between the inundation of water and the force of the current, both lives and property can be lost. People and animals can drown or be injured by the floodwaters and the current-borne debris. This same debris can also cause structural damage to buildings, roads, bridges, and railroads. Sanitary, power, water, and communication installations can be severely damaged and their systems interrupted for long periods of time. Crops can be carried away by the current or destroyed by the inundation. Farmlands may be deeply eroded by new channels, resulting in the loss of valuable topsoil.

Many low lying areas of the County are also damaged yearly by heavy rains. Although they have not been declared disasters, the damage caused by this flooding is extensive. Since the flood plains have been built upon over the years, it would be financially unfeasible to buy all the property that is in the flood zones. Therefore, steps have been taken to evacuate homes along rivers and creeks when water is predicted to overflow the river's banks. For low lying areas, some of the flooding has been attributed to poor sewer and run-off tiles, debris, as well as other items that obstruct the natural flow of the water. Once these problems are corrected, many of the flooding problems will be alleviated.

Flood Terms

100-Year Flood Plain: A flood event that statistically has a 1 out of 100 (or one percent) chance of being equaled or exceeded on a specific watercourse in any given year. A flood event of this magnitude is often used to determine if flood insurance is either advisable or required on a property.

500-Year Flood Plain: A flood having a 0.2% or greater annual probability of occurring every year.

Base Flood: Defined by FEMA as the flood having a 1-percent probability of being equaled or exceeded in any given year; also referred to as the 100-year flood.

Flood Stage: The point at which the water level in a stream begins to cause damage to structures. It may be below the point at which the water level in a stream overtops the banks and spreads out onto the floodplain if structures are located in a floodway.

Floodplain: The area adjoining a watercourse that may be covered by floodwater during a flood. This area, if left undisturbed, acts to store excess floodwater. The floodplain is made up of two sections: the floodway and the flood fringe.

Floodway: A flow path (sometimes artificial) that carries significant volumes of floodwaters during a flood. The floodway carries the bulk of the floodwater downstream and is usually the area where water velocities and forces are the greatest. NFIP regulations require that the floodway be kept open and free from development or other structures that would obstruct or divert flood flows onto other properties.

Flood Fringe: The areas of a delineated floodplain adjacent to the floodway where encroachment may be permitted.

Mitigation: Flood mitigation is any action taken to reduce risk to people or property from flooding and its effects. *Nonstructural* measures are used to make existing and future development more resilient to flooding or to preserve (or restore) natural floodplain functions so that developed property is not affected. Structural measures seek to prevent the advance of flood waters, usually through an engineered measure such as a dam, levee, or floodwall.

Streamflow: The discharge that occurs in a natural channel.

Commonly, people interpret the 50-year flood definition to mean "once every 50 years." This is incorrect. Statistically speaking, a 50-year flood has a 1/50 (2 %) chance of occurring in any given year. In reality, a 50-year flood could occur two times in the same year, two years in a row, or four times over the course of 50 years. It is possible not to have a 50-year flood over the course of 100 years.

FEMA uses the "base" flood as the basis for its regulatory requirements and flood insurance rate setting; it is also the basis for this analysis. The base flood is the 1% chance flood, i.e., the flood

What are the odds of a flood?

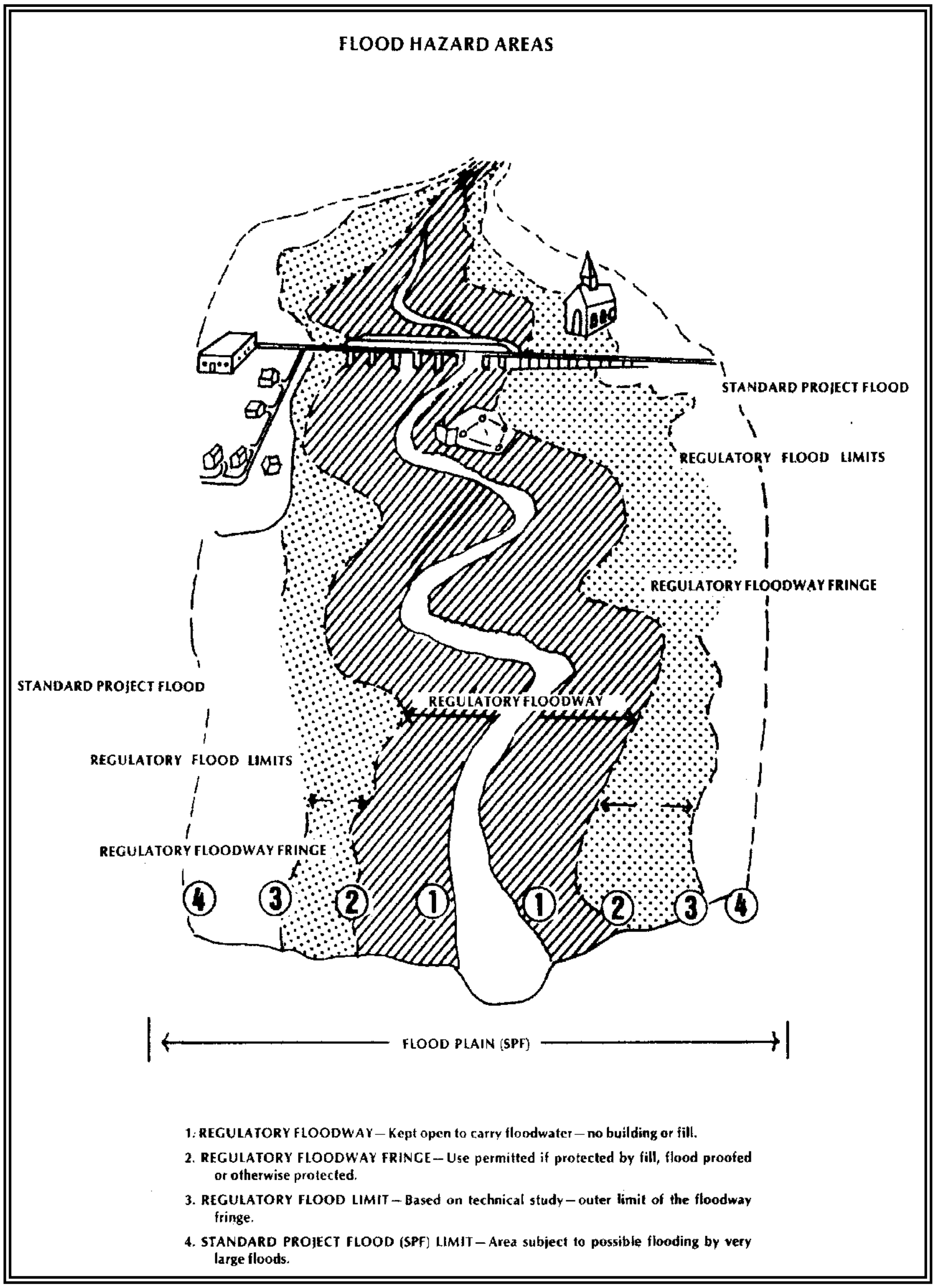
The term "100-year flood" has caused much confusion for people not familiar with statistics. Another way of looking at it is to think of the odds that a base flood will happen sometime during the life of a 30-year mortgage (26% chance).

Chance of Flooding over a Period of Years

	Flood Size			
Period	10-year	25-year	50-year	100-year
1 year	10%	4%	2%	1%
10 years	65%	34%	18%	10%
20 years	88%	56%	33%	18%
30 years	96%	71%	45%	26%
50 years	99%	87%	64%	39%

Even these numbers do not convey the true flood risk because they focus on the larger, less frequent, floods. If a house is low enough, it may be subject to the 10- or 25-year flood. During the proverbial 30-year mortgage, it may have a 26% chance of being hit by the 100-year flood, but the odds are 96% (nearly guaranteed) that a 10-year flood will occur during the 30 year period. Compare those odds to the only 5% chance that the house will catch fire during the same 30-year mortgage.

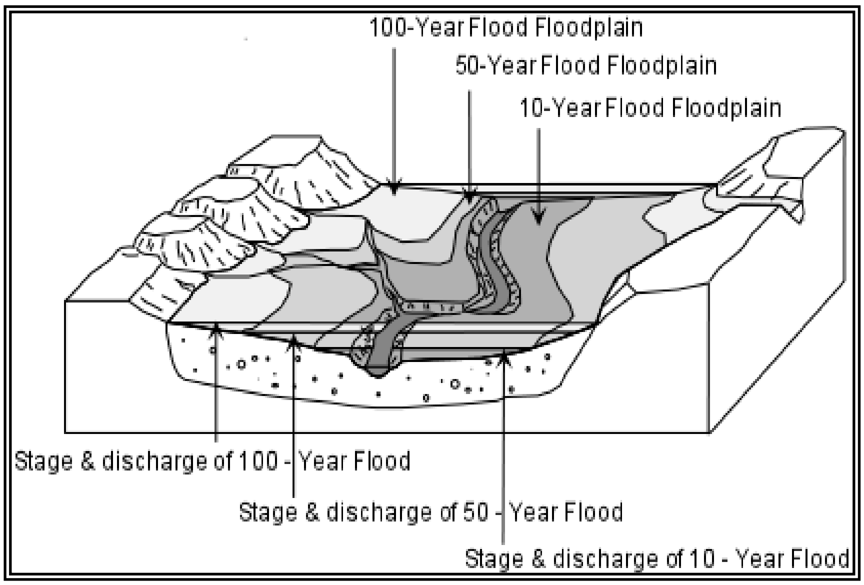
that has a 1% (one out of 100) chance of occurring in any given year. The 1% chance flood has also been called the 100-year flood. The "500-year flood" has a 0.2 % chance of occurring in any given year. While the odds are more remote, it is the national standard used for protecting critical facilities, such as hospitals and power plants.



Flooding as a result of levee failure fits the definition of flooding when "the unusual and rapid accumulation of runoff or surface waters from any source" causing the levee to fail. There are several areas in Illinois that utilize levees to protect land from peak flood levels and/or to protect land that is below river level. The first type of levee is designed to withstand peak flood levels that are caused by rapid snow melt or intense rain fall within the watershed. The second type of levee is typically designed to withstand nominal water levels on a continuous basis as well as peak flood levels.

Watersheds

Watersheds are an important component in handling the excess water in order to prevent flooding. Watersheds come in all shapes and sizes. Some are millions of square miles, others are just a few acres. Just as creeks drain into rivers, watersheds are nearly always part of a larger watershed.



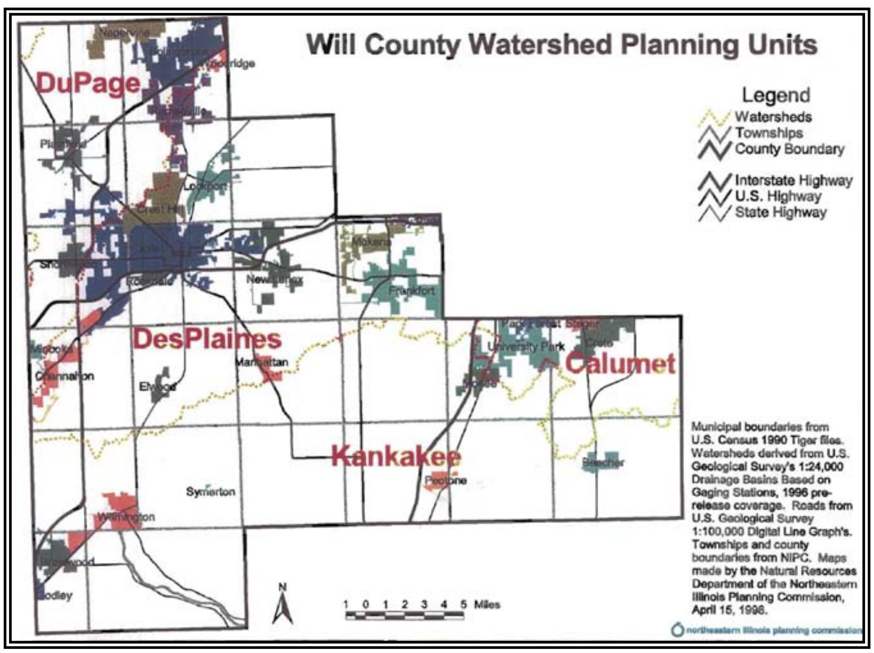
A watershed is a common set of streams and rivers that all drain into a single larger body of water, such as a larger river, a lake, or an ocean. Smaller channels or tributaries collect runoff from rain and snowmelt and send the water to larger channels and eventually to the main channel which is the lowest body of water in the watershed. As the water runs into the streams and rivers from the surface of a watershed it also filters through the soil. These two processes, surface runoff and infiltration are important because they affect water quality. As the water runs off the surface it picks up pollution and deposits the pollution in streams and rivers as it drains the watershed.

A flood occurs when a channel receives too much water causing the water to overflow the banks onto the adjacent land. The land and the condition of the land affect what happens to this water:

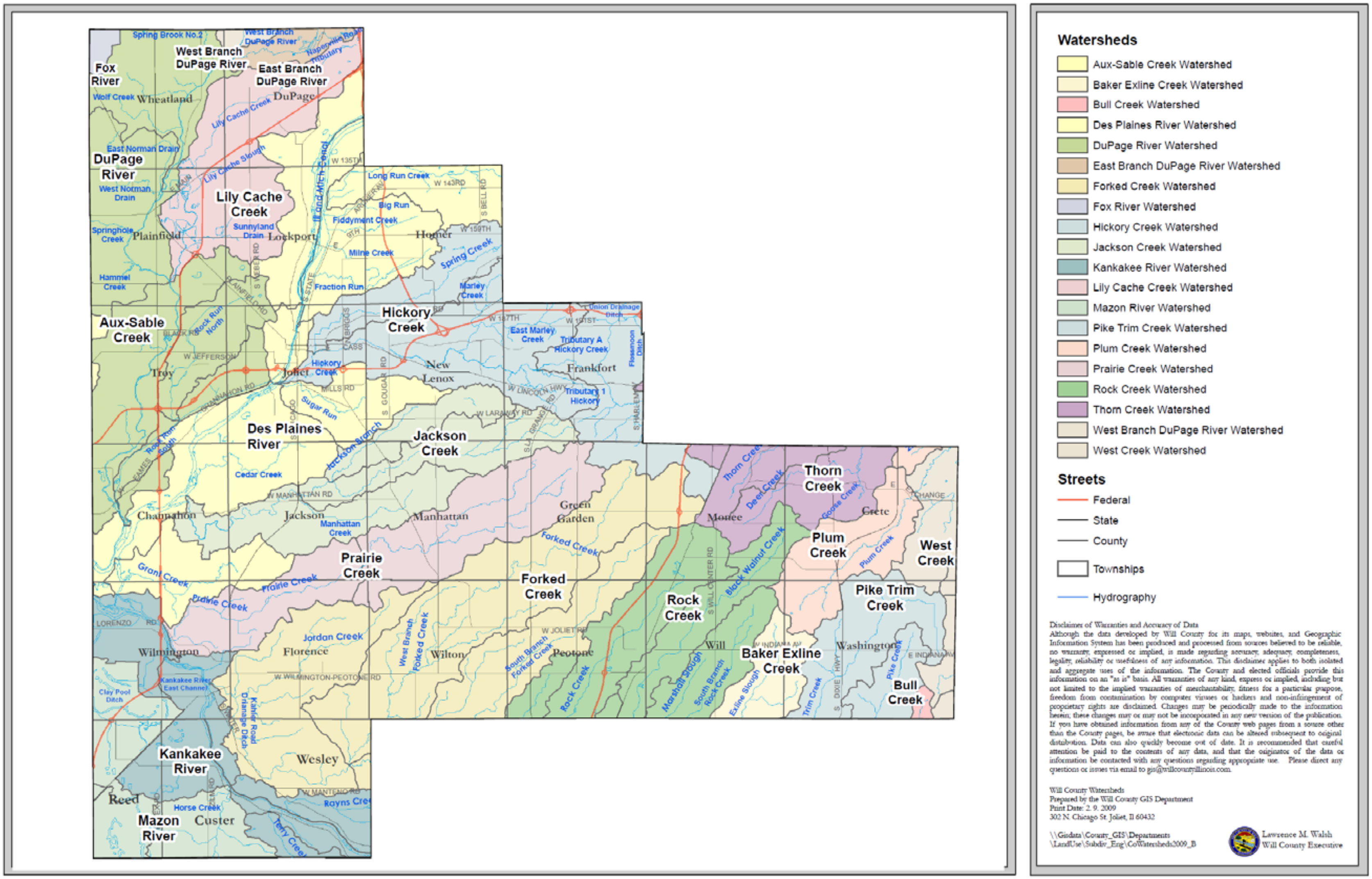
- If the terrain is steep more water will run off the land more quickly into streams.
- If the ground is already saturated from previous rains more water will run off the land into streams and flooding is more likely.
- If the depression storage areas are filled in with water from previous floods, flooding is more likely.
- Urbanizing with inadequately designed stormwater systems during development.

Will County Watersheds

The County has two principal river basins: the Des Plaines River Basin to the north and west and the Kankakee River Basin to the south and east. Several large tributaries to the Des Plaines River also flow through the County, including the DuPage River and the Chicago Sanitary and Ship Canal. The Des Plaines River flows through the western portion of the County and its watershed covers virtually all of Cook and DuPage Counties and nearly half of Lake County. It has headwater areas in both Wisconsin and Indiana. The drainage area of the Des Plaines River basin within Will County is 478 square miles. The Kankakee River basin area within Will County is 368 square miles. Although the Kankakee River flows through the southwest corner of the County, the majority of the Kankakee River basin in Will County is headwater area composed of numerous smaller streams that drain through Kankakee County before joining the Kankakee River. The Kankakee River and the Des Plaines River join to form the Illinois River just outside Will County. For planning purposes, the two basins have been divided into four main watershed planning units.



The character of these four watershed planning units varies both in terms of the demographics and the physical conditions. The Des Plaines River, Calumet River, and DuPage River Watersheds have significant urban and suburban components. However, each of these watersheds still has approximately half their land area in agricultural production. Conversely, the Kankakee River Watershed is primarily rural and has over 75% of its land area in agricultural production. There are relatively few lakes in Will County and there is very little data on the lakes that do exist.


Watersheds
Aux-Sable Creek Watershed
Baker Exline Creek Watershed
Bull Creek Watershed
Des Plaines River Watershed
DuPage River Watershed
East Branch DuPage River Watershed
Forked Creek Watershed
Fox River Watershed
Hickory Creek Watershed
Jackson Creek Watershed
Kankakee River Watershed
Lily Cache Creek Watershed
Mazon River Watershed
Pike Trim Creek Watershed
Plum Creek Watershed
Prairie Creek Watershed
Rock Creek Watershed
Thorn Creek Watershed
West Branch DuPage River Watershed
West Creek Watershed
Streets
Federal
State
County
Townships
Hydrography
Fox River
West Branch DuPage River
East Branch DuPage River
DuPage River
Lily Cache Creek
Aux-Sable Creek
Hickory Creek
Des Plaines River
Jackson Creek
Prairie Creek
Forked Creek
Rock Creek
Thorn Creek
Plum Creek
West Creek
Pike Trim Creek
Baker Exline Creek
Bull Creek
Kankakee River
Mazon River
Wheatland
DuPage
Plainfield
Lockport
Homer
Troy
Joliet
New Lenox
Frankfort
Channahon
Jackson
Manhattan
Green Garden
Monee
Crete
Wilmington
Florence
Wilton
Peotone
Will
Washington
Wesley
Reed
Custer

WILL COUNTY WATERSHEDS										
Watershed Name	**Watershed Grouping**	**Total Drainage Area (sq. miles)**	**Percentage in Will Co. (%)**	**Drainage Area within Will Co. (sq. miles)**	**Watershed Plan**	**Drainage Districts within Watershed**	**Major Tributaries**	**Townships**	**Municipalities**	**Notes**
Aux-Sable Creek		172	0.6	1.1	Yes	No		Plainfield, Troy	Joliet, Shorewood	
Baker Exline Creek	Kankakee	> 17.8		12.7	No	Yes	Exline Slough	Washington, Will		
Bull Creek	Kankakee	6.3	19.0	1.2	No	No		Washington		
Des Plaines River	Des Plaines	2111	6.8	142.5	No	No	Des Plaines River	Channahon, DuPage, Florence, Homer, Jackson, Joliet, Lockport, New Lenox, Troy, Wilmington	Crest Hill, Joliet, Lockport, Bolingbrook, New Lenox, Rockdale, Channahon, Elwood, Homer Glen, Lemont, Romeoville, Woodridge	
DuPage River	DuPage	376	30.9	116.2	YES	No	DuPage River	Channahon, DuPage, Joliet, Lockport, Plainfield, Troy, Wheatland	Aurora, Crest Hill, Joliet, Naperville, Bolingbrook, Plainfield, Shorewood, Channahon, Minooka, Rockdale	Includes East & West Branch
East Branch DuPage River	DuPage	82	8.2	6.7	YES	No	East Branch DuPage River	DuPage, Wheatland	Naperville, Bolingbrook, Woodridge	
Forked Creek	Kankakee	137	101.8	139.4	No	No	South Branch Forked Creek, Forked Creek, West Branch Forked Creek	Florence, Green Garden, Manhattan, Monee, Peotone, Wesley, Wilmington, Wilton	Symerton, Wilmington, University Park, Frankfort, Monee	
Fox River		2642	0.1	2.2	Yes	No		Wheatland	Aurora, Naperville	
Hickory Creek	Des Plaines	107	84.4	90.3	YES	No	Hickory Creek	Frankfort, Green Garden, Homer, Joliet, Lockport, Manhattan, New Lenox	Homer Glen, New Lenox, Mokena, Joliet, Lockport, University Park, Frankfort, Orland Park, Tinley Park	
Jackson Creek	Des Plaines	58.5	100.0	58.5	Yes	No	Jackson Creek	Channahon, Frankfort, Green Garden, Jackson, Joliet, Manhattan, New Lenox	Joliet, New Lenox, Elwood, Manhattan, Frankfort, Mokena	
Kankakee River	Kankakee	5150	1.0	51.7	No	No	Rayns Creek, Terry Creek	Channahon, Custer, Florence, Reed, Wesley, Wilmington	Wilmington, Braidwood, Braceville	
Lily Cache Creek	DuPage	45.1	104.2	47.0	No	No	Lily Cache Creek	DuPage, Lockport, Plainfield, Wheatland	Joliet, Bolingbrook, Romeoville, Plainfield, Crest Hill, Woodridge	

WILL COUNTY WATERSHEDS

Watershed Name	Watershed Grouping	Total Drainage Area (sq. miles)	Percentage in Will Co. (%)	Drainage Area within Will Co. (sq. miles)	Watershed Plan	Drainage Districts within Watershed	Major Tributaries	Townships	Municipalities	Notes
Mazon River	Kankakee	455	8.0	36.2	Yes	No	Horse Creek	Custer, Reed, Wilmington	Braidwood, Wilmington, Coal City, Braceville, Diamond, Godley	
Pike Trim Creek	Kankakee	*		34.7	Yes	Yes	Pike Creek, Trim Creek	Crete, Washington, Will	Beecher	
Plum Creek	Calumet	34.8	70.7	24.6	No	No	Plum Creek	Crete, Manhattan, Washington, Will	Crete, Beecher, Sauk Village	
Prairie Creek	Kankakee	58.5	100.0	58.5	No	No	Prairie Creek	Florence, Frankfort, Green Garden, Jackson, Manhattan, Wilmington, Wilton	Manhattan, Wilmington, Frankfort	
Rock Creek	Kankakee	*		68.5	No	Yes	South Branch Rock Creek, Marshall Slough, Blackwalnut Creek, Rock Creek	Crete, Green Garden, Manhattan, Peotone, Will, Wilton	University Park, Crete, Monee, Peotone	
Thorn Creek	Calumet	104	29.1	30.3	Yes	No	Butterfield Creek, Thorn Creek	Crete, Frankfort, Manhattan	University Park, Frankfort, Park Forest, Monee, Crete, Steger	
West Branch Dupage River	DuPage	125	1.8	2.2	Yes	No	West Branch DuPage River	DuPage, Wheatland	Naperville, Bolingbrook	
West Creek	Calumet	*		2.0	No	No	Plum Creek	Crete, Washington		
			Total Drainage Area	917.8						

Watershed Group	Percentage of Will County
Kankakee	44
Calumet	7
DuPage	16
Des Plaines	33

* Impairments include siltation, nutrients, and metals. Hydromodification.

Note: * Indicates Total Drainage Area Unavailable

Will County Stormwater Management Planning Committee

Will County Stormwater Management Planning Committee (WCSMPC) is an intergovernmental entity with representation from both municipalities and Will County. The WCSMPC is an advisory body to the Will County Board and is responsible for directing the implementation of Comprehensive Stormwater Management Plan and its revision, if necessary. The Stormwater Plan establishes the recommended role of the WCSMPC, which are:

Administration and Management: The WCSMPC is composed of half municipal and half County Board representation. The WCSMPC has authority to establish its own committees and to retain engineering, legal, and financial advisors and inspection personnel; yet, it is planned that County staff will provide these services for the committee as feasible. The committee is required by state statutes to meet, at a minimum, quarterly.

Regulation: The WCSMPC is an advisory body to the County Board and is instrumental in developing and maintaining a county-wide ordinance for the County Board and in advising the County Board on issues related to stormwater management in Will County. The committee's recommendations require due consideration and any regulatory enactments in contravention to the committee's recommendations requires a super majority vote of the County Board.

Planning: This is a primary role for the WCSMPC, which is the preparation and maintenance of this plan, the county-wide stormwater ordinance, and implementation of the county-wide plan.

Maintenance: The Stormwater Management Plan provides authority for the County to ensure maintenance of stormwater facilities and the natural drainage system.

Will County Ordinance and Guides:

- Will County Stormwater Management Ordinance - http://willcountylanduse.com/sites/default/files/StormwaterOrd_20100325.pdf
- Will County Stormwater Technical Guidance Manual - http://willcountylanduse.com/sites/default/files/Approved_TGM_August_25_2010.pdf
- Will County Comprehensive Stormwater Management Plan - http://willcountylanduse.com/sites/default/files/WillCo_SWPlan_1998.pdf

- Countywide Stream Maintenance and Inspection Manual - http://willcountylanduse.com/sites/default/files/stream%20maint%20guide_effective_07_14_2009.pdf

The Will County Land Use Department website provides the public with valuable information on the WCSMPC's mission and activities. See: http://willcountylanduse.com

National Flood Insurance Program

For many years, the strategy for reducing flood damages followed a structural approach of building dams and levees and making channel modifications. However, this approach did not slow the rising cost of flood damage, and did not provide an affordable opportunity for individuals to purchase insurance to protect them from flood damage. It became apparent that a different approach was needed.

Jurisdiction	NFIP#	Participation Date	Current Effective FIRM Date
Aurora	170320	06/14/74	08/03/09
Beecher	170696	04/12/74	09/06/95
Bolingbrook	170812	04/12/74	09/22/99
Braceville	171020	08/02/12	NSFHA
Braidwood	170848	04/11/75	09/06/95
Channahon	170698	03/29/74	08/02/12
Coal City	170258	09/26/75	08/02/12 (M)
Crest Hill	170699	03/29/74	09/06/95
Crete	170700	04/12/74	11/06/00
Diamond	170259	01/16/76	08/02/12 (M)
Elwood	–		
Frankfort	170701	07/30/76	03/17/03
Godley	–		
Homer Glen	171080	11/06/00	
Joliet	170702	05/31/74	01/08/14
Lemont	170117	03/29/74	08/19/08
Manhattan	170703	03/15/74	09/06/95
Mokena	170705	04/05/74	03/17/03
Monee	–		
Naperville	170213	04/12/74	05/18/92
Orland Park	170140	03/22/74	08/19/08
Peotone	170709	03/15/74	09/06/95
Plainfield	170771	11/29/74	01/08/14
Rockdale	170710	03/22/74	09/06/95
Romeoville	170711	03/29/74	09/22/99
Sauk Village	170157	03/08/74	08/19/08
Steger	170713	05/03/74	08/19/08
Symerton	170714	06/30/76	09/06/95
Tinley Park	170169	05/17/74	08/19/08
University Park	170708	09/19/75	08/19/08
Wilmington	170715	04/12/74	09/06/95
Woodridge	170737	04/05/74	12/16/04

NSFHA – No Special Flood Hazard Area (All Zone C)
M – No Elevation Determined (All Zone A, C & X)

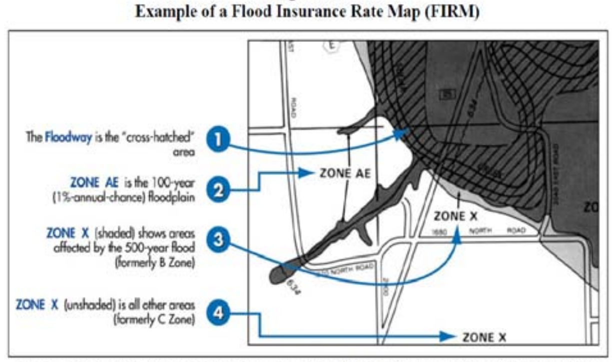
The NFIP was instituted in 1968 to make flood insurance available in communities that have agreed to regulate future floodplain development. As a participant in the NFIP, a community must adopt regulations that: 1) require any new residential construction within the 100-year floodplain to have the lowest floor, including the basement, elevated above the 100-year flood elevation; 2) require non-residential structures to be elevated or dry flood proofed (the flood proofing must be certified by a registered professional engineer or architect); and 3) require anchoring of manufactured homes in flood prone areas. The community must also maintain a record of all lowest floor elevations or the elevations to which buildings in flood hazard areas have been flood proofed.

In return for adopting floodplain management regulations, the federal government makes flood insurance available to the citizens of the community. In 1973, the NFIP was amended to mandate the purchase of flood insurance, as a condition of any loan that is federally regulated, supervised or insured, for construction activities within the 100-year floodplain.

Throughout its 45-year history, the NFIP has provided tens of billions of dollars in claims helping many thousands of home and business owners to recover from the devastating effects of flooding. As the costs and consequences of flooding increase, it is more important than ever to have access to flood insurance. In 2012, Congress passed the Biggert-Waters Flood Insurance Reform Act of 2012 (BW-12) to continue and strengthen the program. BW-12 extends the NFIP for five years, while requiring significant program reform. It requires changes to all major components of the program, including flood insurance, flood hazard mapping, grants, and the management of floodplains.

For the NFIP to remain sustainable, its premium structure must reflect the true risks and costs of flooding. This is a primary driver for many of the changes which are designed to make the NFIP more financially stable and ensure that flood insurance rates more accurately reflect the real risk of flooding. The law calls for the removal of certain subsidies provided to some policyholders and for rates to more accurately reflect risk.

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.

Digital Flood Insurance Rate Maps

The 1968 National Flood Insurance Act required that flood zones be established to define locations subject to higher probability of flooding. Maps were created that showed the location of the 100-year floodplain, known as Special Hazard Flood Areas (SHFAs). FEMA's floodplain maps, also called Flood Insurance Rate Maps (FIRM), are the nationally accepted source of data for determining if a building is

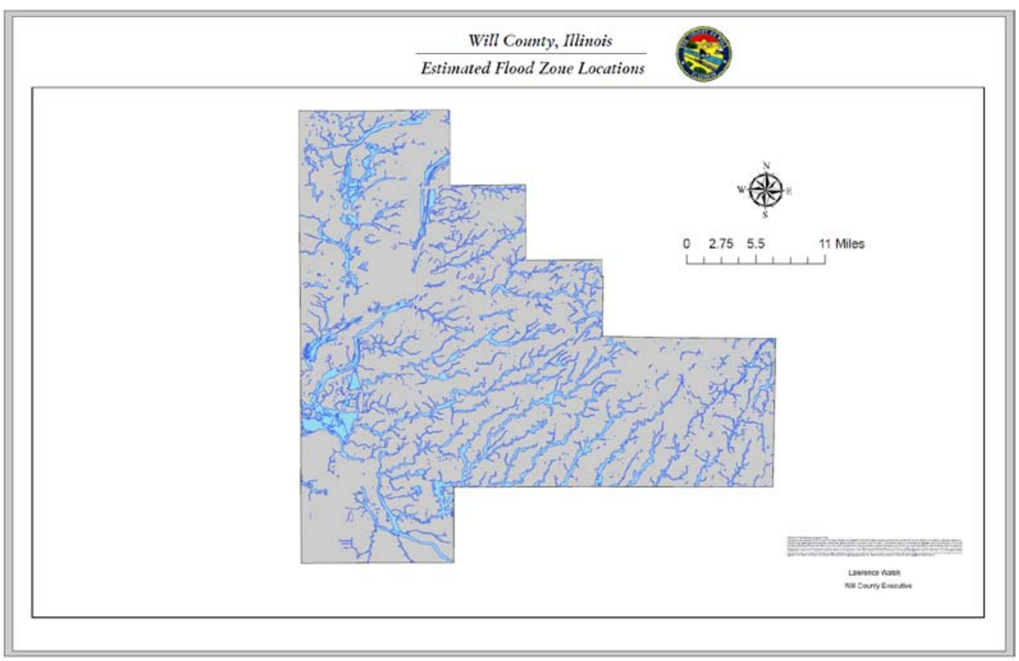
Will County Flood Insurance and Mitigation Spending	
Total Number of Will County Flood Insurance Policies	1,150
Total Claims	1,257
Total Claims Paid	$13,036,154
Repetitive Losses	444 (139 Properties)
Total Mitigation Funding Spent since 1996	$10.6 million
Mitigation Funding - 1996	$4.1 million
Mitigation Funding - 2008	$6.5 million

located in a flood zone. These maps are used to determine the type of construction allowed and assign flood insurance rates. In the 1980s, digital data began to be used to process and produce the paper FIRMs. GIS came of age in the early 1990s and in 2003, a multi-year billion dollar program called Map Modernization began. This effort is providing reliable digital FIRM data (DFIRMs) to the GIS community and has brought floodplain management into a new age.

A Flood Insurance Study of the County prepared by the FEMA was published in January, 1981, pointing out the continuing flooding along the Kankakee River area where yearly ice jams and heavy rains force the Kankakee River to exceed its banks. Since first flood maps, they have been updated multiple times. The last maps for Will County were issued in March of 2003.

The Standard DFIRM Database is designed to provide the user with the ability to determine the flood zone, base flood elevation and the floodway status for a particular location. It also has NFIP community information, map panel information, cross section and hydraulic structure information, and base map information like road, stream, and public land survey data.

Data locating and characterizing floodplains accurately are vitally important to emergency managers, planners, building inspectors, insurance agencies, and others. DFIRMs have improved the quality of floodplain maps and put information in the hands of people who need it. Over the next 40 years, it has been predicted that the Map Modernization program will save $160 billion. Congress has created a program that directly benefits citizens while mitigating the potential loss of lives and property due to flooding and has also given GIS users in many sectors and



industries better quality data that is easier to use. Limited data is available in Will County for the estimation of structures within the 100-year floodplain. Digital flood data is not available for Will County for incorporation into the County's GIS. DFIRMs for Will County are not expected to be available until 2015.

WILL COUNTY NFIP STATISTICS									
1978 to 2013							As Of 12/31/2013		
Community	**Total Losses**	**Closed Losses**	**Closed Without Pay Losses**	**Repetitive Losses**		**Total Payments ($)**	**Policies in Force**	**Insurance In-Force ($)**	**Written Premium In-Force ($)**
				# Losses	**# Properties**				
Aurora	236	197	39			2,998,140.08	684	124,202,500	498,225
Beecher	4	3	1			15,548.49	7	1,506,900	7,260
Bolingbrook	41	29	12			642,996.62	62	14,692,000	42,479
Braceville	1	1	0			26,311.03	2	630,000	802
Braidwood							12	2,781,000	12,771
Channahon	16	13	3			289,135.40	23	6,168,800	24,956
Coal City	7	5	2			63,335.84	2	176,000	479
Crest Hill	10	6	4	4	1	106,438.92	21	7,046,100	22,373
Crete	12	10	2	4	1	90,984.12	19	2,784,000	16,961
Diamond	3	3				52,478.37	1	42,000	209
Frankfort	20	14	6	9	3	483,990.34	65	12,054,500	45,834
Joliet	752	620	131			3,013485.22	697	98,637,700	879,464
Lemont	8	7	1			44,791.96	9	2,388,500	4,354
Lockport	93	79	14	14	5	574,853.95	43	8,814,800	64,020
Manhattan	5	3	2			23,592.57	4	787,100	6,446
Minooka	5	5	0			211,833.37	10	1,701,000	8,269
Mokena	6	5	1			13,942.09	11	3,670,000	16,008
Naperville	157	110	46			1,074,333.28	76	16,419,300	74,029
New Lenox	45	37	8	31	8	429,951.74	34	6,970,700	32,400
Orland Park	68	53	15			807,129.15	73	18,103,300	52,976
Park Forest	6	4	2			11,009.73	10	1,689,000	2,902
Peotone	1	1				2,192.98	10	1,631,000	16,732
Plainfield	94	82	12			2,188,586.62	76	16,419,300	74,029
Rockdale	8	5	3			23,229.49	4	1,186,500	9,706
Romeoville	7	6	1	2	1	48,318.18	10	2,248,600	4,336
Sauk Village	9	6	3			25,916.06	16	4,492,100	13,731
Shorewood	64	56	8	13	5	1,015,132.05	29	8,116,200	37,270
Steger	9	7	2			71,524.26	16	2,172,500	10,281
Symerton	1	0	1			–	1	280,000	427
Tinley Park	67	34	33			94,369.93	179	25,971,900	137,209
University Park	1	0	1			–	4	433,600	1,375
Wilmington	146	128	18	16	6	1,148,894.86	62	11,205,800	72,115
Woodridge	17	14	3			160,058.28	25	6,730,500	17,686

FLASH FLOOD

Hazard Characterization

Two types of flooding occur with rivers and streams. Riverine flooding is a result of persistent rain and causes a slow rising of water causing it to overflow over several days or weeks. This type of flooding has been previously discussed and is the most typical type of flooding in Will County. Flash floods are a result of torrential rainfall over a short period of time, a sudden release of water from a dam failure, or breakup of an ice jam. These floods occur suddenly with tremendous force. Flash floods can turn calm rivers and streams into a turbulent torrent that is able to carry away boulders, trees, houses, trailers, cars, and people.

Flash flooding is a major killer. All flash floods strike quickly and end swiftly. They can be deadly because they produce rapid rises in water levels and have devastating flow velocities. Many flash floods occur at night when they are difficult to see. Most flash flood deaths are related to vehicles being washed away. People are warned not to attempt driving or walking across a flooded area because as little as two feet of moving water will carry most cars away.

Flash floods can occur within several seconds to several hours and with little warning. Several factors can contribute to flash flooding. Among these are rainfall intensity, rainfall duration, surface conditions, and topography and slope of the receiving basin. Most flash flooding is caused by slow-moving thunderstorms in a local area or by heavy rains associated with hurricanes and tropical storms. Although flash flooding occurs often along mountain streams, it is also common in urbanized areas where much of the ground is covered by impervious surfaces.

Areas with steep slopes and narrow stream valleys are particularly vulnerable to flash flooding, as are the banks of small tributary streams. In hilly areas, the high-velocity flows and short warning time make flash floods hazardous and very destructive. Flash floods also can be caused by dam failure, the release of ice-jam flooding, or the collapse of a debris dam.

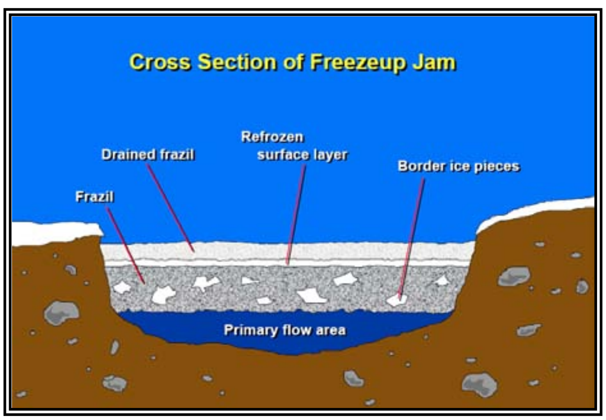
ICE JAMS

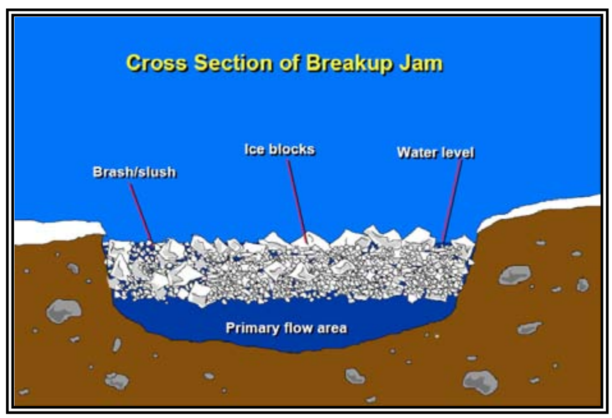
Hazard Characteristics

Ice jams develop when mild temperatures occur in a location with deep snow cover and totally or partially frozen rivers. The rising water in rivers then breaks the ice layer into large chunks. As these chunks float downriver, they accumulate near obstructions, bridges, and dams. This ice jam then creates a dam across the channel over which the water and ice mixture continues to flow allowing more jamming to occur. Backwater upstream from the ice dam forces the water to overflow, flooding the surrounding area and damaging low-lying areas and municipal structures. Flooding moves downstream when the ice dam fails, and the water stored behind the dam is released. At this time, the flood takes on the characteristics of a flash flood, with the added danger of ice flows, that when driven by the energy of the flood-wave, can inflict serious damage on structures.

An added danger of being caught in an ice-jam flood is hypothermia, which can kill quickly. The highest percentage of ice jams occur in the month of January, followed by the month of March.
There are generally two types of ice jams:

- Frazil ice freezes the river and forms a dam.
- When warm weather and rain break up frozen rivers or any time there is a rapid cycle of freezing and thawing, broken ice floats downriver until it is blocked by an obstruction such as a bridge or shallow area.





Ice jams present three hazards:

- Sudden flooding of areas upstream from the jam, often on clear days with little or no warning.
- Sudden flooding of areas downstream when an ice jam breaks. The impact is similar to a dam break, damaging or destroying buildings and structures.
- Movement of ice chunks that can push over trees and crush buildings.

History: Flood, Flash Flood, and Ice Jams

The Kankakee River downstream of Wilmington is prone to Ice Jams

Will County has always been afflicted by the constant damage and destruction of flooding. Damage caused by the 1974 floods was sufficient to declare the County to be a Presidential disaster area. Once again, a Presidential disaster area would be declared in this area due to the flooding in June, 1981. The DuPage River was declared a State Disaster area from the flooding of July, 1983, which included the Will County townships of DuPage, Homer, Lockport, Plainfield, and Troy. Federal disasters were again declared for flooding, including the DuPage River area, occurring in July, 1996; September, 2008; and April, 2013. Mitigation funding of approximately $10.6 million has been spent in Will County from the 1996 and 2008 floods.

Severe Storms and Flooding – July 17 to August 7, 1996
Federal Disaster Declaration #1129
Public Assistance - $4,265,671
Individual Assistance - $933,042 (974 referrals)

Severe storms and torrential rains began on July 17th and continued intermittently through August 7, 1996. Nearly 17 inches of rain fell in northern Will County on July 17th and 18th. Flash flooding resulted in widespread power outages, disruption of commuter rail service, and the flooding of thousands of home and hundreds of businesses. Major transportation routes, including interstate highways, city streets, and commuter rail lines were closed due to the flooding. Damage was widespread throughout Will County with several million of dollars in property damage. Major flooding occurred in the western half of the County in the townships of Lockport, New Lenox, Joliet, Wheatland, DuPage, Homer, Frankfort, Troy, Wilton, Plainfield, Crete, and Channahon. As a result of the Federal declaration, grants and low interest loans were made available to homeowners. Home located along the DuPage River were purchased by the Federal government in Plainfield, Shorewood, and Channahon. Public assistance helped to rebuild roads and bridges that were destroyed or damaged as a result of the flooding.

Severe Storms and Flooding – September 13, 2008
Federal Disaster Declaration #1800
Public Assistance - $667,787
Individual Assistance - $1,438,500 (1,159 referrals)

A flood watch was put into effect in the early morning of September 13th and continued into September 15, 2008. A tornado watch also occurred on September 13th. Rainfall amounts varied around the County from 6 to 9 inches with the heaviest amounts occurring in the central and eastern parts of the County. Flooding issues included sewer back-ups, flooded roads, river flooding, and water in basements. Flooding prompted road closures affected approximately 25 arterial streets along with numerous side streets. The DuPage River level rose to 23.86 feet, surpassing the record set in 1996, causing flooding in the Bolingbrook area. Plainfield, Joliet, and Shorewood undertook sandbagging efforts at various locations along the DuPage River with several homes in the Plainfield area evacuated due to rising water. Sporadic instances of motorists becoming trapped attempting to drive through high water occurred. Beecher experienced a partial disruption to its sanitary sewer system resulting in sewer back-ups in several homes.

The Will County EMA website was a source of information for the public on current flood conditions and weather advisories, what to do if their home was flooded, links to river gauges in Will County, and available monetary assistance for flood damaged homes. Along with traditional news media, the County's websites provided an information resource for those seeking assistance available under the Federal and State emergency declarations.

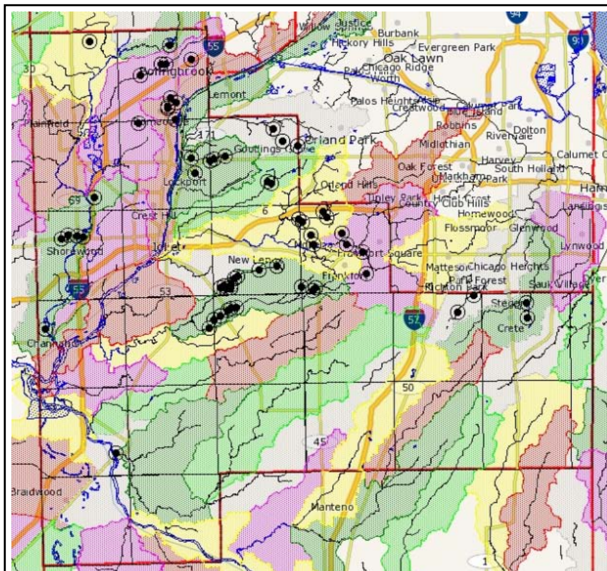
Severe Storms and Flooding – April 18, 2013
Federal Disaster Declaration #4116
Public Assistance - $1,238,434
Individual Assistance - $4,368,244 (2,385 referrals)

In April, 2013, Will County and other northern Illinois counties experienced a large amount of precipitation within a short period of time. The rain began on April 17th and continued into April 19th causing severe flooding throughout the County resulting in damage to roads, businesses, and homes. Rain totals varied from 3" to almost 7" across the County. Areas along the DuPage River, including western

Joliet, Plainfield, and Shorewood generally received the heaviest rainfall amounts. The Kankakee and Des Plaines Rivers did not experience flooding; however all watersheds tributary to those rivers overflowed. Road closures were experienced in Bolingbrook, Joliet, Naperville, Plainfield, with closures also experienced on state roads and inter-state highways. Limited power outages were experienced. Public safety communications for several fire departments in the southwest portion of the County were disrupted due to the flooding of their primary communications tower. Schools were closed in Plainfield, Wilmington, and one elementary school in Joliet. Plainfield temporarily sheltered 12 residents at one of their high schools. Will County hospitals supported Morris Hospital with their evacuation efforts. Thirty-eight counties were declared in a "state of emergency" by Governor Quinn with thirty-three counties declared Federal disasters.

Mitigation Measures

To address flooding issues within Will County after the 1996 flood, The Will County Comprehensive Stormwater Management Plan was developed in 1998. It established the WCSMPC (see p. 4-59), composed of municipal and County Board members, who was tasked to develop a county-wide Stormwater Management Ordinance. This ordinance has set the minimum standards for flood control issues throughout the County and is adopted and implemented by all municipalities in the County. The WCSMPC identifies flood mitigation projects through the recommendations of municipalities, review of available watershed studies, and evaluation of flood incidents. The WCSMPC works with surrounding counties to address flooding issues with watersheds that cross County borders. As an example, a list of current and past projects is available from:



WCSMPC Projects

- http://willcountylanduse.com/stormwater-management-planning-committee/stormwater-projects
- http://willcountylanduse.com/sites/default/files/Stormwater%20Project%20List.pdf

Many types of flood mitigation measures are available to the WCSMPs and community partners. Some for them to consider are:

- Maintaining and implementing the Will County Stormwater Management Plan to indentify flooding issues and strategizing methods to address those issues will continue to reduce damages to infrastructure and buildings. Issues to be addressed in the County's watersheds by the WCSMPC include surface flooding, stream maintenance, erosion/sedimentation control, water quality, watershed education, infrastructure maintenance, agency coordination, and property damage. The following chart identifies some of the watershed concerns and partner jurisdictions in addressing those concerns.

Will County Watershed Concerns

Legend:

Description of Stream Problem
Flooding=Surface Flooding
Maintenance=Stream Maintenance
Erosion=Erosion/Sedimentation Control
Water=Water Quality
Education=Watershed Education
Infrastructure=Infrastructure Maintenance
Coordination=Agency Coordination
Damage=Property Damage

Watershed	**Description of Watershed Problem**	**Primary Area of Concern of Watershed Stakeholders**	**Estimated Cost for Phase 1 Watershed Plan Development**	**% of Watershed Area in Will County**	**% of Will County Area in the Watershed**	**Municipalities**	**Townships**
Aux Sable Creek	Flooding, Maintenance, Erosion, Water, Education, Infrastructure, Coordination, Damage	Water quality impacts due to development	$10,000	0.6	0.1	Joliet, Shorewood	Plainfield, Troy
Baker Exline Creek	Flooding, Maintenance, Erosion, Water, Damage		$14,000	N/A	1.4		Washington, Will
Bull Creek	Flooding, Maintenance, Erosion, Water, Damage		$1,300	19.0	0.1		Washington
DesPlaines River	Flooding, Maintenance, Erosion, Water, Education, Infrastructure, Coordination, Damage	Basement flooding, flooding, water quality	$147,000	6.8	15.1	Crest Hill, Joliet, Lockport, Bolingbrook, New Lenox, Rockdale, Channahon, Elwood, Homer Glen, Lemont, Romeoville, Woodridge	Channahon, DuPage, Florence, Homer, Jackson, Joliet, Lockport, New Lenox, Troy, Wilmington
DuPage River	Flooding, Maintenance, Erosion, Water, Education, Infrastructure, Coordination, Damage	Flooding, basement flooding, water quality, roadway flooding	$152,000	30.9	12.3	Aurora, Crest Hill, Joliet, Naperville, Bolingbrook, Plainfield, Shorewood, Channahon, Minooka, Rockdale	Channahon, DuPage, Joliet, Lockport, Plainfield, Troy, Wheatland

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Watershed	Description of Watershed Problem	Primary Area of Concern of Watershed Stakeholders	Estimated Cost for Phase 1 Watershed Plan Development	% of Watershed Area in Will County	% of Will County Area in the Watershed	Municipalities	Townships
East Branch DuPage River	Water, Maintenance, Flooding, Erosion, Education	Water Quality, flooding	$8,800	8.2	0.7	Naperville, Bolingbrook, Woodridge	DuPage, Wheatland
Forked Creek	Maintenance, Water Education, Infrastructure, Flooding, Coordination, Damage	Flooding, water quality, farm drainage, roadway flooding, stream maintenance	$156,000	100	14.8	Symerton, Wilmington, University Park, Frankfort, Monee	Florence, Green Garden, Manhattan, Monee, Peotone, Wesley, Wilmington, Wilton
Fox River	N/A	N/A	$15,000	0.1	0.2	Aurora, Naperville	Wheatland
Hickory Creek	Flooding, Maintenance, Erosion, Water, Education, Infrastructure, Coordination, Damage	Flooding	$93,000	84.4	9.6	Homer Glen, New Lenox, Mokena, Joliet, Lockport, University Park, Frankfort, Orland Park, Tinley Park	Frankfort, Green Garden, Homer, Joliet, Lockport, Manhattan, New Lenox
I & M Canal	Flooding, Maintenance, Damage, Erosion, Infrastructure	Basement Flooding, flooding	N/A	N/A	N/A	N/A	N/A
Jackson Creek	Flooding, Maintenance, Erosion, Infrastructure, Water, Education	Water Quality	$60,000	100	6.2	Joliet, New Lenox, Elwood, Manhattan, Frankfort, Mokena	Channahon, Frankfort, Green Garden, Jackson, Joliet, Manhattan, New Lenox

Will County Watershed Concerns

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Watershed	Description of Watershed Problem	Primary Area of Concern of Watershed Stakeholders	Estimated Cost for Phase 1 Watershed Plan Development	% of Watershed Area in Will County	% of Will County Area in the Watershed	Municipalities	Townships
Kankakee River	Flooding, Maintenance, Erosion, Water, Education, Infrastructure, Coordination, Damage	Basement flooding, flooding, erosion	$58,000	1.0	5.5	Wilmington, Braidwood, Braceville	Channahon, Custer, Florence, Reed, Wesley, Wilmington
Lily Cache Creek	Flooding, Maintenance, Erosion, Infrastructure, Coordination, Water	Flooding, roadway flooding	$61,000	100	5.0	Joliet, Bolingbrook, Romeoville, Plainfield, Crest Hill, Woodridge	DuPage, Lockport, Plainfield, Wheatland
Mazon River	Maintenance, Erosion, Infrastructure		$40,000	8.0	3.8	Braidwood, Wilmington, Coal City, Braceville, Diamond, Godley	Custer, Reed, Wilmington
Pike Trim Creek	Flooding, Maintenance, Erosion, Water, Damage, Education		$39,000	N/A	3.7	Beecher	Crete, Washington, Will
Plum Creek	Flooding, Maintenance, Infrastructure, Coordination, Erosion, Water, Damage	Flooding	$54,000	70.7	2.6	Crete, Beecher, Sauk Village	Crete, Manhattan, Washington, Will
Prairie Creek	Flooding, Maintenance, Infrastructure, Erosion, Water, Education	Flooding, stream maintenance, roadway flooding, detention pond discharges, stream backups, water quality	$65,000	100	6.2	Manhattan, Wilmington, Frankfort	Florence, Frankfort, Green Garden, Jackson, Manhattan, Wilmington, Wilton
Rock Creek	Flooding, Maintenance, Infrastructure, Coordination, Education	Flooding, water quality	$77,000	N/A	7.3	University Park, Crete, Monee, Peotone	Crete, Green Garden, Manhattan, Peotone, Will, Wilton

Will County Watershed Concerns							
Legend:							
Description of Stream Problem							
Flooding=Surface Flooding							
Maintenance=Stream Maintenance							
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Watershed	**Description of Watershed Problem**	**Primary Area of Concern of Watershed Stakeholders**	**Estimated Cost for Phase 1 Watershed Plan Development**	**% of Watershed Area in Will County**	**% of Will County Area in the Watershed**	**Municipalities**	**Townships**
Thorn Creek	Flooding, Maintenance, Infrastructure, Coordination, Education	Flooding and water quality	$67,000	29.1	3.2	University Park, Frankfort, Park Forest, Monee, Crete, Steger	Crete, Frankfort, Manhattan
West Branch DuPage River	Flooding, Erosion, Maintenance, Education, Coordination, Damage		$2,900	1.8	0.2	Naperville, Bolingbrook	DuPage, Wheatland
West Creek	Flooding, Erosion, Damage, Maintenance, Water		$4,400	N/A	2.0		Crete, Washington

- Improve WCSMPC planning and project prioritization by conducting watershed studies that provide an analysis of each watershed's function, behavior, physical characteristics, and population/land use distribution. The studies will document the flooding issues in each watershed for development of a flood mitigation project list and provide the WCSMPC with a basis for cost/benefit analysis, project prioritization, and partner support.
- The adoption of IBC and IRC building standards (see p. 5-10 for jurisdictions) and development plans (see p. 5-9 for jurisdictional plans) have helped to alleviate flooding issues in construction that has occurred post Flood Insurance Rate Maps (FIRM) that began to be available in the 1980's.
- Federal funding after the 1996 and 2008 floods has helped to purchase or retrofit older buildings located in flood plains. A large share of the properties purchased after the 1996 flood were located along the DuPage River and Jackson Creek. Buyouts after the 2008 were residential in nature and targeted properties located in Plainfield, Channahon, and Crete Townships. Continued

buyouts of pre-FIRM structures in special flood hazard areas or retrofitting will help to alleviate issues with repetitive loss properties.

- Improved technology in monitoring rain and stream gauges allows the NWS and USGS to develop better forecasting models and real-time data that will enable government agencies, private institutions, and individuals to make more informed decisions about risk based policies and actions to mitigate the dangers posed by floods. Additionally, improved forecasting and real-time data combined with the latest in communications and alert systems will also mitigate the dangers of floods and help to save lives. Will County Land Use Department and Emergency Management Agency (EMA) continue to partner with the NWX, USGS, and other agencies to improve forecasting, utilize advanced technology, implement mitigation measures, and maintain planning to ensure the public's safety.
- Communities within Will County are part of the NFIP by meeting minimum standards. The County and communities could improve flood plain management by committing to the NFIP's Community Rating System (CRS) which is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. Through this program, flood insurance premium rates would be discounted to reflect the reduced flood risk resulting from meeting the three goals of the CRS: Reduce flood damage to insurable property, strengthen and support the insurance aspects of the NFIP, and encourage a comprehensive approach to floodplain management.
- Utilize DFIRMS when completed to identify critical facilities located in high flood hazard areas and with GIS to develop and maintain a county-wide database of flood controlled areas, purchased flood plain properties, and flood prone properties to be acquired.
- Another important mitigation measure is flood risk and mitigation techniques education. Federal and state agencies provide a wealth of information on flood risks and dangers which can be provided to the public in flood prone areas. Also, it is important to inform the public about the availability of flood insurance. Other education outreach can inform the public about mitigation techniques that they can implement at their homes or businesses. Educational material can be provided to the public through expanding communication technology. Print material can be distributed through traditional methods of brochures, news media, newsletters, or presentations at community events. Websites and the growing social media are other educational avenues to reach the public. Smartphone applications (apps) are another effective educational tool. County

and communities can continue their public education by adding new and improved communication tools to their outreach efforts.

IMPACT OF FLOOD/FLASH FLOOD EVENTS ON WILL COUNTY (Source: National Climatic Data Center / WC EMA)								
Location	**Date**	**Time**	**Type**	**Deaths**	**Injuries**	**Property Damage**	**Crop Damage**	**Federal Declaration**
Will Co.	06/10/1974		Flood					DR-438
Will Co.	06/30/1981		Flood					DR-643
Will Co.	02/23/1985		Flood					DR-735
Will Co.	05/15/1993		Flood	0	1	0	0	
Will Co.	06/01/1995		Flood	0	0	0	0	
Will Co.	04/22/1996	04:00 AM	Flood	0	0	$35 K	$30 K	
Will Co.	05/01/1996	12:01 AM	Flood	0	0	$100 K	0	
Will Co.	07/17/1996	06:00 PM	Flash Flood	2	0	0	0	
Will Co.	07/18/1996		Flood					DR-1129
Will Co.	02/20/1997	06:00 PM	Flood	0	0	0	0	
Will Co.	05/06/1998	12:45 PM	Flash Flood	0	0	0	0	
Will Co.	08/03/1998	11:00 PM	Flood	0	0	0	0	
Will Co.	04/27/1999	08:45 AM	Flood	0	0	0	0	
Custer Park	06/22/1999	04:15 PM	Flash Flood	0	0	0	0	
Will Co.	06/17/2000	07:00 AM	Flood	0	$	$10 K	0	
Will Co.	07/10/2000	04:00 AM	Flash Flood	0	0	0	0	
Plainfield	10/13/2001	04:15 PM	Flash Flood	0	0	0	0	
Will Co.	12/17/2001	02:00 AM	Flood	0	0	$8 K	0	
Will Co.	07/27/2003	11:30 AM	Flash Flood	0	0	$14 M	0	
Will Co.	08/03/2003	04:45 PM	Flash Flood	0	0	$500 K	0	
Joliet, Romeoville, Mokena & Lockport	04/20/2004	06:35 PM	Flash Flood	0	0	0	0	
Will Co.	05/13/2004	04:45 PM	Flash Flood	0	0	0	0	
Channahon, Monee, Joliet	05/30/2004	06:25 PM	Flash Flood	0	0	0	0	
Will Co.	06/10/2004	05:59 PM	Flash Flood	0	0	0	0	
Will Co.	06/11/2004	09:15 PM	Flash Flood	0	0	0	0	
Will Co.	01/13/2005	01:05 AM	Flood	0	0	0	0	
Will Co.	02/14/2005	03:07 AM	Flood	0	0	0	0	
Will Co.	03/30/2005	07:20 PM	Flood	0	0	0	0	
Will Co.	06/04/2005	04:20 PM	Flash Flood	0	0	0	0	
Beecher	04/16/2006	03:42 PM	Flood	0	0	0	0	
Lockport	07/11/2006	10:30 PM	Flood	0	0	0	0	
Joliet	07/27/2006	03:36 PM	Flood/Flash Flood	0	0	$3 M	0	
Joliet	08/10/2006	08:20 AM	Flood	0	0	0	0	
Channahon	09/13/2006	07:00 AM	Flood	0	0	0	0	
Romeoville	03/01/2007	09:45 AM	Flood	0	0	0	0	
Joliet	05/26/2007	03:11 PM	Flood	0	0	0	0	
Joliet	06/26/2007	01:30 PM	Flood	0	0	0	0	
Joliet	07/18/2007	09:23 PM	Flood	0	0	0	0	
Romeoville	08/05/2007	05:05 PM	Flood	0	0	0	0	
Romeoville	08/22/2007	09:30 PM	Flood	0	0	0	0	

IMPACT OF FLOOD/FLASH FLOOD EVENTS ON WILL COUNTY (Source: National Climatic Data Center / WC EMA)								
Location	**Date**	**Time**	**Type**	**Deaths**	**Injuries**	**Property Damage**	**Crop Damage**	**Federal Declaration**
Joliet	08/23/2007	06:05 PM	Flood	0	0	0	0	
Crest Hill				0	0	0	0	
Crete								
Peotone		08:12 PM		0	0	$25 K	0	
Plainfield		08:21 PM		0	0	0	0	
New Lenox								
Bolingbrook,		06:00 PM	Flash Flood	0	0	0		
Wilmington		09:30 PM		0	0	$15 K	0	
Romeoville	01/08/2008	06:10 AM	Flood	0	0	0	0	
Mokena								
Crete		08:00 AM	Flash Flood	0	0	0	0	
Wilmington	01/22/2008	11:34 AM	Flash Flood	0	0	$100 K	0	
Crest Hill	02/17/2008	03:45 PM	Flood	0	0	0	0	
Joliet	06/04/2008	11:33 PM	Flash Flood	0	0	0	0	
Crest Hill	08/04/2008	07:50 PM	Flood	0	0	0	0	
Will County	09/14/2008	03:30 PM	Flood	0	0	0	0	DR-1800
		07:00 AM	Flash Flood	0	0	$1 M	0	
Lockport		07:00 AM	Flash Flood	0	0	$500 K	0	
Tinley Park	02/26/2009	09:00 PM	Flood	0	0	0	0	
Joliet	03/08/2009	12:10 PM	Flood	0	0	0	0	
Lemont								
Peotone								
Fairmont								
Plainfield	05/26/2009	07:00 PM	Flood	0	0	0	0	
Will County	06/16/2009	05:15 PM	Flash Flood	0	0	0	0	
Ingalls Park	06/23/2010	05:15 PM	Flood	0	0	0	0	
Bolingbrook								
New Lenox		06:45 PM	Flash Flood	0	0	0		
New Lenox	07/24/2010	10:02 PM	Flood	0	0	0	0	
Peotone	07/25/2010	01:15 AM	Flood	0	0	0	0	
Wilton Center	08/03/2010	04:30 AM	Flash Flood	0	0	0	0	
Will County		04:30 AM		0	0	$1 M		
Monee	05/28/2011	06:23 PM	Flood	0	0	0	0	
Crete		06:30 PM	Flash Flood	0	0	0	0	
Lemont	06/09/2011	08:05 PM	Flood	0	0	0	0	
Romeoville								
Peotone								
Plainfield		06:10 am	Flash Flood	0	0	0	0	
Wilmington	05/07/2012	11:00 AM	Flash Flood	0	0	0	0	
		01:00 PM		0	0	0	0	
Caton Farm	03/10/2013	06:05 AM	Flood	0	0	0	0	
Will County	04/18/2013		Flood			TBD		DR-4116
			Flash Flood					
Bolingbrook	05/28/2013	07:55 PM	Flood	0	0	0	0	

IMPACT OF ICE JAM EVENTS ON WILL COUNTY (Source: National Climatic Data Center / WC EMA)							
Date	**Town**	**River**	**Discharge (cfs)**	**Date**	**Town**	**River**	**Discharge (cfs)**
01/21/1916	Wilmington	Kankakee		03/08/1979	Wilmington	Kankakee	48,000
02/14/1918	Wilmington	Kankakee		03/08/1979	Shorewood	DuPage River	
02/07/1924	Wilmington	Kankakee	16,600	12/17/1979	Shorewood	DuPage River	60
02/05/1927	Wilmington	Kankakee	29,100	02/22/1980	Joliet	Hickory Creek	490
12/09/1927	Wilmington	Kankakee	24,000	02/23/1982	Wilmington	Kankakee	
01/12/1928	Wilmington	Kankakee	13,100	02/01/1984	Wilmington	Kankakee	
01/23/1929	Wilmington	Kankakee	18,100	02/07/1985	Wilmington	Kankakee	
01/04/1930	Wilmington	Kankakee	15,600	02/23/1985	Wilmington	Kankakee	50,000
02/15/1935	Wilmington	Kankakee		12/23/1985	Wilmington	Kankakee	50,000
02/29/1936	Wilmington	Kankakee	16,000	01/17/1988	Joliet	Hickory Creek	
01/28/1937	Wilmington	Kankakee		01/19/1988	Wilmington	Kankakee	
02/20/1939	Wilmington	Kankakee	15,000	02/18/1988	Wilmington	Kankakee	
02/06/1943	Wilmington	Kankakee	15,000	12/28/1990	Wilmington	Kankakee	
02/19/1946	Wilmington	Kankakee		02/26/1993	Wilmington	Kankakee	
02/15/1947	Troy	DuPage River	1,500	02/19/1994	Wilmington	Kankakee	
02/28/1948	Wilmington	Kankakee		01/08/1996	Troy	DuPage River	115
02/01/1949	Wilmington	Kankakee		01/12/1996	Wilmington	Kankakee	
02/13/1949	Troy	DuPage River	4,500	12/26/1996	Wilmington	Kankakee	
03/03/1950	Wilmington	Kankakee		12/26/1996	Wilmington	Kankakee	
02/19/1951	Wilmington	Kankakee	30,000	01/27/1997	Shorewood	DuPage River	
01/31/1952	Wilmington	Kankakee		01/22/1999	Joliet	Hickory Creek	600
02/20/1955	Wilmington	Kankakee		01/21/2000	Shorewood	DuPage River	64
02/20/1955	Custer Park	Terry Creek		01/27/2000	Joliet	Hickory Creek	9.2
11/17/1955	Troy	DuPage River	.2	12/26/2000	Joliet	Hickory Creek	8.6
02/19/1957	Wilmington	Kankakee		02/01/2001	Wilmington	Kankakee	
01/09/1958	Wilmington	Kankakee		12/31/2001	Wilmington	Kankakee	
02/14/1959	Custer Park	Terry Creek		12/06/2002	Shorewood	DuPage River	117
02/13/1959	Wilmington	Kankakee		01/11/2003	Shorewood	DuPage River	113
01/23/1960	Wilmington	Kankakee		12/24/2004	Wilmington	Kankakee	
03/08/1963	Wilmington	Kankakee		02/01/2007	Wilmington	Kankakee	
02/08/1965	Troy	DuPage River	1,400	02/25/2007	Wilmington	Kankakee	
02/22/1965	Troy	DuPage River	89	01/20/2008	Wilmington	Kankakee	
01/17/1966	Wilmington	Kankakee		01/24/2008	Wilmington	Kankakee	7,100
02/16/1967	Wilmington	Kankakee	5,000	12/22/2008	Wilmington	Kankakee	
01//30/1968	Wilmington	Kankakee		12/27/2008	Wilmington	Kankakee	
02/19/1971	Shorewood	DuPage River	1,400	12/29/2008	Shorewood	DuPage River	
02/19/1971	Joliet	Hickory Creek	560	01/14/2009	Wilmington	Kankakee	
01/21/1974	Wilmington	Kankakee		01/03/2010	Wilmington	Kankakee	
12/17/1977	Wilmington	Kankakee	10,000	01/10/2010	Joliet	Hickory Creek	5.4
12/29/1978	Wilmington	Kankakee	508	01/10/2011	Wilmington	Kankakee	
03/04/1979	Joliet	Hickory Creek	1,880				

Risk Characterization

Flooding is generally part of a natural cycle that has many important and beneficial functions for the environment. Flooding raises the water table in wetlands, maintains biodiversity, and replenishes nutrients back into the soil. Additionally, higher water tables allow fish and water plants to re-colonize and may also help to control some invasive species. Flooding, however, becomes a problem in the built environment. Drainage systems and city sewers can become overwhelmed, causing raw sewage to back up in basements and onto roadways. Flooding in urban areas can also cause increased runoff, which may carry pollutants through storm sewers into rivers and lakes. Urban runoff can be toxic, as it may contain garbage, fertilizers, oil and other residues from city streets.

Riverine flooding has caused displacement, property damage, and impacts on the health of residents. Floods can damage or destroy public and private property, disable utilities, make roads and bridges impassable, destroy crops and agricultural lands, cause disruption to emergency services, and result in fatalities. People may be stranded in their homes for several days without power or heat, or they may be unable to reach their homes at all. Long-term collateral dangers include the outbreak of disease, widespread animal death, broken sewer lines causing water supply pollution, downed power lines, broken gas lines, fires, and the release of hazardous materials.

Flooding is a hazard whose risks are routinely underestimated by the public, who may be inclined to attempt to walk or drive through shallow waters, or to allow their children and pets to play in the water as if it were part of a beach or swimming pool. Public education is vital so that there is widespread knowledge of the contaminants and germs that floodwaters contain, and a greater awareness of the risks that floodwaters pose to drivers and pedestrians.

Drivers need to know that roads and bridges are often weakened and degraded by flood impacts, and that the road they assume is still there under shallow waters may no longer be intact. Floodwaters tend to conceal the presence of open manholes, dangerous debris (such as rusty nails and metal), and live electrical wires that can cause harmful shocks. Less than a foot of flowing water can cause vehicles to end up in a ditch or sinkhole, where persons may find it impossible to escape from a submerged vehicle under the pressures exerted by flowing water. Those who are tempted to walk through floodwaters should be informed that the waters tend to conceal the presence of open manholes and dangerous debris, such as rusty nails and metal, or live electrical wires that can cause harmful shocks.

Flooding is a major, recurring problem in Illinois. Any buildings in the flood plain are subject to flood damage. Flood damage in Will County results from several different causes. Floods on the Kankakee and Des Plaines Rivers, generally, are associated with spring snowmelt combined with ice jams and frontal rain storms. Flooding is often aggravated by interbasin flow between the Kankakee River and the Des Plaines River, the Kankakee River and Forked Creek, the I and M Canal and the DuPage River, and I and M Canal and Long Run. Floods on much smaller tributaries in Will County are caused by intense thunderstorms which occur in the summer and early fall.

New construction near flood plains potentially alters surface water flows by diverting water to new courses or increases the amount of water that runs off impermeable pavement and roof surfaces. This diverts water, if done improperly, to areas previously safe from flooding. Higher risks are associated to areas with increased populations as well as residential growth. Per census data, Will County grew in population by 34.9% from 2000 to 2010 to a total of 677,560 people making it one of the fastest growing counties in the U.S. and it continues to grow with an estimated 2012 census total of 682,519.
Future plans will continue to keep track of high growth populations and note that they have the potential for higher vulnerability to flooding issues.

Will County Flood Loss Estimates (From 2010 IL Haz. Mit. Plan)	
Total Housing Units	232,007
Median Home Value	$154,300
% in Floodplain (Total Land)	11.6
Estimated Damage	$830,529,378

Impact for Flood: High

Damage to Buildings

Buildings can be impacted by the velocity of flooding with the force of debris or ice against the exterior damaging the outside walls or pushing the structure off its foundation. Flood waters will deposit sediment and other contaminates. This is a severe problem when hazardous materials are released into the flood waters.

Hydrostatic pressure, the pressure exerted by the water when it is at rest, can break walls and floors or even float a structure. Insulation, drywall and other building materials will deteriorate and decompose when wet. Wood will swell from the water and then warp when dried too quickly.
Building contents are usually not salvageable after a flood. Any electrical appliances or gas powered engines will be unsafe unless properly dried and cleaned.

Again, wood will warp and split. Upholstered furniture, carpeting, mattresses, and household goods cannot be dried out to useable condition. Dampness, unless mitigated within 24 to 48 hours, will then encourage the growth of mold. Mold spores can germinate and grow in a moist or damp environment, on any surface that contains organic matter. A home that's been flooded can provide ideal conditions for the growth and proliferation of mold. Indoor mold can trigger allergies or allergy-like symptoms affecting the upper respiratory system.

Critical Facilities

For some activities and facilities, even a slight chance of flooding is too great a threat. Typical critical facilities include hospitals, fire stations, police stations, storage of critical records, and similar facilities. These facilities should be given special consideration when formulating regulatory alternatives and floodplain management plans. A critical facility should not be located in a floodplain if at all possible. If a critical facility must be located in a floodplain, it should be provided a higher level of protection so that it can continue to function and provide services after the flood. Communities should develop emergency plans to continue to provide these services during the flood.

Under Executive Order 11988, Floodplain Management, Federal agencies funding and/or permitting critical facilities are required to avoid the 0.2% (500-year) floodplain or protect the facilities to the 0.2% chance flood level.

Damage to critical facilities can add to the widespread damage experienced by floods by reducing services they provide to the public. Damage to utilities or pipelines can cause outages. Flooded water or wastewater treatment plants can create serious health hazards. Transportation and communication systems can be limited or shut down. Fires are damaging when areas are inaccessible to fire equipment.

Health and Safety

It is imperative that people heed warnings during floods. A car will float in less than two feet of moving water sweeping it into deeper waters. Most deaths during floods are a result of people trapped in their vehicles. It is important that people heed travel warnings as road conditions can be easily misjudged. Water on roads can be much deeper than it appears or sections of road or small bridges can be washed out and the damage not visible.

Health is affected when drinking water is contaminated with dirt, oil, chemicals, or other debris found in the stormwater runoff. It is important that private wells in flooded areas be tested for contamination and contaminated wells disinfected before resuming well use. As flood waters recede, pools of standing water become a breeding ground for mosquitoes. Wet farm fields negatively impact the planting and harvest seasons and can damage farm equipment. Damp areas of buildings not properly disinfected begin to grow mold or mildew. People may experience heart attacks from overexertion or stress. Deaths also occur from electrocution when electrical mechanisms short out and create live current.

Floods also have a psychological impact on the people who have lost their home or keepsakes. For those located in floodplain areas, knowledge that their homes could be flooded again causes additional psychological strain.

Economic Impact

Flood has an economic impact on all residents of the County. Public expenditures are expended on flood fighting, sandbags, fire department calls, road closures and repairs, clean-up, and repairs to damaged public property. The public is further impacted when the underfunded NFIP makes payouts for flood claims. The NFIP is meant to be self-supporting, though in 2003 the Government Accountability Office (GAO) found that repetitive-loss properties cost the taxpayer about $200 million annually. To cover these costs, the NFIP borrows from the U.S. Treasury when losses are heavy, and these loans are paid back with interest. After 45 years, flood risks continue and the costs and consequences of flooding are increasing dramatically. As previously discussed, the Biggert-Waters Flood Insurance Reform Act of 2012 (BW-12) was passed to make the NFIP more sustainable and financially sound.

Business losses also occur due to flood damage to the facility structures and inventory. Customers may not be able to reach businesses located in the flood area or raw materials or goods cannot be transported in or out. Additionally, businesses can be impacted by employees who must clean-up their flood damaged homes. Repeated flooding in an area can cause declining property values. In rural areas, flooded fields can mean the loss of the season's crops or food source for livestock.

Future Occurrence

Though flooding can never be eliminated, measures can be taken to lessen the impact of flooding. Among the more notable flood protection measures is the WCSMPC. It is responsible for directing the implementation of *Comprehensive Stormwater Management Plan* and provides the *Will County Stormwater Technical Guidance Manual* to developers, applicants, and administrators to assist them in complying with the Stormwater Management Ordinance and the technical requirements of a stormwater permit application.

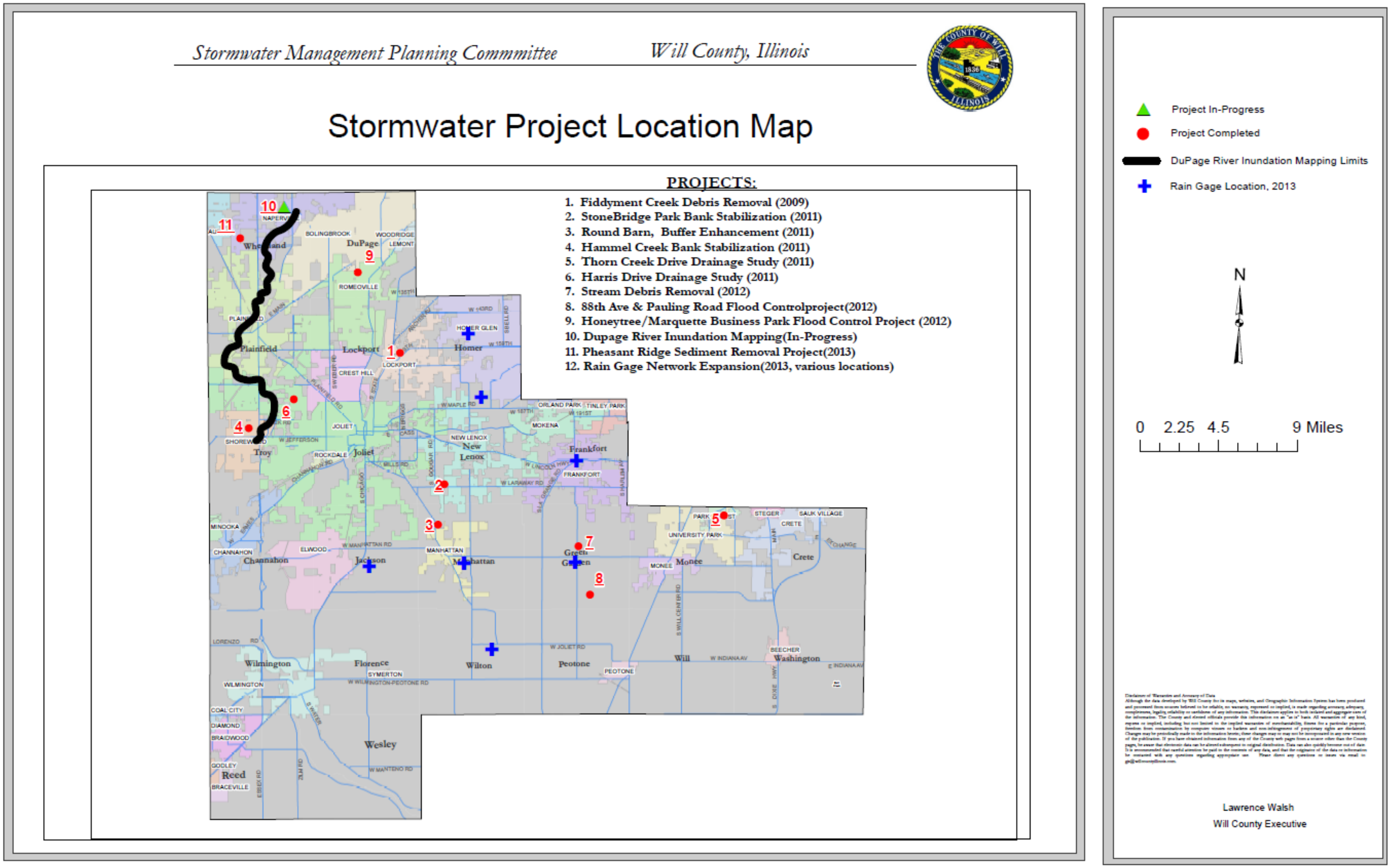
The primary purpose of the WCSMPC is to provide county-wide coordination of stormwater management in Will County, to ensure consistent levels of flood mitigation, and to prevent stormwater related problems throughout the County's watersheds. This provides for a consolidated county-wide framework.

The goals for the Will County Stormwater Program are as follows:

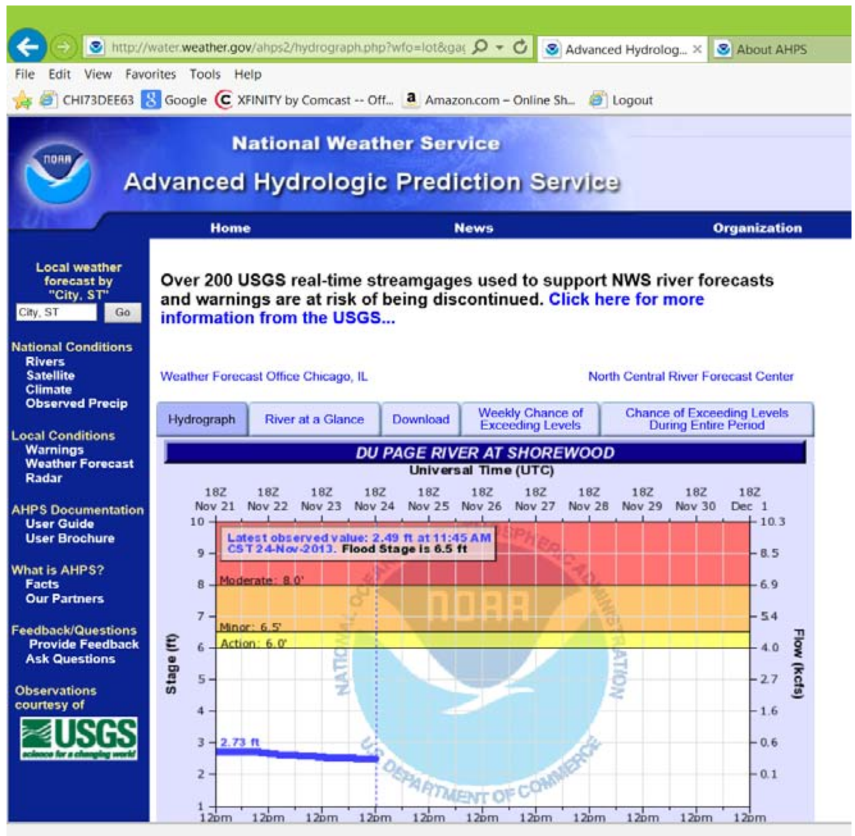
1. Consolidate and coordinate existing stormwater management programs and activities into an effective, unified county-wide structure.
2. Prevent increases in stormwater related problems associated with development, redevelopment and other watershed activities.
3. Remediate existing problems related to improper management of stormwater runoff and encroachment into floodprone areas.
4. Ensure maintenance, management, and sustainable operation of natural and manmade stormwater drainage and storage features.

A result of their work is the comprehensive county-wide stormwater ordinance that applies to both incorporated and unincorporated areas. It minimizes any increases in stormwater-related problems and specifies standards for stormwater drainage and detention, floodplain management, soil erosion and sediment control, and stream and wetland protection in a single document. To ensure consistency among watershed plans, the committee coordinates watershed projects within the County and with neighboring counties where watersheds cross County borders. Since 2009, sixty stormwater projects have been established by the committee.

- See: http://willcountylanduse.com/sites/default/files/Stormwater%20Project%20List.pdf


Stormwater Management Planning Committee
Will County, Illinois
Stormwater Project Location Map
PROJECTS:
1. Fiddyment Creek Debris Removal (2009)
2. StoneBridge Park Bank Stabilization (2011)
3. Round Barn, Buffer Enhancement (2011)
4. Hammel Creek Bank Stabilization (2011)
5. Thorn Creek Drive Drainage Study (2011)
6. Harris Drive Drainage Study (2011)
7. Stream Debris Removal (2012)
8. 88th Ave & Pauling Road Flood Controlproject(2012)
9. Honeytree/Marquette Business Park Flood Control Project (2012)
10. Dupage River Inundation Mapping(In-Progress)
11. Pheasant Ridge Sediment Removal Project(2013)
12. Rain Gage Network Expansion(2013, various locations)
Project In-Progress
Project Completed
DuPage River Inundation Mapping Limits
Rain Gage Location, 2013
N
0 2.25 4.5 9 Miles
Lawrence Walsh
Will County Executive

Another flood protective measure has been the increased use of stream gauge monitors with telemetry that provide real-time information. Stream gauges provide the National Weather Service (NWS), in collaboration with many federal, state, and local agencies, with accurate and updated data that improves their river forecasts and warning system for the protection of life and property, and the enhancement of the national economy. NWS data and products form a national information database and infrastructure which can be used by other governmental agencies, the private sector, the public, and the global community. Real-time data can be obtained online as represented by this NWS sample and following link to stream gauges.



- See stream gauges: http://www.willcountylanduse.com/stormwater-management-planning-committee/will-county-stream-and-rain-gages-0

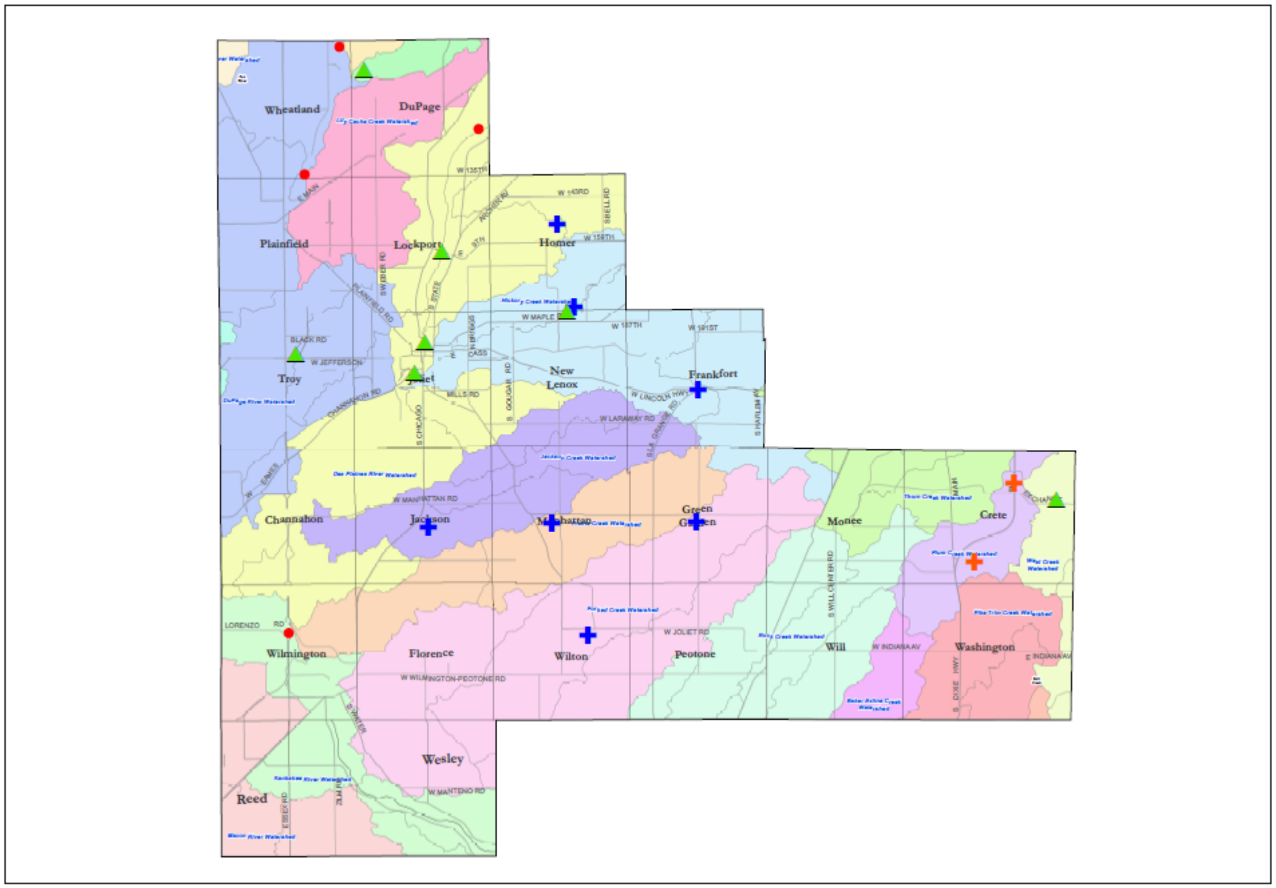
These telemetry monitored rain gauges also help to provide data that support flood inundation maps developed by the USGS. See flood inundation maps: http://il.water.usgs.gov/ifhp/will

The *2013 Illinois Natural Hazard Mitigation Plan* rates the flood hazard for Will County as high.

FLOOD/FLASH FLOOD PROBABILITY		
Type	**Number of Occurrences Since 1996**	**Annual Mean**
Flood	58	3.4

Stormwater Management Planning Committee *Will County, Illinois*

Stream & Rain Gage Location Map

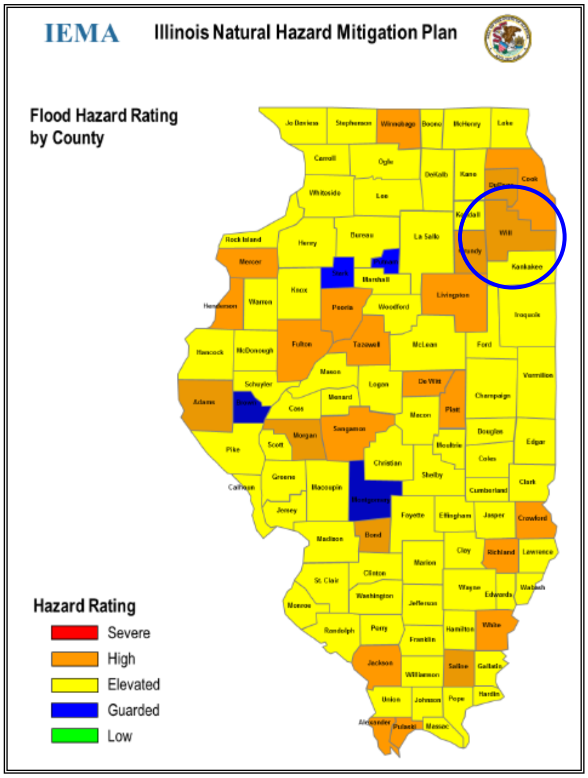


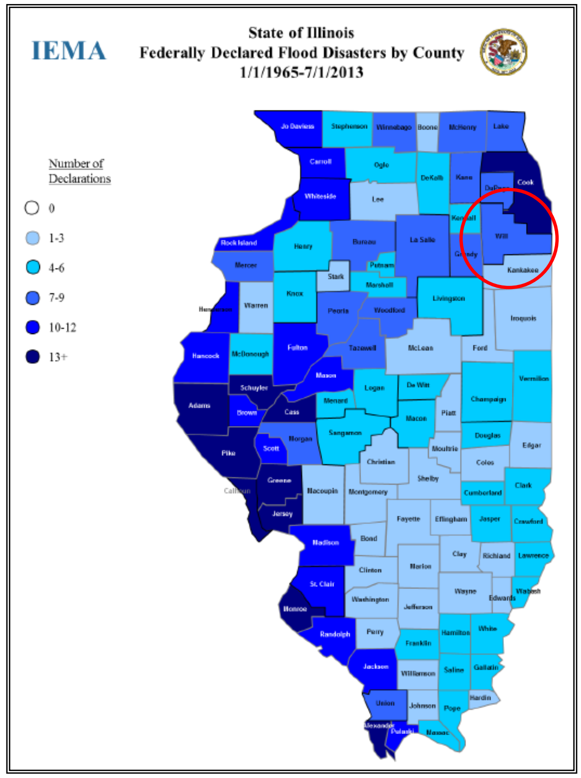
- Existing USGS Stream Gage Location
- Existing USGS Stream & Rain Gage Station
- Existing USGS Rain Gage Location
- New USGS Rain Gage Location, 2013

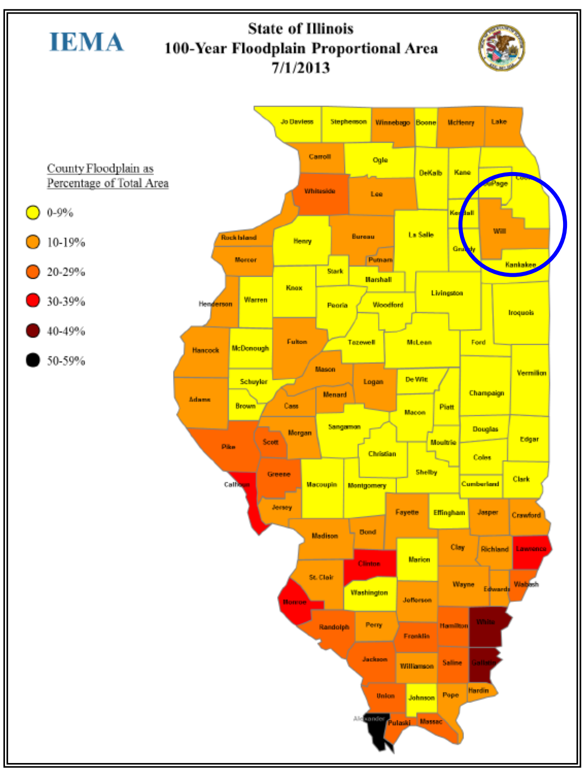
N

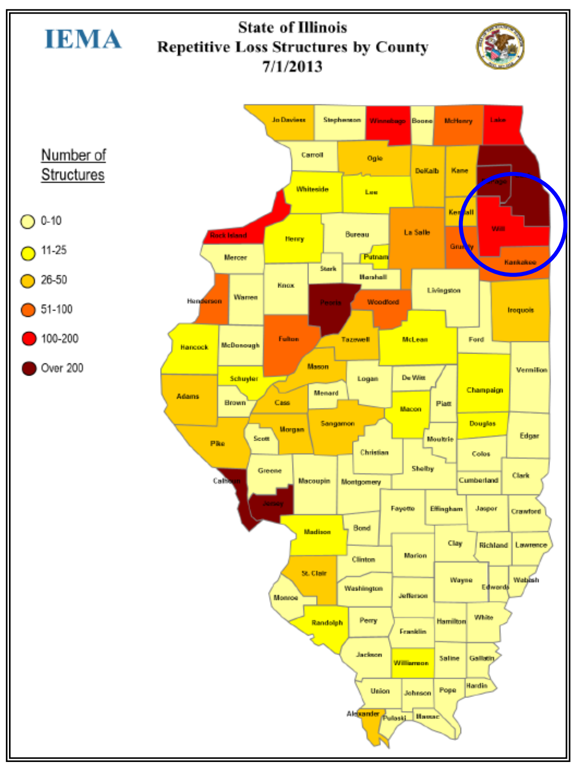
0 2.25 4.5 9 Miles

Lawrence Walsh
Will County Executive


IEMA
Illinois Natural Hazard Mitigation Plan
Flood Hazard Rating by County
Hazard Rating
Severe
High
Elevated
Guarded
Low


IEMA
State of Illinois
Federally Declared Flood Disasters by County
1/1/1965-7/1/2013
Number of Declarations
0
1-3
4-6
7-9
10-12
13+


IEMA
State of Illinois
100-Year Floodplain Proportional Area
7/1/2013
County Floodplain as Percentage of Total Area
0-9%
10-19%
20-29%
30-39%
40-49%
50-59%

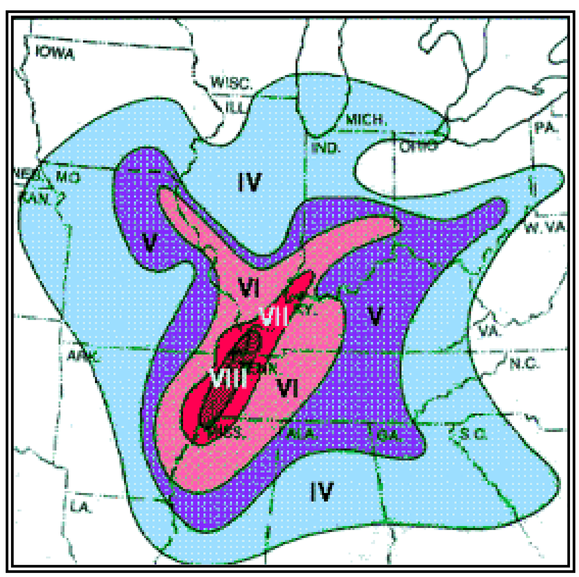

IEMA
State of Illinois
Repetitive Loss Structures by County
7/1/2013
Number of Structures
0-10
11-25
26-50
51-100
100-200
Over 200

EARTHQUAKE

Hazard Characterization

The earth's crust is far from being a motionless mass, but rather, it is in a constant state of flux. A sudden motion of the ground that causes surface faulting or ground rupture, ground shaking, and ground failure is the result of an earthquake. The onset of a large earthquake is initially signaled by a deep rumbling or by disturbed air making a rushing sound. This is shortly followed by a series of violent ground movements. The ground often splits and there can be large, permanent displacements of the earth. Buildings, bridges, dams, tunnels, and other rigid structures are damaged or collapse when subjected to this stress.

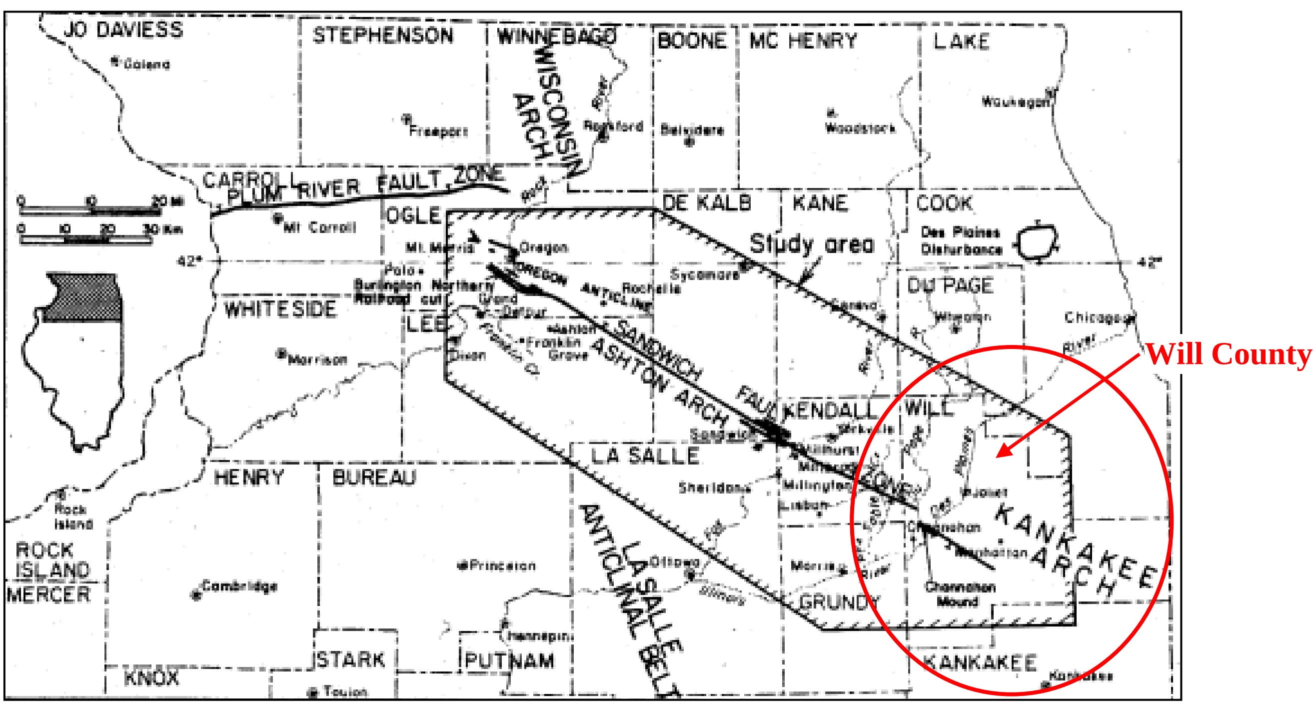
In addition to structural problems, water in tanks, ponds, and rivers are frequently displaced. In lakes, an oscillation known as "seiching" occurs in which the water surges from one end of the lake to the other, causing the water to reach great heights and eventually the lake overflows its banks. Secondary effects are dam failures, fires, floods, and subsidence. Earthquakes can trigger other types of ground failures which could contribute to the damage, such as landslides and liquefaction. In the latter situation, shaking can mix groundwater and soil, liquefying and weakening the ground that supports buildings and severing utility lines. This is a special problem in floodplains where the water table is relatively high and the soils are more susceptible to liquefaction.



There are thousands of earthquakes in the U.S. each year, but most are so small in magnitude that they are unable to be felt. Historically, the most violent earthquakes have occurred in the central U.S. The old flat-lying, intact bedrock of the central United States behaves as a good "transmitter" of the earthquake's energy, and tremors can be felt hundreds of miles away. By contrast, the young, broken up bedrock of the West Coast allows the energy to dissipate quickly, which keeps the effects of the earthquake more localized.

The New Madrid Fault Zone runs from Cairo, Illinois to Memphis, Tennessee. It is the site of the most powerful earthquake ever recorded on this continent. An occurrence in this zone has occurred every 150 to 200 year; thus, it is likely that there will be another major earthquake within the next ten to twenty years. Should an earthquake occur in the New Madrid Fault Zone, Will County would be affected indirectly. The possibility of cracking could occur in plaster and chimneys of older buildings, and transit service would be delayed from the southern portion of the state.

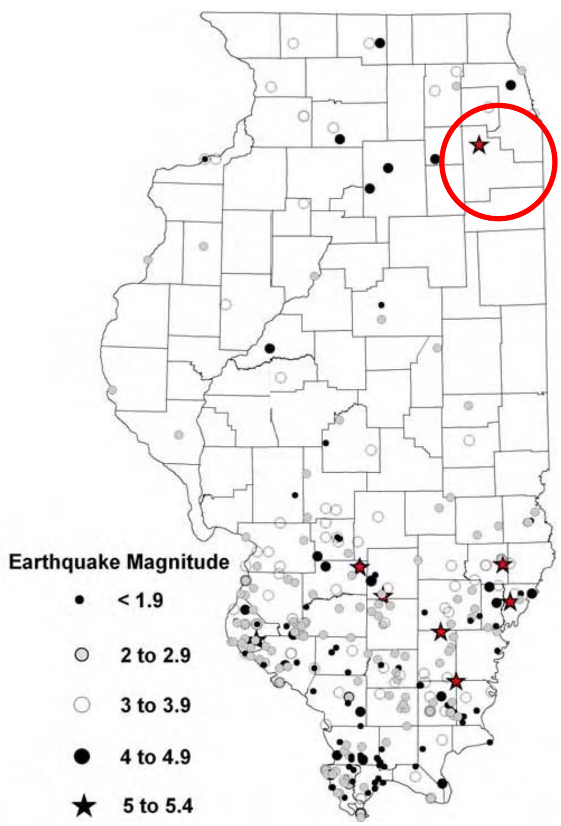
The Sandwich Fault Zone is located in the highly populated northern part of Illinois. It is a narrow belt of high-angle faults that runs from Oregon, Illinois, southeast past Manhattan, Illinois. Knowledge of bedrock geology in this area has been applied in land-use planning. An understanding of the fault zone and associated geologic structures is important in evaluating the potential for underground disposal of waste materials and for underground storage and pipeline transportation of gas and liquid petroleum products. Also, the knowledge can be used to determine the suitability of sites for construction of major buildings, such as nuclear power plants.



Sandwich Fault Zone Map

Magnitude and **intensity** are terms used to describe the severity of an earthquake, but they do not mean the same thing. *Magnitude* is a measure of the seismic energy released from the earthquake. It is calculated from measurements of the ground vibrations recorded by seismographs. Earthquake magnitudes are reported in logarithmic increments. This means that a magnitude 7 earthquake has about 32 times greater energy than a 6 and an increase of 0.2 means twice the energy is released. The *Richter Scale* is one of several variations of magnitude that are reported, each using a different formula to calculate the magnitude from the recorded vibrations (Bolt, 1993).

Earthquakes in Illinois from 1795 to 2010



Source: 2010 Illinois Hazard Mitigation Plan

Earthquakes in Illinois originate within the crust at depths of 1 to 20 km. The vibrations move out away from the point of origin (hypocenter or focus) through the bedrock and then up through the overlying soils on top of the bedrock. In the central part of the U.S., the bedrock is flat-lying, old, intact, and strong. Earthquake vibrations travel very far through material such as this in comparison to the young, broken, weak bedrock of the west coast. Because of this difference in bedrock, Central U. S. earthquakes are felt and cause damage over an area 15 to 20 times larger than California earthquakes with similar magnitudes.

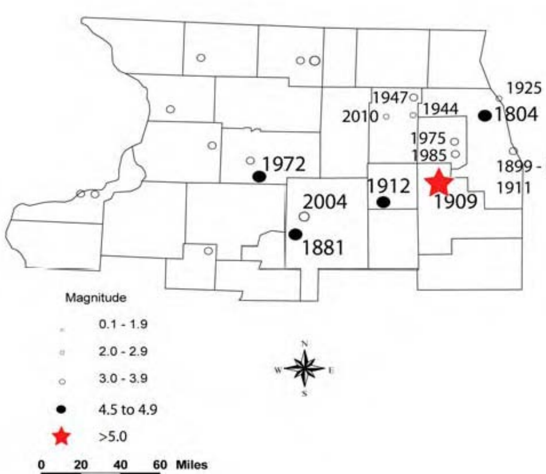
Intensity is a description of the effects brought about by an earthquake, using the observations of people in the area affected. Intensities are based on descriptive reports, rather than calculated from instrument readings. In general, intensities decrease at greater distances from an epicenter. Intensities are influenced by the soils resting on bedrock. Thick, loose, saturated soils such as in river valleys may amplify earthquake ground motions and thus have higher intensities reported than just outside of the valley. Several formal intensity scales have been proposed for use in different parts of the world. In the U. S., earthquake intensities are reported using the twelve-point *Modified Mercalli Intensity Scale* increasing from barely detectable to catastrophic. For any earthquake, there will be multiple intensities, depending on the location of observers - but only one magnitude.

History

In the United States, the most frequent reports of earthquakes come from the West coast, but the largest earthquakes in the lower 48 states occurred in Missouri in 1811 and 1812 along the New Madrid Faults. The Great New Madrid Earthquakes are the benchmarks from which all earthquakes in the Midwest are measured. An important fact is that the earthquakes of 1811 and 1812 were not single events. Rather the earthquakes were a series of over 2,000 shocks in five months.

Six of these quakes were larger than a magnitude of 7 on the Richter Scale and two were near magnitude 8. They totally destroyed the town of New Madrid and caused the land to roll in visible waves. They raised and sank the land as much as 20 feet. The tremors of these earthquakes were no doubt felt throughout all of Illinois, since the quakes are said to have rung church bells in New England.

Northern Illinois Earthquakes



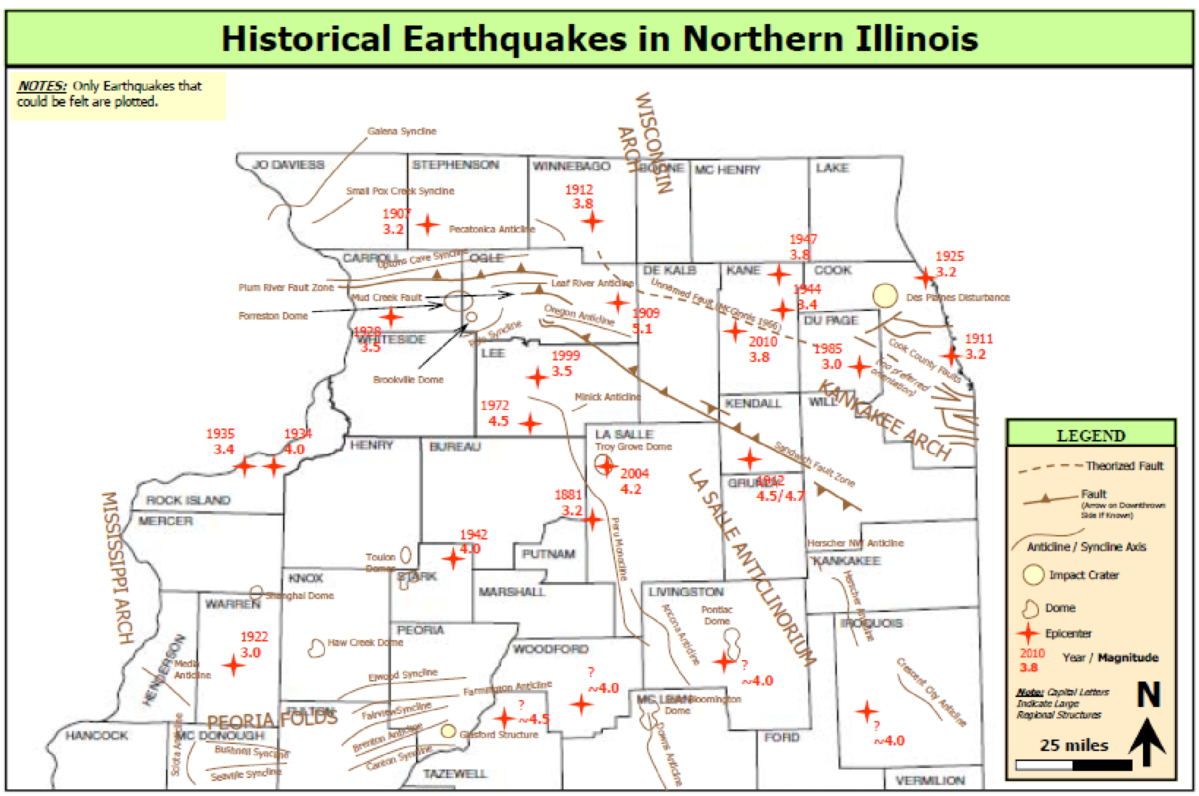
Source: 2010 Illinois Hazard Mitigation Plan

Northern Illinois: Fire at Aurora - One of the largest earthquakes in Illinois occurred in northern Illinois on May 26, 1909. The exact location of the magnitude 5.1 (estimated) earthquake is not known, but the largest intensities occurred in and near Aurora where many chimneys fell, a stove overturned, gas lines broke, and a fire started. Although considerable excitement ensued, the Aurora fire was quickly extinguished and soon forgotten. It was felt over 500,000 square miles, buildings swayed in Chicago where there was fear that the walls would collapse, houses were jostled out of plumb in Beloit, Wisconsin, and brick walls cracked as far away as Bloomington.

A somewhat smaller earthquake occurred nearby in 1912. A magnitude 4.0 earthquake centered in north-central Illinois south of Rockford, near the village of Amboy, woke many Chicago area residents when it struck late at night on September 15, 1972. It was felt over a very large area, but the intensity was much smaller than in the 1909 earthquake.

Twenty-seven years later on September 2, 1999, a magnitude 3.5 earthquake occurred at nearly the same location as the 1972 earthquake. The greatest intensities were several miles northwest of the epicenter as located by regional seismographs. This same area also experienced a 4.2 magnitude event on June 28, 2004, which was felt in six states.

Many of the 364 Illinois earthquakes have very small magnitudes, 2 to 4, that do not cause much damage, but are felt over large areas. Earthquakes occur throughout the state with most in the southern third of the state. Eight percent have occurred in the northern part of the state. Fifteen events have been recorded in Cook, DuPage, Kane, Kendall, and Will Counties since 1804. A 3.8 magnitude earthquake struck on February 10, 2010, about 2 miles northwest of Lily Lake in Kane County. This earthquake was located about 6 miles below the ground surface deep down within the granites.



Source: *Earthquake Facts* 1991-1 ISGS, *Structural Features in Illinois* B-100 1995 Nelson, *Earthquakes in the Central United States – Three Centuries of Earthquakes* 1699-2002 USGS, *Earthquake Hazards Program for Illinois* 2010 USGS

Risk Characterization

Although there have been over 560 earthquakes in Illinois during the last two centuries, only very few of them have caused any damage (Modified Mercalli Intensity of VI or higher) or injuries. Larger earthquakes in the New Madrid region have caused more damage in Illinois. The risk of probable damage from future earthquakes can be estimated based on the historical record of past earthquakes. The USGS have created maps for building codes in areas of the largest probable ground shaking that have a low probability of being exceeded over a 50 year period. They have plotted information as numerical values of ground shaking, or accelerations. These values can be converted to Modified Mercalli Intensities. These USGS maps only show the estimate of shaking on the top of bedrock. Shaking will be modified by the overlying soils.

For most of Illinois, the risk is dominated by the possibility of large earthquakes recurring in the New Madrid Seismic Zone, south of Illinois. In this scenario, the maximum accelerations in the southern-most counties of Illinois exceed 60 percent of gravity, or Modified Mercalli Intensity X. Although the risk decreases to the north, there is a 2 % probability during the next 50 years that accelerations greater than 10 percent of gravity, Modified Mercalli Intensity VII, could be exceeded in any of the southern half of Illinois. Because of the current record of minor to moderate earthquakes in northern Illinois, occurring west of Chicago, the risk of damaging earthquake motions increases in the western suburbs of Chicago. But if magnitude 4 to 5 earthquakes occur near or South of Chicago, as early events have been located, damage could occur to weak, old structures throughout parts of the city.

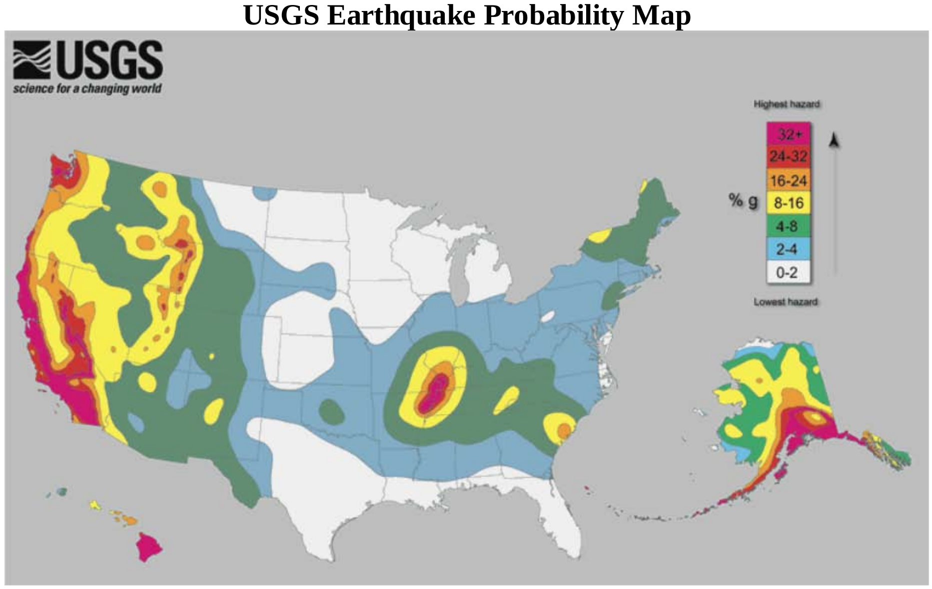
Earthquakes create numerous risks in people's homes. People can lessen the severity of earthquake damage by identifying hazards that exist in their homes, schools, or places of business and then systematically removing or correcting each hazard. This is especially important in the southernmost counties of Illinois where the earthquake risks are the greatest. Some common hazards include: free standing water heaters, stoves, and other gas or electric appliances which could move or fall during an earthquake; bookshelves or filing cabinets which are free standing or bookshelves with objects stored above head level; water or gas pipes which are not fastened well to walls or ceiling, and large panes of glass which could fracture and fly apart.

Some other things that people can do to make their homes more earthquake ready include: keeping a few days supply of food and water available; being sure each home has a fire extinguisher and smoke alarm;

maintaining a properly equipped first aid kit complete with any necessary prescription medication in sufficient quantities to last a few days to a few weeks; organizing and testing a family emergency plan which would help ensure each family member's survival; and having residents know how to turn off the gas supply to a building.

Should you be involved in an earthquake, remembering a few simple facts can greatly increase your chance of survival and can help to reduce the possibility of serious injury. If inside a building, stay inside and duck, cover, and hold. Protection inside a building is found next to or under heavy furniture. Do not run outside of a building during the shaking. Falling parts (bricks and glass) of buildings can kill or injure you. Rooms with lots of fixtures (hanging lights within a dropped ceiling) can be dangerous if they fall. Large windows or groups of windows can shatter and shards of glass can fly inward. These areas should be avoided. Large rooms with open-span ceilings or roofs are the most vulnerable to collapse and should be avoided.

USGS Earthquake Probability Map



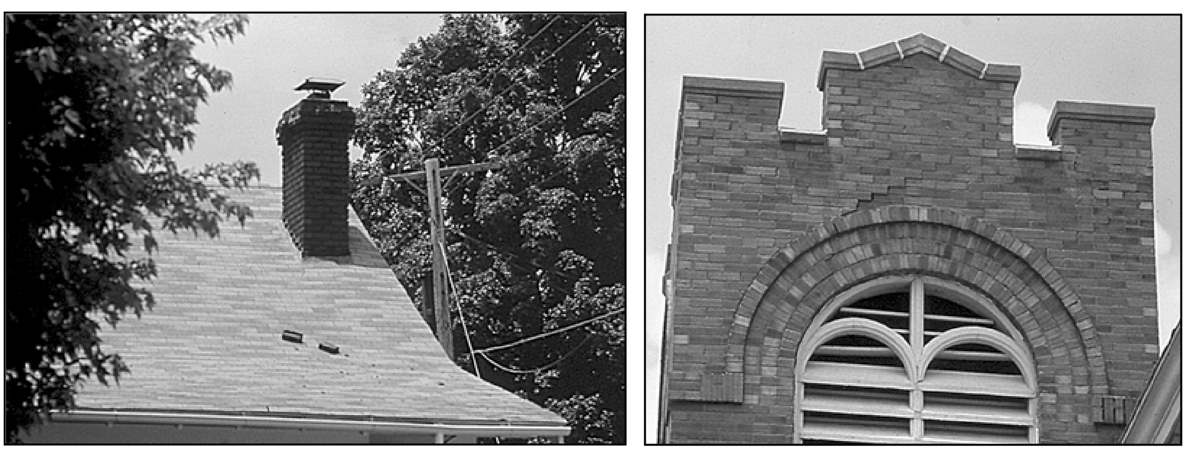
For over 20 years, IEMA has been involved in the Central United States Earthquake Consortium (CUSEC). During most of these years, an earthquake planner has been employed by IEMA. Part of their duties is to promote earthquake safety awareness. As discussed previously, there are steps individuals can take to make their surroundings more secure during an earthquake which have extensively been promoted. Also, there are earthquake resistant building techniques which can be incorporated into building construction. Unfortunately, the State of Illinois does not have a standard uniform building code. Each jurisdiction adopts and enforces the building code they chose. IEMA has worked to make southern Illinois aware of the earthquake risk and encouraged earthquake resistant construction in new buildings. All new schools built with State funds must comply with the 2007 International Building Code.

Damage to Buildings

Damage to buildings, highways, power lines, pipelines and other structures only partly depend on the amount of energy released during the earthquake. Certain kinds of earth materials resting on the bedrock amplify the earthquake ground motions. In Illinois, structures built on thick, loose sediments of river flood plains are more likely to be damaged than structures on glacial till (stiff, pebbly clay) or bedrock. In fact, seismic intensity may increase one or more units on the Modified Mercalli Intensity Scale, if loose sediments are present. Also, loose sandy sediments with high moisture content can turn to liquid, quick sand type state - (liquefaction), when shaken enough.

Generally, wood frame buildings and structures on solid ground fare best during an earthquake. Wood frame buildings are flexible enough to withstand ground shaking and swaying. Evaluations of recent earthquakes found that damage was primarily caused to:

- Un-reinforced masonry structures
- Older buildings with some degree of deterioration
- Buildings without foundation ties
- Multi-story structures with open or “soft” first floors

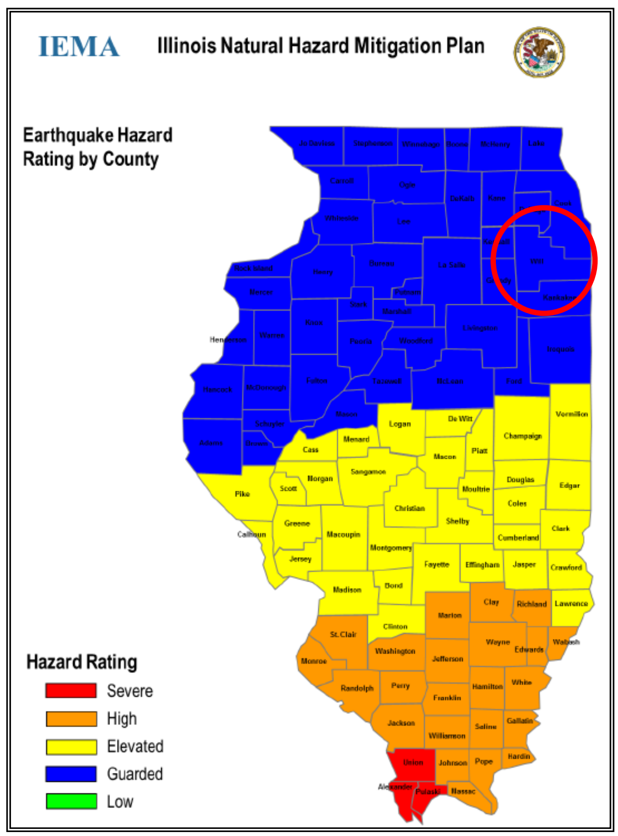


Typical minor damage (Modified Mercalli Intensity VI to VII) from Lawrenceville, Illinois M 5.0 earthquake. Bricks thrown from Chimney and diagonal masonry cracks in church tower.

At risk in Will County, given the low threat of an earthquake at a Mercalli Intensity of VII or greater, are un-reinforced masonry structures. Most of these structures can be considered to be historical masonry buildings, built before current building codes.

Other areas of potential damage include transportation systems: bridges, pavement cracks or buckles, and misalignment or fissures of rail lines. Utilities could be impacted by downed power and communication lines, breaks in water and sanitary sewer lines, and cracking or breaking of natural gas pipelines. Cracks in dams or levees could cause failure.

Impact: Guarded



Critical Facilities

The overall earthquake damage to critical facilities is low.

Health and Safety

While injury and loss of life are important factors in other parts of Illinois when assessing earthquakes, they are of low concern for Will County. During an earthquake, injuries are expected to be few; however falling debris or fires could be a threat. However, should a major earthquake impact southern Illinois, there exists the potential for damage to natural gas pipelines. This would be of greatest concern in the winter in northeastern Illinois. However, the overall impact to health and safely is considered to be low.

Economic Impact

If any damage was sustained to businesses and infrastructure, the impact of an earthquake would be on the local economy. Public expenditures for repairs to public facilities and clean-up and disposal of debris can be high, especially if the structures are not insured for earthquakes. The overall expected economic impact is considered to be low.

Future Occurrence

The *2013 Illinois Natural Hazard Mitigation Plan* rates the earthquake hazard for Will County as guarded.

STATE-WIDE ESTIMATE WITH DEFAULT DATA

The Federal Emergency Management Agency sponsored HAZUS (Hazards US) computer loss estimation program comes with default data of building and some infrastructure inventory from various sources including the 2000 census. It uses one type of soil for the entire area. Soils modify the earthquake ground motions that travel through the bedrock and typically amplify the ground motions, increasing shaking at the ground surface as compared to the shaking on the bedrock. The default building inventory contains numbers of structures by construction type per census track and replacement costs for structures are based on an average cost per square foot for 2002. It contains an inventory of essential facilities such as: hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities and high potential loss facilities such as: dams, levees, military installations, nuclear power plants and hazardous material sites.

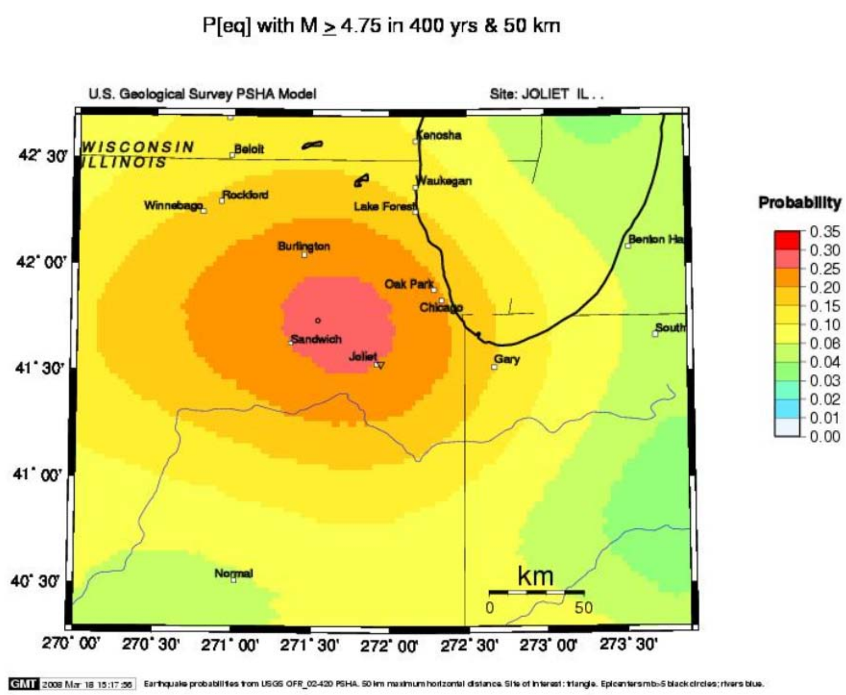
State-Wide Damage for Magnitude 6.3 New Madrid Event

HAZUS estimates that 4,453 buildings will sustain at least moderate damage and of those 1,689 will be completely damaged. No essential facilities are expected to be completely damaged and a large percentage will be functional on the day of the event. It is estimated 6,321 households will be without potable water and 3,964 without electricity on the day of the event. Eight of the 22,854 bridges in Illinois are expected to be completely damaged along with two ferry facilities. Debris generated is estimated to be 219,000 tons. Displaced households are 1,882 with 556 requiring shelter. There are 540 casualties and a total direct economic impact of about $920 million.

State-Wide Damage for Magnitude 7.7 New Madrid Event

HAZUS estimates that 75,272 buildings will sustain at least moderate damage and of those 19,044 will be completely damaged. Forty-two essential facilities are expected to be completely damaged including two hospitals and many facilities will need a few days to a month to recover to functionality. It is estimated 100,483 households will be without potable water and 25,191 without electricity on the day of the event. Sixty-two of the 22,854 bridges in Illinois are expected to be completely damaged along with two ferry facilities and one airport. Debris generated is estimated to be 3,377,000 tons. Displaced households are 22,468 with 6,556 requiring shelter. There are 7,629 casualties and a total direct economic impact of about $9 billion.

Probability Map based on Magnitude 5.0 Will County Area



DROUGHT

Hazard Characterization

The basic cause of drought in Will County and the surrounding counties is a prolonged deficiency of rainfall that can happen any time of the year. The effects of the drought vary in different areas due to such factors as unequal distribution of rainfall, differences in topography and soil, the erratic distribution of drainage features, and the continuing change in the underlying bedrock geology throughout Will County. In certain locations, man's erratic development, alteration, and misuse of natural resources will significantly affect the severity of the drought. Drought devastates crops resulting in low yields and economic losses. Winds blow away topsoil and create dust storms further eroding farm land. Water tables are lowered. Forests and grasslands are susceptible to fire.

A drought is defined as the cumulative deficit of precipitation relative to what is normal for a region over an extended period of time. Unlike other natural hazards, a drought is a non-event that evolves as a prolonged dry spell. Droughts occur when a long period passes without substantial rainfall. A heat wave combined with a drought is a very dangerous situation. When a drought begins or ends may be difficult to determine. A drought can be short, lasting just a few months, or persist for years before climatic conditions return to normal. There are four commonly used operational definitions:

Meteorological Drought: A period of well-below-average precipitation that spans from a few months to a few years.

Agricultural Drought: A period when soil moisture is inadequate to meet the demands for crops to initiate and sustain plant growth.

Hydrological Drought: A period of below-average streamflow and/or depleted reservoir storage (i.e., streamflow, reservoir and lake levels, ground water).

Economic Drought: This definition deals with the supply and demand of water. Some years there is an ample supply of water and in other years there is not enough to meet human and environmental needs.

While drought conditions can occur at any time throughout the year, the most apparent time is during the summer months. High temperatures, prolonged high winds, and low relative humidity can aggravate drought conditions. Because the impacts of a drought accumulate slowly at first, a drought may not be recognized until it has become well established. The many aspects of drought reflect its varied impacts on people and the environment. While the impacts of precipitation deficit may be extensive, it is the deficit, not the impacts, that defines a meteorological drought.

Primary Effects

- Crop failure is the most apparent effect of drought in that it has a direct impact on the economy and, in many cases, health (nutrition) of the population that is affected by it. Due to a lack of water and moisture in the soil, many crops will not produce normally or efficiently and, in many cases, may be lost entirely.

- Water shortage is a very serious effect of drought in that the availability of potable water is severely decreased when drought conditions persist. Springs, wells, streams, and reservoirs have been known to run dry due to the decrease in ground water, and, in extreme cases, navigable rivers have become unsafe for navigation as a result of drought.

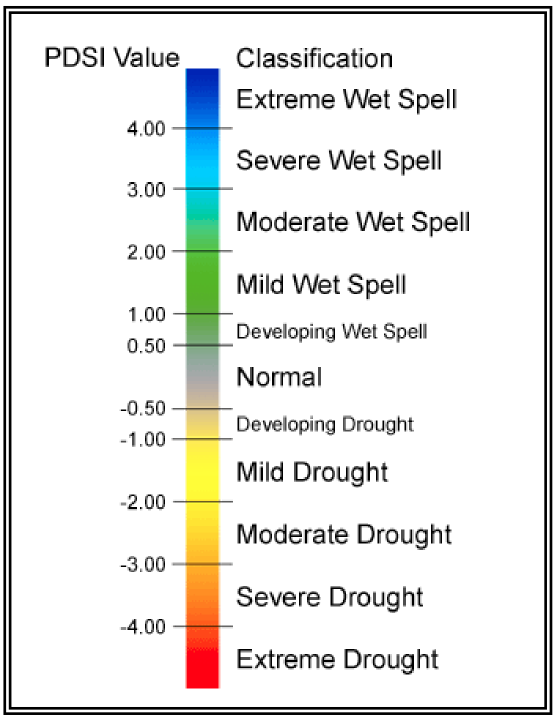
Secondary Effects

- Fire susceptibility is increased with the absence of moisture associated with a drought. Dry conditions have been known to promote the occurrence of widespread wildfires.

Tertiary Effects

- Environmental degradation in the forms of erosion and ecological damage can be seen in cases of drought. As moisture in topsoil decreases and the ground becomes dryer, the susceptibility to windblown erosion increases. In prolonged drought situations, forest root systems can be damaged and/or destroyed resulting in loss of habitat for certain species. In addition, prolonged drought conditions may result in loss of food sources for certain species.
- In prolonged drought situations the soil surrounding structures subsides, sometimes creating cracks in foundations and separation of foundations from above ground portions of the structure.

The Palmer Drought Severity Index (PDSI) is an attempt to compare weekly temperature and precipitation readings over a defined climatic region in order to identify periods of abnormally dry (or wet) weather. These PDSI readings reflect the relative disparity between moisture supply (precipitation and soil moisture) and demand (evapotranspiration, soil recharge and runoff needs) for a particular region based upon what is considered normal for the area. The index is used to evaluate scope, severity, and duration of abnormal weather. Based on the PDSI, the State's *Hazard Mitigation Plan* designates Will County as having a "guarded" hazard level for drought. Southern Illinois is generally more vulnerable to drought due having to soils that hold less water.



The PDSI is an important climatological tool for evaluating the scope, severity, and frequency of prolonged periods of abnormally dry or wet weather. It can be used to help delineate disaster areas and indicate the availability of irrigation water supplies, reservoir levels, range conditions, amount of stock water, and potential intensity of forest fires.

Droughts occur when a long period passes without substantial rainfall. A prolonged drought, such as the drought that remained in the Midwest from 1987 to 1991, can have a serious economic impact on a community. Increased demand for water and electricity may result in shortages of resources. Moreover, food shortages may occur if agricultural production is damaged or destroyed by a loss of crops or livestock.

The 2004 Illinois Hazard Mitigation Plan estimated that the frequency of droughts in the state "occurs about once every 21 years." Extreme heat events have occurred more frequently in Will County. A 15 year overall recurrence for extreme heat and drought is used (annual recurrence of 0.067).

History

One-month precipitation deficits on a statewide or regional basis do not usually constitute droughts, although there may be significant impacts on agriculture depending on the time in the growing season and on soil moisture conditions. Agricultural and hydrologic droughts have different lag times in relation to the timing of precipitation, and their intensities do not correlate exactly with one another.

Agricultural droughts typically trigger the availability of several USDA emergency assistance programs from the Farmers Home Administration (loans), Agricultural Stabilization and conservation Service (disaster assistance payments), Natural Resource Conservation Service (formerly SCS, for technical assistance), and Federal Crop Insurance Corporation (loss claims). In September 1983, all 102 counties were proclaimed State disaster areas because of high temperatures and insufficient precipitation beginning in mid-June. More recently in 1988, 54 percent of the State was impacted by drought-like conditions, resulting in disaster relief payments to landowners and farmers exceeding $382 million, but no State proclamations.

The Palmer Drought Severity Index (PDSI) is an attempt to compare weekly temperature and precipitation readings over a defined climatic region in order to identify periods of abnormally dry (or wet) weather. These PDSI readings reflect the relative disparity between moisture supply (precipitation and soil moisture) and demand (evapotranspiration, soil recharge and runoff needs) for a particular region based upon what is considered normal for the area. The index is used to evaluate scope, severity, and duration of abnormal weather.

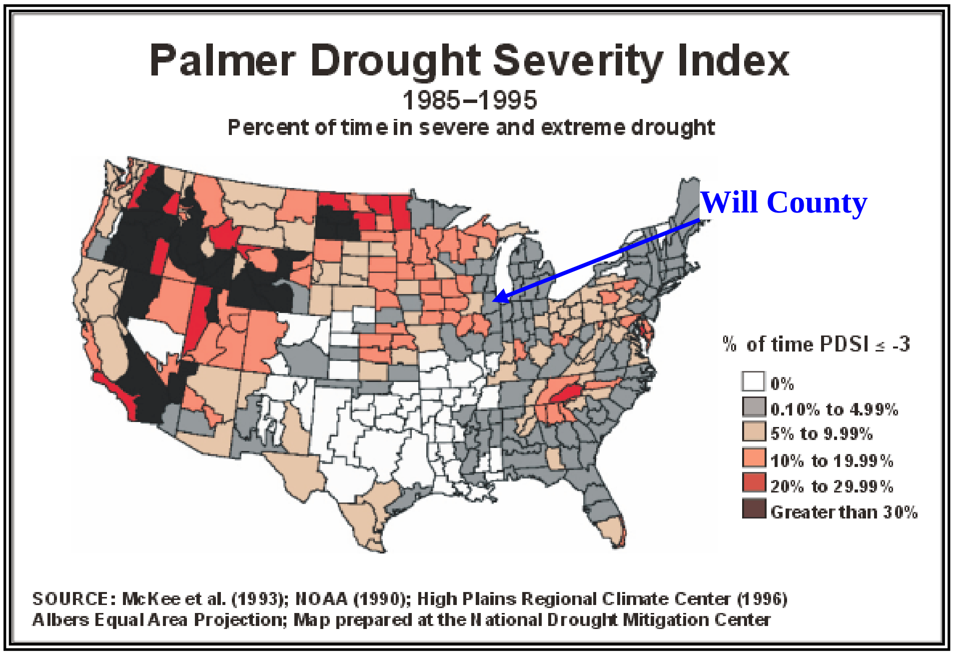
Both the timing and amount of precipitation are responsible for the occurrence of a drought. The mean annual precipitation in Illinois varies from 34 inches in Northern Illinois to 46 inches in the South. Annual amounts fluctuate primarily within a 10-inch range of the median. The most severe drought in recent years was 1988, when rainfall was 88 percent of normal. The timing or distribution was also abnormal because 1988 saw less than 50 percent of the April through August normal rainfall. Droughts of this magnitude occur about once every 21 years.

A smaller drought occurred in the northern two-thirds of the State (NWS zones 1-10). Although it only lasted through the month of May 1992, Chicago, Moline and Rockford recorded the driest May on record, and Springfield and Peoria their second driest.

Precipitation of less than 88 percent of normal also occurred in all of Illinois in September of 1994, Northwestern Illinois in December of 1994, the northern half of the State in February of 1995, all of the

State in March, and the northern half again in June of 1995. However, even though precipitation values were below average, none of these were considered drought-like conditions officially.

Precipitation values from 54 to 65 percent of normal for the months of February and April of 1996, in northwest and central portions of the State would technically put those areas into the 3-month or 6-month precipitation drought categories. However, above average precipitation in May reversed all drought impacts.



A severe drought struck Illinois in 2005-06, especially in the northern half of the State. Dry conditions in 2005 reached a historic level of severity in some parts of Illinois and ranked as one of the three most severe droughts in Illinois in 112 years of records. The timing of the dryness during the spring and summer, when water demand and use are high, ensured substantial impacts on agriculture and other sectors. The drought also had several unusual characteristics. The drought area was long and narrow, extending from south Texas to the Great Lakes. But within the Midwest, the drought had relatively minor impact on states other than Illinois. A record number of remnants of hurricanes and tropical storms passed through Illinois during July, August and September, substantially ameliorating drought conditions in portions of central and southern Illinois. Crop yields were surprisingly high in parts of the State, perhaps providing evidence of increased drought resistance in modern varieties and the benefits of timely rains.

Risk Characterization

All areas in the United States are at risk of drought at any time of the year. The following paragraph was provided by Jim Angel, State Climatologist at the Illinois State Water Survey, to explain the Illinois Hazard Rating Drought Map.

"One of the obstacles to an objective and reasoned reaction to drought in Illinois is uncertainty over its definition. One way of measuring drought is through the Palmer Drought Severity Index (PDSI), which takes into account both temperature and precipitation in determining the severity of drought. Historically, the 1930s and 1950s were periods when drought was most frequent and troublesome in Illinois. More recently, the 1988 drought was severe but short-lived, lasting from June to October of that year. Based on the PDSI, the risk of drought has historically been evenly distributed across the State. This is not surprising since drought is partially the result of changes in the large-scale circulation patterns of the atmosphere, for example, the location of a high-pressure dome over the Midwest in summer. Historically, moderate to severe drought occurs about 17% of the time in Illinois. However, Southern Illinois is generally more vulnerable to drought due to soils that hold less water and water supplies that are more likely to rely on shallow groundwater and surface water."

IMPACT OF DROUGHT EVENTS ON WILL COUNTY (Source: National Climatic Data Center / WC EMA)
September, 1998
August, 1999
September, 1999
October, 1999
November, 1999
December, 1999
August, 2002
September, 2002
June, 2005
July, 2005
August, 2005
September, 2005
October, 2005
November, 2005
December, 2005
January, 2006
February, 2006

Impact: Moderate

Damage to Buildings

Heat and drought have little or no impact on structures. The impact on buildings is low. Since impact is low, the vulnerability of extreme heat and drought has not been calculated.

Critical Facilities

Extreme heat and drought can have an impact on water supply. The demand on electric utilities is elevated. The impact of extreme heat and drought to critical facilities is low.

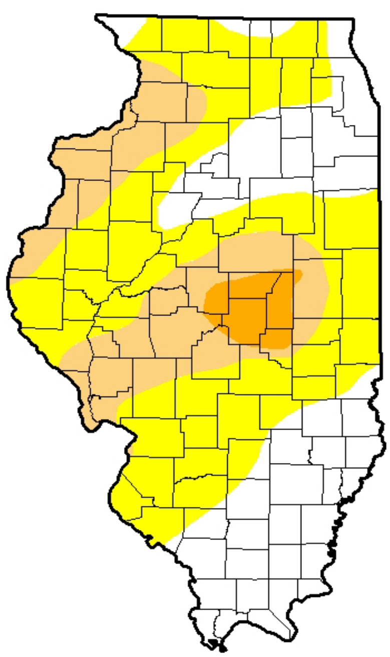
Health and Safety

Will County, like most areas of the Midwest, is very vulnerable to extreme heat. Stagnant atmospheric (humid and muggy) conditions and poor air quality can induce heat-related illnesses.

Urban areas are exposed more acutely to the dangers of extreme heat due to heat being retained in asphalt and concrete and being released at night. In addition to air quality, concrete and asphalt store heat longer and gradually release the heat at night which produces higher nighttime temperatures, allowing little relief.

Young children; the elderly; those who are sick, overweight or have alcohol problems; and men in general (because they sweat more and become more quickly dehydrated) are more susceptible to extreme heat. Usually the victims have been overexposed to heat or have over-exercised for their age and physical condition. People are at risk for heat stroke or sun stroke, heat exhaustion, and dehydration. Impact on people is high.

U.S. Drought Monitor
Illinois



November 26, 2013
(Released Thursday, Nov. 28, 2013)
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	31.07	68.93	24.19	3.49	0.00	0.00
Last Week *11/19/2013*	31.07	68.93	24.19	3.49	0.00	0.00
3 Months Ago *8/27/2013*	31.95	68.05	20.84	0.00	0.00	0.00
Start of Calendar Year *1/1/2013*	22.36	77.64	40.01	8.90	0.00	0.00
Start of Water Year *10/1/2013*	9.96	90.04	46.96	16.28	0.00	0.00
One Year Ago *11/27/2012*	22.03	77.97	35.62	11.26	0.00	0.00

Intensity:
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

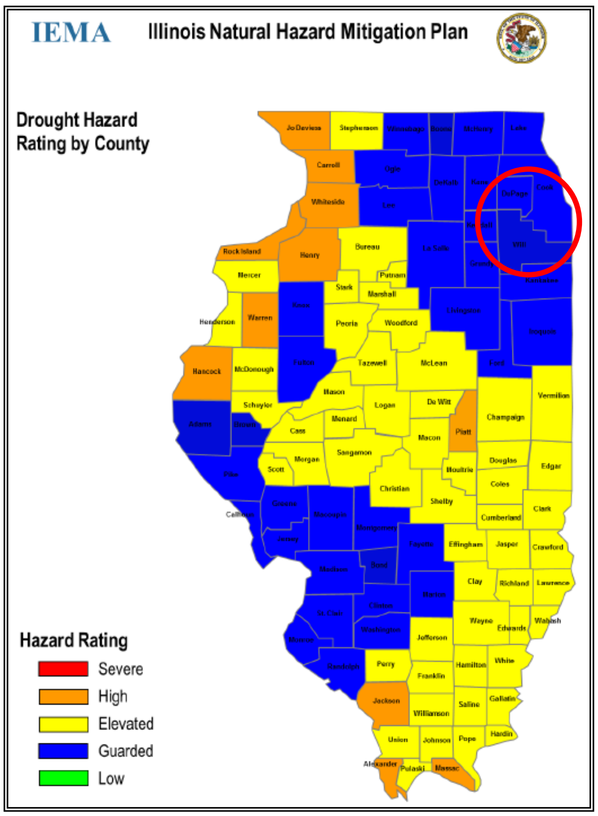
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Richard Heim
NCDC/NOAA

http://droughtmonitor.unl.edu/

Economic Impact

A heat wave combined with a drought creates a very dangerous environment. Also, a prolonged drought, such as the drought that plagued the Midwest from 1987 to 1991, can have a serious economic impact on a community. Increased demand for water and electricity may result in shortages of resources. Both of these can be supplied in the municipalities with no economic disruption. In rural areas and villages where water is drawn from shallow wells, rationing or lawn watering bans may be needed. Moreover, food shortages may occur if agricultural production is damaged or destroyed by a loss of crops or livestock.



There are no available figures on the cost of drought or heat to Will County. The 1988 drought/heat wave resulted in $382 million in disaster relief payments to landowners and farmers throughout the state. While not the major industry as in the past, agriculture is still important to the County's economy. A severe drought would have a ripple effect on other sectors, especially in the rural areas.

Future Occurrences

The *2013 Illinois Natural Hazard Mitigation Plan* rates Will County's future risk of drought as guarded.

DROUGHT		
Type	**Number of Occurrences Since 1993**	**Annual Mean**
Drought	9	.06

EXTREME HEAT

Hazard Characterization

Extreme heat for a region is temperatures that hover 10 degrees or more above the average high temperature for several days to several weeks. The definitions do vary by region; however, a heat wave is usually defined as a period of at least three consecutive days above 90 degrees. Humid or muggy conditions, which add to the discomfort of high temperatures, occur when a "dome" of high atmospheric pressure traps hazy, damp air near the ground. Excessively dry and hot conditions can provoke dust storms and low visibility.

Prolonged periods of extreme heat and humidity have a deleterious effect on a community, particularly the elderly and those who cannot afford cooling capabilities. The National Weather Service (NWS) has devised the "heat index" to describe how hot it feels when temperature and humidity are combined. When the temperature is above 90º F and humidity is high, the body is under great stress to regulate the body's normal temperature.

Heat waves can cause heatstroke, a medical emergency, and heat exhaustion. Heatstroke causes high body temperatures and the victim may become delirious, stuporous, or comatose. Heat exhaustion is less severe but can cause dizziness, weakness, and fatigue. It is typically the result of fluid imbalance caused by increased perspiration. Extreme

EXTREME HEAT TERMS	
Heat Advisory	Issued within 12 hours of the onset of the following conditions: heat index of at least 105°F but less than 115°F for less than 3 hours per day, or nighttime lows above 80°F for 2 consecutive days.
Heat Wave	Prolonged period of excessive heat often combined with excessive humidity.
Heat Index	A number in degrees Fahrenheit (F) that tells how hot it feels when relative humidity is added to the air temperature. Exposure to full sunshine can increase the heat index by 15 degrees.
Heat Cramps	Muscular pains and spasms due to heavy exertion. Although heat cramps are the least severe of heat related medical problems, they are often the first signal that the body is having trouble with the heat
Heat Exhaustion	Typically occurs when people exercise heavily or work in a hot, humid place where body fluids are lost through heavy sweating. Blood flow to the skin increases, causing blood flow to decrease to the vital organs. This results in a form of mild shock. If not treated, the victim's condition will worsen. Body temperature will keep rising and the victim may suffer heat stroke.
Heat or Sun Stroke	Heat stroke is life-threatening. The victim's temperature control system, which produces sweating to cool the body, stops working. The body temperature can rise so high that brain damage and death may result if the body is not cooled quickly.
Source: Are You Ready?, FEMA, H-34/September, 2002	

heat can also cause heat syncope, a loss of consciousness, and heat cramps, all brought on by over exercise.

Stagnant atmospheric (humid and muggy) conditions and poor air quality can induce heat-related illnesses. Heatstroke and heat exhaustion are more intense in urban areas. Other effects of extreme heat are water shortages, fire hazards, excessive demands for energy, damaged crops, and danger to livestock. Roads, bridges, railroad tracks, and other infrastructure can also be damaged by the thermal expansion caused by extreme heat.

HEAT INDEX / HEAT DISORDERS	
Heat Index	**Possible Heat Disorders for People in Higher Risk Groups**
130° or Higher	Heat stroke/sun stroke, highly likely with continued exposure.
106° - 130°	Sun stroke/heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity.
90° - 108°	Sun stroke, heat cramps and heat exhaustion possible with prolonged exposure and/or physical activity.
80° - 90°	Fatigue possible with prolonged exposure and/or physical activity.
Source: Heat Wave, produced by NOAA, FEMA and ARC, NOAA/PA 85001	

The NWS offices with responsibility for counties in the State of Illinois will initiate alert procedures to warn people of the impending danger due to excessive heat. When the heat index is forecast to exceed 105 - 110 degrees for at least two consecutive days, NWS procedures are:

- Heat Index values will be included in all NWS forecasts
- "Hazardous Weather Outlook" products will highlight any threat of excessive heat for the following 1 to 7 day period
- "Excessive Heat Warning" products will present a detailed discussion of:
  - The extent and expected duration of the hazard, including forecast temperatures and heat index values
  - Who is most at risk
  - Safety rules for reducing the risk
- State and local health officials will assist in preparing emergency messages prior to and during excessive heat events. Meteorological information from "Excessive Heat Warnings" will be included, as well as more detailed medical information, advice, and names and telephone numbers of health officials

- Forecasts, outlooks and warnings will be released by the NWS to the media, over NOAA's All Hazards Weather Alert Radio system, and via NEWS web sites.

History

Severe heat waves have caused catastrophic crop failures, thousands of deaths and widespread power outages due to increased use of air conditioning. The Illinois Department of Public Health (IDPH) has provided information on heat related deaths. Identifying the exact number of deaths due to heat is very difficult. Usually heat is not the primary cause listed on the death certificate but an "underlying cause".

IMPACT OF HEAT EVENTS ON WILL COUNTY (Source: National Climatic Data Center / WC EMA)
July 12, 1995
June 25, 1997
June 22, 2009
July 21, 1999
July 28, 1999
August 16, 1999
May 23, 2010
May 30, 2011
July 4, 2012
July 19, 2013

The heat waves of the summer of 1995 caused deaths and injuries previously unseen in the State of Illinois. Throughout the entire State, the combination of record or near record high temperatures and high dewpoint temperatures led to heat indices routinely above the 120-degree mark from July 12-17. The heat index peaked at 125 degrees on July 14 when the air temperature was 98 degrees and the relative humidity was 63 degrees.

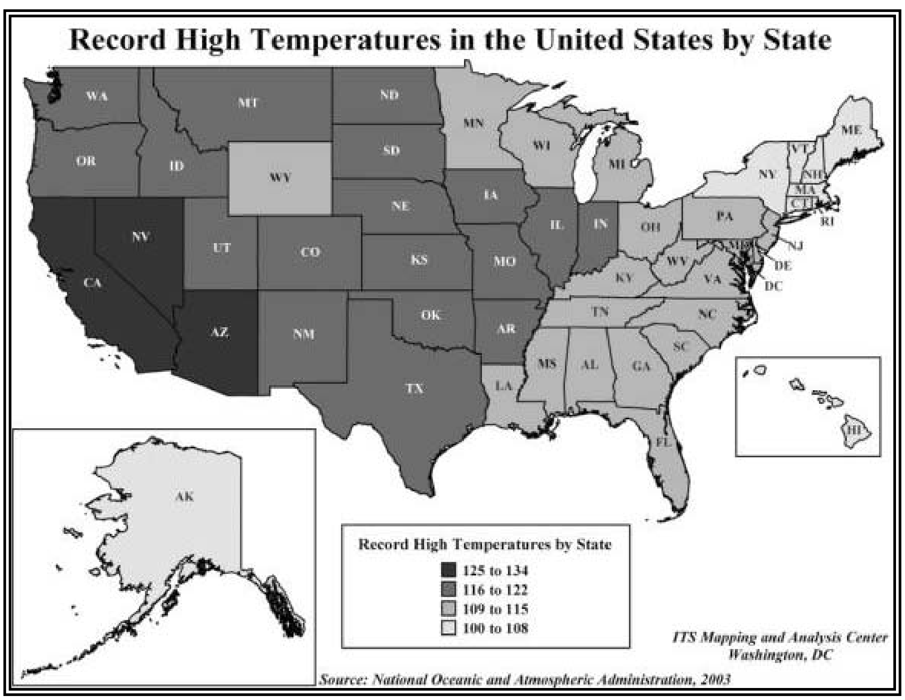
HEAT RELATED DEATHS in ILLINOIS 1990-2007	
YEAR	# of DEATHS
1990	7
1991	10
1992	1
1993	12
1994	11
1995	152
1996	10
1997	12
1998	12
1999	174
2000	11
2001	19
2002	22
2003	5
2004	3
2005	10
2006	17
2007	8

An approach used by IDPH to identify heat as being responsible for deaths is to look at "excess deaths". In 1995, there were roughly 600-700 excess deaths. IDPH identifies heat as a contributor to the death of 600 to 700 people. These figures are slightly higher for 1995 than other figures identified in this section. All of the sources have documented that excessive heat can contribute to death.

Conditions such as these create hardships for respiratory and cardiovascular systems of every person, but especially in toddlers and the elderly. The human body is very capable of handling extreme temperatures; however, when high humidity accompanies these conditions, it is often too much for the body to handle (the same is true for the human body with cold temperatures when combined with strong winds, producing dangerous wind chills).

Scattered power outages compounded the problem when Commonwealth Edison, the supplier of electricity to virtually the entire Chicago metropolitan area, and other electric utilities could not keep up with the record demand. Of the 583 fatalities associated with the 1995 heat waves, 75 death certificates listed heat as the primary cause, and 508 as the secondary cause. In a sampling of 134 of the heat victims, 61% were over the age of 65, but only 2 of the 134 fatalities (1.5%) were toddlers. Five-hundred four of the deaths were in Chicago. At the time there was a perception that the numbers were inflated, later studies indicated the opposite was true and the heat victims were significantly undercounted. Local officials believed that many of the elderly were scared to come out of their apartments because of high amounts of crime in their neighborhoods. Many were found in their rooms with air temperatures in excess of 120 degrees. The City of Chicago has taken a number of steps to mitigate the health hazards in the event of future heat waves, including a program for home visits to check the condition of people indicated as vulnerable.

In 1999, the entire Midwest was above normal in temperature for the month of July, with the last ten days consisting of a major heat wave. As a ten-day average, both maximum and minimum temperatures were 7 to 11 degrees above normal. The peak of the heat struck on July 29th and 30th in most of the Midwest. Minimums exceeded 78 degrees in cities like Chicago, St. Louis and Cincinnati, where many heat related deaths occurred. The maximum temperature exceeded 100 degrees in many of these same cities, with most of the Midwest recording maximums 10 to 20 degrees above normal.



Chicago had previously experienced deadly heat waves in 1955 when “large numbers of deaths” occurred and in 1916 with 535 deaths. In the 1990's, two significant heat waves impacted Chicago. In the 1995 heat wave, the number of estimated fatalities varies, but most sources agree that the number exceeded 700. Then in 1999, Chicago experienced another heat wave that closely matched the 1995 event, but the death toll was reduced to approximately 100 people. A paper written by Michael Palace and Stanley Chignon, of the State Water Survey, attribute much of the reduction in deaths to mitigation efforts. The efforts included education by the news media and care monitoring procedures for the urban elderly. The September 2005, Chicago All-Hazard Risk Assessment also states the 1999 deaths were lower than 1995 and believed to be the result of the implementation of Chicago's Extreme Weather Operations Plan.

Risk Characterization

The New York Times article dated August 13, 2002, "Most Deadly of the Natural Disasters: The Heat Wave" states that heat waves kill more people in the United States than all other natural disasters combined." The article goes on to state that a University of Delaware study indicated that 1,500 American city dwellers die each year because of heat compared with 200 from tornadoes, earthquakes and floods combined.

This natural disaster has long been overlooked because there is not visible damage like in a tornado and its impact is greatly understated in terms of human toll because not all heat related deaths are recorded. The current mitigation planning process encourages the State to look at such factors as urbanization, the elderly, and low income. It is impossible to ignore these factors when analyzing heat waves. According to historical discussion and the above referenced article, when the Chicago heat wave of July 1995, occurred "the poor, the old, residents of abandoned and violent neighborhoods who lived alone, lacked access to transportation and lacked air-conditioning" were the victims.

The time we have until the next heat wave is unknown, but all of the major reports on global warming indicate that an increase in severe heat waves is likely. Chicago is one of the State's most vulnerable areas because of their size and population. Their Risk Assessment predicts 17.8 days a year where temperatures breach the 90 degree mark.

Articles all agree that summer heat kills more people than other natural hazards. The National Weather Service (NWS) indicates that in a normal year the number will be 175 Americans. Other sources project the number of deaths to be much higher each year. So not only do we not know when heat waves will strike, we do not have a firm estimate on the number of people who will be impacted.

Impact: Moderate

Damage to Buildings

Heat and drought have little or no impact on structures.

Critical Facilities

Extreme heat and drought can have an impact on water supply. The demand on electric utilities is elevated.

Health and Safety

Heat kills by pushing the human body beyond its limits. Under normal conditions, the body's internal thermostat produces perspiration that evaporates and cools the body. However, in extreme heat and high humidity, evaporation is slowed and the body must work extra hard to maintain a normal temperature.

Most heat disorders occur because the victim has been overexposed to heat or has over exercised for his or her age and physical condition. Other conditions that can induce heat-related illnesses include stagnant atmospheric conditions and poor air quality.

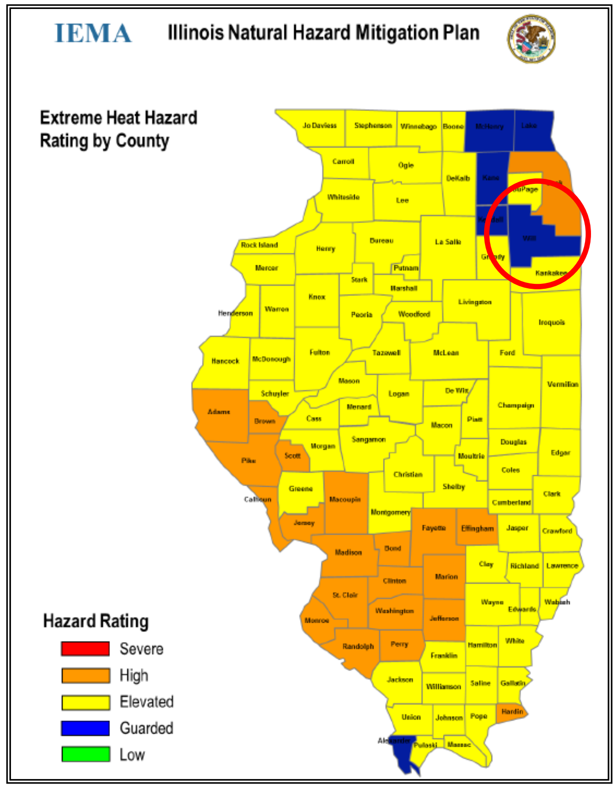
Extreme heat events can be just as deadly as other natural hazards due to the nature of the event. Extreme heat doesn’t immediately impact people when it sets in, instead it is when the periods of extreme heat last for days and weeks that it takes its toll on people. The elderly are at particular risk.

Economic Impact

Generally, extreme heat impacts agricultural areas in the State.

Future Occurrence

Extreme heat events do not have a specific area or size that is usually associated with them. Therefore, all areas located within Will County have a probability of being affected by one or more extreme heat events. The *2013 Illinois Natural Hazard Mitigation Plan* rates the extreme heat hazard for Will County as guarded.



HEAT/EXCESSIVE HEAT PROBABILITY		
Type	**Number of Occurrences Since 1995**	**Annual Mean**
Heat/ Excessive Heat	10	.55

INFRASTRUCTURE FAILURE

Hazard Characterization

Infrastructure failure of critical public or private utilities results in a temporary loss of essential functions and/or services. The residents of Will County depend on the public and private utility infrastructure to provide essential services such as electric power, heating and air conditioning, water, sewage disposal and treatment, storm drainage, communications, and transportation. Failure of any of these services for an extended length of time would require an emergency management organization response to supply food, water, heating, etc. Failure can occur within a distribution system or be caused by external factors such as severe storms or fire. Codes and standards govern the design, construction, and operation of infrastructures, but they are inadequate to protect against disaster related damage.

Electricity failure interrupts the functions of businesses and homes, causes life-threatening situations in medical facilities, creates traffic stoppages, spoils food, and disrupts communication and computer functions. Failure of heating and air conditioning units can threaten lives in extreme cold or hot weather. Disruption of storm drainage can lead to flooding, and inoperable sewage treatment facilities will cause pollution leading to serious public health problems. Infrastructure failure heavily impacts the most vulnerable members of the community, namely the elderly, children, impoverished individuals, and people in poor health. The cost to repair these systems along with the economic and societal damage caused by lengthy disruption is excessively high.

History

Utility interruptions have been rare in Will County other than those associated with weather events.

Risk Characterization

Infrastructure failure may result from natural, technological, or societal hazards along with human error, equipment failure, or poor maintenance. The impact of infrastructure failure can be significant depending on the length of disruption and the extent of the affected area. Infrastructure failures can also create serious safety hazards when power lines are down, fire or explosion ensues, or hazardous materials are released into the environment.

Natural hazards include tornadoes and severe thunder or winter storms that may damage utility supply lines. Extreme heat can place a high demand for electricity causing an over-demand and failure of power grids. Drought can impact water supplies. Technological hazards can impact infrastructure through fire, pipeline damage, or industrial accidents. Societal hazards include intentional acts of disruption resulting from terrorist attacks, civil disturbances, or sabotage.

Disruptions

Electric Utility: Affects the population primarily during winter and summer when the need and demand for heat and air-conditioning are high. Electric disruptions impact business when computers, lighting, refrigeration, gas pumps, and other equipment cannot be powered.

Telecommunications: Society has become very dependent on our variety of communication devices. When telephone service is disrupted, the use of land or cell phones, internet, or credit cards may be impacted. This can have a negative affect on emergency services and the banking system. Usage overloads of cell phones occur when there are large public events or emergencies. Storms may have an affect on radio communications. With many forms of communication devices available to us, the unavailability of one type should not affect the use of others.

Water Supply: Severe drought can have an impact on water supply causing restrictions on use.

Wastewater Services: Damage to wastewater facilities may cause sanitation and biological hazards, overloading of systems causing overflows and pollution, sewage discharge, and economic loss due to cleanup costs.

Gas Supply: Damage to gas supply systems can cause fire, explosion, death, evacuation of affected areas, loss of heat and cooking facilities, and economic losses to business and industry.

Petroleum Distribution: Loss of petroleum supply and distribution networks can result in fire, explosions, death, panic buying of fuel, social disruption, environmental cleanup costs, and economic losses to business and industry.

Transportation Systems: Infrastructure losses would cause the loss of traffic signals and damage to roadways, bridges, or waterways due to fire or explosion resulting in traffic congestion, social disorder, and economic losses.

Impact: High

Damage to Buildings

Damage to buildings due to infrastructure failure is low. The potential exists for water damage when a facility is without heat and pipes freeze causing them to burst. Fire is another hazard when people find alternate sources for heat or light when electricity or heating fuel is disrupted. Explosion can occur from damaged gas lines.

Health and Safety

Impact on people and pets occurs when heating and cooling sources are lost. With extreme cold and heat events, the elderly are generally the first population group to be adversely affected. Injury or death may be possible when fire, explosions, or gas leaks occur.

Economic Impact

A study characterizing infrastructure failure interdependencies identified the sectors affected as: HVAC in buildings, effects on water systems, effects on health systems, and effects on road transportation systems. If disrupted by infrastructure failure, all of the sectors could have a significant impact on businesses and homes in the affected area.

Future Occurrence

Infrastructure failure may occur individually or in combination with natural or technological hazards. It is estimated that the probability of occurrence and effect is low; however, the potential exists for widespread effect, particularly as secondary effects from hazards such as tornadoes.

HAZARDOUS MATERIAL – FIXED SITE and TRANSPORTATION

Hazard Characterization

Will County has many oil refineries, chemical manufacturers, and other businesses that use hazardous materials in their processing. A dozen facilities are listed on the State Hazardous Sites list. Over three hundred facilities are Environmental Protection Agency (EPA) regulated and are required to report to the EPA the storage and releases of specific chemicals. This reporting system is guided by the Emergency Planning and Right to Know Act (EPCRA) of 1986 and provides information for hazardous and toxic chemicals.

EPCRA establishes requirements for federal, state and local governments, Indian tribes, and industry regarding emergency planning and "Community Right-to-Know" reporting on hazardous and toxic chemicals. The Community Right-to-Know provisions help increase public's knowledge and access to information on chemicals at individual facilities, their uses, and releases into the environment. States and communities, working with facilities, can use the information to improve chemical safety and protect public health and the environment. EPCRA has four major provisions:

- Emergency planning (sections 301-303)
- Emergency release notification (section 304)
- Hazardous chemical storage reporting requirements (sections 311-312)
- Toxic chemical release inventory (section 313)

Reporting Schedules

Section	
302	One time notification to SERC / TERC and LEPC.
304	Each time a release above a reportable quantity of an EHS or CERCLA Hazardous Substance occurs to LEPC and SERC or TERC.
311	One time submission of MSDS or list of hazardous chemicals. An update is required for new chemicals or new information about chemicals already submitted to the SERC or TERC, LEPC, and the fire department with jurisdiction over the facility.
312	Annually, by March 1 to SERC or TERC, LEPC, and the fire department with jurisdiction over the facility.
313	Annually, by July 1, to EPA, states and tribes.

Releases of hazardous or toxic chemicals must be reported which include emission of gases, wastewater releases into rivers and other bodies of water, solid waste disposal in landfills, injection of wastes into underground wells, transfer of wastewaters to public sewage plants, and transfer of wastes to off-site facilities for treatment or storage.

EPCRA CHEMICALS AND REPORTING THRESHOLDS				
Chemical Covered	**Section 302** 355 Extremely Hazardous Substances	**Section 304** >1,000 substances	**Sections 311/312** Approximately 500,000 hazardous chemicals	**Section 313** > 650 Toxic Chemicals and categories
Thresholds	Threshold Planning Quantity1-10,000 pounds on site at any one time	Reportable quantity, 1-5,000 pounds, released in a 24-hour period	500 pounds or TPQ whichever is less for EHSs; 75,000 gallons for gasoline; 100,000 gallons for diesel and 10,000 pounds for all other hazardous chemicals	25,000 pounds per year manufactured or processed; 10,000 pounds a year otherwise used; persistent bio-accumulative toxics have lower thresholds

The chemicals and materials that these facilities use have a wide range of toxicity. A small release of many of these chemicals may have little effect on the surrounding environment; however, the release of some chemicals or radioactive materials could have long lasting affects on the environment and injure or kill many people in the affected area. The hazard from these chemicals can be explosive, flammable, combustible, corrosive, reactive, poisonous, toxic, a biological agent, or radioactive.

Hazardous materials can be spilled or released during the manufacturing or refining process or they can be spilled during transportation to or from these facilities as raw elements or processed goods. Radioactive materials are included with nuclear sites located in Braidwood and nearby Grundy County. Thousands of hazardous materials are shipped on a daily basis through the County's local communities by all modes of transportation. With the intermodal systems in place in Will County, hazardous chemicals are transported by rail, highway, pipeline, and waterway on a daily basis. An accident within any of these transportation systems could cause an emergency affecting many people.

Hazardous materials include corrosives, flammables, toxic materials, radioactive substances, explosives, dangerous gases, and poisons. Accidents can affect the immediate vicinity of the accident site or spread to involve a portion of the surrounding community. These types of accidents can usually be handled effectively by local emergency services. Large-scale accidents that involve a widespread release of a toxic substance can have severe implications for the surrounding environment and population. Statistically, most hazardous material accidents are caused by some type of human error and rarely by mechanical failure of the facility or carrying vessel.

History

Numerous spills have occurred along the County's highway and railway systems. Most involve the spill of diesel fuel, but others have involved corrosive and flammable liquids. On December 12, 2004, two-thousand gallons of diesel fuel were spilled in Joliet along the BNSF railroad. A spill on July 19, 2001, involved 13,000 gallons of Nalkylene 540 L detergent Alkylate on the Des Plaines River near Channahon. On July 2, 1999, 12,000 lb. of an oil/water mix was dispersed near Channahon affecting 7,500 people, 2,500 homes, and area crops.

IMPACT OF HAZARDOUS MATERIAL – FIXED SITE & TRANSPORTATION EVENTS IN WILL COUNTY (Source: National Response Center) Number of Incidents from 1990 to 2013							
Fixed Site	**Pipeline**	**Vehicle**	**Railroad**	**Railroad – No Release**	**Storage Tank**	**Vessel**	**Unknown Source**
946	82	98	57	58	66	96	160

Risk Characterization

Hazardous material incidents are intentional and/or unintentional releases of a hazardous material. Each incident's impact and resulting response depends on many variables that include the quantity and specific characteristics of the material, the conditions of the release, the weather conditions in the area of the release, and the area/population centers involved. The effects of the spill could be limited to the incident site or quickly spread by wind or water for many miles.

HAZMAT site control and clean-up is a highly technical and expensive process requiring specialized training and equipment. Local fire districts have some limited ability to deal with hazardous material, but area chemical facilities and the Will County EMA also have HAZMAT teams who are specially trained to deal with such incidents.

Will County has a diverse mix of manufacturing and agricultural entities. Both types of entities deal with chemicals that can have hazardous effects. In addition, the agricultural economy can be affected when hazardous chemicals are dispersed by the wind over farm fields or livestock. Spills and releases are usually random, but are minimized with regular inspections and maintenance, good housekeeping, effective emergency plans, readily available fire suppression equipment, proper warning labels, the use of appropriate containers and storage, and training in proper safety and handling procedures.

Impact: High

Damage to Buildings

Damage can result from contamination, but in most cases damage or destruction occurs from fire or explosion.

Critical Facilities

Critical infrastructures can be damaged or destroyed by fire or explosion. Water supplies can be contaminated when hazardous chemicals enter the water system.

Health and Safety

Health problems may be immediate, such as skin burns, eye and lung irritation, or delayed, such as cancer and genetic damage.

Economic Impact

Chemicals released into the environment contaminating soil, ground or surface water, buildings, and crops or affecting the health of the area population can prove costly to contain, remediate, and cleanup to acceptable standards. When the responsible party for the spill cannot be identified, it can leave the local and state government in charge of protecting the public and financing the clean-up process.

Future Occurrence

As the County continues to grow and attract more industrial and manufacturing companies, the potential for future hazardous material spills and release will also grow.

NUCLEAR POWER PLANT ACCIDENT

Hazard Characterization

There are two nuclear power plants, the Braidwood Nuclear Power Station and Dresden Nuclear Generating Station, which have direct effect on the population of Will County. The areas of risk associated with these facilities are the plume emergency planning zone that encompasses a ten-mile radius of the facility and the ingestion emergency planning zone that encompasses a fifty-mile radius. Because of the danger of exposure from radioactive materials, plants are sited away from major population centers and are designed with safety systems and back-up safety systems. Nuclear plants are required to have an emergency radiological response plan in effect.

Braidwood Generating Station

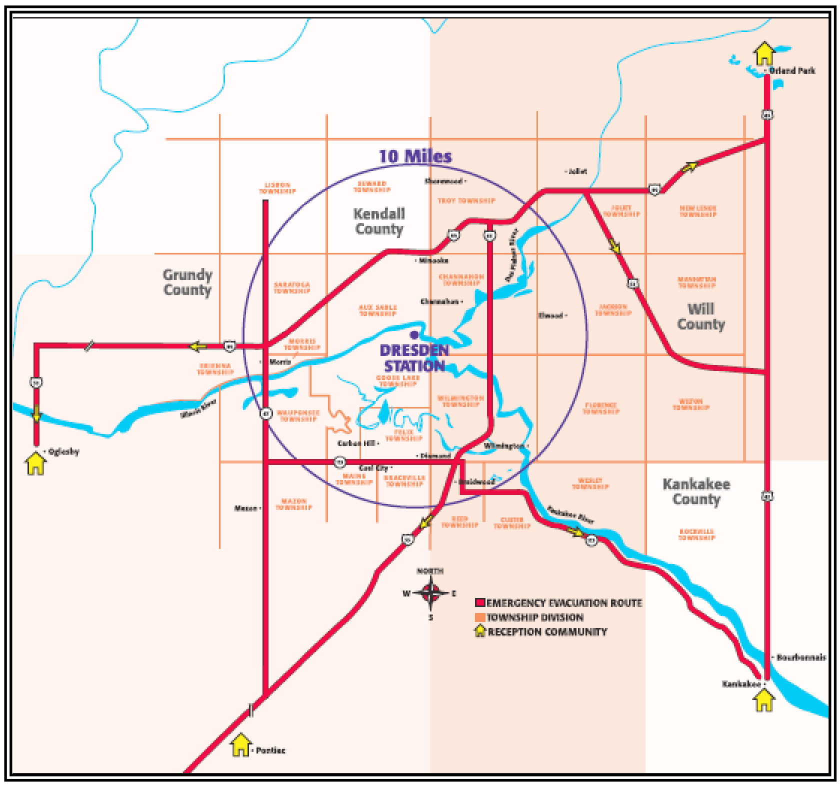
Exelon's newest nuclear power station is located in northeastern Illinois, approximately 20 miles southwest of Joliet and about 60 miles southwest of Chicago in Will County. The station is built on a 4,457-acre site, and its cooling lake was formed from scarred farming land and an old strip mine. It's Units 1 and 2 began commercial operation in July and October of 1988, respectively. The initial construction cost for the station was $5.2 billion.

Both of Braidwood's units are pressurized water reactors designed by Westinghouse. Each unit is capable of generating nearly 1,200 net megawatts and together they can produce enough power to support the electricity needs of over two million average American homes.

Braidwood has about 885 Exelon employees. The majority of Braidwood's employees live in Grundy and Will Counties. The station's annual payroll is about $82 million. Additionally, during refuel outages, Braidwood employs several hundred temporary contractors, who boost the local economy during their stay. Exelon pays local real estate taxes totaling about $20.7 million every year to support county and township government, area schools, libraries, park districts and other taxing bodies.

Dresden Generating Station

Located in rural Grundy County, Dresden is home to the nation's first full-scale, privately financed nuclear power plant which began operation in 1960. Capable of generating 210 megawatts of electricity before its retirement in 1978, Dresden Unit 1 is designated a Nuclear Historic Landmark by the American Nuclear Society. Dresden Units 2 and 3 began commercial operation in June 1970 and November 1971, respectively. In October of 2004, the Nuclear Regulatory Commission renewed the operating licenses for both units for an additional 20 years, extending them to 2029 and 2031. Both units contain boiling water reactors designed by General Electric. Each unit is capable of generating nearly 900 megawatts of electricity, which together can produce enough power to support the electricity needs of over 1.5 million average American homes.



Dresden has about 900 Exelon employees. Most of Dresden's employees live in Grundy and Will Counties. The station's annual payroll is about $74 million. Additionally, during refueling outages, Dresden employs several hundred temporary contractors, who boost the local economy during their stay. Exelon pays local real estate taxes totaling about $22.4 million every year to support county and township government, area schools, libraries, park districts and other taxing bodies.

Generation of Electricity

Power plants create electricity by running steam turbines, which are powered either by the fossil fuels coal, oil, or natural gas or by nuclear power. Nuclear technology produces energy by splitting uranium atoms in a process called fission. Fission generates heat that boils water for the steam that runs the turbines, which produce the electricity that we all use making, for instance, toast for breakfast. In a nuclear power plant, pea-sized uranium pellets are stacked inside long, thin fuel rods which are grouped in “assemblies” inside a reactor “core.” The core is encased in a very thick steel capsule, and the entire reactor is further protected by an airtight steel and concrete building called a “containment.” This complex structure is designed to help ensure the safe utilization of nuclear power.

Waste

Any fuel used to produce energy also produces waste. By-products of coal-burning include smoke, ashes and slag. Even with the latest technologies, it is impossible to prevent some of this waste from reaching the environment outside the power plant. Nuclear power generation, on the other hand, produces waste primarily in the form of spent fuel, which is not released into the environment. Besides helping to protect the environment, nuclear energy is also highly efficient, producing vastly more energy for its weight than coal or oil. We would have to burn 120+ gallons of oil or up to a ton of coal to produce the same amount of energy as that found in a single pellet of uranium.

History

Worldwide

Three significant accidents in the fifty year history of civil nuclear power generation are:

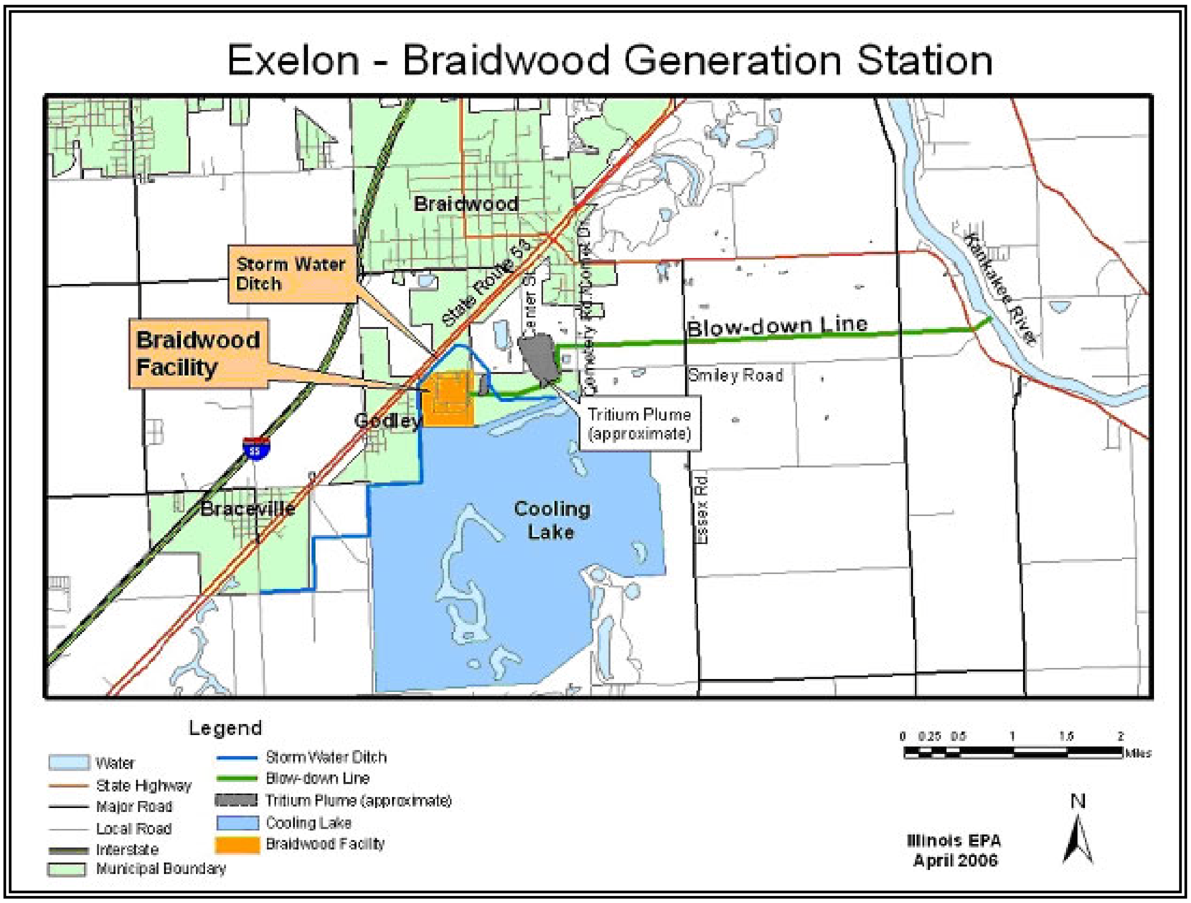
Three Mile Island (USA 1979)	The reactor was severely damaged but radiation was contained and there were no adverse health or environmental consequences.
Chernobyl (Ukraine 1986)	The destruction of the reactor by steam explosion and fire directly killed 41 people and had significant health and environmental consequences. Studies continue on the health effects on the impacted population.
Fukushima (Japan 2011)	Following a major earthquake, a tsunami disabled the power supply and cooling of three reactors. All three cores largely melted in the first three days. There have been no deaths or cases of radiation sickness from the nuclear accident, but over 100,000 people had to be evacuated from their homes. Studies of health effects are ongoing.

Will County

Nuclear regulatory agencies require testing of groundwater along with emissions from nuclear generation facilities. Tritium is a radioactive isotope of hydrogen that produces a weak level of radiation. It is produced naturally in the upper atmosphere when cosmic rays strike atmospheric gases and is produced in larger quantities as a by-product of the nuclear energy industry. When combined with oxygen, tritium has the same chemical properties as water. Tritium can be found at very low levels in nearly all water sources. The area located on the northeast corner of the Braidwood Generation Station property just south of Smiley Road was the location of tritiated water that spilled back in 1998.

The highest concentration of tritium in a well from this location showed 230,000 picocuries per liter in Dec. 2005. As of Dec. 2007, the highest on-site concentration of tritium detected in groundwater has decreased more than 90 percent to 22,800 picocuries per liter. To further expedite the remediation process and ensure increased capture of tritiated groundwater on plant property south of

Smiley Road, workers at Braidwood Station began pumping water from existing groundwater wells into a pond on Exelon property. "We continue to see significant progress with our remediation efforts," said Tom Coutu, Braidwood Station site Vice-President. "We believe that the enhanced pumping will help us reduce tritium concentrations more quickly in the area."



The remediation process involves pumping down a pond adjacent to the plant. As the pond level lowers, the groundwater adjacent to the pond, which contains tritium, flows toward the pond. The water pumped out of the pond goes into the existing underground pipe or blowdown line and is then discharged into the Kankakee River pursuant to federal and Illinois EPA permits.

The tritium in the groundwater has not affected any private drinking wells and poses no health or safety threat to the public. The U.S. EPA's drinking water limit for tritium is 20,000 picocuries per liter. Illinois Department of Public Health's (IDPH) Division of Epidemiology reviewed data for cancer incidence, childhood mortality, infant mortality, low birth weight and congenital anomalies in Will County and Braidwood, IL. These investigations by IDPH found that the pediatric cancer incidence and mortality rates were not significantly different from those for comparison groups. In addition, they found no evidence of an increased cancer incidence rate after the startup of the nuclear power plants.

Risk Characterization

Essentially, radiation is a form of energy that can travel through the air, just like light, heat or radio waves. Small amounts of radiation are naturally generated by different elements in the environment. Food, water, air and sunlight all expose us daily to tiny amounts of radiation. Uranium is simply a more powerful source of radiation which, when used properly, can be highly beneficial.

Sometimes people are concerned that a power plant reactor will "blow up," but this is virtually impossible. The uranium contains only 3 to 4 percent fissionable material, and the fuel is further diluted to slow down the fission process. This low concentration can generate enough heat to boil water but not enough to explode. In short, there is no way for a power plant reactor to produce a nuclear explosion.

Some people also think that they, or the environment, may be accidentally exposed to nuclear radiation by living or being near a nuclear power plant. Although radioactivity can be dangerous, keep in mind that a power plant reactor is designed to contain radiation, protecting the rest of the plant and the surrounding community. To ensure the greatest safety, however, any incident at a power plant that presents the slightest potential for a leak would be addressed with the utmost care. First, special teams would gather detailed radiation readings at the plant and throughout surrounding areas. Depending on a number of factors, which include the amount of radiation released and weather conditions that would affect movement of the radioactive "plume", state officials would recommend a course of action. A significant incident might require people to stay indoors or to evacuate to temporary relocation centers. In any event, you would be instructed in a safe course of action to protect yourself and your loved ones.

Accidents occur in three different levels or degrees. The first degree is an accident that is handled effectively within the plant by safety systems. The second is an accident in which the safety systems malfunction and radioactive noble gases and iodine are released into the atmosphere. The third degree is a core meltdown and involves an accident in the cooling system. Three dominant exposure modes people experience as a result of a release of radioactive materials are whole body exposure, thyroid exposure, and exposure from ingestion of radioactive materials.

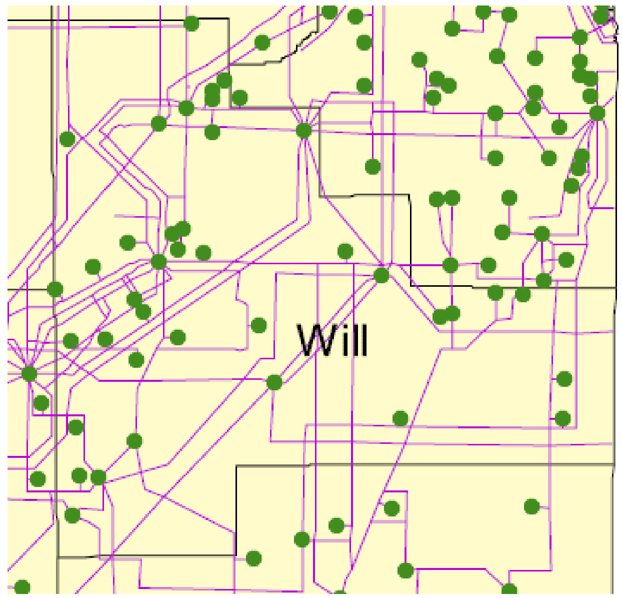
Regulations for nuclear power plants are stringent to ensure the public's safety.

- Nuclear Power Plants (6) in Illinois and the United States are subject to meeting standards established by the Nuclear Regulatory Commission (NRC) and the State. These building and construction standards are delineated in each plant's Updated Safety Analysis Report.
- There are no specific land-use practices in place for areas surrounding a nuclear power plant. However, for the area surrounding each nuclear power plant, a 10-mile Emergency Planning Zone has been established. Detailed plans are established, implemented and trained against to ensure that offsite response organizations can effectively manage an accident at a nuclear power plant.
- The IEMA limits the quantities of radioactive materials a facility can have on hand at any one time. A licensing and enforcement program accomplishes this limitation.
- For existing nuclear power plants, utility access controls are in place to prevent unauthorized access to the facility. The IEMA works with shippers of high hazard radioactive material to improve the performance of shipping containers.
- The basic characteristics of radiation are fixed by the Laws of Physics and are immutable. IEMA is working with manufacturers of high hazard radioactive materials to improve their basic structural integrity and reduce the probability of release during normal use and accident conditions.
- The Bureau of Nuclear Facility Safety (BNFS) reviews all licensing issues to ensure the requirements for nuclear power plant protective systems and equipment are maintained. Additionally IEMA's Resident Inspectors routinely inspect these systems for operability and maintenance activities. IEMA Response personnel are equipped with appropriate radiological detection and monitoring instrumentation, personal protective equipment, dosimetry, training and procedures to handle a radiological emergency.
- Nuclear power plants are designed, built and operated with redundant and diverse critical systems and equipment.

Impact: High

Damage to Buildings

Damage to property is low; however, contamination could have major adverse effects rendering buildings and facilities unusable.



Generating and Relay Stations
Major Electrical Transmission Lines

Critical Facilities

Damage or destruction of the nuclear generation station would impact the production and delivery of electricity to the area. Complete shutdown of the Braidwood station could impact electric service to as many as two million homes. The shutdown of Dresden could impact electric service to as many as one and a half million homes. Water and sewer utilities would be unable to function without electricity to power pumps.

Health and Safety

Radiation is measured in rems or in millirems (thousandths of a rem). On average, a person living in Illinois receives about 300 millirem of radiation annually from natural sources and another 60 millirem or so from X-rays and other medical procedures. It takes more than 60 times this much, over 20,000 millirem in a single day, to produce identifiable effects in the body. Federal regulations allow workers to receive up to 5,000 millirem of radiation in the course of a year's work.

Economic Impact

The partial or complete loss of electric generation would have a severe economic impact on Will County and the surrounding area. Homes and businesses would lose the use of utilities necessary for everyday living and business activities. Transportations systems would be impeded since road and railways would lose the use of lights and signals necessary for controlling traffic. Fuel would become unavailable without functioning fuel pumps. Most needed services would be impacted.

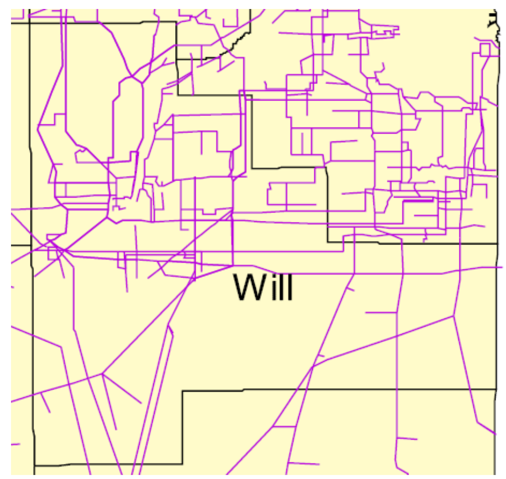
Future Occurrences

There have been three major reactor accidents in the history of civil nuclear power: Three Mile Island, Chernobyl, and Fukushima nuclear disasters. These are the only major accidents to have occurred in more than 14,500 cumulative reactor years of commercial operations in thirty-three countries. One was contained without harm to anyone, the next involved an intense fire without provision for containment, and the third severely tested the containment, allowing some release of radioactivity. Extraordinary effort has been put into safety and security issues to safeguard the public against harmful incidents with stringent regulations enforced by the Nuclear Regulatory Commission. The risks from western nuclear power plants, in terms or the consequences of an accident or terrorist attack, are minimal.

PIPELINE RUPTURES

Hazard Characterization

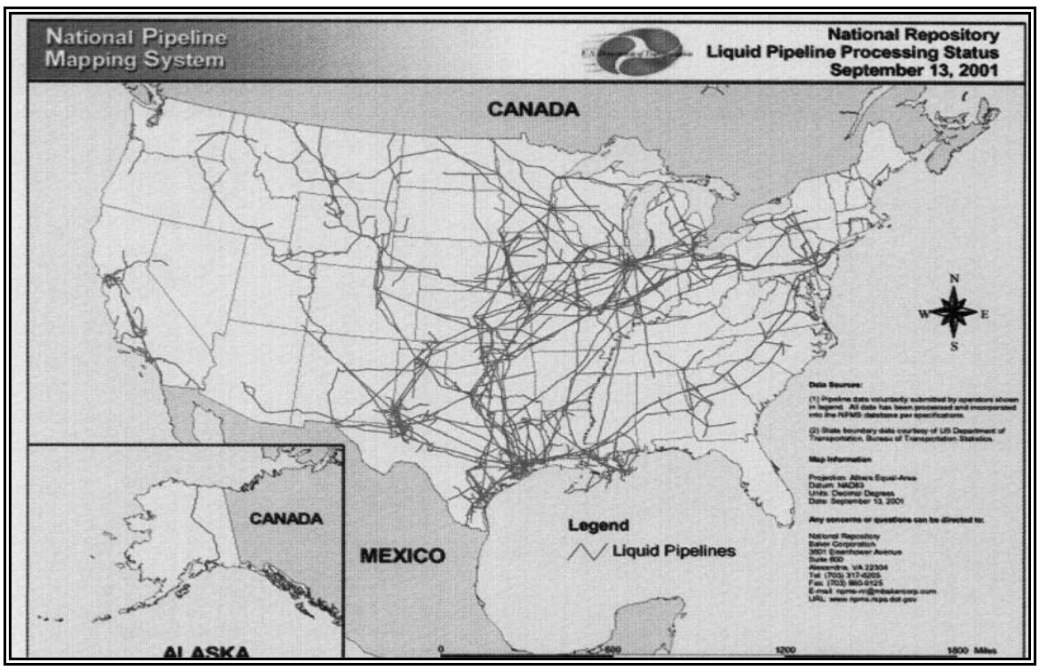
Pipelines are a potential hazard because of the materials conveyed within them. The most common materials carried by pipelines are petroleum, crude oil, propane, ammonia, kerosene, and natural gas. Pipelines range in diameter from 3/8 inch to 3+ feet in diameter with many of the pipes having been laid more than twenty-five years ago. Elements in the soil such as moisture, bacteria, or acids act on the pipes causing damaging exposure. The release of material because of pipe failure due to age or breakage during excavation work can cause explosion, fire, pollution, or loss of communication or power. Pipeline failures can also be secondary to land subsidence, earthquake, fires, or erosion.



Pipelines are the safest method of transporting materials; however, it is not without problems. The results of pipeline failure are injuries, fatalities, and/ or property damage. Pipeline failures are a potential hazard within Will County because of the vast network that travels through the County into Chicago. The County is a major hub in the United States natural gas pipeline grid where pipelines from Canada and the Gulf of Mexico meet and then fan out to serve the Midwest.

The federal government establishes minimum pipeline safety standards under the U.S. Code of Federal Regulations (CFR), Title 49 "Transportation", Parts 190 - 199. The Office of Pipeline Safety (OPS), within the U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration (PHMSA), has overall regulatory responsibility for hazardous liquid and gas pipelines under its jurisdiction in the United States. OPS inspects and enforces the pipeline safety requirements for interstate gas pipeline operators in Illinois. OPS also inspects and enforces the pipeline safety regulations for both intrastate and interstate hazardous liquid pipeline operators in Illinois.

Operator compliance with state and federal pipeline safety regulations is monitored through a comprehensive inspection and enforcement program. The Illinois Commerce Commission, Pipelines Safety Section, certification by OPS, is in charge of identifying and checking standards of safety within the State of Illinois. They work in partnership with the federal Pipeline and Hazardous Materials Safety Administration (PHMSA) to assure pipeline operators are meeting requirements for safe, reliable, and environmentally sound operation of their facilities. The program is comprised of field inspections of operations, maintenance, and construction activities; programmatic inspections of operator procedures, processes, and records; incident investigations and corrective actions; and through direct dialogue with operator management.

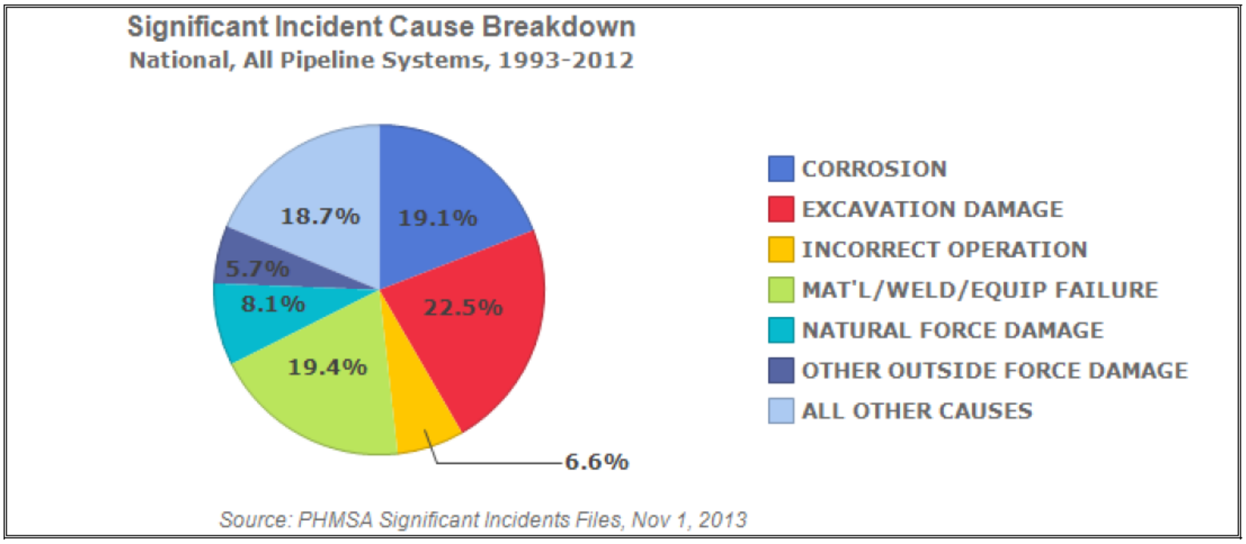


PHMSA's 135 federal inspectors and our 375 state partners are responsible for regulating over 3,100 operators who operate 2.6 million miles of pipelines, 129 liquefied natural gas facilities, and 6,448 hazardous liquid breakout tanks. Through PHMSA oversight programs, significant pipeline incidents have decreased by 12.5% since 2008. Pipeline safety personnel spend 80 percent of their time conducting safety-related activities, including inspections and incident investigations on the ground, in the lab, and at the office, as well as enforcement and public outreach.

While PHMSA serves as the federal pipeline safety regulator, pipeline operators must know, understand, and manage the risks associated with their own pipeline facilities. In addition to PHMSA inspections, operators frequently conduct internal reviews of their procedures, facilities, staff and emergency procedures.

History

There are numerous causes of pipeline incidents. Almost 40% of the national incidents are a result of material failure or corrosion, over 25% are caused by human error or excavation damage, and 6.6% are a result of natural forces such as earth movement or floods.



Will County has 814 miles of liquid pipeline and 649 mile of gas pipeline. Twenty incidents involving death, injury, or property damage or combination thereof have occurred in Will County in the last twenty years. In April, 1999, a natural gas pipeline was struck during excavation work injuring 7 people, destroying 34 town homes, and damaging 199 homes out of 394.

Reportable Incidents

Hazardous Liquids Pipeline Incident:

An event or failure in a pipeline system that must be reported to the Office of Pipeline Safety and that results in the release of a hazardous liquid or carbon dioxide and in any of the following:

- Explosion or fire not intentionally set by the operator

- Release of 5 gallons (19 liters) or more of hazardous liquid or carbon dioxide, except that no report is required for a release of less than 5 barrels (0.8 cubic meters) resulting from a pipeline maintenance activity if the release is:
  - Not otherwise reportable under this section (i.e., 49 CFR 195.50),
  - Not one described in 49 CFR 195.52(a)(4),
  - Confined to company property or pipeline right-of-way, and
  - Cleaned up promptly;
- Death of any person
- Personal injury necessitating hospitalization
- Estimated property damage, including cost of cleanup and recovery, value of lost product, and damage to the property of the operator or others, or both, exceeding $50,000 (49 CFR 149.50).

Natural Gas Pipeline Incident:

An event in the natural gas pipeline system that must be reported to the Office of Pipeline Safety and:

- Involves a release of gas from a pipeline or of liquefied natural gas (LNG) or gas from an LNG facility and results in
  - Death, or personal injury necessitating in-patient hospitalization; or
  - Estimated property damage, including cost of gas lost, and damage to the property of the operator or others, or both, of $50,000 or more.
- Results in an emergency shutdown of an LNG facility.
- Is significant, in the judgment of the operator, even though it did not meet the criteria of (1) or (2) above (49 CFR 191.3).

Risk Characterization

As communities and pipelines grow closer together, concerns about protecting people and the environment from risk of pipeline incidents have increased. Community awareness and involvement programs are a key component to safeguarding pipeline safety. By knowing where pipelines are located and how to manage activities near them, we can live safely around them. Risks associated with pipeline incidents are explosion, contamination, asphyxiation, and fire resulting in injury, death, and property damage. Leaking pipes can send hazardous liquids into the soil or water or gases into the atmosphere. Fortunately, major incidents are infrequent.

Many transmission lines were laid decades ago through sparsely populated states in the Sun Belt and through West Coast states. These areas are now experiencing rapid population growth, raising concern about increased numbers of people living or working close to pipelines. Moreover, many lines that serve major cities and that run through heavily developed areas were constructed in what were then sparsely populated, rural areas. Few of these areas had extensive land use or zoning regulation in place at the time the lines were laid.

IMPACT OF PIPELINE EVENTS ON WILL COUNTY
(Source: Pipeline & Hazardous Materials Safety Administration / WC EMA)

Date	Location	Deaths	Injuries	Property Damage	Net Barrels Lost
02/22/1988	I-80 & I-55	1			
04/27/1989	Romeoville				
09/08/1998	Lockport	0	0	$60,605	1,800
12/02/1998	Lemont	0	0	$181,814	259
12/07/1998	Essex	0	0	$480,110	0
02/14/1999	Crest Hill	0	0	$119,639	0
03/26/1999	Wilmington				
04/29/1999	Romeoville	0	7	$1,795	0
03/05/2002	Lockport	0	0	$376,604	0
08/27/2002	Shorewood	0	0	$151,127	0
07/10/2003	Lemont	0	0	$854,248	15
09/13/2003	Bolingbrook	1	0	0	0
11/11/2003	Lemont	0	0	$9,084	6
01/31/2004	Lockport	0	0	$120,710	0
04/28/2004	Lockport	0	0	$164,576	0
05/03/2004	Manhattan	0	0	$241,421	0
07/10/2005	Lockport	0	0	$109,035	0
12/05/2005	Shorewood	0	0	$379,044	0
08/12/2006	Romeoville	0	0	$467,139	1,419
02/23/2007	Manhattan	0	0	$1,731	10
03/14/2008	Lemont	0	0	$607,926	
09/17/2008	Shorewood	0	0	$109,469	3
06/24/2009	Romeoville	0	1	$263,354	
03/21/2010	Mokena	0	0	$161,561	
09/09/2010	Romeoville	0	0	$49,003,154	0
12/14/2010	Lockport	0	0	$16,215,240	0
12/31/2010	Lockport	0	0	$255,268	0
05/14/2011	Romeoville	0	0	$724,047	100
05/26/2011	Monee	0	0	$419,135	3
08/08/2011	Lemont	0	0	$412,297	3
03/03/2012	New Lenox	2	3	$2,836,777	1,245
05/18/2012	Manhattan	0	0	$395,779	0
11/20/2012	Mokena	0	0	$9,800,000	

Natural gas and petroleum pipelines are relatively secure because the majority of pipeline mileage is below ground. Operators generally also have in place security measures to protect pipeline facilities from vandalism or intrusion. This includes the employment of such measures as guards, fences and electronic surveillance around facilities. Operators provide added protection against security concerns by conducting employee background checks, and carrying out communications with residents along pipeline rights-of-way, with police authorities, and with emergency responders in affected communities.

After the terrorist attacks of September 11, 2001, awareness increased of safeguards and security needs relative to our nation's critical infrastructure. The Office of Pipeline Safety (OPS), along with the Department of Homeland Security and the pipeline industry began looking at ways to enhance the security of our energy pipeline infrastructure thereby ensuring that critical energy transportation was not disrupted. Enhanced communication networks were developed to share information on suspicious activities and potential threats to the pipeline infrastructure and to begin identifying noteworthy and possible enhancements to help assure the security of hazardous liquid and natural gas pipeline systems.

Following 9/11/01, OPS undertook several initiatives to help reduce the increased threat of terrorist activity against pipelines:

- Communications
- Vulnerability Assessments
- Developing consensus security guidance with the pipeline industry and states on conducting vulnerability assessments, improving security plans, developing specific deterrent and protective actions, and upgrading response and recovery plans
- Obtaining executive-level commitment from pipeline operators to implement needed security provisions described in the guidance
- Developing a definition for “critical pipeline facility” and a system of recommended deterrent and protective measures that are synchronized with the threat control levels of the Office of Homeland Security's threat warning system
- Drafting and distributing for review by state and federal officials initial verification audit protocols
- Soliciting R&D proposals to detect encroachments, continuously monitor rights-of-ways and improve system controls
- Working with DOE and FERC to address issues related to rapid response and recovery of critical pipeline service in the case of a pipeline disturbance.

The Pipeline Safety Improvement Act (PSIA) of 2002 serves to further strengthen regulations regarding pipeline safety and security. Federal pipeline safety regulations require pipeline operators to conduct continuing public awareness programs to provide pipeline safety information to four stakeholder audiences:

- Affected Public

- Emergency Officials
- Local Public Officials
- Excavators

OPS will continue its efforts relative to pipeline security by:

- Collaborating with pipeline operators, state pipeline safety agencies, and other federal agencies to continue identifying critical facilities using the established definition of "critical pipeline facility"
- Continuing work with the DOE, FERC and other federal agencies, states and the pipeline industry to advance planning for rapid response and recovery of damaged pipeline systems. This will include identifying and resolving barriers to recovery, including the sharing of critical parts and the need for emergency authorities
- Planning and conducting regional exercises with emphasis on response and recovery
- Continuing to work with state pipeline safety agencies to verify that pipeline operators have developed and implemented security, response and recovery plans for critical pipeline facilities

Impact: Moderate

Damage to Buildings

Pipeline incidents can cause extensive damage to buildings through contamination, fire, or explosion.

Critical Facilities

The United States currently consumes about 63 billion cubic feet of natural gas daily, nearly all of which is transported by pipeline and about 19.5 million barrels of petroleum products. Interruptions in pipeline service can cause delays in natural gas production and utilities, and chemical processing plants who utilize the products transported through the pipeline system. Communication systems or electric power can also be lost when underground lines are damaged.

Health and Safety

Injuries and deaths occur when fire, explosion, or noxious fumes result when pipelines are damaged or fail due to corrosion or material defects.

Economic Impact

Being that Will County is a major pipeline hub, a damaged pipeline can cause an interruption in service of that product not only locally but also throughout the region of its transport. This can cause a loss of natural gas needed to heat buildings or petroleum products being sent to refineries or processing centers causing delays in production.

Future Occurrence

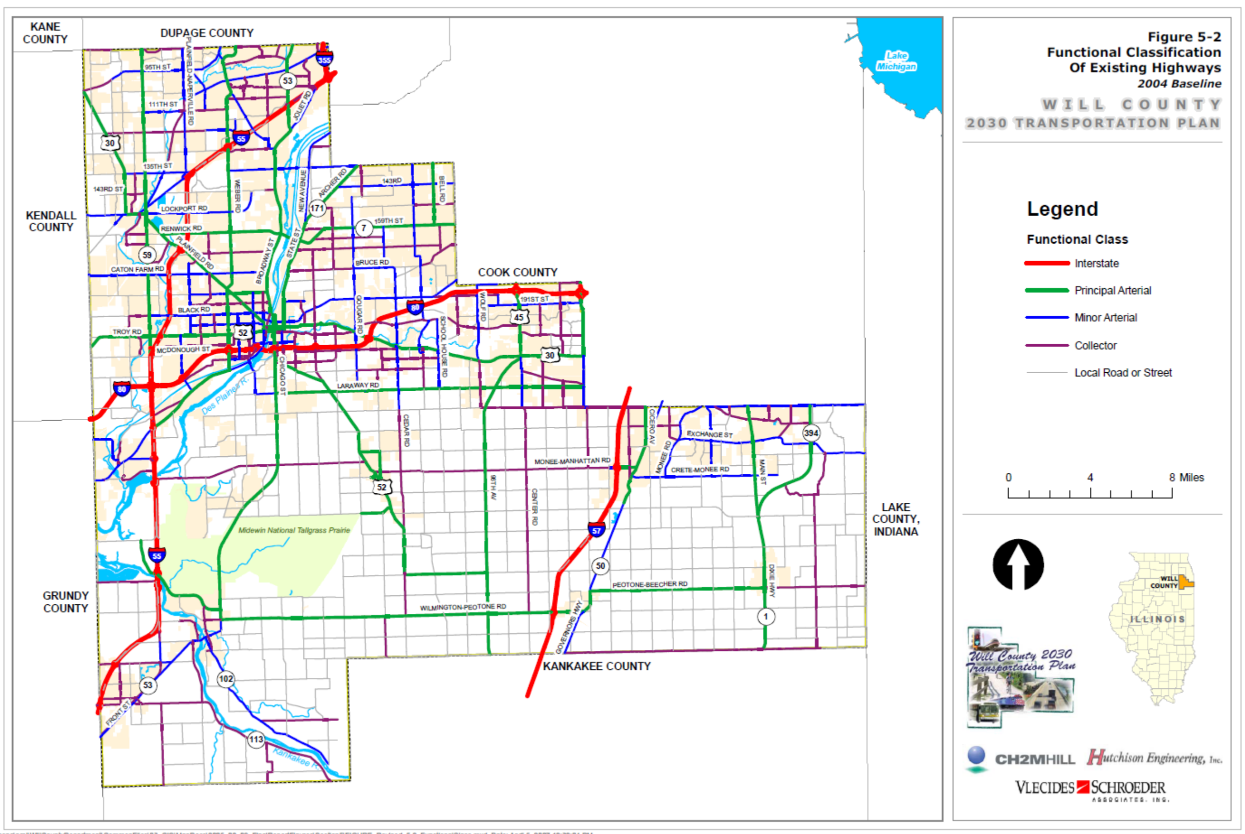
PIPELINE INCIDENTS PROBABILITY	
Number of Occurrences Since 1988	**Annual Mean**
31	1.2

Due to its location, Will County has throughout its borders numerous pipeline systems carrying hazardous liquid and gas products. There is risk of serious incidents due to the nature of these products; however, government agencies and the pipeline industries are working together to promote and improve safety throughout the pipeline systems.

NON-HAZARDOUS MATERIAL TRANSPORTATION

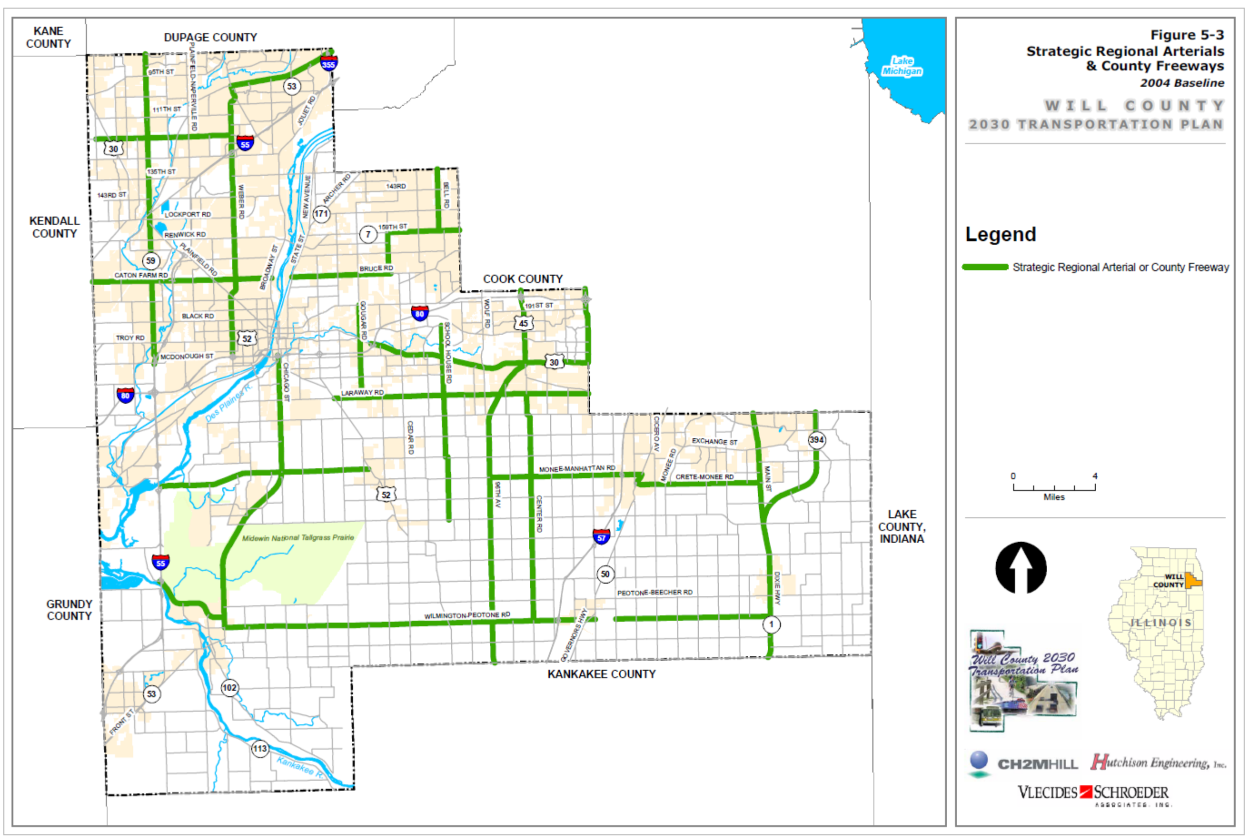
Hazard Characterization

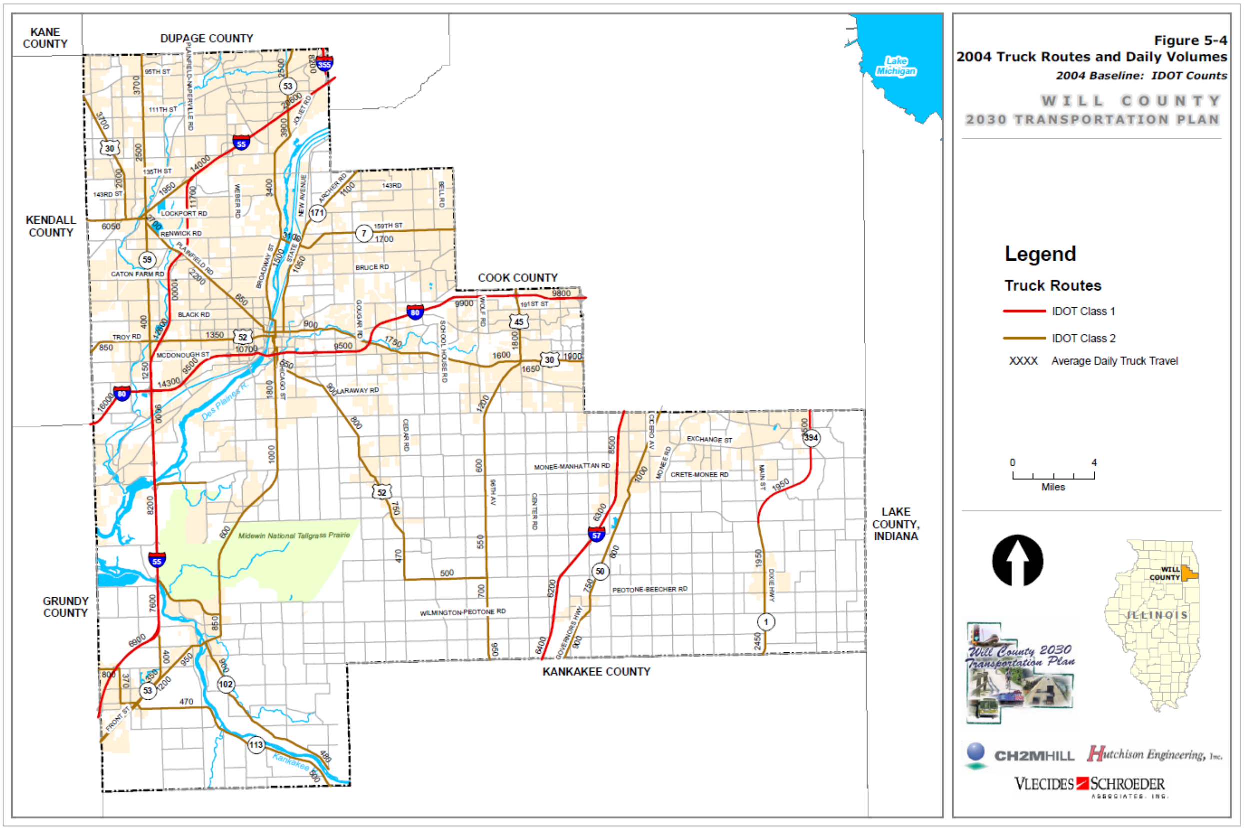
The transportation sector consists of roads, commuter and freight rail services, regional buses, waterways, and bikeways that transport goods and people. Being proximate to Chicago has led Will County to develop an intricate and varied transportation system for the conveyance of raw materials, finished goods, workers, and tourists in and out of Chicago and its metropolitan area. It has developed over decades as a result of public and private investment. The diversity and size of the transportation sector makes it essential to the County's economy and security.



Regardless of the mode of transportation, accidents can and do occur. Motor vehicles, airplanes, trains, or boats are all subject to the risk of accidents. These accidents can occur anywhere within the transportation system because of the driver's error, mechanical failure, poor weather conditions, or sabotage. With the many major highways, rail lines, airports, and waterways, Will County does experience transportation accidents and must be prepared to provide immediate emergency response.

Though accidents normally are not considered disasters, the results of an accident can be of severe magnitude and it is these incidents that are addressed in preparedness planning. Multiple car and truck accidents, train derailments, airplane crashes, and boat accidents can cause mass injuries or kill many people. Fire and explosions may result from the impact. Property can be damaged or destroyed by the accident. Any incident that slows or shuts down a major transportation route will affect the travel time of people and the transportation flow of raw materials and goods. To mitigate accidents, laws and regulations require driver training, provide rules for vehicle operation, and regulate vehicle maintenance. Laws and regulations cannot eliminate accidents, but they can help to lower the incidence of accidents.





History

IMPACT OF NON-HAZARDOUS MATERIAL TRANSPORTATION EVENTS ON WILL COUNTY (Source: National Transportation Safety Board / WC EMA)				
Date	**Type**	**Location**	**Injuries**	**Deaths**
01/25/2001	Highway	I-80 & I-55	0	11
04/30/1999	Highway	Braidwood	20	1
04/06/1989	Train	Lemont	58	0
03/21/1988	Train		16	
07/01/1987	Train	Joliet	28	1
07/28/1983	Train/Truck	Wilmington		
02/16/1982	Train	Beecher		
11/19/1975	Train/Truck	Elwood		
08/12/1967	Highway	Joliet		

With I-80 and I-55 being major transportation routes, numerous accidents have occurred on these highways. On January 25, 2002, a 15-passenger van was traveling too fast on icy roads. It slid out of control, crossed the median, and was struck by an on-coming tractor trailer. All eleven passengers in the vehicle were killed. Another highway incident occurred near Braidwood on April 30, 1999 involving a bus. Twenty people were injured and one was killed.

Train accidents have also involved many injuries. On April 6, 1989, fifty-eight people were injured; on March 21, 1988, sixteen were injured; and on July 1, 1987, twenty-eight were injured and one was killed.

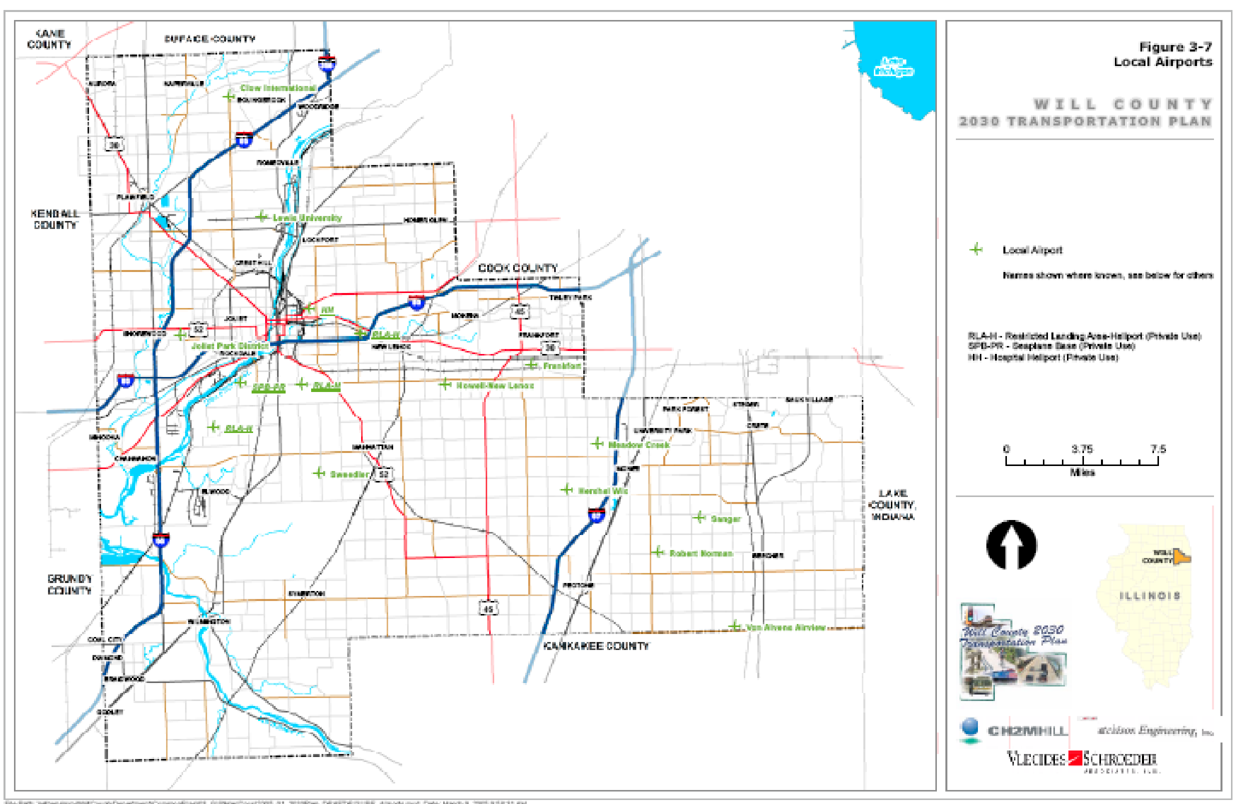
Risk Characterization

Interdependences exist between the various modes of transportation as goods are moved in and out of the County between highway, rail, and water. Interdependences also exist between transportation and every other sector of the economy. Consequently, accidents in the transportation sector may impact other industries that rely on it for its transport of raw materials, finished goods, and workers.

Impact: Moderate

Transportation Modes

Airports: The aviation mode has the symbolic value of representing the freedom of movement that Americans value so highly along with the technological and industrial prowess which has made the United States a world power. The nation's aviation system consists of airports/airplanes and the associated assets needed to support their operations and aviation command, control, communications, and information systems needed to maintain safe use of our national airspace. Will County has six private or general aviation airports that provide business and recreational aerial service to the local area.



Bridges: Vehicular and railroad bridges represent choke points and therefore play a very critical role and present unique challenges. Within Will County are major bridges that cross waterways, railways, and connect major interstates that are important links in the transportation system. Should they be damaged or destroyed, emergency response and movement of both commercial and private vehicles would be severely hampered.

Highways: The trucking and busing industry is a fundamental component of not only our national but also our County transportation infrastructure. Without the transportation sector's resources, the movement of people, goods, and services would be greatly impeded. Components of this infrastructure include highways, roads, inter-modal terminals, bridges, tunnels, trucks, buses, and maintenance facilities. Millions of privately owned and commercial trucking vehicles utilize the extensive interstate system that crosses Illinois on a daily basis, and millions of tons of goods are shipped in and out of the state each year. The interstate network is vital to the commercial trucking industry for both intra- and inter-state shipments of products.

There are three major travel corridors within Will County: first, a northeasterly flow to and from Chicago from the northwestern sections of the County; second, a north-south flow to and from Chicago from the central and eastern sections of the County; and third, a north-south inter-suburban flow between Will and DuPage Counties that provide work commuting routes. The County's highway system consists of four interstate highways and nine state highways. The interstate highway system is designed as a paved, four-lane, high-speed vehicle travel corridor that allows virtually uninterrupted travel through the Chicago Metropolitan Area and to other parts of Illinois and surrounding states. Over one-hundred County highways exist to provide service between interstate and state highways while township roads serve the needs of the farming community and municipal streets serve local and through traffic within the cities and villages.

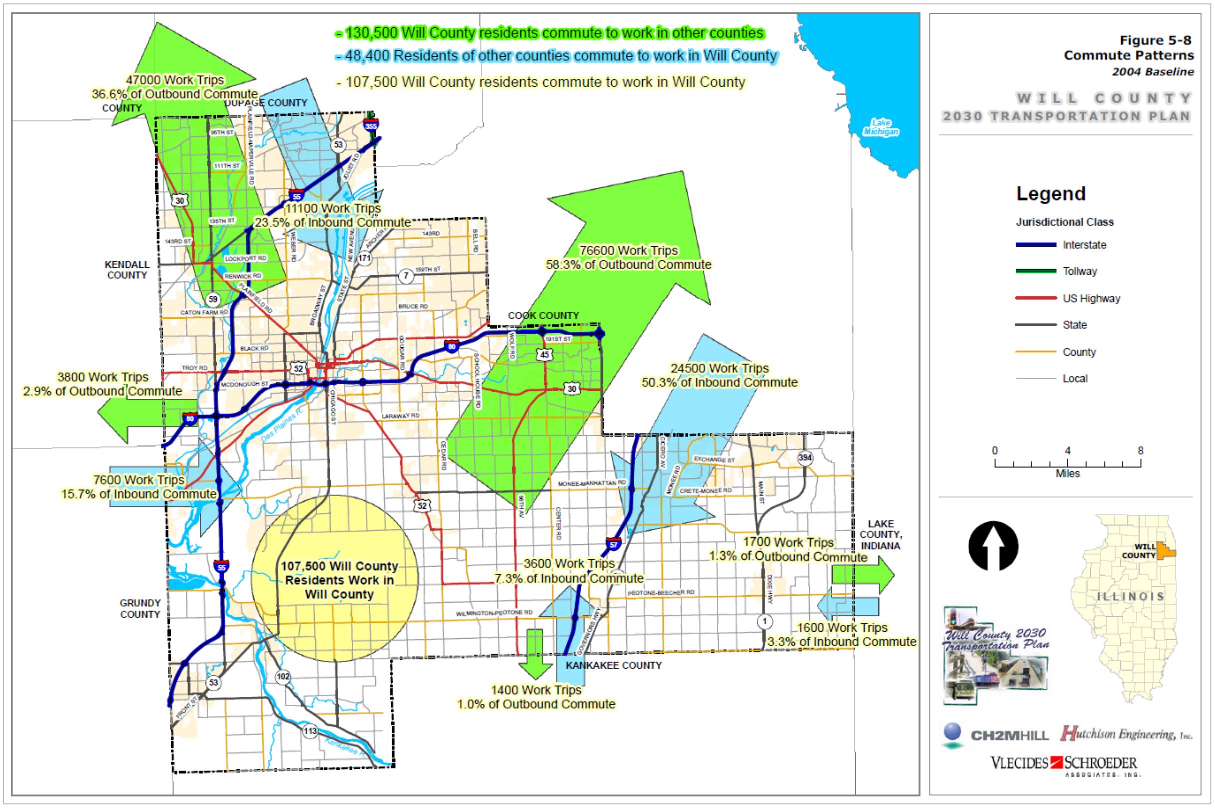


Figure 5-8
Commute Patterns
2004 Baseline
WILL COUNTY
2030 TRANSPORTATION PLAN
- 130,500 Will County residents commute to work in other counties
- 48,400 Residents of other counties commute to work in Will County
- 107,500 Will County residents commute to work in Will County
47000 Work Trips
36.6% of Outbound Commute
11100 Work Trips
23.5% of Inbound Commute
76600 Work Trips
58.3% of Outbound Commute
24500 Work Trips
50.3% of Inbound Commute
3800 Work Trips
2.9% of Outbound Commute
7600 Work Trips
15.7% of Inbound Commute
107,500 Will County Residents Work in Will County
3600 Work Trips
7.3% of Inbound Commute
1700 Work Trips
1.3% of Outbound Commute
1600 Work Trips
3.3% of Inbound Commute
1400 Work Trips
1.0% of Outbound Commute
DUPAGE COUNTY
KENDALL COUNTY
COOK COUNTY
GRUNDY COUNTY
KANKAKEE COUNTY
LAKE COUNTY, INDIANA
Legend
Jurisdictional Class
Interstate
Tollway
US Highway
State
County
Local
Miles
ILLINOIS
WILL COUNTY

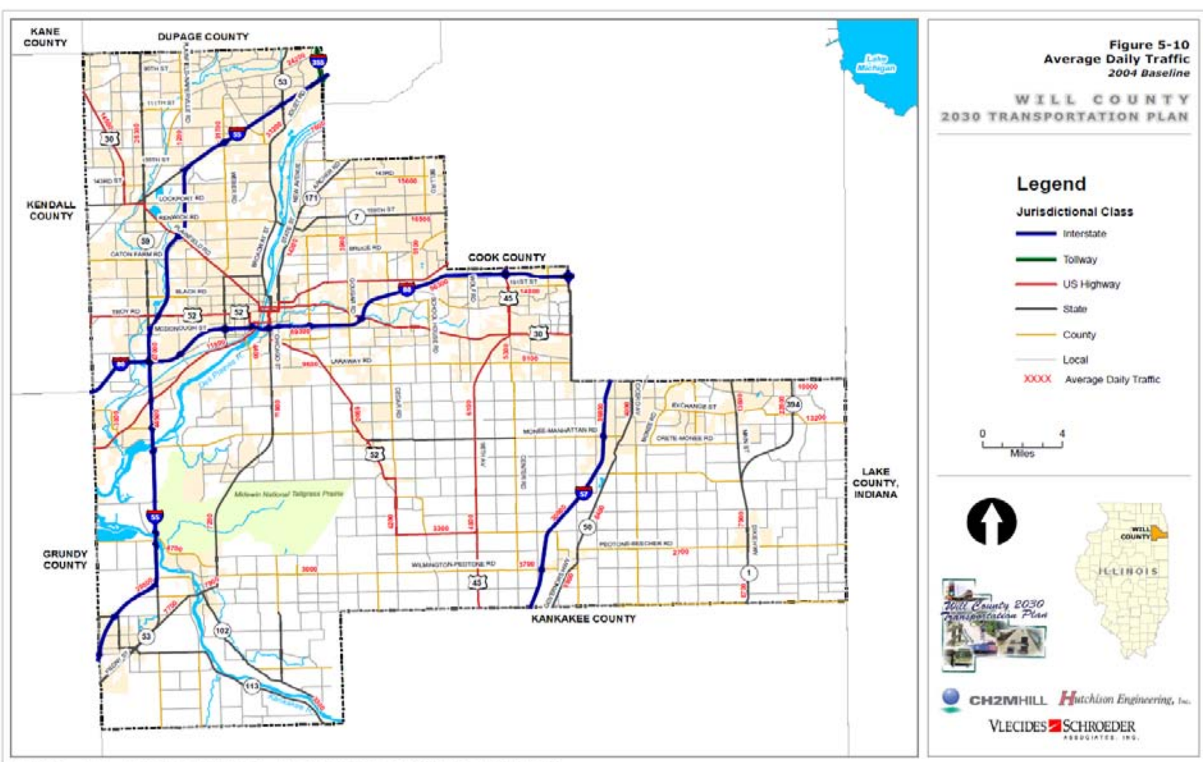
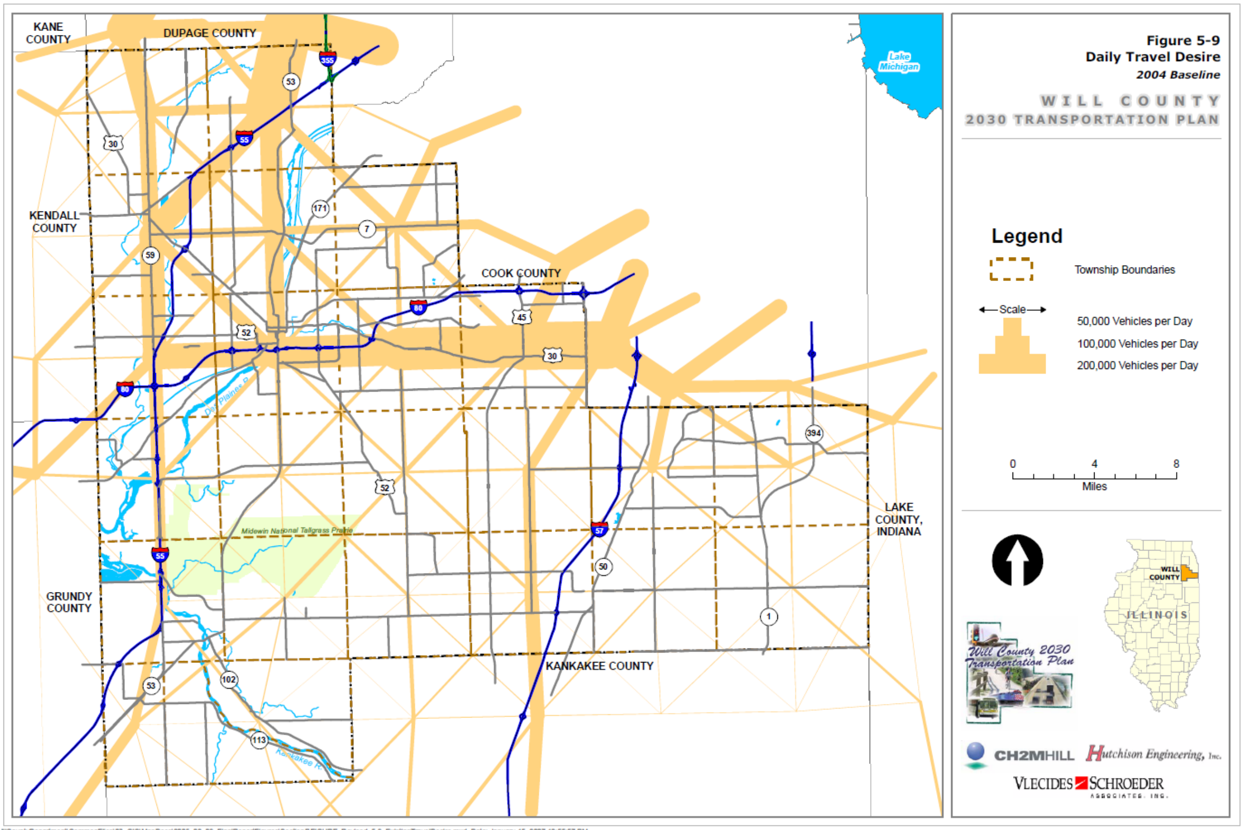


Figure 5-10
Average Daily Traffic
2004 Baseline
WILL COUNTY
2030 TRANSPORTATION PLAN
KANE COUNTY
DUPAGE COUNTY
KENDALL COUNTY
COOK COUNTY
GRUNDY COUNTY
KANKAKEE COUNTY
LAKE COUNTY, INDIANA
Legend
Jurisdictional Class
Interstate
Tollway
US Highway
State
County
Local
XXXX Average Daily Traffic
Miles
ILLINOIS
WILL COUNTY

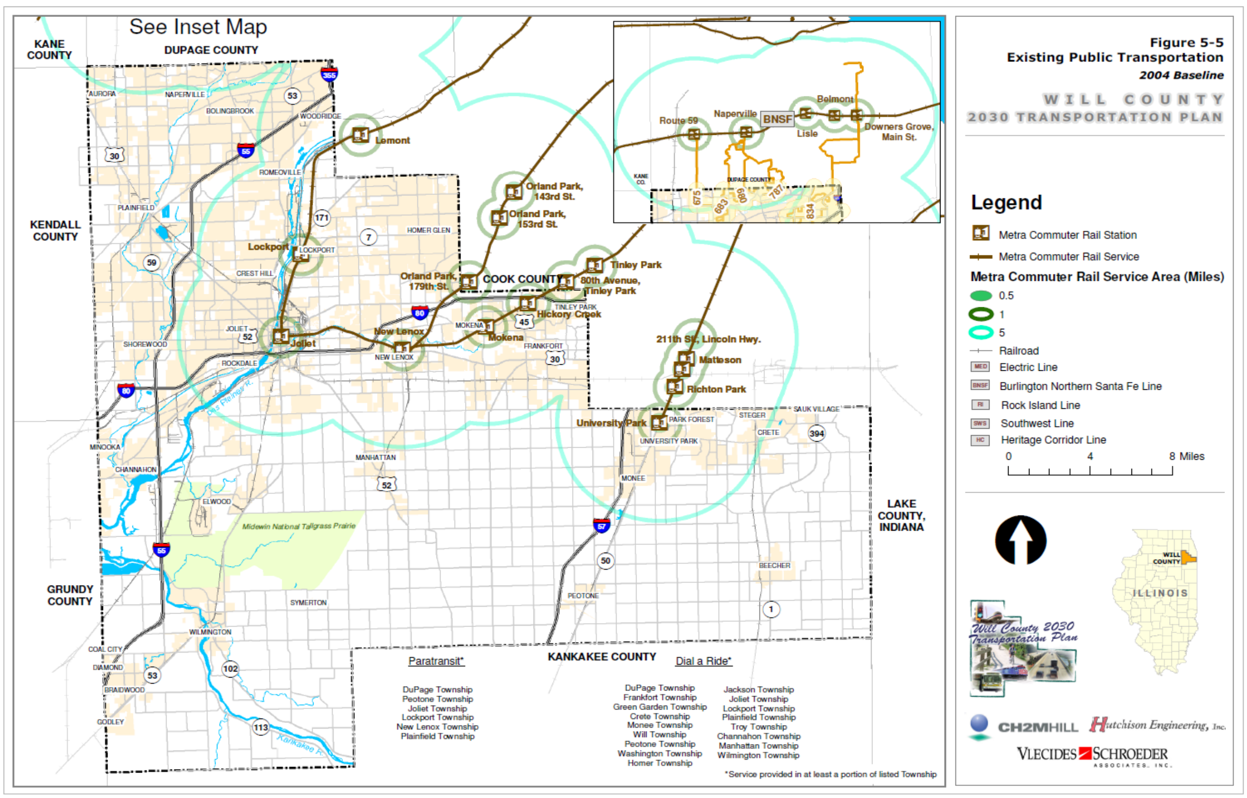


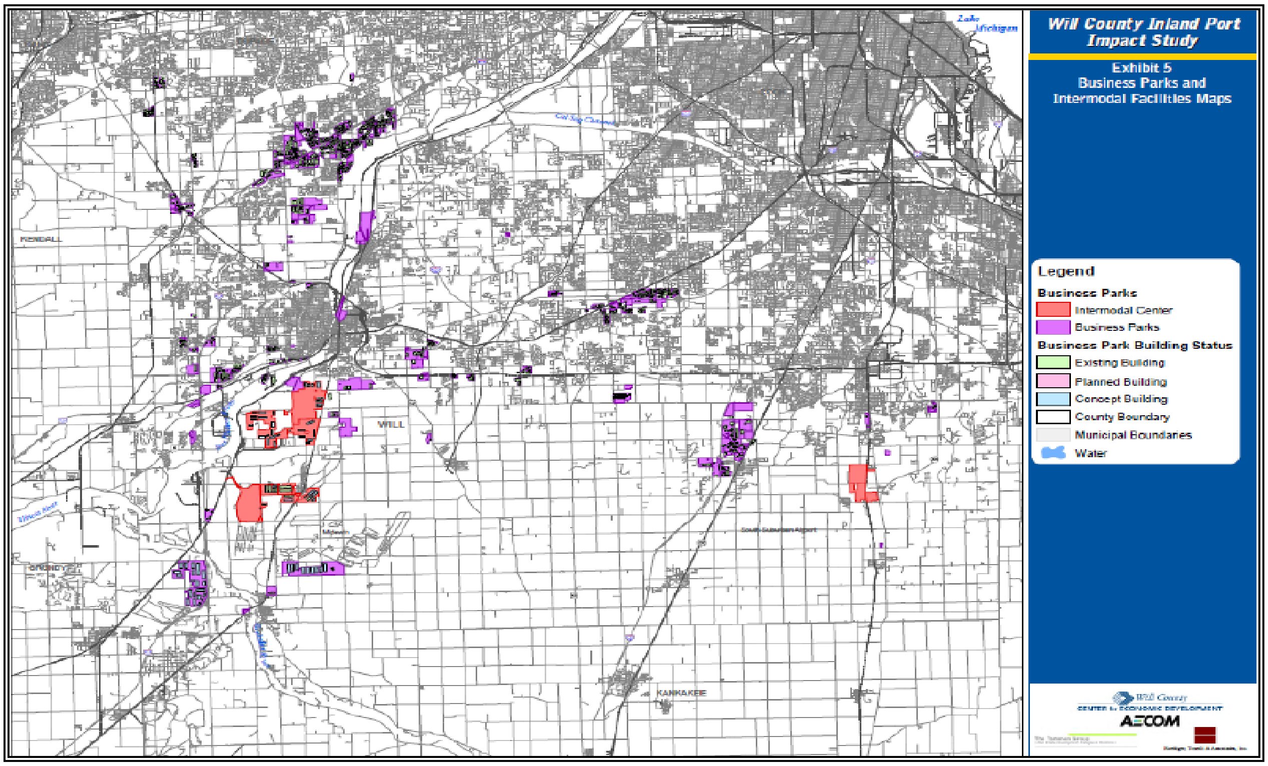
Railroads/ Train Stations:

Illinois is viewed as the center of the nation's rail network. Chicago is considered the railroad capital and has established its status as the nation's railroad intermodal hub. There are roughly 7,300 route miles or railroad lines in Illinois and approximately 4,000 of those miles are vital to the transportation of freight and passengers within Illinois. More than 40 railroads are able to provide service from Illinois to every part of the United States. Trains carry mining, manufacturing, and agricultural products; liquid chemicals and fuels; and consumer goods. The EJ&E Railroad (now the Canadian National) and BNSF Railway Company provide transportation of goods and Metra provides commuter transportation in and out of Will County.

Two new intermodal centers are up and running in Will County. Approximately 454 million tons of freight, or 24.5 percent of the total tons of freight carried, go through

Illinois. Coal, an essential resource for the generation of electricity, composes almost 20% of the freight. Passenger trains transport over 20 million intercity travelers annually, and 45 million passengers use trains and subways operated by local transit authorities. Metra provides commuter transportation in and out of Will County.





Health and Safety

Traffic accidents are influenced by weather conditions, speed of traffic, and the number of vehicles occupying the road. Conditions that lead to accidents include rain, fog, ice, heavy rain, strong winds, high speed, and heavy traffic congestion. Accordingly, people are injured or killed as a result of accidents.

Economic Impact

Short delays due to slow downs or shut downs in transportation systems are the most common results of accidents. Should a major transportation route be shut down for an extended period of time, people traveling through that area and businesses transporting raw materials and goods could be impacted until that route is repaired.

Future Occurrence

As the County grows in population and business/manufacturing entities, use of all transportation systems will increase and likely increase in the number of accidents.

FIRE

Hazard Characterization

Fire is any occurrence of uncontrolled burning which results in major structural damage to residential, commercial, industrial, institutional, or other types of property. In urban areas where buildings are set close together, fire can jump from one building to another, resulting in major conflagration. Embers from these fires can travel by wind to the roofs of other structures setting off secondary fires. Fire can also damage forests and grassy areas.

Fire at an industrial site may involve flammable or hazardous materials. Fire may ensue at a gasoline service station or from a damaged pipeline. Fire may result into a serious explosion. Along with property damage, it is a hazard to the County community causing injury or death to its residents. It can damage communication and power lines or force evacuation of the affected area.

History

Numerous fires have occurred in the history of Will County. Major occurrences include:

IMPACT OF FIRES ON WILL COUNTY
(Source: WC EMA/Local News Media Reports)

Date	Location	Type	Impact
August 14, 2001	Lemont	Refinery Fire	$25 million damages
July 2, 1999	Channahon	Propane Explosion	2 Injured
April 29, 1999	Romeoville	Pipeline Rupture	7 Injured 34 Townhomes destroyed 199 out 394 homes damaged
March 17, 1990	Lemont	Refinery Fire	1 Injured 65,000 gal. Gal.Oil storage tank
April 23, 1988	Joliet	Grain Elevator Explosion	3 Injured, 5 Dead
March 12, 1988	Rockdale	Werco Warehouse Fire	6 Injured $5 + million damages
July 23, 1984	Romeoville	Union Oil Refinery Explosion	30 Injured, 17 Dead $25 million damages
June 5, 1942	Elwood	Elwood Ordnance Plant (Joliet Army Ammunition Plant) Explosion	67 Injured, 49 Dead $30 million damages

Risk Characterization

A fire or explosion may occur at any time with no warning. Urban fires may result in very costly damages. Urban communities with newer industrial and business facilities are reasonably secure from potential conflagration. These buildings are generally constructed of fire resistive materials, protected with automatic sprinkler systems, equipped with fire extinguishing and fire detection systems, and reasonably well separated.

Prevention is a simple solution to reduce destructive fires. It is incumbent upon each citizen to prepare and practice fire safety. Good public education programs on fire safety, fire alarms, and fire response are important prevention measures.

Impact: Low

Damage to Buildings

Fires cause serious damage or destruction to buildings.

Critical Facilities

Critical facilities can be seriously damaged or destroyed by fires disrupting services to businesses and household.

Health and Safety

Fires cause serious burns, injuries, smoke inhalation, and death to individuals inside burning buildings, first responders, and area population when hazardous chemicals are released into the atmosphere as a result of fire or explosion.

Economic Impact

Injury, loss of property, and business interruption can have devastating economic impact to individuals, businesses, industry, and populations served by affected businesses and infrastructure. There may or may not be insurance to cover the cost of structure repair or replacement, injuries, or lost business.

Future Occurrence

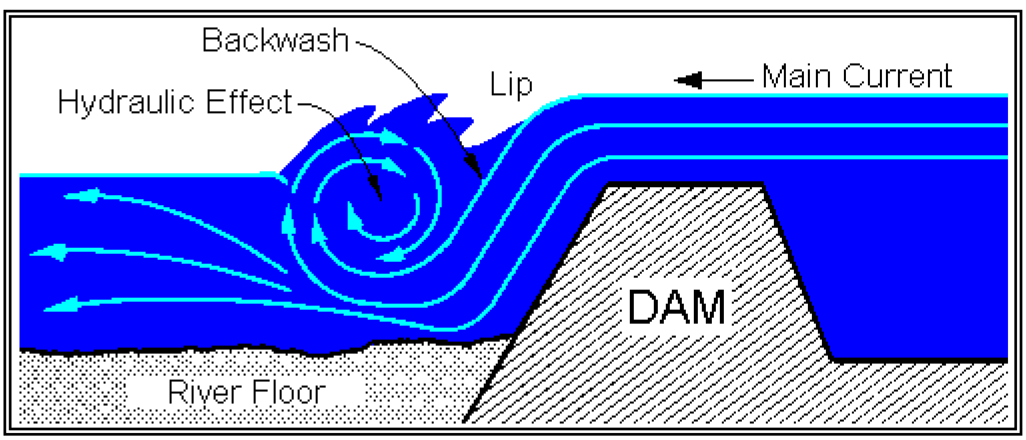
The risk of fire is always a potential but can be mitigated with fire safety practices, fire detection systems, fire suppression equipment, and fire resistive materials. New facilities must meet building codes which are implemented to reduce fire risk for the protection of people and property.

DAM FAILURE

Hazard Characterization

A dam is built to control water and can be made from earth, rocks, or concrete. Dams are usually constructed on rivers to store water in a reservoir during times of excess flow and then released as needed. They are important because they provide water for drinking, industrial processes, fishing, recreation, navigation, and transport of raw goods on rivers. The water impounded behind a dam is referred to as the reservoir and is measured in acre-feet, with one acre-foot being the volume of water that covers one acre of land to a depth of one foot. Due to topography, even a small dam may have a reservoir containing many acre-feet of water.

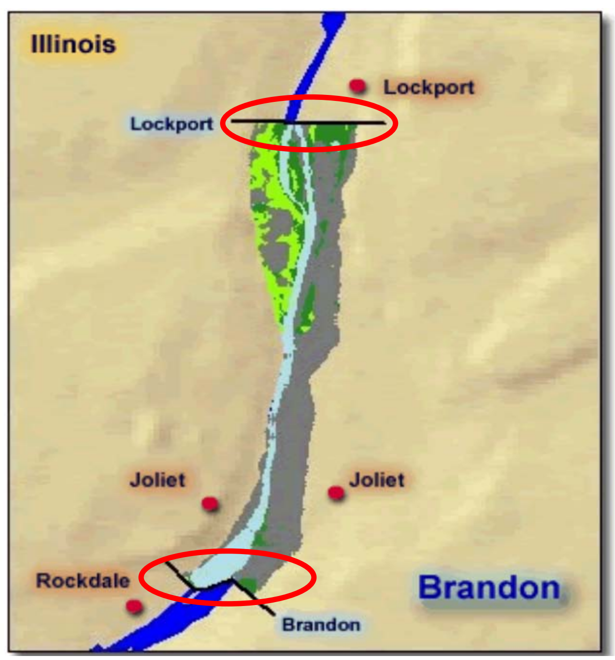
Dam failure is an accidental or unintentional collapse or other failure of an impoundment structure that results in downstream flooding. Dams are man-made structures and dam failures are usually considered technological hazards; however, dams usually fail as a result of the secondary effects of storms. Dam failures may result from natural events, human-caused events, or a combination thereof. Failure can result in the release of the reservoir contents that include water, mine wastes or agricultural refuse causing a negative impact upstream or downstream or at location remote from the dam. A flood that is caused by the breach of a dam may be of greater magnitude than floods originating from the runoff of rainfall or snowmelt.



Wilmington Dam

Will County is situated on the Illinois Waterway System, a primary waterway-barge link between the St. Lawrence Seaway, the Great Lakes, the Mississippi River and the Gulf of Mexico. The system follows along the I & M Canal and the Des Plaines River through Will County, providing manufacturers with excellent low-cost barge shipping opportunities for bulk materials. Coal, petroleum products, chemicals, metals and ores, non-metallic minerals, grain, stone, sand, clay, and cement are among the major commodities that travel through Will County on the Illinois Waterway System. Will County is home to the third greatest number of public and private waterway terminals in Illinois.

The Illinois Waterway system consists of 336 miles of water from the mouth of the Chicago River to the mouth of the Illinois River at Grafton, Illinois. It is a system of rivers, lakes, and canals which provide a shipping connection from the Great Lakes to the Gulf of Mexico via the Mississippi River. The Illinois and Michigan Canal opened in 1849. In 1900, the Chicago Sanitary and Ship Canal replaced it and reversed the flow of the Chicago River so it no longer flowed into Lake Michigan. The United States Army Corps of Engineers maintains a 9 foot deep navigation channel in the waterway.

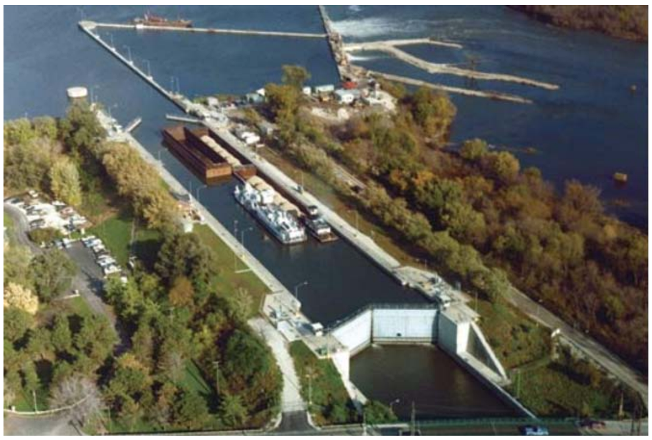


A series of seven locks control water flows from Lake Michigan to the Mississippi River system. Two of those lock and dam systems are located in Will County: Brandon Road Lock and Dam and Lockport Lock and Dam.

Brandon Road Lock and Dam

Brandon Road Pool is created by Brandon Road Lock and Dam on the Des Plaines River in Will County, Illinois, and is used for improved navigation purposes. It connects from the Chicago River (connecting to Lake Michigan) to the Illinois River. It was completed in 1933. It is owned by U. S. Army Corps of Engineers.

Brandon Road Lock and Dam



BRANDON ROAD LOCK & DAM	COMMODITY TONNAGE	Coal	1,622,706
		Petroleum	1,553,955
		Chemicals	1,554,847
		Crude Materials	3,703,640
		Manufactured Goods	1,932,124
		Farm Products	219,272
		Manufactured Machinery	147,470
		Waste Material	17,400
		Containers & Pallets	1,600
		Unknown	7,617
		Grain	100,200
		Steel	1,005,629
	OCKAGES	Commercial Boats	2,548
		Recreation Boats	628
		Light Boats	415

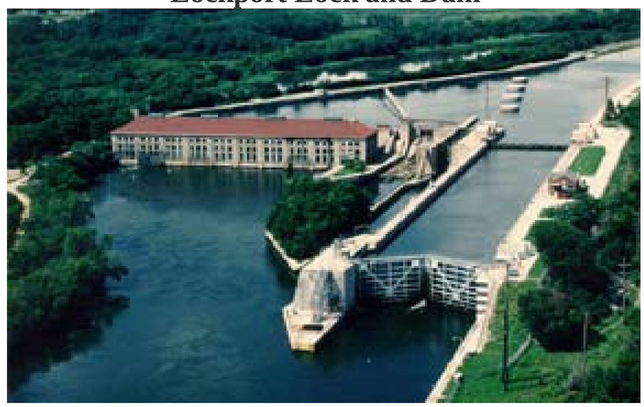
Brandon Road Lock and Dam, also known as Brandon Road Pool, is a gravity dam. The core is homogeneous, earth, concrete, and metal. The foundation is rock. Though originally completed in 1933, the structure was modified in 1985. Its height is 40 feet with a length of 14,250 feet. Its capacity is 4,500 acre feet. Normal storage is 4,500 acre feet. It drains an area of 1,500 square miles.

Lockport Lock and Dam

This lock and dam is located in Lockport, Illinois, within the three-mile lower reach of the Chicago Sanitary Ship Canal which extends from the Chicago River to the Illinois Waterway. The Lockport upper pool is perched 38 feet above the surrounding communities. The lock has a width of 110 feet and length of 600 feet. It was completed in 1933. Rehabilitation work was completed in 1989.

A safety assessment was completed in 2005. The Lockport Pool Approach Dike and walls were confirmed potentially unsafe. Total estimated repair project cost is $132,400,000. The Approach Dike is presently under repair with a 300 foot test section of full depth concrete cut-off wall being constructed. If successful, it will lead to 4,300 feet of the dike receiving a full depth cut-off wall. Interim risk reduction measures were completed including weir repair and tree cutting along the back side of the dike. In addition, design of the left descending bank wall repairs is underway with a proposed fourth quarter contract award.

Lockport Lock and Dam



LOCKPORT ROAD LOCK & DAM	COMMODITY TONNAGE	Coal	1,607,210
		Petroleum	1,580,305
		Chemicals	1,550,197
		Crude Materials	3,592,954
		Manufactured Goods	1,801,459
		Farm Products	214,572
		Manufactured Machinery	179,520
		Waste Material	17,400
		Containers & Pallets	1,600
		Unknown	7,617
		Grain	98,800
		Steel	1,021,364
	LOCKAGES	Commercial Boats	2,696
		Recreation Boats	545
		Light Boats	413
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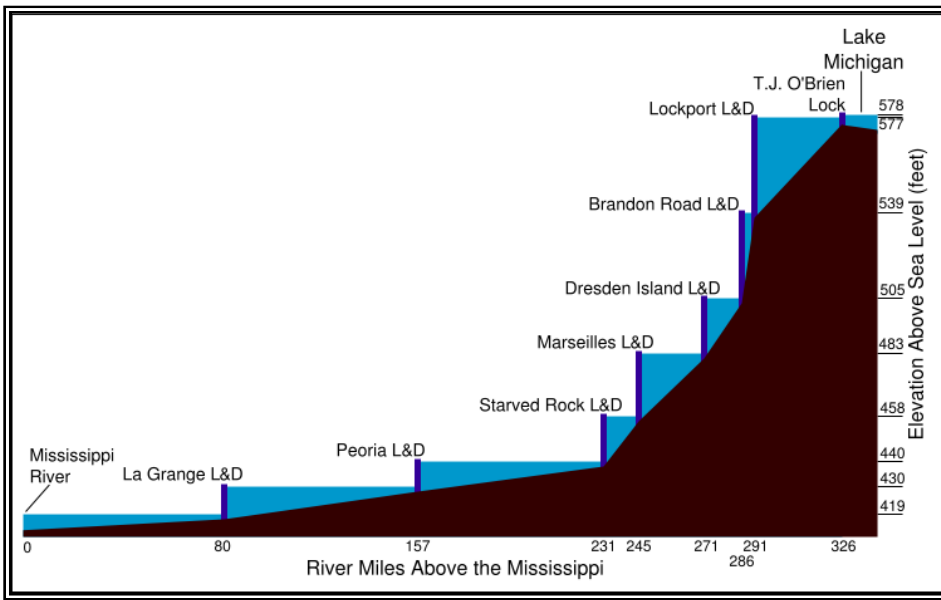


WILL COUNTY DAMS and LOCKS					
Dam Name	**Source**	**Year Completed**	**Storage (AC/FT)**	**Height (Ft)**	**Class**
Braidwood Station Cooling Pond Dam	Kankakee River	1979	35,000	22	I
Brandon Road Lock and Dam	Des Plaines River	1933	4,500	45	I
Brookwood Trace Dam	Springbrook Creek 2	1991	90	12	III
Cedar Glen Unit 2 Dam	Spring Brook	1985	75	11	III
Channahon Dam	DuPage River	1930E	750	25	III
Deer Lake Dam	Deer Creek	1920	600	15	II
Doyle Lake Dam	Trib. Jordan Creek		142	14	III
Gun Club Lake Dam (Hamburgh-Martin Number 6 Dam)	Trib. Hickory Creek	1969	102	20	III
Joliet Junior College Lake Dam	Trib. Rock Run Creek	1980	59	11	II
Kemery Lake Dam	Prairie Creek		116	20	I
Lockport Powerhouse and Controlling Work Reservoir Dam	Chicago Sanitary & Ship Canal	1907	25,000	38	I
Maple Brook Estates Dam	Lily Cache Creek	1997E	97	6.6	III
Monee Reservoir Dam	Trib. Rib Rock Creek	1900	650	29	II
Puddle Pond Dam	Trib. DuPage River	1957	80	17	III
Sauk Trail Dam	Trib. Hickory Creek	1980	3,230	34	I
Spring Brook Gabion Dam	Spring Brook	1984	89	9	III
Wilmington Dam	Kankakee River				II
Lockport Lock	Chicago Sanitary & Ship Canal	1933	40,000	65	II

State Regulation

The State of Illinois regulates dams under Title 17, Chapter I, III, Administrative Code 3702. Dams are categorized according to the degree of threat to life and property in the breach wave inundation area:

Class I Failure has a high probability of causing loss of life or substantial economic loss, similar to that of US Army Corps of Engineers High Hazard Potential or USDA Natural Resources Conservation Service Class (c) dams.

Class II Failure has a moderate probability for causing loss of life or substantial economic loss, similar to USCOE Significant Hazard Potential or USDA/NRCS Class (b) dams.

Class III Failure has a low probability for causing loss of life or substantial economic loss, similar to the USCOE Low Hazard Potential or USDA/NRCS Class (a) dams. The health and safety concerns are similar to flooding, but the nature of the breach wave flood creates a higher level of damage to structures and a higher velocity of flow in open areas.

History

The history of dam failure in Will County has primarily been the result of severe storms. The possibility of dam failure is rare if dams and locks are properly maintained and inspected.

IMPACT OF DAM FAILURE ON WILL COUNTY (Source: Cold Regions Research and Engineering Laboratory/ US Army Corps of Engineers National Inventory of Dams/WC EMA)		
Date	**Dam**	**Description**
07/17/1996	Maple Brook Estates Dam	> 10” Rainfall in 24 hr.
07/17/1996	Puddle Pond Dam	> 10” Rainfall in 24 hr.
07/17/1996	Cedar Glen Unit 2 Dam	> 10” Rainfall in 24 hr.
07/17/1996	Gun Club Lake Dam	> 10” Rainfall in 24 hr.
07/17/1996	Joliet Junior College Lake Dam	> 10” Rainfall in 24 hr.
07/17/1996	Channahon Dam	> 10” Rainfall in 24 hr.
06/1990	Wilmington Dam	Breach approx. 100” long
1948	Channahon Dam	High flow overtopped embankment

Risk Characterization

The affected area for dam failure includes the dam and the area impacted by the release of the water in the reservoir. For the most part, there are few people on the dam and the health and safety impacts are negligible. The threat in the area below the dam can be significant. Damages are similar to flooding with increased structural damages due to the higher velocities of flow. Responders will experience the same hazards as in other flood response situations.

More than half of the 240 operational Corps funded lock chambers in the U.S., which handle over 625 million tons of freight each year, are over 50 years old and have exceeded their economic design lives. The replacement value of our lock and dam facilities has been estimated at more than $125 billion. Owned and operated by the federal government, the system’s infrastructure has been recapitalized with an investment at the grossly inadequate level of approximately $220 million annually over the past 10 years, although this trend has begun to improve in the past few years.

Many locks currently in use are too small for today’s larger tows. This leaves the dams susceptible to closures and long delays for repairs and unable to deal effectively with lines and wait times that result from their obsolescence. On the Upper Mississippi River, for instance, many lock chambers are 600 feet in length. However, the average length of a modern tow (15 barges pushed by a towboat) is 1,200 feet.

Consequently, for a modern tow to navigate through these antiquated locks, it must split in half and transit the lock one section at a time, resulting in costly delays.

The U.S. Army Corps of Engineers reports increasing amounts of scheduled and unscheduled downtime at the locks on America's inland navigation system. In 2005, for example, the Corps reported navigation locks were unavailable (scheduled and unscheduled without ice) for about 110,000 hours (about 4,600 days). Queue delays at congested or unavailable locks cost the industry hundreds of millions of dollars annually.

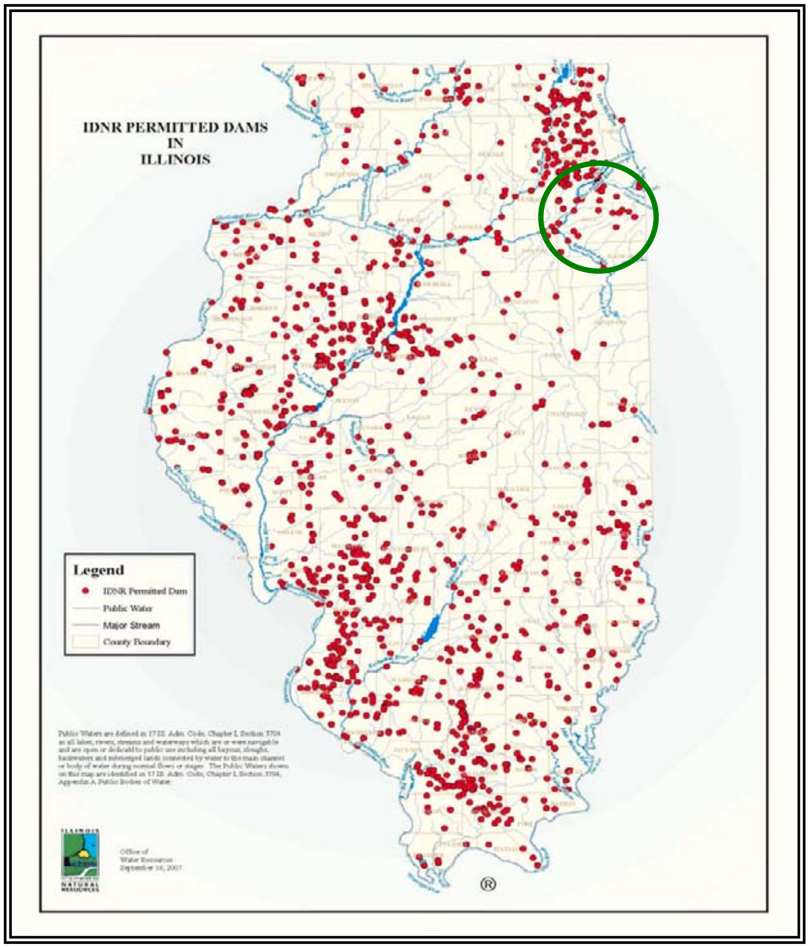
Waterborne transportation is generally out of sight, out of mind. But the inland waterways transportation system binds us together in this country and allows us to turn on lights, eat our cereal in the morning, and drive our cars to work. It deserves our support and our commitment to nurture it, not neglect it.

Impact: Low

Dam Failures

Dam failures usually occur when the spillway capacity is inadequate and water overtops the dam or when internal erosion through the dam foundation occurs, also known as piping. If internal erosion or overtopping causes a full structural breach, a high-velocity, debris-laden wall of water is released and rushes downstream, damaging or destroying whatever is in its path. Dam failures may result from one or more the following:

- Prolonged periods of rainfall and flooding [the cause of most failures
- Inadequate spillway capacity which causes excess overtopping flows
- Internal erosion due to embankment or foundation leakage or piping
- Improper maintenance
- Improper design
- Negligent operation
- Failure of upstream dams
- Landslides into reservoirs
- High winds
- Earthquakes.



For emergency planning purposes, dam failures are categorized as either *rainy day* or *sunny day failures*. *Rainy day failures* involve periods of excessive precipitation leading to an unusually high runoff. This high runoff increases the reservoir of the dam and if not controlled, the overtopping of the dam or excessive water pressure can lead to dam failure. Normal storm events can also lead to rainy day failures if water outlets are plugged with debris or otherwise made inoperable. *Sunny day failures* occur due to poor dam maintenance, damage/obstruction of outlet systems, or vandalism. This is the worst type of failure and can be catastrophic because the breach is unexpected and there may be insufficient time to properly warn downstream residents.

If a dam suffers a partial or complete failure, the potential energy of the water stored behind even a small dam can cause loss of life and great property damage downstream. The following factors influence the impact of a dam failure:

- Level of failure (partial or complete)
- Rapidity of failure (sudden or gradual)
- Amount of water released
- Nature of the development or infrastructure located downstream

Damage to Buildings

Buildings downstream of a dam failure can be inundated and lost due to flooding. Damages are similar to flooding with increased structural damages due to the higher velocities of flow.

Critical Facilities

Essential utilities and facilities can be damaged or lost from resultant flooding due to dam failure.

Health and Safety

Injury and loss of life can occur when a dam fails or water overspills its banks. Damages to the environment are typically less than flooding. Duration of inundation due to dam failure is short.

Economic Impact

The economic impact from dam failure is similar to flooding. The local economy can be affected when businesses and homes are flooded by the overspill of a dam. Dam Failure can have a serious effect on the movement of goods through our waterway system that would have an impact beyond our local economic area. Our country's inland navigation system plays a critical role in our nation's economy, moving hundreds of millions of tons of domestic commerce valued at $300 billion annually. Additionally, our inland waterways facilitate a significant portion of the $851.5 billion worth of imports and exports to and from the United State each year. Specific data regarding economic impact can be found through IEMA – Economic Impact Multi-Hazards Estimates binder.

Future Occurrence

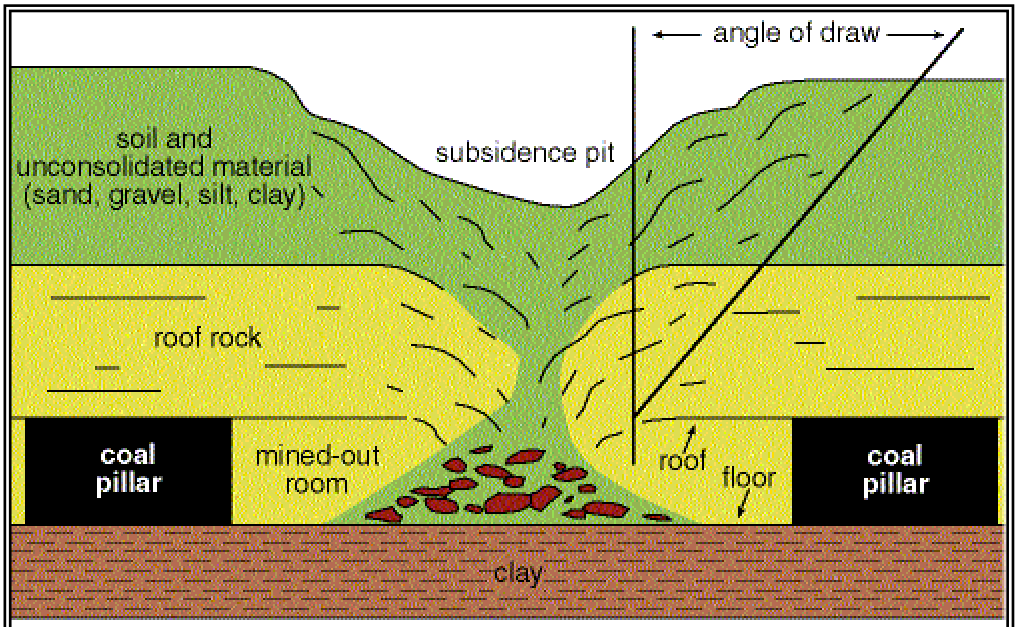
With five high hazard dams, Will County is vulnerable to dam failure; however, the likelihood of occurrence is low.

DAM FAILURE PROBABILITY	
Number of Occurrences Since 1990	**Annual Mean**
7	.44

LAND SUBSIDENCE

Hazard Characterization

Land subsidence is any vertical displacement or downward movement of a generally level ground surface resulting from either natural or man-induced surface or subsurface conditions. Natural subsidence occurs when the ground collapses into underground cavities produced by the solution of limestone or other soluble materials by groundwater. Drought or excessive rainfall can also cause sinkholes. Human-induced subsidence is caused mainly by groundwater withdrawal, drainage of organic soils, and underground mining.

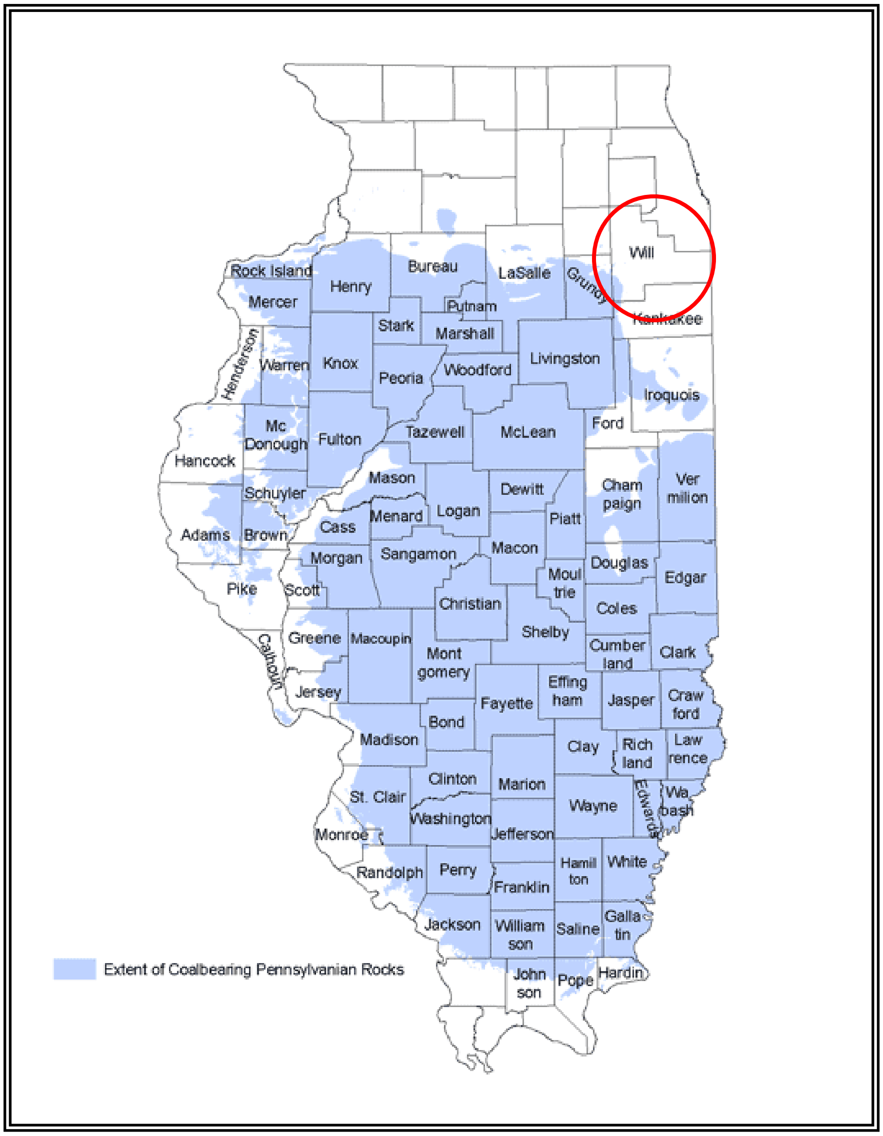


Diagrammatic cross section of typical subsidence resulting from mine-roof collapse. No scale implied.

Loosely packed materials tend to compact and sink as time passes. In an open field, subsidence presents no real problem. Gradually, depressions make the land marshy and unfit for cultivation. The problem becomes serious where land has been developed. Subsidence poses a greater risk to property than to life and generally affects very few people. Mine subsidence may take years to become apparent. As subsidence occurs, buildings begin to crack and slope to one side. Severe subsidence can result in complete collapse or deterioration serious enough to warrant the building being condemned. Roads can collapse. Gas mains and sewer lines underlying the building may also crack, thus causing secondary problems with explosions, fire, or flooding.

History

No history of mine subsidence is available for review in this plan. While over 750,000 acres of the state have been undermined, the occurrence of mine subsidence, statistically, is fairly infrequent.



Risk Characterization

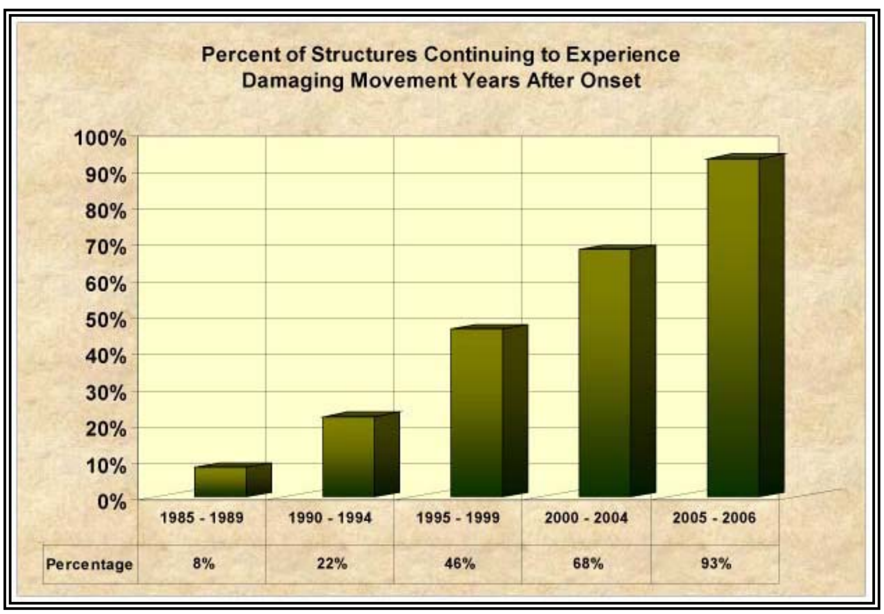
The southwestern portion of Will County was once the site of shaft coalmines. Most of these mines were abandoned around the turn of the century, but the mined-out areas still exist. Estimates that were taken from the Illinois Geological Survey maps indicate that about one-eighth of the County was undermined. The communities of Diamond, Godley, and Braidwood have extensive underminings.

Mine subsidence is affected by three aspects of Illinois geology:

- Much Illinois coal exists between weak layers of shale, claystone, limestone, and sandstone. These layers form a weak mine roof, allowing eventual collapse between support pillars.
- The layer under most Illinois coal is a soft clay, providing a poor foundation for mine roof support pillars, which can sink and collapse the mine.
- Illinois' soft coal tends to deteriorate upon contact with air in the mine. This means that roof support pillars carved out of the coal are prone to crumble and fail.

Impact: Low

Damage to Buildings



Damage to property from mine subsidence can range from mild to severe. The following conditions may indicate a mine subsidence loss, but it is important to note that these conditions are often times the result of normal ground movement due to changes in soil moisture or seasonal temperature changes.

- Sudden appearance of cracks in the building's foundation, exterior walls, basement or garage floors
- Foundation, porch or steps appear to pull away from the frame of the house
- Tilt in the house; doors start swinging open, or shut, or become jammed
- Windows start sticking, jamming, or even breaking

- Noticeable separations between walls and floors
- Water pipes break, resulting in contaminated tap water, loss of water pressure or interior water damage
- Popping or snapping might be heard as the ground shifts

If mine subsidence is the cause, it is likely that several of these problems will develop. Initial damage may occur within a few days or gradually over months. Ground movement from mine subsidence usually continues for years.

Future Occurrence

It is theoretically possible for an entire mine to collapse. Generally, with mine subsidence, it will not be an extensive area, usually less than 3 acres. Probably the most effective way of stopping mine subsidence is to eliminate gravity. Since we can not do that, mine subsidence probably can not be fully stopped. Modern mining techniques, such as those used in Illinois today, minimize the potential for future mine subsidence. The Illinois Mine Subsidence Insurance Fund generally investigates losses caused by older mines, which were mined a generation or two ago.

TERRORIST ATTACK

Hazard Characterization

The Code of Federal Regulations defines terrorism as "... an intentional, unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives." The Federal Bureau of Investigation (FBI) adds that terrorism can be domestic or international. FEMA's definition of terrorism incorporates the use of Weapons of Mass Destruction (WMD) which would include biological, chemical, nuclear, and radiological weapons; arson, incendiary, explosive, and armed attacks; industrial sabotage and intentional hazardous materials releases; agriterrorism; and cyberterrorism. The intent of these activities is to instill fear into a community and cause death or serious injury to people or significant damage to property or information systems.

Terrorism Components	Description
Violence/ Force	Violence/Force only needs to be threatened as long as the act is perceived to be real. Violence is utilized to achieve maximum publicity in order to create psychological effects beyond the immediate physical damage.
Victims as Pawns	Victims are not necessarily the direct targets but are used as pawns to cause fear in those who witness the attack. The plight of the victim is intended to frighten onlookers into a course of political or social action. The randomness of the choice of victim increases fear and anxiety.
Fear/Terror	Psychological techniques are used to bring about conformity of behavior. Fear is the actual agent of change. Fear erodes people's trust in the government to protect them and they push officials to fulfill the terrorist's demands.
Observers as Audience	Terrorists are trying to gain the attention of society, not necessarily the victim. Those who observe the act are the targets or "audience". Media coverage can further the terrorist's cause by broadcasting the act and the terrorist's agenda.
Political or Social Change	The intention of the act is to generate the public's fear or distrust in the government in order to force change in political, social, economic, religious, or ideological beliefs in order to facilitate the terrorist's desired change.

According to the Federal Emergency Management Agency (FEMA), there is no universal definition of terrorism, despite decades of debate, and the term can be interpreted in many ways. Common usage of the term has become a catchall that includes political violence and non-political criminals. Complicating the issue of defining terrorism even further, U.S. statutes do not include terrorism as a crime. Accordingly, terrorists are arrested for elements of their terrorist acts, such as murder or weapons violations.

Definition

In order to assess vulnerability to terrorism, a common understanding of what terrorism is must be deciphered. It is probably best to agree that the meaning of terrorism changes over time as political and social settings change. The meaning of terrorism may need to be adaptable just as terrorists are adaptable to events and surroundings in order to further their cause.

Most definitions studied incorporate the key elements of violence, victims, fear, observers, and political/social causes. By accepting these five elements as a basis for the meaning of terrorism, it will allow us to move forward to assess potential vulnerability to terrorist acts.

Types of Terrorists	Description
International	Supported by a government, but the terrorism is directed against citizens or agencies of other states.
Domestic	Local, national acts by individuals or groups acting independently of any government support.
Left or Right-wing	Left-wing groups strive to reform or overthrow the established government for the greater freedom or well-being of the common man. Their actions tend to be symbolic; rarely do they act to cause widespread, arbitrary casualties. Right-wing groups endeavor to maintain the power of the state or to preserve the advantages held by a certain group. There is often a religious, racial, or politically paranoid survivalist dimension to their ideas. They can be extremely violent.
Special Interests	Groups may support “liberal” or “conservative” issues; like left-wing groups, less lethal in their actions. Special interest groups include those who may oppose legalized abortion or nuclear power, radical environmentalists, and militant animal rights activists.
Anarchists	Perceives themselves as the purest of terrorists, live to destroy state’s authority and strive for complete freedom. Their politics are the most extreme.
Neo-Fascists	Share characteristics with communism. They are revolutionary, look to overturn the entire order and create a new order of the most far-reaching sort.

Many state and local law enforcement agencies have a broader definition of terrorism than the FBI whose statistics point to low levels of terrorist activity. Unlike the FBI, these agencies recognize right-wing extremists (Neo-Nazi, anti-Semitic, anti-federalist) and identify specific organizations (anti-abortion, animal right, environmentalist) as the most likely sources of terrorism within their communities.

A broader definition of terrorism at the local level may be a good thing. In the assessment process, a broader definition of terrorism may allow planners to identify a more expansive range of potential terrorists, targets, methods, weapons, etc. A wider range of terrorist possibilities requires local planners to prepare a more comprehensive plan to avert or mitigate such disasters. Terrorists tend to prefer situations that maximize the element of surprise. A community that has carefully identified its most likely targets and instituted protective measures against terrorism is a less desirable victim to terrorists. By having an understanding of the broader range of possible terrorist methods, more expansive methods of detection, aversion, training, response, and recovery can be developed in order to secure the safety of the community and avert the potential of terrorism.

Weapons

Bombs, firearms, and limited range rockets continue to be the most common weapons used by today's terrorists. These weapons are easy to obtain, transport, and use. Occurring more frequently is the use of secondary explosives to increase casualties. The concern is the growing use of unconventional weapons. These include chemical, biological, and radiological weapons, more commonly referred to as Weapons of Mass Destruction (WMD). These weapons have increased capacity to kill large numbers of people. The use of WMDs is limited because they are more difficult to obtain and handle. Just the thought of their use creates massive fear and may make the use of such weapons more appealing to terrorists.

Targets

Terrorists target infrastructure that are more critical to daily operations and are harder to restore to service. Interrupting and disabling services that the public depends on for health, economic, and social activities brings attention and recognition that terrorist groups seek. The impact of the attack is furthered when critical infrastructures are interconnected. With advances in communication and technology, more and more critical infrastructures are becoming dependent upon the others. The literature on terrorism shows that some critical infrastructures are targeted more often than others because of the nature of the services they provide. Areas most vulnerable to terrorism include transportation systems, industry, utilities, and entertainment/recreation venues. Attacking these critical infrastructures disables important services the public depends on or may cause further damage to the population and structures surrounding the attack area.

History

Incidents of terrorism have been minimal within Will County. Two groups are known to operate within Will County. One is the Animal Liberation Front (ALF) whose cause is to support animal rights. ALF is described by their founder, Ronnie Lee, as a "…non-violent guerilla organization, dedicated to the liberation of animals from all forms of cruelty and persecution at the hands of mankind." Activists turned from legal tactics of hunt disruption to illegal tactics of sabotage when they grew weary of being assaulted and jailed and sought more effective tactics. ALF migrated to the U.S. in the early 1980s and is now an international movement in over twenty countries.

ALF is a loosely associated collection of cells of people who go underground and violate the law on behalf of animals. They break and enter to rescue animals, and they also destroy property in order to prevent further harm done to animals and to weaken exploitation industries economically. Official ALF guidelines are: (1) to liberate animals from places of abuse; (2) to inflict economic damage to industries that profit from animal exploitation; (3) to reveal the horrors and atrocities committed against animals behind locked doors, and (4) to take all necessary precautions against harming any human or nonhuman animals. ALF claimed responsibility for the April, 2003, fire at an exotic meat market located in Lockport.

The other terrorist group operating within Will County reported by law enforcement officials is a right-wing white supremacist group. In the recent past, they have staged rallies and demonstrations in support of their ideas.

Potentially threatening incidents have occurred that involve transportation sites. These occurrences include photographic surveillance within Will County, bomb threats to locks and dams, suspicious aircraft flights, and suspicious individuals/vehicles identified within Illinois.

Risk Characterization

There are many variations within the types of terrorist activities. While natural hazards may be readily identifiable and somewhat predictable, terrorist activities cannot be reliably predicted. Terrorists are not under any one person or nation's control, but identify with various national or international communities, religions, cults, or philosophies. Thus, terrorist type activities can occur anywhere at any time. As a nation, we have experienced occurrences of terrorism. The Boston Marathon bombing, Columbine High School shootings, attacks of 9/11, anthrax mailings, and Washington, D.C. area sniper shootings are examples of how difficult it is to anticipate when and where such random acts of human-caused disasters may occur. As the population of Will County grows and more industrial and sports/entertainment complexes are developed, the threat and incident of a terrorist attack becomes more attractive, more probable.

Specific threats of terrorism have not been made against any critical infrastructure within Will County. Federal officials have issued warnings of potential attacks against the chemical, oil and gas, nuclear, electrical power, and agricultural industries. International terrorist groups, such as al Qaeda, attempt to strike at poorly defended targets. They are determined to attack the U.S. homeland and seek a way to disrupt the country's economic and military base. They most likely would use conventional weapons to cause contamination, disruption, and terror.

Environmental activist groups are very active throughout Illinois. They have committed numerous criminal acts including arson and criminal damage to property. Groups, such as the Earth Liberation Front (ELF), target any commercial or industrial venture that would disrupt land, water, or other environmental features. They are highly organized and practice leaderless resistance principles. Members are hardcore fanatics some of who are accomplished arsonists, vandals, and saboteurs.

Impact: High

Damage to Buildings

Bombs are terrorists' weapon of choice. Bombs, along with incendiary devices, can cause serious damage or destruction to buildings.

Critical Facilities

Terrorists are drawn to critical facilities. They are highly visible or vulnerable targets, which can attract attention to the terrorists' cause and instill fear into the public witnessing the act. Terrorists can damage or destroy these facilities with bombs or incendiary devices, but they also can disrupt the function of critical facilities by infiltrating the electronic infrastructure of these facilities. Cyberterrorism threatens the inter-connected networks that regulate the flow of power, water, financial services, medical care, telecommunication networks, and transportation systems.

Health and Safety

The threat of harm to the health and safety of human beings is part of the psychology of terrorism. The mere threat of harm may be sufficient for the terrorists to further their cause.

Economic Impact

Impairing the economic structure of a society can be the intent of the terrorist act. By damaging the business and critical infrastructure directly or by threat, the terrorist gain the attention they seek to promote their cause.

Future Occurrence

Will County is vulnerable to terrorism. Its location in the Chicago metropolitan area and the infrastructure that supports the function of that metropolitan area make it a potentially attractive target to terrorists. Transportation systems, manufacturing industries, power plants, pipeline systems, and entertainment venues are some of the potential targets that terrorists may to drawn to for publicizing their cause. Details of the critical infrastructure that may be at risk by terrorism can be found in the *Will County Terrorism Vulnerability Assessment.*

ENEMY ATTACK

Hazard Characterization

Enemy attack is any hostile action taken against the United States by foreign forces that result in the destruction of military and/or civilian targets. It is conventional war as seen in WWII that could occur through accident, miscalculation, an irrational act, or a deliberate act. The attacking foreign forces are more clearly defined than in a terrorist attack. Foreign forces are identified as an organized government with military forces rather than a pocket of militants or extremists. The methods of attack could include explosives, nuclear arms, or chemical or biological weapons.

History

No occurrence has occurred in the U.S. since September 11, 2001; however, all areas of the U.S. are at risk at any time for direct or secondary effects.

Risk Characterization

Explosives would be life threatening and damaging to public and private structures. Nuclear weapons would have devastating and far-reaching effects. The blast overpressure, fire, and radioactive fallout could affect millions of lives and completely destroy property and infrastructure. The effects of chemical and/or biological weapons would differ depending on the agent used. Chemical agents include blister, blood gases, lung irritants, and nerve agents. Biological weapons contain living organisms that can cause disease or death, but are dependent on their ability to reproduce. The threat of nuclear, chemical, and biological weapons is worrisome as their development and delivery systems are improved by Third World nations desiring more control.

Impact: High

Future Occurrence

The events of September 11th are evidence that the threat of enemy attack is real. Local law enforcement must work closely with State and Federal agencies to identify and coordinate response to potential threats from enemies. Local law enforcement must be watchful of individuals or groups who may be:

- Recording or monitoring activities;

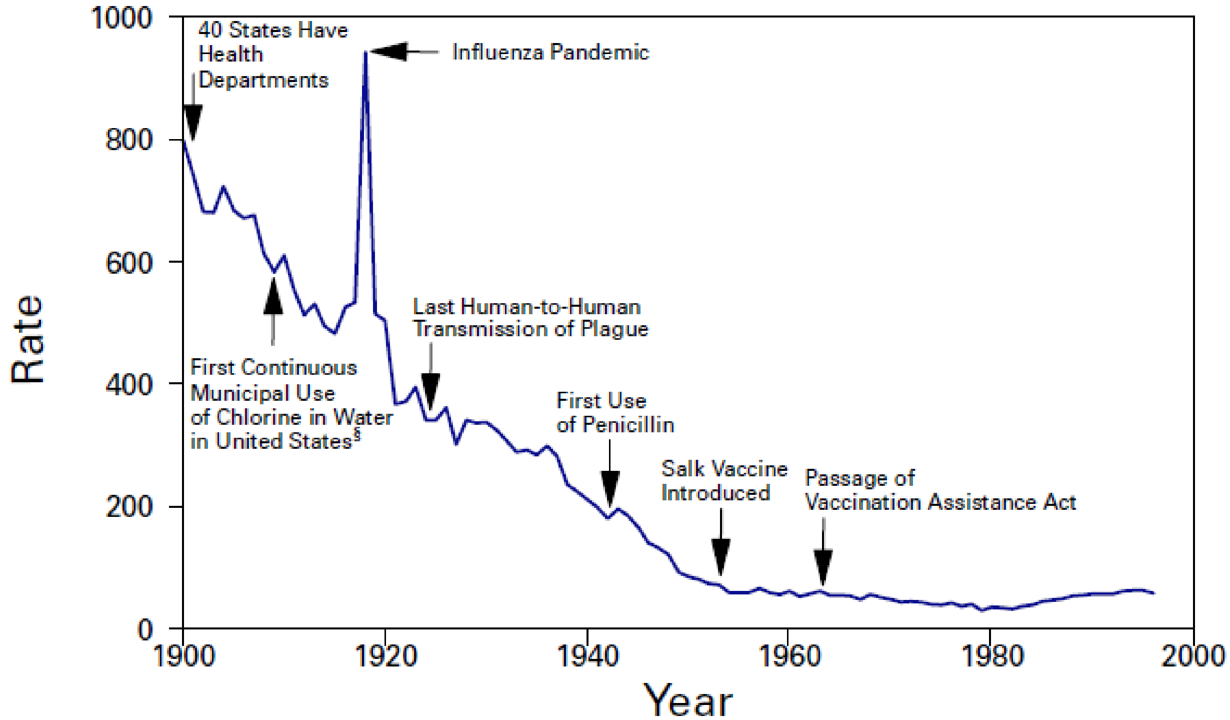
- Trying to obtain information about military operations;
- Testing security barriers or procedures;
- Acquiring supplies for use as weapons, uniforms, or other controlled items;
- Acting suspiciously or appearing to be out of place;
- Attempting dry or trial runs to test their plan of attack; or
- Deploying assets to be used in an attack.

Potential targets within Will County are an army training facility, raceway venue, numerous manufacturing/refining companies, and nuclear facilities that may draw the interest of an enemy. Careful observance of suspicious activities and coordination with Federal law enforcement may prevent attacks from happening in the future.

PUBLIC HEALTH

Hazard Characterization

Public health issues typically bring to mind infectious disease epidemics. Up through the early 1900's, there was significant risk from diseases such as tuberculosis, typhoid fever, poliomyelitis, and measles. As the 1900's progressed, research brought about better sanitation, medical care, immunization, and new drugs that reduced the risks of epidemics. As methods of prevention of serious diseases were discovered, public health services grew.



Today, major epidemics are uncommon but still exist as a threat. The increase in life expectancy during the 20th century is largely due to improvements in child survival resulting from reductions in infectious disease mortality. Immunizations are the primary impetus for these reductions with others being the use of antibiotics, improvements in screening and testing guidelines, and improvements in diagnosis of infectious disease. However, infectious disease remains the major cause of illness, disability, and death in the U.S. Foodborne illness, encephalitis, West Nile disease, hepatitis, tuberculosis (TB), pneumonia, and influenza, among others, are potential threats to Will County's residents.

Public Health Emergencies are defined as incidents that involve a widespread and/or severe epidemic, contamination, or other situations that present a danger to or otherwise negatively impact the general health and well being of the public. Though diseases that were life threatening years ago are now under control, unexpected sources of infection do occur and can spread before the source of the problem can be contained.

Death Rates for Common Infectious Diseases in the United States in 1900, 1935, and 1970

	Mortality rate per 100,000 population		
	1900	1935	1970
Influenza and pneumonia	202.2	103.9	30.9
Tuberculosis	194.4	55.1	2.6
Gastroenteritis	142.7	14.1	1.3
Diphtheria	40.3	3.1	0.0
Typhoid fever	31.3	2.7	0.0
Measles	13.3	3.1	0.0
Dysentery	12.0	1.9	0.0
Whooping cough	12.0	3.7	0.0
Scarlet fever (including streptococcal sore throat)	9.6	2.1	0.0
Meningococcal infections	6.8	2.1	0.3

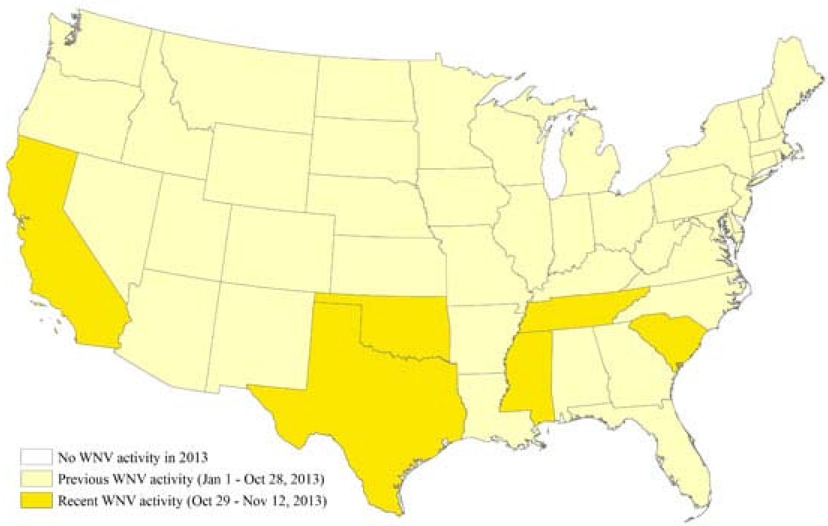
The Will County Health Department is prepared for potential disease threats and monitors unusual or suspect symptoms. The Health Department and other healthcare providers (hospitals, TB clinic, private labs, etc.) evaluate many factors in its response to a disease threat, including the mode of transmission, the route of entry, and the commonality of victims. Indicators of unusual disease activity include:

- Rapidly increasing disease incidence;
- Unusual increase in the number of people seeking care, especially with neurological, respiratory, dermal, and/or gastrointestinal symptoms;
- Higher attack rates among persons who had attendance at similar activities or events;
- Clusters of patients arriving from a single locale;
- Large numbers of rapidly fatal cases;
- Any patient presenting with symptoms and/or signs that suggest inhalation, ingestion, or dermal exposure to a toxic chemical agent;
- Increased utilization of hotlines, such as “Poison Control”;
- Unusual age distribution for common diseases;
- Unexplained cluster of diseases or dead animals; or
- Unexplained evidence of disease or toxic exposure to the general environment, such as trees or plants.

History

As an example of how infections can spread, outbreaks of West Nile virus began to occur in the New York metropolitan area in the fall of 1999. The virus, transmitted to humans by the bite of an infected mosquito, has quickly spread across the country. The West Nile virus was first documented in Illinois in September of 2001. By the end of 2002, Illinois led the country with over 800 confirmed cases of West Nile virus in humans and sixty-three deaths. Eighteen of the confirmed cases occurred in Will County. A West Nile Response Plan was adopted by the Will County Health Department in June, 2002.

INCIDENCE of WEST NILE VIRUS in WILL COUNTY		
Year	**Cases**	**Deaths**
2013	0	0
2012	11	0
2011	1	0
2010	2	0
2009	0	0
2008	0	0
2007	3	0
2006	18	1
2005	8	1
2004	3	0
2003	3	0
2002	18	0



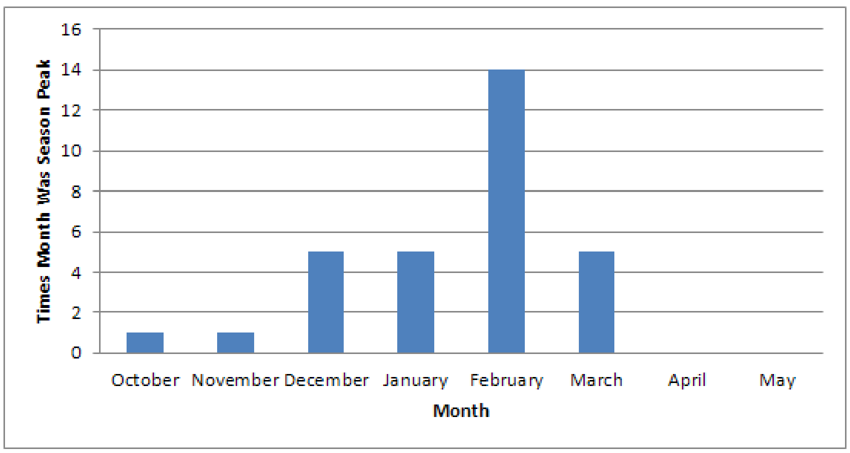
During the 20th Century, the emergence of several new Influenza A virus subtypes caused three pandemics, all of which spread around the world within a year of being detected. Influenza A viruses still circulate today after being re-introduced into the human population in 1977. Both the Asian Flu and Hong Kong Flu pandemics were caused by viruses containing a combination of genes from a human influenza virus and an avian influenza virus. The Spanish Flu pandemic virus appears to have an avian origin. Despite annual vaccinations, approximately 2,000 deaths occur in Illinois each year.

The Spanish Flu [A (H_1N_1)], 1918-1919, caused the highest number of known influenza deaths. More than 500,000 people died in the United States, and up to 50 million people may have died worldwide. Many people died within the first few days after infection, and others died of secondary complications.

The Asian Flu [A (H_2N_2)], 1957-1958, caused about 70,000 deaths in the United States. First identified in China in late February 1957, the Asian flu spread to the United States by June 1957.

The Hong Kong Flu [A (H_3N_2)], 1968-1969, caused about 34,000 deaths in the United States. This virus was first detected in Hong Kong in early 1968 and spread to the United States later that year.

Peak Month of Flu Activity: 1982-83 through 2012-13



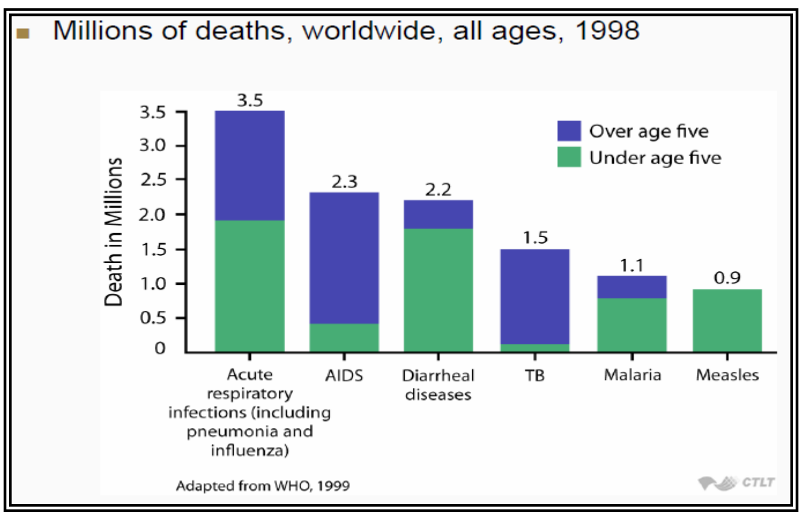
The United States experienced its first wave of 2009 H1N1 activity in the spring of 2009, followed by a second wave in the fall, with the number of people infected peaking at the end of October. The novel influenza virus first caused illness in Mexico and then in the United States. It was not long after those initial reports that the "swine flu," so named because it was related to a respiratory disease in pigs, was reported in Illinois and around the country. Later renamed H1N1 flu, the virus was so prolific in its spread that by June, 2009, the World Health Organization signaled a global pandemic was underway.

The first confirmed case of H1N1 flu in Illinois was reported in late April, 2009. Hundreds of cases of H1N1 flu followed and, for a period of time, the state had reported the highest number of cases in the U.S. Unlike seasonal flu, which is usually active in the fall and winter, H1N1 flu continued to circulate in the nation and in Illinois throughout the summer.

A second wave of H1N1 influenza began in the fall and the state's H1N1 caseload climbed to more than 2,500 cases and 79 deaths by the end of the 2009. The H1N1 influenza vaccine began arriving in Illinois in early October, 2009, and the state started vaccinations of those identified as most at risk of the novel flu. Complicating the H1N1 flu resurgence in the fall was the threat of seasonal flu, which typically occurs between October and April. Illinois usually records about 2,600 seasonal flu and pneumonia deaths per year, making it the 10th leading cause of death. Will County experienced two deaths from the H1N1 virus.

Risk Characterization

The common characteristic of most public health emergencies is that they adversely impact, or have the potential to adversely impact, a large number of people. Public health emergencies can be statewide, regional, or localized in scope and magnitude. These emergencies can occur as primary events by themselves, or they may be caused by another disaster or emergency. Along with infectious diseases, natural, technological, and societal hazardous occurrences can pose secondary hazards that threaten the public's health. Storms, floods, earthquakes, chemical spills, nuclear accidents, and sabotage can damage infrastructure disabling water, power, transportation, and communication facilities. This can lead to contaminated water and food supplies, subject the population to extreme temperatures, expose people to deadly toxins or radiation, delay the receipt of medical equipment or supplies, or prevent the public from receiving information important to their safety.



Assessment and planning are needed to identify public health concerns that could occur as a result of a hazard and to prepare mitigating steps to handle such concerns. It is through surveillance and population-based interventions that disease and injury are best prevented. Observation and monitoring systems are used to develop data related to health determinants. This information along with the process of developing policy options and planning are essential to prevent and avert community wide health problems before they spread.

WILL COUNTY HEALTH DEPARTMENT STATISTICS

	Comm. Health Center Visits	Water Supply Inspect.	Sewage Inspect.	Food San. Inspect.	Flu Vaccines	Food Borne Illness	E. Coli	Salmonellosis	Hepatitis Incidents		
									A	B	C
2012		1,271	676	7,835	1,417			90	4	63	233
2011		1,264	702	7,771	1,827			107	1	58	268
2010		1,255	716	7,756	1,963			118	3	60	230
2009		1,461	831	7,431	3,217		3	78			
2008		1,367	1,190	7,262	2,788		7	83	19	168	319
2007		1,812	1,198	6,697	2,512		7	120	26	177	274
2006	25,374	1,648	1,281	6,610	2,669	1	8	98	2	94	261
2005	29,667	1,155	1,348	6,097	3,891	7	9	112	10	83	259
2004	25,828	959	1,250	5,560	3,784	7	8	100	6	93	282
2003	28,141	1,074	1,220	5,717	3,274	5	10	79	2	78	222
2002	24,145	1,344	1,205	5,303	2,752	2	7	75	17	98	212
2001	21,378	1,196	1,263	4,779	3,202	5	7	57	20	70	240
2000						22	9	78	17	58	169

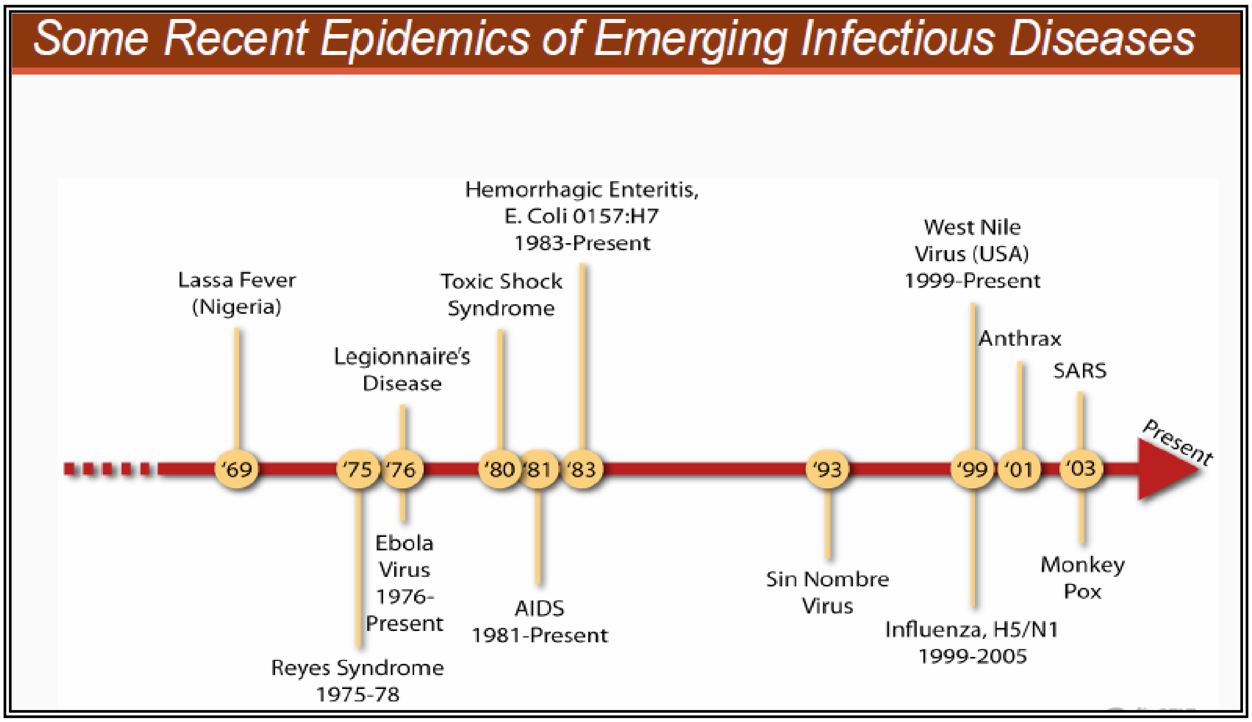
Potential Public Health Events

West Nile Virus: Usually spread by mosquitoes, a mild case of this virus will mimic the flu, while a severe case is life threatening. No drugs or vaccines are available to treat West Nile Virus.

The virus is present in Will County; however, most people fully recover from it. In more severe cases, intensive supportive therapy is indicated, often involving hospitalization, intravenous fluids, airway management, respiratory support (ventilator), prevention of secondary infections (pneumonia, urinary tract), and good nursing care.

Influenza: On average, 10-20 percent of U.S. residents will contract the flu by person-to-person contact. This is commonly a result of respiratory droplets released during coughing and sneezing. Some of these influenza cases will be fatal. Each year, the flu claims 36,000 American lives.

Healthy adults are usually not at risk for serious complications. Typically, the elderly, small children, those with weakened immune systems, and those affected by other illnesses are especially susceptible. Though, populations vulnerable to a specific influenza strain will vary. Vaccine is available each year for seasonal flu and vaccination is effective because the type of virus we are exposed to each winter can be reliably predicted.



Pandemic: A pandemic is a disease that attacks or affects the population of an extensive area. This is sometimes an entire country or continent. Each year, different strains of influenza are labeled as potential pandemic threats. Pandemics occur three to four times a century and can take place any season.

An influenza pandemic is a global outbreak of disease that occurs when a new Influenza A virus appears or “emerges” in the human population, causes serious illness, and spreads easily among people worldwide. Experts predict an infection rate of 25 to 50 percent of the population, depending on the severity of the virus strain.

Pandemics are different from seasonal outbreaks or "epidemics" of influenza. Seasonal outbreaks are caused by subtypes of influenza viruses that already circulate among people, whereas pandemic outbreaks are caused by new subtypes, by subtypes that have never circulated among people, or by subtypes that have not circulated among people for a long time. Pandemic influenza tends to occur in waves. The reasons for multiple waves of varying impact are not precisely understood, but they probably include adaptation of the virus to its new host, demographic or geographic variation, seasonality, and the overall immunity of the population. Past influenza pandemics have led to high levels of illness, death, social disruption, and economic loss.

A vaccine against pandemic flu may not be available at the start of a pandemic. New types of viruses must be accurately identified, and producing an effective vaccine may take six months.

Swine and Avian Influenza:

Pigs may be infected with influenza viruses that are different from human flu viruses. Swine flu viruses spread among pigs and – while rare – they can spread from pigs to people too. The Centers for Disease Control and Prevention (CDC) is concerned about a new flu virus that has been found in U.S. pigs and has infected people too. This virus is called *H3N2v* when it infects people. Most cases have happened in people exhibiting pigs at fairs. Exposure to pigs, especially close contact with pigs, is the main risk factor for infection with this virus. While most illness has been mild, some people have been hospitalized.

Avian flu affects birds and is transmitted most commonly to humans by birds or through an intermediate host. Human infections with avian influenza (AI, or "bird flu") are rare but do occur, most commonly after exposure to infected poultry (bird-to-human spread). Limited person-to-person spread of bird flu is thought to have occurred rarely in the past.

H5N1 is a highly pathogenic, highly disease causing, avian (bird) flu virus that has caused serious outbreaks in domestic poultry in parts of Asia and the Middle

East. Although H5N1 does not usually infect humans, nearly 600 cases of human cases of H5N1 have been reported from 15 countries since 2003.

- Most human cases of "highly pathogenic" H5N1 virus infection have occurred in people who had recent contact with sick or dead poultry that were infected with H5N1 viruses. About 60% of people infected with the virus died from their illness.
- Unlike other types of flu, H5N1 usually does not spread between people.
- There have been no reported infections with these viruses in birds, poultry, or people in the United States.
- You cannot get infected with these viruses from properly handled and cooked poultry or eggs.

Human infections with a new avian influenza virus, A (H7N9), continue to be reported in China. The virus has been detected in poultry in China as well. While mild illness in human cases has been seen, most patients have had severe respiratory illness and some people have died. No cases of H7N9 outside of China have been reported. Most important, however, is that this transmission not be sustained (ongoing). The new H7N9 virus has not been detected in people or birds in the United States.

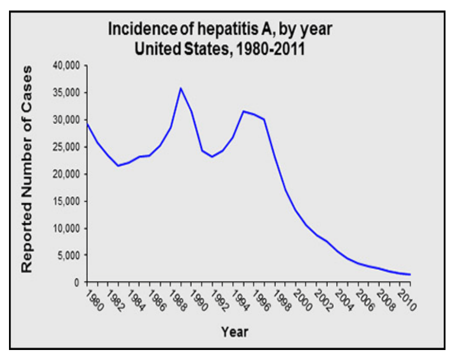
Coronaviruses: The name coronavirus comes from its appearance under the microscope – the viruses have a spiky or crown-like (corona) appearance. Until recently, SARS-CoV was the only member of the coronavirus family known to cause death or severe respiratory disease in humans. The other viruses in this group cause mild upper-respiratory infections in humans and are associated with respiratory, gastrointestinal, and neurologic diseases in animals. One reason that SARS-CoV might have been more lethal than other coronaviruses is that it appears to interfere with an enzyme system in humans that is critical for regulating body fluid balance. Therefore, the virus could disrupt normal functioning of the lungs by blocking this enzyme system and allowing fluid to leak into the air sacs of the lungs, resulting in severe respiratory illness.

A new member of the coronavirus family emerged in the fall of 2012 in the Arabian Peninsula. The new virus has been named Middle East respiratory syndrome coronavirus (MERS-CoV). Although MERS-CoV is distinct from SARS-CoV, the disease caused by the new virus Middle East respiratory syndrome (MERS) is similar to SARS in that it causes a severe respiratory illness that can be fatal in humans.

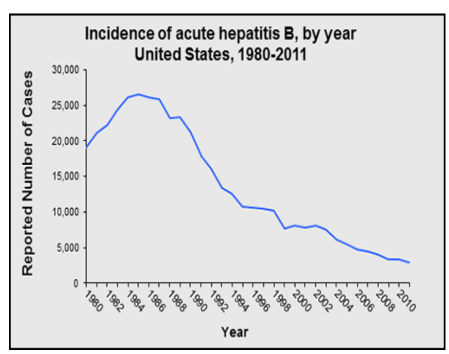
The first and vast majority of cases of MERS have occurred in Saudi Arabia. As of late July 2013, approximately 90 cases of MERS infection were reported to the WHO, with about half of the cases resulting in death. MERS-CoV appears to spread between people who are in close contact.

Hepatitis: A disease affecting the liver that can affect anyone. Hepatitis is usually spread by person-to-person contact. Three types are common to the U.S. – Hepatitis A, B, and C with B and C being most prevalent.

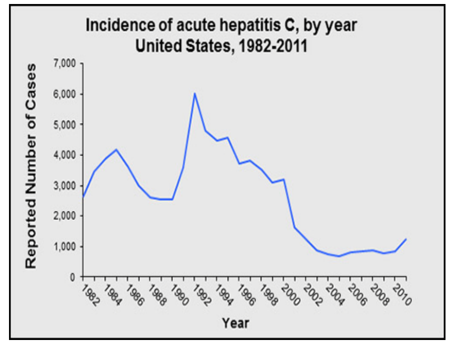
- Hepatitis A (HAV) is a liver disease that can affect anyone. It lasts from a few weeks to several months. It does not lead to chronic infection. Transmission may occur through ingestion of fecal matter, even in microscopic amounts, from close person-to-person contact or ingestion of contaminated food or drinks.



- Hepatitis B (HBV) ranges in severity from a mild illness, lasting a few weeks (acute), to a serious long-term (chronic) illness that can lead to liver disease or liver cancer. Transmission is through contact with infected bodily fluids.



♦ Hepatitis C is caused by the Hepatitis C virus (HCV). HCV infection sometimes results in an acute illness, but most often becomes a chronic condition that can lead to cirrhosis of the liver and liver cancer. HCV is spread by contact with the blood of an infected person.



Foodborne Illness: Each year, 48 million people in the U.S. get sick from contaminated food. Common culprits include bacteria, parasites and viruses. Symptoms range from mild to serious. They include

- Upset stomach
- Abdominal cramps
- Nausea and vomiting
- Diarrhea
- Fever
- Dehydration

Harmful bacteria are the most common cause of foodborne illness. Foods may have some bacteria on them when you buy them. Raw meat may become contaminated during slaughter. Fruits and vegetables may become contaminated when they are growing or when they are processed. But it can also happen in your kitchen if you leave food out for more than 2 hours at room temperature or power outages knock out refrigeration units.

Contamination: Water sources may become contaminated due to natural hazards. Flood, tornadoes/thunderstorms, ice storms, ice jams or melting ice, etc. can cause contaminated run-off from floods or debris to filter into water sources. Because of an extensive flood area and the speed and direction of ground water flow, wells may not be a safe source of water for many months after a flood. The well can become contaminated with bacteria or other contaminants. Using contaminated water for drinking, cooking, or bathing can cause severe illness.

Waste water from malfunctioning septic tanks or chemicals seeping into the ground can contaminate the ground water even after well water is tested and found to be safe. It is necessary to take long range precautions, including repeated testing, to protect the safety of drinking water.

Bioterrorism: A Bioterrorism attack is the deliberate release of viruses, bacteria, or other germs (agents) used to cause illness or death in people, animals, or plants. These agents are typically found in nature, but it is possible that they could be changed to increase their ability to cause disease, make them resistant to current medicines, or to increase their ability to spread into the environment. Biological agents can be spread through the air, through water, or in food. Terrorists may use biological agents because they can be extremely difficult to detect and do not cause illness for several hours to several days.

Surveillance is the cornerstone for Bioterrorism and Pandemic Influenza Preparedness. Early recognition and reporting of any disease outbreak, along with rapid implementation of post-attack prophylaxis (preventive medicine/vaccination), are the two most critical means of reducing losses. In the event of a public health emergency, the Will County Pharmaceutical Distribution Plan provides a multi-jurisdictional response for mass distribution of pharmaceuticals (antibiotic medications) to the entirety of Will County and any other areas of responsibility.

Agroterrorism: A*groterrorism* is defined as "the deliberate introduction of an animal or plant disease for the purpose of generating fear, causing economic losses, or undermining social stability." It represents a tactic to attack the economic stability of the United States. Killing livestock and plants or contaminating food can help terrorists cause economic crises in the agriculture and food industries. Secondary goals include social unrest and loss of confidence in government. Because it lacks the drama and spectacle of more common terrorist violence, such as bombings and murders, agroterrorism has remained a secondary consideration, and no documented attacks in the homeland have occurred since 9/11.

Within Will County, potential targets for agroterrorism exist through its farming and transportation industry

Tuberculosis: Tuberculosis (TB) is a contagious and potentially life-threatening disease caused by a bacterium called *Mycobacterium tuberculosis* being transmitted through the air. While it can affect any part of the body (such as the brain, the kidneys or the spine), TB usually affects the lungs.

Although both preventable and curable, tuberculosis once was the leading cause of death in the United States. Today in Illinois, less than 30 deaths a year are attributed to tuberculosis and the number of cases in the state has fallen more than 40 percent in the past 10 years, reaching an all-time low of 633 in 2003.

Public Health Mitigation:

- ♦ Surveillance of communicable disease and environmental disease
  - Monitoring systems through schools and hospitals
  - Biowatch, EpiX, and other surveillance tools
  - Inspection of food handling facilities
  - Testing of wells and septic systems
  - Mosquito traps

- ♦ Public education
  - Disease agents
  - Prophylactic intervention (anti-viral medication, anti-biotics, and/or immunization if available)
  - Safe food handling
  - Boil water orders
  - Sanitation, good hygiene and other protective measures

- Emergency preparedness plans and resources to address protection, response, and recovery issues
    - Pandemic Influenza Plan
    - Strategic National Stockpile – Mass Dispensing Plan
    - Personal Protective Equipment (PPE) caches
- Mutual aid agreements with surrounding health departments and community partners

Impact: Low

Critical Facilities

Critical facilities could be impacted because of the loss of people to run them by a widespread infectious agent occurring naturally or intentially/unintentially spread by terrorist, animals/insects, or people traveling the world. Between 15-35 percent of the U.S. population could be affected by an influenza pandemic. Workers may be unable to work because they are ill, may die from the infection, or may need to care for infected family members. Accordingly, the ability of critical facilities to provide service will be seriously affected due to the severe reduction in workforce capacity.

Health and Safety

Many scientists believe it is only a matter of time until the next influenza pandemic occurs. The severity of the next pandemic cannot be predicted, but modeling studies suggest the impact of a pandemic on the United States could be substantial. In the absence of any control measures (vaccination or drugs), it has been estimated that in the United States, a “medium-level” pandemic could cause 89,000-207,000 deaths, 314,000-734,000 hospitalizations, 18-42 million outpatient visits, and another 20-47 million sick people.

Immunizations are a cost-effective method in preventing infectious disease and childhood immunization programs provide a high return on investment. Routine childhood immunization schedule saves 33,000 lives, prevents 14 million cases of disease, reduces direct health care costs by $9.9 billion, and saves $33.4 billion in indirect healthcare costs.

Economic Impact

Trust for America's Health (TFAH)'s March 2007 report *Pandemic Flu and Potential for U.S. Economic Recession* finds a severe pandemic flu outbreak could result in the second worst recession in the U.S. since World War II. The U.S. Gross Domestic Product (GDP) could drop over 5.5 percent, leading to an estimated $683 billion loss.

Future Occurrence

The probability of a widespread public health emergency is every 10 years or less. Minor outbreaks and incidents have the potential to occur more frequently. Will County is a major hub for transportation of raw materials and products and a potential method for transporting in an infectious agent. New infectious diseases continue to be detected and infectious disease must be studied in a global context because of increased international travel and migration, import of foods and agricultural practices, and continued threat of bioterrorism.

Public health emergencies typically occur on a regional basis. Sources include infected animals, contaminated food, and improperly prepared food. While the whole County is vulnerable to a public health emergency, the source of the infection may be a farm or restaurant.

CIVIL DISTURBANCE

Hazard Characterization

Civil disturbances are incidents that intend to disrupt a community to the degree that police intervention is required to maintain public safety. Civil disturbances can include prison or institutional rebellions, disruptive political gatherings, violent labor disputes, urban protests or riots, demonstrations, or problems at large-scale events resulting in police intervention and arrests. Civil disturbances can occur anytime but tend to be more frequent during summer months when the hot, humid weather places a stress on the public.

The threat from a disturbance varies by the type, severity, and range of the event. Public welfare and property are at risk along with infrastructure services such as electricity, water supply, public transportation, communications, etc. Government buildings, universities, military bases, nuclear power plants, and correctional facilities tend to be targeted the most. As the profile of Will County points out, Will County has all of these types of facilities and entities. Thus, preparation to effectively deal with civil disturbances is important.

History

No documentation of recent civil disturbances is available.

Risk Characterization

The economic impact to urban areas during civil unrest and following such events can be profound. Direct impacts include looting and smashed windows as well as endangering shop owners and customers. Indirect economic impacts result from the loss of business when potential customers do not approach businesses for extended periods of time. Customer impressions and habits can change from the experience of a single threatening event.

Civil Disturbances or Demonstrations can be identified in three (3) categories:

- Peaceful, Non-Obstructive Demonstrations
- Non-Violent, Disruptive Demonstrations
- Violent, Disruptive Demonstrations

The severity of civil disturbance depends on the nature of the disturbance. A localized civil disturbance involving a small segment of the population, for instance, workers who chose to strike and establish a picket line, or some other small scale demonstration, would have a low severity rating. In the instance of a low severity civil disturbance, police might be called upon to ensure that protestors did not block traffic corridors or intrude on private property. A moderately severe civil disturbance would be one wherein the protests disrupt nearby businesses and possibly cause some property damage. In this instance, police intervention would be required to restore order without employing chemical agents or physical force. A severe civil disturbance would involve rioting, arson, looting, and assault.

Civil disturbance can, in extreme cases, cause extensive social disruption, loss of jobs, death, and property damage. These may result either from those involved in the action or initiated by those in higher authority in response to what they perceive as a threat to either the status quo or their own authority. In addition, the government may also curtail certain civil liberties even to the eventual imposition of martial law. Looting and general vandalism are the most common activities associated with civil disturbance. Arson is also quite common and can quickly spread due to slow response times of overwhelmed fire departments. Transportation routes can become blocked making it difficult for non-rioters to leave the area and difficult for the emergency response personnel to arrive. Long-term effects may include a local depressed economy, environmental damage, social disruption, and long lasting animosity between the contending groups.

Impact: Low

Damage to Buildings

Buildings and property can be damaged or destroyed by participants of civil disturbances or fire if it ensues.

Critical Facilities

Disruption of services such as electricity, water supply, public transportation, communications, etc., could result from civil disorder.

Health and Safety

Injury and loss of life can occur as a result of civil disturbance.

Economic Impact

Loss of life and property as well as fear can be a factor and interrupt the normal functioning of a community. The need for increased security for sites vulnerable to civil disorder places demands on local law enforcement organizations.

Future Occurrence

The occurrence of civil disorder is always a possibility, but the likelihood is low. The potential for civil disturbances exists within Will County because of:

- Large manufacturing enterprises and labor organizations that could result in public demonstration over labor disputes;
- Will County Jail, River Valley Juvenile Detention Center, and Stateville Correctional facilities that could face uprisings due to overcrowding or jail conditions;
- Three universities and a junior college that could experience student demonstrations or crowd disturbances; or
- Radical groups, such as the Animal Liberation Front (ALF) and a right-wing white supremacist group that are known to exist in the county.

CHAPTER 5: MITIGATION GOALS, OBJECTIVES, & STRATEGIES

Will County Emergency Management Agency (EMA), with the collaboration of participating jurisdictions, have identified the expectations of the *Will County County-Wide All Hazard Mitigation Plan* and the strategies to meet these goals and objectives. The expectations of this planning document are defined as the Mitigation Goals and Objectives. The mitigation plan's goals are broad statements that describe the principles that will guide the suggested mitigation. The objectives are targeted statements that define strategies and implementation procedures to attain the mitigation plan's goals. The Committee developed the goals, objectives, and strategies based upon the findings of the All Hazard Risk Assessment, previously prepared by the County, individual expertise, knowledge of existing and planned county-wide programs and projects, and collaboration with participating jurisdictions. The Mitigation Steering Committee held a workshop on October 10, 2013, with participating jurisdictions to review and update, further define, and finalize the goals and objectives originally established in 2008.

Goals and Objectives

Goal #1: Protect and secure life and property.

Objectives:

- *Increase public education and awareness of all hazards and what they can do to protect and secure their community.*
- *Implement effective approaches to protect neighborhoods, buildings, and critical facilities and infrastructure from all hazards.*
- *Nurture and support local and regional organizations that have missions that fulfill this goal.*
- *Increase capabilities to disseminate pre-event and post-event information.*
- *Increase readiness of the public and all levels of government within Will County.*

Goal #2: ***Continue to improve and enhance county-wide emergency management programs and develop relationships county-wide.***

Objectives:

- *Support and promote the integration of efficient emergency management and homeland security operations, functions, and tools with local, state, and federal governments, private industry, non-governmental organizations, community groups, and other emergency management partners.*
- *Identify essential government functions and develop back-up plans to ensure reliable services during a time of emergency.*
- *Leverage existing opportunities to upgrade aging equipment and infrastructure that are critical to emergency management.*
- *Encourage and support the professional development fields relevant to Emergency Management.*

Goal #3: ***Ensure economic stability, preserve cultural resources, and improve quality of life throughout Will County.***

Objectives:

- *Nurture and support strategic local and regional private/public partnerships to limit or minimize the impact from a disaster to key employers and from market sectors.*
- *Work with local universities, private/non-profit organizations, and other organizations to identify opportunities to implement mitigation.*
- *Promote and nurture mitigation actions that facilitate security to private and public sectors while leveraging available funding.*
- *Increase readiness of the private sector within Will County and promote private sector readiness within the region.*

Goal #4: ***Develop, promote, and integrate mitigation actions.***

Objectives:

- *Assist Will County and its participating jurisdictions in the development of mitigation proposals and identify sources of federal funding.*
- *Identify and facilitate mitigation opportunities pertinent to the locale with internal, neighboring, and regional partners.*
- *Assist essential and critical facilities (hospitals, universities, utilities, and eligible private/non-profits) to identify mitigation opportunities.*
- *Engrain mitigation strategies and actions into everyday planning and project development.*
- *Integrate mitigation projects with other federal funding sources (FEMA, DHS, US EPA, HUD, etc.) and projects in order to maximize efficiency and program eligibility.*

Goal #5: ***Take advantage of opportunities offered by growth while also protecting natural systems and natural resources.***

Objectives:

- *Incorporate hazard mitigation practices into the activities of other County departments and Will County jurisdictions.*
- *Integrate mitigation actions into existing and future opportunities, projects, and developments.*
- *Focus on flood hazard mitigation actions that can increase open space and meet targets for natural environment sustainability.*

Mitigation Implementation Strategies

The Mitigation Implementation Strategies section of this plan addresses the action plan to reduce loss from future hazard events throughout Will County. The specific projects, responsible agencies, potential funding sources, and priorities are listed in the pages that follow.

Prioritization

Mitigation strategies were defined and prioritized primarily through a formalized workshop with participating jurisdictions. The initial selection and prioritization of these strategies was drafted by the mitigation project planning team, using the following criteria to identify mitigation strategies and actions that:

- Address the plan's goals and objectives.
- Take advantage of opportunities presented by on-going or future initiatives, programs, and activities related to emergency management, public safety, homeland security, planning, growth management, community development, transportation, utilities, and other capital improvements, facilities maintenance, code revisions, and other programs to build mitigation opportunities into on-going functions of government to the maximum extent possible.
- Are within the capabilities of Will County and/or local jurisdiction that find the mitigation strategy and action to be pertinent to their locale to execute the mitigation action.
- Offer a significant benefit in relation to its cost.
- Have an identified funding source or sources.
- Have an identified lead agency with appropriate jurisdictional authority to coordinate implementation.
- Have an identified schedule for implementation.

The team devised a worksheet (Appendix D) to organize all mitigation ideas and priorities. The participants were encouraged to identify mitigation strategies that had an all-hazards approach and that targeted select hazards that were determined to have a significant risk to communities in Will County. The participants were persuaded to consider evaluation criteria as indicated in the *State and Local Mitigation Planning How-To-Guides* developed by FEMA. These evaluation criteria consist of public support, technical feasibility, staffing, funding, maintenance requirements, political support, legal authority, and cost effectiveness. Information from these worksheets is incorporated into the matrix shown on pages 5-13 through 5-20.

A detailed benefit-cost analysis (BCA) was not conducted during the mitigation strategy development phase. A detailed BCA will be done at the time that the mitigation action strategy's defined scope of work is developed and supported. Although the benefits of a mitigation action can be determined, an accurate cost could not be determined at this meeting because of too many unknown variables.

Integrating Mitigation

Some of the mitigation strategies suggested are more accurately defined as preparedness, response, and recovery actions. Although the purpose of a hazard mitigation plan is to address mitigation actions, the communities of Will County recognized the importance of integrating overlapping functions of all phases of emergency management. The preparedness, response, and recovery actions identified support the goals and objectives of this plan. Although FEMA mitigation funds may not be able to fund these actions, the communities of Will County consider these actions as important in achieving the overall goals and objectives of this plan. Will County EMA also recognizes that hazard risks, vulnerabilities, and disasters often transcend beyond political boundaries. Therefore, the plan also addresses strategies for long term planning and coordination purposes as neighboring jurisdictions develop hazard mitigation plans.

The results of this plan will be incorporated into ongoing planning efforts for Will County and its jurisdictions. Funding opportunities to implement a variety of the mitigation action items identified in the plan are identified within each mitigation action item found on pages 6-5 thru 6-35 in Chapter 6. Funding avenues for these action items varies dependent on the potential funding opportunities and the identified responsible organizations. The identified Mitigation Action Items and Goals within the *Will County All-Hazards Mitigation Plan* will be integrated into the following ongoing planning efforts when applicable.

PLANNING ELEMENTS	
National Response Framework	Establishes the framework for Federal, State, and local emergency planning addressing preparedness, response, mitigation, and recovery efforts. It is built on scalable, flexible, and adaptable concepts identified in the National Incident Management System to align key roles and responsibilities across the Nation. This Framework describes specific authorities and best practices for managing incidents that range from the serious but purely local to large-scale terrorist attacks or catastrophic natural disasters. The National Response Framework describes the principles, roles and responsibilities, and coordinating structures for delivering the core capabilities required to respond to an incident and further describes how response efforts integrate with those of the other mission areas.
Will County Emergency Operations Plan	The WC EOP describes the County's disaster management system which conforms to the National Incident Management System (NIMS). It is used by all county government agencies when implemented for response or recovery operation in any part of the County affected by a major emergency or disaster.
Will County Land Resource Management Plan	Presents a regional vision for the general form and shape of future growth within the County. Identifies guidelines for development which can be incorporated into local plans and regulations.
Illinois Plan for Radiological Accidents (IPRA)	A comprehensive emergency response plan for radiological accidents. It outlines responsibilities for state, county, and municipal jurisdictions that might be affected by an accident at a nuclear facility and sets state-wide policy for our emergency response efforts. Will County is in the emergency protective zones of the Braidwood and Dresden Nuclear Power Plants.
Will County LEPC Plan	Implements Superfund Amendments and Reauthorization Act (SARA) of 1986 within Will County to promote chemical and emergency preparedness and prevention.
Will County Stormwater Management Plan & Technical Guidance Manual	Consolidates and coordinates existing stormwater management programs and activities into an effective, unified county-wide structure. Purpose is to prevent increases in stormwater related problems associated with development, re-development and other watershed activities; remediate existing problems related to improper management of stormwater runoff and encroachment into flood prone areas; and ensure maintenance, management, and sustainable operation of natural and manmade stormwater drainage and storage features.
Will County 2030 Transportation Framework Plan	Describes the planning process to establish a transportation plan capable of supporting impending development in Will County. The report also highlights the effects of transportation improvements and provides an implementation plan, including revenue and expenditure forecasts, to assist in the determination of projects to be incorporated in the County's fiscal program.
Illinois Route 53 Corridor Plan	A corridor plan for a 25 mile section of IL Route 53 / Historic Route 66, stretching from Joliet to Braidwood. Acts as a roadmap to reach the long term goal to create a major vacation and recreation destination here for Chicago and the Midwest.

Planning and its implementation must be conducted within the authority of the governing body. The primary laws, regulations, programs and policies that have an impact on mitigation programs in Will County are listed below.

LEGAL AUTHORITIES	
Robert T. Stafford Disaster Relief and Emergency Assistance Act, PL 100-707	Provides the legal authority for the federal government to provide assistance to states during declared major disasters and emergencies. Outlines the actions Federal agencies are likely to take to assist State, tribal, and local governments that are affected by a major disaster or emergency. Authorizes the delivery of federal technical, financial, logistical, and other assistance to states and localities during declared major disasters or emergencies. The Federal Emergency Management Agency (FEMA) coordinates administration of disaster relief resources and assistance to states. Federal assistance is provided under the Stafford Act if an event is beyond the combined response capabilities of state and local governments.
Superfund Amendments and Reauthorization Act (SARA) of 1986	Title III of SARA establishes the "Emergency Planning and Community Right to Know Act" which includes: 1. Procedures for emergency planning in states and localities. 2. Building a framework of community awareness concerning potential chemical hazards and requirements for submission of MSDS chemical inventory forms and toxic release forms. 3. Trade secrets protections, citizen petitions, and information availability. A State Emergency Response Commission (SERC) is appointed by the Governor and is under the Illinois Emergency Management Agency and supports Local Emergency Planning Committees (LEPC), assists in chemical emergency planning, provides public access to chemical data, raises public awareness of chemical risks, and encourages public participation in local chemical safety issues.
(20 ILCS 3305) Illinois Emergency Management Agency Act	Outlines the responsibilities and actions performed by the State of Illinois during, before and after a disaster but also provides legal authority and guidance to "local political subdivisions" i.e. Local governments on emergency management issues. In chapter 127 paragraph 1060, the IEMA Act authorizes and guides local governments to establish "Emergency Service and Disaster Agencies (ESDA)" in their perspective jurisdictions. Paragraph 1061, provides the legal authority for local governments regarding local disaster declarations. Mutual Aid requirements and guidelines are discusses in Chapter 127 paragraph 1063 for local governments.
(50 ILCS 805 Section 4) Land Resource Management Planning Act:	Encourages municipalities and counties to protect the land, air, water, natural resources and environment of the State and to encourage the use of such resources in a manner which is socially and economically desirable through the adoption of joint or compatible Local Land Resource Management Plans.
(765 ILCS 77/) Residential Real Property Disclosure Act	Requires a seller to tell a potential buyer, if they are aware of any basement flooding, if the property is in the floodplain, or if the seller has flood insurance.
(425 ILCS 25/9 Section 9) Fire Investigation Act	Enables the State Fire Marshal to make, or cause to be made, inspections of buildings, structures and premises to determine their conformity with the provisions in this Act and their safety to life and property from fire or other emergency requiring evacuation of the building (such as presence of explosive or flammable gasses, fume hazard, and power failure).
(50 ILCS 815 Section 2) Flood Damage Prevention Act	Enables local governments to issue building permits in relation to infrastructure for runoff water. Any county or municipality may, by ordinance, adopt requirements that all applications for building permits contain a statement that such buildings and appurtenances connected therewith include facilities for the orderly runoff or retention of rain and melting snow. The governing body of the county or municipality shall determine rain and snowfalls taking into consideration such factors as the permeability and water absorbing quality of the soil and adequacy of existing water-ways.

LEGAL AUTHORITIES	
(210 ILCS 120/) Illinois Mobile Home Tie down Act	Indicates that the owner of each mobile home installed in Illinois on or after January 1, 1980, or which is moved from one lot to another after that date, shall be responsible to ensure that approved tied down equipment is obtained and used to secure the mobile home to the surface upon which it is to rest when occupied. After January 1, 1990, the owner of each mobile home park shall make available to the owner of any mobile home moved within or into their mobile home park with a copy of the Mobile Home Owner's Tie Down Guide pamphlet prepared by the Department.
School Safety Drill Act (PA 094-0600)	Develops, maintains and administers the minimum standards for 876 Illinois public school districts to follow when conducting school safety drills and the minimum standards for reviewing school emergency and crisis response plans, and the standards and procedures for ensuring compliance with the minimum standards.
School Safety Drill Act Administration Title 29 Part 1500	Joint Rules of the Office of the State Fire Marshal and the Illinois State Board of Education: School Emergency and Crisis Response. The Act establishes the requirements for the annual review and updating of the protocols and procedures in each school's emergency and crisis response plan.
Rivers, Lakes and Streams Act, 615 ILCS 5 (Dam Safety Program)	Illinois Department of Natural Resources, Division of Resource Management regulates the construction, operation and maintenance of new dams and the modification, operation and maintenance of existing dams. Dams are classified by the Division based on hazard potential into one of three hazard classifications. All dams in the two higher classifications are required to have a permit under Dam Safety rules promulgated by the Department. Dams in the lower hazard classification require a permit for construction or modification if they meet certain size criteria.
(815 ILCS 670/) Illinois Residential Building Code Act	Provides minimum requirements for safety and to safeguard property and the public welfare by regulating and controlling the design, construction, installation, and quality of materials of new residential construction as regulated by this Act.
Will County Building and Zoning Ordinances	Regulations and standards that delineate the minimum standards for building construction practices and guidance for development within unincorporated Will County.
County-Wide Stormwater Ordinance	Regulates stormwater management and governs the location, width, course, and release rate of all stormwater runoff channels, streams, and basins in the County, in accordance with the Will County Comprehensive County-Wide Stormwater Management Plan.
Water Resource Ordinance for Unincorporated Will County	Promotes effective, equitable, acceptable, and legal water resource management measures by establishing reasonable rules and regulations for development.
Will County Subdivision Ordinance	Purpose is to protect and promote public health, safety, and general welfare by implementing adopted plans and policies through the promotion of environmentally responsible development practices; provision of adequate public facilities and improvements; maintaining a range of housing choices; safeguarding against flood damage, soil erosion, and sedimentation; prescribing reasonable rules governing subdividing and platting; and providing remedies for violations and a means for enforcement.
Will County Mobile Home Ordinance	Sets the standards for mobile home parks within the County.
Will County Historic Preservation Ordinance	Identifies, designates, protects, preserves, and encourages the restoration, rehabilitation, and adaptation for continued use of those properties and structures which represent or reflect the historical, cultural, artistic, social, economic, ethnic or political heritage of the United States of America, State of Illinois, or County of Will or which may be representative of an architectural or engineering type inherently valuable for the study of style, period, craftsmanship, method of construction or use of indigenous materials.
Local Plans and Ordinances	Adopts county-wide plans and ordinances as minimum standards and tailors them to fit local needs and priorities.

PLANNING DOCUMENTS BY JURISDICTION

PLANNING DOCUMENT TYPE	Will County	City of Aurora	Village of Beecher	Village of Bolingbrook	Village of Braceville	City of Braidwood	Village of Channahon	Village of Coal City	City of Crest Hill	Village of Crete	Village of Diamond	Village of Elwood	Village of Frankfort	Village of Godley	Village of Homer Glen	City of Joliet	Village of Lemont	City of Lockport	Village of Manhattan	Village of Minooka	Village of Mokena	Village of Monee	City of Naperville	Village of New Lenox	Village of Orland Park	Village of Park Forest	Village of Peotone	Village of Plainfield	Village of Rockdale	Village of Romeoville	Village of Sauk Village	Village of Shorewood	Village of Steger*	Village of Symerton	Village of Tinley Park	Village of Univ. Park	City of Wilmington	Village of Woodridge
Plans																																						
Comprehensive Plan	♦		♦		♦	♦	♦	♦	♦	♦	♦		♦		♦	♦	♦	♦	♦	♦	♦		♦	♦	♦	♦	♦	♦		♦		♦			♦	♦	♦	♦
Emergency Management Plan	♦								♦														♦	♦		♦				♦						♦		
Land Use Plan	♦		♦				♦	♦		♦	♦		♦					♦						♦	♦	♦				♦								
Transportation Plan	♦						♦	♦		♦	♦		♦		♦		♦	♦					♦	♦	♦					♦								
Regional All Hazards Risk Assessment Plan	♦																																					
Codes & Ordinances																																						
Building Codes	♦		♦	♦	♦	♦	♦	♦	♦	♦	♦		♦		♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦		♦	♦	♦	♦		♦	♦	♦	♦
Historic Preservation Ordinance	♦															♦		♦					♦	♦	♦			♦										
Subdivision Ordinances	♦		♦			♦	♦	♦		♦	♦				♦	♦	♦	♦	♦	♦		♦	♦	♦	♦	♦	♦	♦		♦	♦	♦			♦	♦	♦	♦
Zoning Ordinances	♦		♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦		♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦		♦	♦	♦	♦		♦	♦	♦	♦
Maps																																						
Land Use Maps	♦		♦				♦			♦	♦	♦	♦			♦	♦			♦			♦	♦	♦		♦			♦		♦			♦			♦
Infrastructure Maps	♦		♦						♦	♦		♦			♦	♦	♦			♦	♦		♦	♦	♦		♦	♦		♦		♦			♦			
Zoning Maps	♦		♦	♦		♦	♦	♦	♦	♦	♦	♦	♦		♦	♦	♦	♦	♦	♦	♦		♦	♦	♦	♦		♦		♦		♦			♦	♦	♦	♦
Flood Related																																						
Flood /Drainage Ordinance (County-Wide)	♦	□	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	□	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	□	♦	♦	♦	♦	♦	♦	□
Flood Insurance Rate Maps	♦	□	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	□	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	□	♦	♦	♦	♦	♦	♦	□
Technical Guidelines Manual	♦		♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦		♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦		♦	♦	♦	♦	♦	♦	

♦ Jurisdictional ordinance meets or exceeds Will County-Wide stormwater ordinance □ Opted for another County's stormwater ordinance

INTERNATIONAL BUILDING CODES ADOPTION BY JURISDICTION (JULY, 2014)

INTERNATIONAL BUILDING CODE	City of Aurora *	Village of Beecher	Village of Bolingbrook	Village of Braceville *	City of Braidwood	Village of Channahon	Village of Coal City *	City of Crest Hill	Village of Crete	Village of Diamond *	Village of Elwood	Village of Frankfort	Village of Godley*	Village of Homer Glen	City of Joliet	Village of Lemont *	City of Lockport	Village of Manhattan	Village of Minooka *	Village of Mokena	Village of Monee	City of Naperville *	Village of New Lenox	Village of Orland Park *	Village of Park Forest *	Village of Peotone	Village of Plainfield	Village of Rockdale	Village of Romeoville	Village of Sauk Village *	Village of Shorewood	Village of Steger*	Village of Symerton	Village of Tinley Park *	Village of Univ. Park *	City of Wilmington	Village of Woodridge *	Will County
International Building Code	♦		♦		♦	♦	♦	♦	♦		♦	♦		♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦		♦		♦			♦		♦	♦	♦
International Residential Code	♦		♦		♦	♦	♦	♦	♦		♦	♦		♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦		♦	♦		♦		♦			♦		♦		♦
International Fire Code	♦		♦		♦				♦			♦		♦	♦			♦	♦			♦	♦						♦					♦		♦		♦
International Mechanical Code	♦		♦		♦			♦	♦		♦	♦		♦	♦	♦		♦	♦	♦	♦	♦	♦	♦		♦	♦		♦			♦		♦		♦		♦
International Plumbing Code	♦		♦				♦								♦							♦																
International Private Sewage Disposal Code																			♦																			
International Fuel Gas Code	♦		♦						♦					♦		♦		♦	♦		♦	♦	♦						♦					♦		♦		♦
International Energy Conservation Code			♦		♦				♦					♦	♦	♦		♦	♦	♦		♦	♦	♦			♦		♦					♦				♦
International Property Maintenance Code	♦	♦	♦		♦		♦		♦					♦	♦	♦	♦	♦	♦	♦		♦	♦	♦		♦	♦				♦					♦	♦	♦
International Existing Building Code			♦						♦									♦	♦																			
International Code Council Performance Code									♦																													

* Jurisdictions that border or have only a portion of their corporate limits in Will County and may choose not to adopt this *Plan*. Obtained from: http://www.iccsafe.org

Mitigation Actions

The mitigation plan identifies mitigation actions that were developed from the risk assessment, the Steering Committee, collaboration with participating jurisdictions, and the public participation process. Each mitigation strategy describes the opportunity, how to implement it, funding sources, and responsible agencies.

The matrix on pages 5-13 through 5-20 provides a guide of the mitigation actions that were identified and where, in Chapter 6, further detail can be found. The matrix describes:

- The hazard that the strategy addresses.
- The implementation timeline for the project. Short-term mitigation items are either 1) crucial to the life safety of Will County residents, or 2) relatively easy to implement because funding has already been secured or is readily available. Any project noted as on-going should be implemented early in the planning cycle, but will be a continuous project once implementation has occurred.
- The agency that will take the lead in implementing the strategy.
- Potential sources of funding.
- References to detailed information about the strategy in Chapter 6.
- The plan goal(s) the strategy addresses.

The Mitigation Actions identified in Chapter 6 address the following:

Problem/Opportunity:	This describes either a problem or a possible opportunity to reduce risk.
Implementation Strategy:	Each mitigation strategy includes ideas to implement and accomplish the specific project and potential resources, which may include grant programs or human resources.
Lead Agency:	This is the agency or agencies that will organize resources, find appropriate funding, or oversee project implementation, monitoring and evaluation.
Funding:	This offers suggestions on potential financial resources for implementing the mitigation strategy. This includes funding from government agencies as well as various different types of grants.
Timeline:	This estimates the amount of time it will take to begin implementation of each strategy.

IMPLEMENTATION OF MITIGATION ACTION ITEMS

MITIGATION ACTION ITEM		Action Item to be Implemented by:						
		Will County Board	**Will County Stormwater Management Planning Committee**	**Will County EMA**	**Will Land Use Department**	**Municipal Boards & Councils**	**Municipal Staff**	**Other Stakeholders**
1	Adoption of plan update	♦				♦		
2	NIMS compliance & integration	♦		♦			♦	♦
3	Regional Collaboration expansion			♦			♦	
4	Risk/hazard incorporation into comprehensive plans, programs & projects	♦	♦	♦	♦	♦	♦	♦
5	Public awareness & education to promote understanding of risks & ways to prepare & mitigate			♦			♦	
6	Plan for vulnerable population needs			♦	♦		♦	♦
7	Promote professional development education for improved planning		♦	♦	♦		♦	♦
8	Critical facilities retrofits for facilities located within high-hazard areas				♦		♦	
9	Utilize GIS to track community vulnerability to hazards		♦	♦	♦		♦	
10	Update base flood elevations in accordance with FHMP		♦					
11	Maintain county-wide floodplain ordinance	♦	♦			♦	♦	
12	Participate in the Community Rating System to reduce flood damage		♦		♦		♦	
13	Integrate FHMP with GIS		♦					
14	Use GIS for database of flood controlled areas, purchased floodplain properties, & flood prone properties to be acquired		♦					
15	Continue storm water management planning to improve storm drainage systems		♦		♦		♦	
16	Complete/maintain maps of shallow flooding/ponding areas to prioritize storm water infrastructure improvements		♦		♦			
17	Increase open space in high flood areas		♦		♦		♦	
18	Capitalize on opportunities to acquire/relocate flood prone properties		♦		♦		♦	
19	Improve flood warning system & integrate into county-wide emergency communication strategy		♦	♦			♦	
20	Utilize inventory of non-federal dams/levees, identify deficiencies, & guide non-compliant owners to make improvements			♦	♦			♦
21	Encourage/support shelters for all hazards			♦			♦	♦
22	Coordinate Tier II facilities emergency planning with development/maintenance of applicable community emergency plans			♦			♦	♦
23	Encourage continuity planning in public & private sectors			♦			♦	♦
24	Develop drought contingency plans & public education			♦			♦	
25	Develop Post-Disaster Recovery ordinance & planning document	♦		♦		♦	♦	
26	Implement/conduct public health surveillance to identify/mitigate emergencies & develop partnerships to coordinate planning & response	.		♦				♦

Action Item	Mitigation Action by Jurisdiction	Hazard Addressed				Timeline (ST – Short Term, LT – Long Term, & Ongoing)	County Lead	Jurisdiction Lead(s) / Primary Partner(s)	Potential Funding Opportunities	Mitigation Action Description and Implementation Strategy (Chapter 6)	Emergency Management Function	National Priority or NFRP Applicable	Plan Goals Addressed				
		Natural Hazards	Technological Hazards	Societal Hazards	Specific Hazard								Life & Property	Enhance Emergency Management	Economic Stability	Develop, Promote, Integrate Mitigation	Protect Natural Systems
1	Revise and adopt the *Will County County-Wide All Hazard Mitigation Plan* by resolution of the County Board, City Councils, Boards of Trustees, and other governing boards as appropriate. The municipal, fire protection districts, colleges, and other agencies' resolutions should adopt each action item that is pertinent to the community and designate staff responsible for implementation.	X	X	X	All	ST	Will County EMA	County Board, Village Boards, City Councils, & Stakeholders	Operating Budget	6-5	Prevent / Protect Prepare Mitigate Respond Recover		X	X	X	X	X
2	Ensure the thoroughness and NIMS/NRP compliance of emergency management planning documents, operations, and functions and integrate emergency management operations, functions, and initiatives with all levels of government and neighboring jurisdictions.	X	X	X	All	LT - Ongoing	Will County EMA	County Board, WC EMA, Municipal Staff, & Stakeholders	DHS – EMPG, Operating Budget	6-6	Prevent / Protect Prepare Mitigate Respond Recover	X	X	X		X	
3	Expand regional collaboration by developing outreach programs and coordinating with neighboring jurisdictions, regional partnerships, businesses, non-profit, and universities.	X	X	X	All	Ongoing	Will County EMA & Land Use	WC EMA & Jurisdictional EMAs	Operating Budget, Private Funds	6-7	Prevent / Protect Prepare Mitigate Respond Recover	X	X	X	X	X	X

Action Item	Mitigation Action by Jurisdiction	Hazard Addressed				Timeline (ST – Short Term, LT – Long Term, & Ongoing)	County Lead	Jurisdiction Lead(s) / Primary Partner(s)	Potential Funding Opportunities	Mitigation Action Description and Implementation Strategy (Chapter 6)	Emergency Management Function	National Priority or NFRP Applicable	Plan Goals Addressed				
		Natural Hazards	Technological Hazards	Societal Hazards	Specific Hazard								Life & Property	Enhance Emergency Management	Economic Stability	Develop, Promote, Integrate Mitigation	Protect Natural Systems
4	Incorporate risk assessment and hazard mitigation principles into comprehensive planning efforts, programs, and projects in order to secure communities from all hazards.	X	X	X	All	Ongoing	Will County EMA	WC Boards, WC EMA, WC SMPC, WC Land Use, Municipal Boards/ Councils/Staff & Chambers of Commerce	Operating Budget	6-8	Prevent / Protect Prepare Mitigate		X	X		X	X
5	Expand the county-wide public awareness and education programs and promote the understanding of each community's risks, vulnerabilities, what to do during and after a disaster, and how to mitigate the effects of disasters.	X	X	X	All	Ongoing	Will County EMA	WC EMA & Jurisdictional EMAs	Operating Budget	6-9	Prevent / Protect Prepare		X	X	X	X	
6	Continue to strengthen infrastructure, build redundancies, and implement contingency plans for vulnerable populations and essential services and networks.	X	X		Infrastructure Failure	LT - Ongoing	Will County EMA, Dept. of Highway, & Land Use	Will County Dept. of Highways, will County Land Use, Jurisdictional Public Works Departments & Local Utilities	Operating Budget / Capital Improvement Budgets	6-11	Prevent / Protect Prepare Mitigate		X		X	X	

Action Item	Mitigation Action by Jurisdiction	Hazard Addressed				Timeline (ST – Short Term, LT – Long Term, & Ongoing)	County Lead	Jurisdiction Lead(s) / Primary Partner(s)	Potential Funding Opportunities	Mitigation Action Description and Implementation Strategy (Chapter 6)	Emergency Management Function	National Priority or NFRP Applicable	Plan Goals Addressed				
		Natural Hazards	Technological Hazards	Societal Hazards	Specific Hazard								Life & Property	Enhance Emergency Management	Economic Stability	Develop, Promote, Integrate Mitigation	Protect Natural Systems
7	Continue to support the delivery of education for existing and free training platforms to educate officials, critical personnel, first responders, and communities on risks and vulnerabilities, fundamental operations of emergency management, and mitigation for the purpose of strengthening planning and advancing professional development.	X	X	X	All	Ongoing	Will County EMA	Will County EMA, Will County SMPC, Will County Land Use, & Jurisdictional Staff & EMAs	Collaboration between colleges, state,& local funding	6-12	Prevent / Protect Prepare Mitigate Respond Recover			X	X	X	X
8	Identify critical facilities that are located within high-hazard areas and relocate them or incorporate mitigation retrofits to protect them from future floods.	X	X		Attention to flooding	LT - Ongoing	Will County Land Use	Will County GIS, Will County Land Use, & Affected Jurisdictions	FEMA – HMGP & PDM	6-13	Prevent / Protect Prepare Mitigate		X	X	X	X	X
9	Support the use, development, and implementation of Geographic Information Systems (GIS) throughout the County to track community vulnerability to hazards.	X	X	X	All	Ongoing	Will County GIS	Will County GIS & Channahon, Joliet, & Naperville	Operating Budget	6-14	Prevent / Protect Prepare Mitigate Respond Recover	X	X	X		X	
10	Update base flood elevations (BFE) throughout the County in accordance with the Flood Hazard Mapping Program.	X			Flooding	ST	Will County SMPC	Will County SMPC	Operating Budget, State, & FEMA – HMGP & PDM	6-15	Prevent / Protect Prepare Mitigate		X	X		X	X

Action Item	Mitigation Action by Jurisdiction	Hazard Addressed				Timeline (ST – Short Term, LT – Long Term, & Ongoing)	County Lead	Jurisdiction Lead(s) / Primary Partner(s)	Potential Funding Opportunities	Mitigation Action Description and Implementation Strategy (Chapter 6)	Emergency Management Function	National Priority or NFRP Applicable	Plan Goals Addressed				
		Natural Hazards	Technological Hazards	Societal Hazards	Specific Hazard								Life & Property	Enhance Emergency Management	Economic Stability	Develop, Promote, Integrate Mitigation	Protect Natural Systems
11	Maintain or amend, as needed, the county-wide floodplain ordinance.	X			Flooding	Ongoing	Will County Land Use & Will County SMPC	Will County Board, Will County SMPC, & Jurisdictional Boards/ Councils & Staff	Operating Budget	6-16	Prevent / Protect Prepare Mitigate Recover		X			X	X
12	Participate in the Community Rating System to further reduce flood damage in the communities of Will County.	X			Flooding	Ongoing	Will County Land Use	Will County SMPC, Will County Land Use & Jurisdictional Staff	Operating Budget	6-17	Prepare / Prevent Mitigate		X			X	X
13	Integrate Flood Hazard Mapping Program updates with improved county-wide GIS capabilities.	X			Flooding	ST	Will County GIS & Will County SMPC	Will County GIS, Will County SMPC, & Jurisdictional Staff	Operating Budget	6-18	Prevent / Protect Prepare Mitigate		X	X	X	X	X
14	Utilizing GIS, develop and maintain a county-wide database of flood controlled areas, purchased flood plain properties, and flood prone properties to be acquired.	X			Flooding	LT - Ongoing	Will County GIS & Will County SMPC	Will County GIS & Will County SMPC	Operating Budget	6-20	Prevent / Protect Prepare Mitigate Recover		X	X	X	X	X

Action Item	Mitigation Action by Jurisdiction	Hazard Addressed				Timeline (ST – Short Term, LT – Long Term, & Ongoing)	County Lead	Jurisdiction Lead(s) / Primary Partner(s)	Potential Funding Opportunities	Mitigation Action Description and Implementation Strategy (Chapter 6)	Emergency Management Function	National Priority or NFRP Applicable	Plan Goals Addressed				
		Natural Hazards	Technological Hazards	Societal Hazards	Specific Hazard								Life & Property	Enhance Emergency Management	Economic Stability	Develop, Promote, Integrate Mitigation	Protect Natural Systems
15	Continue stormwater management planning and ordinances to improve existing storm drainage systems.	X	X		Flooding and Infrastructure Failure	LT - Ongoing	Will County Dept. of Highways, Will County Land Use, & Will County SMPC	Will County Dept. of Highways, Will County Land Use, Will County SMPC, Will County EMA, & Jurisdictional Planning Departments & Public Works See p. 4-69 to 4-72 for watershed jurisdictions	FEMA - HMGP, US EPA, Operating Budget	6-21	Prevent / Protect Prepare Mitigate		X			X	X
16	Complete and maintain maps of shallow flooding and urban ponding areas to prioritize stormwater infrastructure improvements.	X			Flooding	ST	Will County Land Use & Will County SMPC	Will County Land Use & Will County SMPC	Operating Budget	6-23	Prevent / Protect Prepare Mitigate		X			X	X

Action Item	Mitigation Action by Jurisdiction	Hazard Addressed				Timeline (ST – Short Term, LT – Long Term, & Ongoing)	County Lead	Jurisdiction Lead(s) / Primary Partner(s)	Potential Funding Opportunities	Mitigation Action Description and Implementation Strategy (Chapter 6)	Emergency Management Function	National Priority or NFRP Applicable	Plan Goals Addressed				
		Natural Hazards	Technological Hazards	Societal Hazards	Specific Hazard								Life & Property	Enhance Emergency Management	Economic Stability	Develop, Promote, Integrate Mitigation	Protect Natural Systems
17	Increase open space and conservation easements, as well as incorporate natural mitigation features, in high flood hazard areas throughout the County.	X			Attention to flooding	Ongoing	Will County Land Use	Will County Land Use & Jurisdictional Staff See p. 4-69 to 4-72 for watershed jurisdictions	Federal Clean Water Act 319 funds, FEMA – HMGP & PDM, Private Developer Incentive Programs	6-24	Prevent / Protect Prepare Mitigate		X			X	X
18	Continue to capitalize on opportunities to acquire, relocate, or elevate flood prone properties.	X			Flooding	LT - Ongoing	Will County Land Use & Will County SMPC	Will County Land Use, Will County SMPC, & Affected Jurisdictional Staff See p. 4-69 to 4-72 for watershed jurisdictions	FEMA – HMGP. Army Corp of Eng.	6-26	Prevent / Protect Prepare Mitigate		X		X	X	X
19	Expand and improve existing flood warning system capability and integrate it with a county-wide emergency communication strategy.	X			Flooding	LT	Will County EMA	Will County EMA, Will Count SMPC, & Jurisdictional EMAs	DHS – EMPG IEMA	6-27	Prepare Respond		X	X		X	

Action Item	Mitigation Action by Jurisdiction	Hazard Addressed				Timeline (ST – Short Term, LT – Long Term, & Ongoing)	County Lead	Jurisdiction Lead(s) / Primary Partner(s)	Potential Funding Opportunities	Mitigation Action Description and Implementation Strategy (Chapter 6)	Emergency Management Function	National Priority or NFRP Applicable	Plan Goals Addressed				
		Natural Hazards	Technological Hazards	Societal Hazards	Specific Hazard								Life & Property	Enhance Emergency Management	Economic Stability	Develop, Promote, Integrate Mitigation	Protect Natural Systems
20	Utilize inventory of non-federal dams/levees subject to high and significant hazard to determine current status and to notify owners of any deficiencies. Provide non-compliant owners with direction on complying with state planning and inspection requirements.	X	X		Dams & Flooding	LT	Will County EMA & Will County Land Use	Will County EMA, Will County Land Use, & Dam/Levee Owners	Operating Budget	6-28	Prevent / Protect Prepare Mitigate		X	X		X	
21	Encourage & support shelters for all types of hazards in public spaces and high risk locations.	X			Tornado	LT - Ongoing	Will County EMA	Will County EMA, Will County Building & Zoning, & Jurisdictional EMAs & Staff	FEMA – HMGP Operating Budgets	6-29	Prevent / Protect Prepare Mitigate		X			X	X
22	Target regulatory, development, and preparedness efforts of Tier II hazardous material facilities and coordinate the development and maintenance of applicable community and facility emergency plans.		X		Hazardous Materials Release	LT - Ongoing	Will County EMA	Will County EMA, Will County ELPC, & Jurisdictional EMAs	Illinois EPA, US EPA Operating Budget, & Private Funds	6-30	Prevent / Protect Prepare Mitigate Respond Recover		X	X	X		
23	Encourage the development of continuity planning for both public and private sectors.	X	X	X	All	ST - Ongoing	Will County EMA & Center for Economic Development	Will County EMA, Jurisdictional EMAs & Staff & Center for Economic Development	Operating Budget & Private Funds	6-31	Prevent / Protect Prepare Mitigate Respond Recover		X	X	X	X	

Action Item	Mitigation Action by Jurisdiction	Hazard Addressed				Timeline (ST – Short Term, LT – Long Term, & Ongoing)	County Lead	Jurisdiction Lead(s) / Primary Partner(s)	Potential Funding Opportunities	Mitigation Action Description and Implementation Strategy (Chapter 6)	Emergency Management Function	National Priority or NFRP Applicable	Plan Goals Addressed				
		Natural Hazards	Technological Hazards	Societal Hazards	Specific Hazard								Life & Property	Enhance Emergency Management	Economic Stability	Develop, Promote, Integrate Mitigation	Protect Natural Systems
24	Develop a drought contingency plan that educates the public on water saving techniques and identifies criteria/triggers for drought related actions.	X			Drought	LT	Will County EMA	Will County EMA & Jurisdictional EMAs & Staff	US Dept of Ag. & Operating Budget	6-32	Prevent / Protect Prepare Mitigate		X		X		
25	Develop a "Post-Disaster Recovery" ordinance and planning document to prepare a community for an orderly recovery operation.	X	X	X	All	LT	Will County EMA	Will County Board, Will County EMA, & Jurisdictional Boards/ Councils, EMAs, & STaff	DHS – EMPG & FEMA – HMGP, Operating Budget, IEMA 404 Mitigation Funds	6-33	Prepare Respond Recover		X	X	X	X	
26	Implement and conduct surveillance programs to identify or mitigate emerging public health emergencies. Develop partnerships and coordinate emergency plans with public and private sectors to effectively prepare, mitigate, respond, and recover from public health emergencies.	X	X	X	All	LT / Ongoing	WCHD	WCHD & Will County EMA	CDC, HRSA, Operating Budget	6-35	Prevent / Protect Prepare Mitigate Respond Recover		X	X	X	X	

CHAPTER 6: MITIGATION ACTIONS

Overview

The communities of Will County have numerous natural, technological, and societal hazards that pose a threat to the residents, businesses, infrastructure, property, and community assets. Identifying and prioritizing mitigation actions are the fundamental component of the *Will County County-Wide All Hazard Mitigation Plan*. Analyzing mitigation actions that address all or multiple hazards will improve the effectiveness and benefits. However, mitigation actions that address one hazard category (i.e., natural hazards) or a specific hazard (flooding) are also identified in this section.

A cost-benefit analysis was not developed due to the open scope of many of these items. A cost-benefit analysis based on FEMA's methodology will be developed when the actions are implemented. The cost benefit analysis will help in prioritizing actions by describing appropriate benefit-cost methodologies for evaluating the effectiveness of a range of potential mitigation actions. As a result, mitigation actions are prioritized by whether they address the target hazards identified in the risk assessment or by the number of hazards that they address. To complement state initiatives, mitigation actions that address relative "National Priorities", as dictated by DHS doctrines, are also identified. The intent of this section is to identify actions that will accurately articulate the communities of Will County's needs for mitigating the consequence of high risk events and to improve emergency services.

Common Themes and Issues

Rapid Growth and Urban Sprawl

Will County is one of the Nation's fastest growing counties. Between 1990 and 2010, Will County's population grew by 89% or over 320,000 people. Annual estimates and future projections show this rapid growth trend will continue with population totals exceeding 1.1 million people. Currently there is a population of 682,518, which makes Will County's population the fourth largest in the state and the 89th largest in the country. This rapid growth makes Will County the second fastest developing county in Illinois.

The nation has witnessed an alarming increase in the number and severity of natural disasters. Experts believe that this trend will continue, with the potential of larger and more devastating disasters occurring. While geophysical disasters, such as earthquakes, have remained relatively constant in this country over the past 50 years, weather-related disasters have skyrocketed. In addition, our technological advances have further increased our vulnerabilities and potential for impacts are exacerbated with the growing presence of societal hazards such as terrorism.

Population growth and urbanization are major contributors to a community's increase in vulnerability, as well as exacerbating the potential impacts of a disaster. Urban sprawl and our desire to control our environment with engineered structures have led to more development in high-risk areas. This encouragement of developing high-risk areas, coupled with aging infrastructure, makes the potential impact of a disaster even greater. In addition, growing populations combined with increased risks require a greater need for identifying evacuation routes. Larger populations and a higher concentration of people living in urban areas will result in disasters that affect a larger number of individuals.

One of the Will County's greatest risks is flooding. 'No Adverse Impact Floodplain Management' is a managing principle being offered by the Association of State Floodplain Managers (ASFPM) that is easy to communicate and from a policy perspective tough to challenge. In essence, a no impact floodplain is one where the action of one property owner does not adversely impact the rights of other properties, as measured by increased flood peaks, flood stage, flood velocity, and erosion and sedimentation potentials. While Will County participates in the National Flood Insurance Program (NFIP) guidelines, many structures remain at risk simply because they are in the floodplain. By joining the Community Rating System (CRS), the County:

- Will reduce insurance premiums of those policy holders located in the floodplain.
- Would have a process in place to enable the County to tailor future development.
- Would better allow communities to incorporate environmental concerns into floodplain management.

Digital Flood Insurance Rate Maps (DFIRM) for Will County is expected to be completed in 2015 providing a digital version of the FEMA flood insurance rate maps designed for use with digital mapping and analysis software. Flood Insurance Studies (FIS) date back to the late 1970's and early 1980's. As a result, the flood elevations associated with various flood events may not be indicative of expected flood inundation. This discrepancy, coupled with the current increase in population density, will be resolved when final DFIRMS are available.

Similarly, the location and conditions of Will County non-federal dams should be assessed since increased population density downstream of a dam could result in increased destruction during a dam failure.

Local and Regional Partnerships

Like all emergency management functions, hazard mitigation begins at the local level. Individual properties and businesses can be the most vulnerable to hazards. Therefore, it is important for businesses, industry representatives, and local governments to form partnerships and work together to plan for disasters. This partnership would create a more thorough response and initiate the framework and resources needed for post-disaster recovery. Partnerships will bring mitigation into the forefront. Development of local and regional partnerships was identified by FEMA as a National Priority.

Crisis Management vs. Consequence Management

Since September 11th, there has been much debate on the roles and responsibilities of emergency management. Although there is a close relationship between crisis and consequence management, there are defined differences. Crisis management is predominately a law enforcement function and includes measures to identify, acquire, and plan the use of resources needed to anticipate, prevent and/or resolve a threat or act of terrorism. Consequence management is predominately an emergency management function and includes measures to protect public health and safety, restore essential government services, and provide emergency relief to governments, businesses, and individuals affected by the consequences of an event. For this reason, the hazard mitigation actions are focused on alleviating the impacts or consequences of a hazard, whether it is a natural or man-made event.

By definition, mitigation actions are:

> "Any *action* taken to eliminate or reduce long-term risk to human life and property from the *consequences* of natural and human-caused hazards". Such actions are taken to reduce the *consequences* of disasters and break the vicious cycle of destruction, repair,

destruction, repair, etc. Mitigation actions are the foundation of a truly effective emergency management program."

Leveraging Available Funds

In recent years, the financial resources for mitigation activities have declined with the reduction in funds for the FEMA Pre-Disaster Mitigation Program (PDM) and the Hazard Mitigation Grant Program (HMGP). However, leveraging Department of Homeland Security (DHS) initiatives to address natural, technological, and societal hazards, as well as potentially funding mitigation actions, will ensure efficiency in public funding. The 2005 Emergency Management Performance Grants – Program Guidance and Application Kit states that "emergency managers at all levels should leverage all available funding and resources from multiple sources wherever possible…(and)…should not restrict their activities to only Federal funding to achieve the goals outlined within their strategies. Rather, special attention should be given to leveraging relevant funding sources and resources that support"… mitigation activities.[1] Additional sources include other Federal preparedness programs, those offered by Department of Health and Human Services (HHS) through CDC, Department of Health and Human Services (HRSA), and the U.S. Food and Drug Administration; the Department of Agriculture; the Department of Justice (DOJ); the Department of Transportation; FEMA; DHS Science and Technology Directorate; DHS Information Analysis and Infrastructure Protection Directorate; and other relevant organizations. In addition to federal programs, State homeland security and preparedness programs and resources may be available to meet the objectives outlined in the *Will County County-Wide All Hazard Mitigation Plan*.

Regardless of the mitigation activities and the corresponding jurisdictions and potential funding mechanisms that have been identified, it is not the intent of this plan to convey any specific commitment or obligation to carry out a specific project. It is understood that the completion of mitigation actions identified in this plan are contingent upon further planning and review, specific endorsement or approval from appropriate agencies and governing bodies, and financial, technical, and other necessary resources.

[1] "The Subcommittee on Economic Development, Public Buildings, & Emergency Management Hearing on The National Preparedness System: What are we preparing for?" April 14, 2005. http://www.house.gov/transportation/pbed/04-14-05/04-14-05memo.html

Hazard Mitigation Actions and Implementation

Mitigation Action #1:	Revise and adopt the *Will County-Wide All Hazard Mitigation Plan* by resolution of the County Board, City Councils, Boards of Trustees, and other governing boards as appropriate. The municipal, fire protection districts, colleges, and other agencies' resolutions should adopt each action item that is pertinent to the community and assign a person responsible for it.
Goals Addressed:	Goal #1 - Protect and secure life and property. Goal #2 - Continue to improve and enhance county-wide emergency management programs and develop relationships county-wide. Goal #3 - Ensure economic stability, preserve cultural resources, and improve quality of life throughout Will County. Goal #4 - Develop, promote, and integrate mitigation actions. Goal #5 - Take advantage of opportunities offered by growth while also protecting natural systems and resources.
Problem/Opportunity:	Formal adoption of this *Plan* ensures that County and municipal staffs are authorized and instructed to implement its action items. Adoption is also a requirement for recognition of the *Plan* by mitigation funding programs and the Community Rating System.
Implementation Strategy:	Gain public and political support to adopt the plan.
Jurisdictions:	County Board, Village Boards, City Councils, and Other Stakeholder Boards
Lead Agency:	Will County Emergency Management Agency (EMA)
Funding:	Operating Budget
Timeline:	Short-term

Mitigation Action #2:	Ensure the thoroughness and NIMS/NRP compliance of emergency management planning documents, operations, and functions and integrate emergency management operations, functions, and initiatives with all levels of government and neighboring jurisdictions.
Goals Addressed:	Goal #1 - Protect and secure life and property. Goal #2 - Continue to improve and enhance county-wide emergency management programs and develop relationships county-wide. Goal #4 - Develop, promote, and integrate mitigation actions.
Problem/Opportunity:	Local emergency management agencies have worked tirelessly to secure the community and to keep up to date on revolving threats, as well as the evolution of emergency management. There have been significant changes within the field of emergency management following the events of September 11th and recent hurricanes/tornadoes, as well as the introduction of new directives, changes to the National Federal Response Plan, and the development of the National Incident Management System. It is essential to ensure that emergency management doctrine, operational systems, and programs at all levels of government within Will County are thorough and integrated.
Implementation Strategy:	Execute a gap analysis of emergency planning documents and operational systems throughout Will County at all levels of government. Identify needs and actions to ensure thoroughness and integration of emergency management operations and functions at all levels of government. For example, in order to be compliant with the National Response Plan, Will County EMA should develop a Recovery Operations Plan that addresses all hazards and integrates federal and state directives.
Jurisdictions:	Will County Board, Will County EMA, Municipal Staff, and other Stakeholder Boards
Lead Agency:	Will County Emergency Management Agency
Funding:	FEMA - Hazard Mitigation Grant Program (HMGP), Operating Budget
Timeline:	Long-term/Ongoing

Mitigation Action #3: Expand regional collaboration by developing outreach programs and coordinating with neighboring jurisdictions, regional partnerships, businesses, non-profit, and universities.

Goals Addressed:

Goal #1 - Protect and secure life and property.

Goal #2 - Continue to improve and enhance county-wide emergency management programs and develop relationships county-wide.

Goal #3 - Ensure economic stability, preserve cultural resources, and improve quality of life throughout Will County.

Goal #4 - Develop, promote, and integrate mitigation actions.

Goal #5 - Take advantage of opportunities offered by growth while also protecting natural systems and resources.

Problem/Opportunity: Major events will have cross-geographic consequences and impacts. There is a large need within emergency management for embracing partnerships across multiple jurisdictions, regions, and States in building capabilities cooperatively. Successful regional collaboration would allow for multi-jurisdictional and multi-disciplinary approach to increase efficiency and leverage local and regional capabilities.

Implementation Strategy: Formalize, update, and expand mutual aid agreements with surrounding communities, regional partnerships, and other organizations for the purposes of sharing equipment, personnel, and facilities during an emergency.

Exercise the execution of mutual aid agreements to identify challenges and familiarize officials with regional resources.

Coordinate preparedness assistance expenditures and planning efforts on a regional basis to avoid duplicative or inconsistent investments.

Jurisdictions: Will County EMA and Jurisdictional EMAs
Lead Agency: Will County Emergency Management Agency and Will County Land Use
Funding: Operating Budget, Private Funds
Timeline: Ongoing

Mitigation Action #4:	Incorporate risk assessment and hazard mitigation principles into comprehensive planning efforts, programs, and projects in order to secure communities from all hazards.
Goals Addressed:	Goal #1 - Protect and secure life and property. Goal #2 - Continue to improve and enhance county-wide emergency management programs and develop relationships county-wide. Goal #4 - Develop, promote, and integrate mitigation actions. Goal #5 - Take advantage of opportunities offered by growth while also protecting natural systems and resources.
Problem/Opportunity:	Will County is one of the Nation's fastest growing communities. Population growth and urbanization are major contributors to a community's increase in vulnerability, as well as exacerbates the potential impacts of a disaster. Urban sprawl and our desire to control our environment with engineered structures have led to more development in high-risk areas.
Implementation Strategy:	Support, promote, and expand the development of the Hazard Mitigation Steering Committee into a permanent component throughout the County. Implement annual workshops and roundtables to educate others on the need for and benefits of mitigation, identify opportunities, and integrate developments into revisions of the All Hazard Mitigation Plan along with local plans and ordinances.
Jurisdictions:	Will County Boards, Will County EMA, Will County Stormwater Management Planning Committee, Will County Land Use, Local Municipal Boards/Councils and Staff, and Chambers of Commerce
Lead:	Will County EMA
Funding:	Operating Budget
Timeline:	Ongoing

Mitigation Action #5:	Expand the county-wide public awareness and education programs and promote the understanding of each community's risks, vulnerabilities, what to do during and after a disaster, and how to mitigate the effects of disasters.
Goals Addressed:	Goal #1 - Protect and secure life and property. Goal #2 - Continue to improve and enhance county-wide emergency management programs and develop relationships county-wide. Goal #3 - Ensure economic stability, preserve cultural resources, and improve quality of life throughout Will County. Goal #4 - Develop, promote, and integrate mitigation actions.
Problem/Opportunity:	When a disaster occurs, it affects everyone living in the community. Therefore, it is essential to ensure public awareness of the community's threats and what they can do to prepare and measures they can take to reduce the consequences of a disaster. During and after a hazard event, emergency responders may be either overwhelmed with emergency calls or unable to access some residential areas. It is important that individual households are prepared for a period of self-sufficiency while responders deal with more immediate and life-threatening situations. Disasters also open a window of opportunity following a disastrous event of local, national or international significance in which citizens will take action to improve their own safety and preparedness. This strategy supports response and recovery.
Implementation Strategy:	Evaluate existing public education efforts and identify opportunities to expand or develop new programs that present the risks that face the community and measures they can take to prepare and mitigate. Leverage existing forums such as public meetings, universities, and workshops to deliver these programs. Following a disaster, provide rapid information to the public on disaster preparedness and mitigation measures. Follow up with sustained education campaign for the following two months. • Develop and index a mitigation/preparedness packet for the public and for the media to have ready for each type of hazard.

- Develop customized recovery packets for each hazard for delivery to the public and media to have ready for when a disaster occurs.
- Draft a campaign strategy to deploy the information strategically.
- Expand current advertising/public service announcements (PSA) outlet information.
- Promote the development of Citizen Corps Councils and Community Emergency Response Teams (CERT).
- Utilize the latest communication technology for public education outreach.

Jurisdictions:	Will County EMA and Jurisdictional EMAs
Lead Agency:	Will County EMA
Funding:	Operating Budget
Timeline:	Ongoing

Mitigation Action #6:	Continue to strengthen infrastructure, build redundancies, and implement contingency plans for vulnerable populations and essential services and networks.
Goals Addressed:	Goal #1 - Protect and secure life and property. Goal #3 - Ensure economic stability, preserve cultural resources, and improve quality of life throughout Will County. Goal #4 - Develop, promote, and integrate mitigation actions.
Problem/Opportunity:	Hazard events can cause power outages, obstruct roads, and disrupt essential services. This can have a devastating impact on isolated communities and select populations.
Implementation Strategy:	Continue an analysis utilizing GIS applications to identify areas that lack redundancy. Focus should be given on essential utility systems, road networks, and critical facility service areas. Develop a system of priority routes, facilities, and systems for hazard events and their associated needs. Work with other departments and work with utilities in order to identify needs and actions to cost effectively implement redundancies.
Jurisdictions:	WC Department of Highways, WC Land Use, Jurisdictional Public Work Departments, and local utilities
Lead Agency:	Will County EMA, Will County Department of Highways, and Will County Land Use
Funding:	Operating and capital improvement budgets
Timeline:	Long-term/Ongoing

Mitigation Action #7:	Continue to support the delivery of existing and free training platforms to educate officials, critical personnel, first responders, and communities on risks, fundamental operations of emergency management, and mitigation for the purpose of improving community preparedness and advancement of professional development.
Goals Addressed:	Goal #2 - Continue to improve and enhance county-wide emergency management programs and develop relationships county-wide. Goal #3 - Ensure economic stability, preserve cultural resources, and improve quality of life throughout Will County. Goal #4 - Develop, promote, and integrate mitigation actions. Goal #5 - Take advantage of opportunities offered by growth while also protecting natural systems and resources.
Problem/Opportunity:	It is essential to have political and peer support prior to, during, and following a disaster by establishing, cultivating, and maintaining relationships throughout the County, between communities, local officials and department liaisons prior to an event. In addition, the field of Emergency Management has grown rapidly over the past few decades. The challenges and complexities of the relationship between our environment, global politics and their impacts on our infrastructure, economics, and sustainability have required the need for a vast array of specialty.
Implementation Strategy:	Continue county-wide emergency management workshops and training for communities, department liaisons and local officials that focuses on their community's risks, vulnerabilities, and opportunities to protect and mitigate. Also, encourage and support emergency management and other related professionals throughout the County to obtain higher education degrees, certifications, and membership in professional organizations.
Jurisdictions:	Will County EMA, Will County Stormwater Management Planning Committee, Will County Land Use, and Jurisdictional staff and EMAs
Lead Agency:	Will County EMA
Funding:	Collaboration between local colleges and universities, state, and local funding
Timeline:	Ongoing

Mitigation Action #8: Identify critical facilities that are located within high-hazard areas and relocate them or incorporate mitigation retrofits to protect them from future floods.

Goals Addressed:

Goal #1 - Protect and secure life and property.

Goal #2 - Continue to improve and enhance county-wide emergency management programs and develop relationships county-wide.

Goal #3 - Ensure economic stability, preserve cultural resources, and improve quality of life throughout Will County.

Goal #4 - Develop, promote, and integrate mitigation actions.

Goal #5 - Take advantage of opportunities offered by growth while also protecting natural systems and resources.

Problem/Opportunity: The flood modeling conducted in this report identified several fire stations and schools that were located within or near the 100 year floodplain. NFIP regulations encourage communities to have critical facilities outside of the 500 year floodplain.

FEMA now provides the Standard Digital Flood Insurance Rate Map (DFIRM) Database which is a digital version of the FEMA flood insurance rate map that is designed for use with digital mapping and analysis software. Will County is expected to receive their DFIRMs in the near future which will allow planners to more accurately identify critical facilities located in flood-prone areas.

Implementation Strategy: Upon receipt of updated DFIRM database provided by FEMA, conduct a detailed study of each facility to evaluate the potential impacts to each facility and identify mitigation options to protect it from future damages and to ensure operations during an event. Conduct a benefit-cost analysis and implement the best mitigation alternative.

Jurisdictions: Will County GIS, Will County Land Use, and affected Jurisdictional Staff

Lead Agency: Will County Land Use

Funding: FEMA - HMGP & Pre-Disaster Mitigation (PDM)

Timeline: Long-term/Ongoing

Mitigation Action #9:	Support the use, development, and implementation of Geographic Information Systems (GIS) throughout the County to track communities' vulnerability to hazards.
Goals Addressed:	Goal #1 - Protect and secure life and property. Goal #2 - Continue to improve and enhance county-wide emergency management programs and develop relationships county-wide. Goal #4 - Develop, promote, and integrate mitigation actions.
Problem/Opportunity:	Will County communities are increasingly incorporating geospatial technologies and data into their daily operations. Geospatial technologies and data have become a valued asset in preparedness, protection, response, and recovery emergency management operations. In the preparedness phase, emergency management planners, as well as responders, need current, accurate, and easily accessible information to ensure the readiness of teams to respond. The mapping and analysis of critical infrastructure vulnerabilities and public health surveillance capabilities is an important component of strategy development including response and recovery in order to provide a dynamic common operating picture, coordinate and track emergency assets, enhance capabilities, understand event impacts, accurately estimate damage, locate safety zones for quarantine or detention, and facilitate recovery. Through the mitigation planning process, the Will County communities have identified the benefit of integrating HAZUS technology and the benefits of robust, accurate, and detailed data.
Implementation Strategy:	Continue to encourage communities to invest in GIS technology by training staff, obtaining and updating detailed geospatial data, and incorporating GIS technology and modeling programs into community decisions. Data sharing agreements have been made with twenty-eight communities throughout Will County along with many other tax districts and agencies.
Jurisdictions:	Will County GIS and Jurisdictions with GIS (Channahon, Joliet, and Naperville)
Lead Agency:	Will County GIS
Funding:	Operating Budget
Timeline:	Ongoing

Mitigation Action #10:	Update base flood elevations (BFE) throughout the County in accordance with the Flood Hazard Mapping Program.
Goals Addressed:	Goal #1 - Protect and secure life and property. Goal #2 - Continue to improve and enhance county-wide emergency management programs and develop relationships county-wide. Goal #4 - Develop, promote, and integrate mitigation actions. Goal #5 - Take advantage of opportunities offered by growth while also protecting natural systems and resources.
Problem/Opportunity:	Current development is based on outdated BFE's determined in the late 1970's and early 1980's. These outdated flood maps may not adequately represent present flood inundation levels for areas with increased urban and commercial development. Continuing development based on current BFE's may result in an increased negative impact. Additionally, many areas impacted will likely not possess flood insurance due to their expectations of the base flood elevation.
Implementation Strategy:	The Digital Flood Insurance Rate Maps (DFIRM) for Will County are almost complete. Once completed, the Stormwater Management Planning Committee will begin utilizing them for planning and mitigation projects.
Jurisdiction:	Will County Stormwater Management Planning Committee
Lead Agency:	Will County Stormwater Management Planning Committee
Funding:	Implementation Strategy - Operating Budget. Overall Mitigation – State and Federal
Timeline:	Short-term

Mitigation Action #11:	Maintain or amend, as needed, the county-wide floodplain ordinance.
Goals Addressed:	Goal #1 - Protect and secure life and property. Goal #4 - Develop, promote, and integrate mitigation actions. Goal #5 - Take advantage of opportunities offered by growth while also protecting natural systems and resources.
Problem/Opportunity:	A community's agreement to adopt and enforce floodplain management ordinances, particularly with respect to new construction is an important element in making flood insurance available to home and businesses owners. Currently over 20,000 communities voluntarily adopt and enforce local floodplain management ordinances that provide flood loss reduction building standards for new and existing development. Will County has updated the County floodplain ordinance to incorporate more stringent regulations. Supporting the ordinance is the County's *Stormwater Management Plan* and *Technical Guidance Manual for County-Wide Stormwater Ordinance.*
Implementation Strategy:	Maintain or amend the ordinance as needed. All communities in Will County have adopted the County's ordinance or implemented more stringent measures.
Jurisdictions:	Will County Board, Will County Stormwater Management Planning Committee, and all Municipal Boards/Councils & Staff
Lead Agency:	Will County Land Use and Stormwater Management Planning Committee
Funding:	Operating Budget
Timeline:	Ongoing

Mitigation Action #12:	Participate in the Community Rating System to further reduce flood damage in the communities of Will County.
Goals Addressed:	Goal #1 - Protect and secure life and property. Goal #4 - Develop, promote, and integrate mitigation actions. Goal #5 - Take advantage of opportunities offered by growth while also protecting natural systems and resources.
Problem/Opportunity:	Currently, the County and jurisdictions do not participate in the Community Rating System (CRS). The CRS is part of the National Flood Insurance Program and can provide discounts of up to 45% off flood insurance premiums for residents of communities that participate. Communities apply for a CRS classification and are given credit points that reflect the impact of their activities on reducing flood losses, insurance rating, and promoting awareness. CRS process includes ten steps: 1) organize, 2) involve the public, 3) coordinate with agencies and organizations, 4) assess the hazard, 5) evaluate the problem, 6) set goals, 7) review mitigation strategies, 8) draft action plan, 9) adopt the plan, 10) implement, evaluate, and revise.
Implementation Strategy:	Leverage the *Will County County-Wide All Hazard Mitigation Plan* to fulfill some of the requirements identified in the CRS process. Identify gaps needed to implement the CRS and maximum CRS points.
Jurisdictions:	Will County Stormwater Management Planning Committee, Will County Land Use, and Jurisdictional Staff
Lead Agency:	Will County Land Use
Funding:	Operating Budget
Timeline:	Ongoing

Mitigation Action #13: Integrate Flood Hazard Mapping Program updates with improved county-wide GIS capabilities.

Goals Addressed:

Goal #1 - Protect and secure life and property.

Goal #2 - Continue to improve and enhance county-wide emergency management programs and develop relationships county-wide.

Goal #3 - Ensure economic stability, preserve cultural resources, and improve quality of life throughout Will County.

Goal #4 - Develop, promote, and integrate mitigation actions.

Goal #5 - Take advantage of opportunities offered by growth while also protecting natural systems and resources.

Problem/Opportunity: Will County GIS Division is currently working closely with jurisdictions to improve GIS capabilities and develop measures to protect communities from flooding. County-wide GIS capabilities have been steadily increasing; however, there is a limitation in the amount of data available. The County would like to utilize the existing technology and to leverage FEMA's current Risk Map Program initiative to map flood hazards. The Risk Map Program will:

- Create new maps that take advantage of revised data and improved technologies for identifying flood hazards.
- Create up-to-date maps to support a flood insurance program that is more closely aligned with actual risk, encourage wise floodplain management, and increase the public's flood hazard awareness.
- Provide local communities and various stakeholders desired more timely updates of floodplain maps and easier access to the data.
- Map Modernization is a cornerstone for helping communities to be better prepared for flood disasters. The NFIP currently serves 4.5 million policyholders and provides $650 billion in coverage.

Implementation Strategy:	Maintain Data Sharing Agreements or Data Licensing Agreements between Will County GIS and participating jurisdictions and taxing/agency bodies throughout the County. Provide training to staff on the use of GIS technologies and supporting models.
Jurisdictions:	Will County GIS, Will County Stormwater Management Planning committee, and local Jurisdictions
Lead Agency:	Will County GIS and Stormwater Management Planning Committee
Funding:	Operating Budget
Timeline:	Short-term

Mitigation Action #14:	Utilizing GIS, develop and maintain a county-wide database of flood controlled areas, purchased flood plain properties, and flood prone properties to be acquired.
Goals Addressed:	Goal #1 - Protect and secure life and property. Goal #2 - Continue to improve and enhance county-wide emergency management programs and develop relationships county-wide. Goal #3 - Ensure economic stability, preserve cultural resources, and improve quality of life throughout Will County. Goal #4 - Develop, promote, and integrate mitigation actions. Goal #5 - Take advantage of opportunities offered by growth while also protecting natural systems and resources.
Problem/Opportunity:	As budgets shrink and the need grows for managing mitigation and recovery projects within rapidly growing communities, efficiency in managing information on flood prone areas is essential. GIS provides management of data and mapping capabilities that allows analysis of the information for planning, mitigation, and recovery purposes. Mitigation funding of approximately $10.6 million has been spent in securing repetitive loss properties in Will County from the 1996 and 2008 floods. Data on flood controlled areas, previously purchased flood plain properties, and flood prone properties to be purchased can be integrated into useable formats for planners. This will improve efficiency in flood plain management projects and maximize limited budgets.
Implementation Strategy:	Use improved GIS capabilities and completed DFIRMs for Will County when available to integrate flood plain data on flood controlled areas, purchased flood plain properties, and flood prone properties to be acquired. This will allow planners to be more efficient in data analysis and budgeting for planning, mitigation, and recovery projects.
Jurisdictions:	Will County GIS and Stormwater Management Planning Committee
Lead Agency:	Will County GIS and Stormwater Management Planning Committee
Funding:	Operating Budget
Timeline:	Long-term/Ongoing

Mitigation Action #15: Continue stormwater management planning and ordinances to improve existing storm capacity and drainage systems. Utilize watershed studies and mapping to identify and prioritize mitigation needs in each watershed. Potential projects include retention basins improvement, culvert enlargement/improvement, stream maintenance, erosion/sedimentation control, water quality assessment, watershed and flood risks education, infrastructure maintenance, agency coordination, property/infrastructure protection, roadway elevations correction, and data for improved emergency planning/response.

Goals Addressed:

Goal #1 - Protect and secure life and property.

Goal #4 - Develop, promote, and integrate mitigation actions.

Goal #5 - Take advantage of opportunities offered by growth while also protecting natural systems and resources.

Problem/Opportunity: Current watershed concerns have been identified through existing studies, community recommendations, and past flood incident data. There is a concern that some of the drainage systems throughout the County are undersized due to the rapid development within the County from rural farm fields to suburbanized communities. As the County developed, farm field tiles that once controlled flooding were abandoned as developments were built on neighboring land. Growing communities increase the need for effective stream maintenance, proper sizing of retention basins and culverts, erosion/sedimentation control, and protection of property and infrastructure from flooding.

Watershed studies would assist the WCSMPC to identify, prioritize, and address flooding issues; thus, these studies would provide a cost-effective approach to addressing existing and future flood problems. Staffing and funding are obstacles for the development of the studies and implementing recommended flood control measures.

Implementation Strategy: Utilize Will County Stormwater Plan and Technical Guidance to:

- Employ studies by a licensed professional engineer to re-evaluate watersheds and determine the true flood areas and issues causing flooding.

- Assess problematic areas where field tiles were once the primary method of flood control.
- Perform an enhancement capability assessment of the stormwater facility to handle the increase of flood waters.
- Have the stormwater facilities fixed or re-sized to the appropriate capacity.
- Address erosion and sedimentation control issues.
- Identify and address infrastructure maintenance issues.
- Coordinate flood projects with neighboring counties where watersheds cross jurisdictions.
- Continue education of public on watershed and flood risk issues
- Review available data to improve emergency planning and response.

Jurisdictions: Will County Land Use Department, Will County Stormwater Management Planning Committee, Will County Department of Highways, Will County EMA, and Jurisdictional Planning Departments and Public Works (see pages 4-69 to 4-72 for watershed concerns and specific municipalities in watersheds)

Lead Agency: Will County Land Use Department, Will County Stormwater Management Planning Committee, and Will County Department of Highways

Funding: FEMA - HMGP, US EPA
Local - Operating Budget

Timeline: Long-term/Ongoing

Mitigation Action #16:	Complete and maintain maps of shallow flooding and urban ponding areas to prioritize stormwater infrastructure improvements.
Goals Addressed:	Goal #1 - Protect and secure life and property. Goal #4 - Develop, promote, and integrate mitigation actions. Goal #5 - Take advantage of opportunities offered by growth while also protecting natural systems and resources.
Problem/Opportunity:	Some areas throughout the County are subject to flooding that occurs as a result of poor drainage rather than proximity to a river or stream. Major developments have been constructed in these shallow flooding areas and more are proposed. Flooding can occur well outside of mapped floodplains and the number of flood insurance policy holders outside of identified flood-prone areas demonstrates the need to map shallow flooding areas. Identifying shallow flooding areas would help reduce future problems and future surprises to residents, and provide a prioritized list of needed capital improvements. Tools, such as GIS and Light Detection and Ranging (LIDAR) maps, are available to identify shallow flooding areas.
Implementation Strategy:	Identify past occurrences of shallow flooding, urban ponding, and high ground water areas using LIDAR and county-wide aerial photography of historical floods. Incorporate these into flood maps to monitor and prioritize infrastructure improvements throughout the County.
Jurisdictions:	Will County Land Use and Will County Stormwater Management Planning Committee
Lead Agency:	Will County Land Use and Stormwater Management Planning Committee
Funding:	Operating Budget
Timeline:	Short-term

Mitigation Action #17: Increase open space and conservation easements, as well as incorporate natural features, in high flood hazard areas throughout the County.

Goals Addressed:

Goal #1 - Protect and secure life and property.

Goal #4 - Develop, promote, and integrate mitigation actions.

Goal #5 - Take advantage of opportunities offered by growth while also protecting natural systems and resources.

Problem/Opportunity: Extensive new development could greatly alter the natural hydrology throughout the County. Each new development adds impervious surfaces, such as sidewalks, driveways, foundations or others. This means that, because less water filters through the ground and into the water table, more rain drains more rapidly into stormwater management systems, streams and rivers. This situation increases the risk of flooding, adds sediment and toxins to run off, and slows aquifer replenishment. Furthermore, the cumulative affect of rapid growth throughout the County degrades environmental quality and increases the risk of flooding.

Low impact development (LID) has the potential to alleviate these adverse impacts through the creation of appropriately placed green space, landscaping, grading, streetscapes, roads and parking lots. LID can achieve multifunctional objectives and help to reduce stormwater impacts, and provide and maintain the beneficial hydrologic functions of a natural drainage system.

Implementation Strategy: Coordinate existing Will County Stormwater Management Plan into overall flood hazard mitigation activities. This could achieve several objectives:

- Ensure coordination of other planning efforts with those of the Will County Stormwater Management Plan Committee.
- Ensure coordination with the Will County Stormwater Management Planning Committee on issues pertaining to floodplain development, stormwater control, and other related matters.
- Ensure a wider understanding of and adherence to the Stormwater Management Plan and Stormwater Ordinance.

Coordinate and implement efforts to increase open space in high hazard areas throughout the County with the Will County Land Use Plan. The use of LID could achieve several objectives:

- LID measures can result in no net increase in run off thereby maintaining the current flood risk without affecting development potential.
- It recharges the aquifer. Groundwater supplies at least 95% of the drinking water supply and water critical for commerce in Will County.
- It supports the hydrologic regime, in turn supporting a healthy ecosystem and demanding less cost for maintenance and energy.
- It results in open space.

Develop county/jurisdiction regulations and guidelines that implement LID objectives to:

- Minimize impacts to the extent practicable by reducing imperviousness, conserving natural resources and ecosystems, maintaining natural drainage courses, reducing the use of pipes and minimizing clearing/grading.
- Recreate detention and retention storage dispersed and evenly distributed throughout a site with the use of open swales, fatter slopes, depressions, storage rain gardens (bio-retention), water use (rain barrels) and others.
- Maintain the predevelopment time of concentration by strategically routing flows to maintain travel time.
- Provide effective public education and socioeconomic incentives to ensure property owners use effective pollution prevention measures and maintain management measures.

Jurisdictions: Will County Land Use and local Jurisdictional Staff (Aurora, Bolingbrook, Braceville, Channahon, Crest Hill, Diamond, Elwood, Frankfort, Homer Glen, Joliet, Lemont, Lemont, Lockport, Manhattan, Minooka, Naperville, New Lenox, Park Forest, Plainfield, Rockdale, Romeoville, Shorewood, Steger, Wilmington, Woodridge)

Lead Agency: Will County Land Use

Funding: Federal Clean Water Act Section 319 Funds, FEMA – HMGP & PDM, county/jurisdiction operating budgets, private developers incentive programs

Timeline: Ongoing

Mitigation Action #18:	Continue to capitalize on opportunities to acquire, relocate, or elevate flood prone properties.
Goals Addressed:	Goal #1 - Protect and secure life and property. Goal #3 - Ensure economic stability, preserve cultural resources, and improve quality of life throughout Will County. Goal #4 - Develop, promote, and integrate mitigation actions. Goal #5 - Take advantage of opportunities offered by growth while also protecting natural systems and resources.
Problem/Opportunity:	FEMA is currently updating digital flood maps in Will County that should be available soon. The new DFIRMS will be overlaid onto aerial photographs identifying structures that are within a flood zone providing information for mitigation opportunities.
Implementation Strategy:	Identify structures within the flood zones and evaluate these locations for accuracy. Often flood maps do not reflect changes of the site due to new development, new elevations caused by placed fill, or flood control and stormwater infrastructure. Compare the findings of the strategy above to existing inventory of repetitive loss structures. Educate the public of this risk and promote potential opportunities to mitigate such as buy-out programs, relocation, or elevation.
Jurisdictions:	Will County Land Use, Will County Stormwater Management Planning Committee, and local Jurisdictions in the Des Plaines River, DuPage River, and Kankakee River Watersheds (see pages 4-69 to 4-72 for municipalities within those watersheds).
Lead Agency:	Will County Land Use and Stormwater Management Planning Committee
Funding:	FEMA - HMGP and Army Corps of Engineers
Timeline:	Long-term/Ongoing

Mitigation Action #19:	Expand and improve existing flood warning system capability and integrate it with a county-wide emergency communication strategy.
Goals Addressed:	Goal #1 - Protect and secure life and property. Goal #2 - Continue to improve and enhance county-wide emergency management programs and develop relationships county-wide. Goal #4 - Develop, promote, and integrate mitigation actions.
Problem/Opportunity:	Will County has improved its flood monitoring resources to assist in notifying communities quickly and accurately of a flood threat. A flood warning system may consist of people or machines monitoring water level with stream gauges. Although a flood warning system does not provide long term damage reduction, it can alleviate health and safety risk by providing citizens time to remove belongings that could be damaged. Additionally, Will County has successfully issued approximately 800 NOAA weather radios throughout the County as part of improving the emergency communication system.
Implementation Strategy:	Continue to expand flood warning systems that monitor water levels of rivers, streams, creeks, and other bodies of water that threaten properties throughout the County and incorporate these systems into the county-wide emergency communication strategy.
Jurisdictions:	Will County EMA, Will County Stormwater Management Planning Committee, and Jurisdictional EMAs (Bolingbrook, Channahon, Frankfort, Homer Glen, Joliet, Lockport, Manhattan, Naperville, New Lenox, Romeoville, Shorewood, Wilmington)
Lead Agency:	Will County EMA
Funding:	DHS Emergency Performance Grants (EMPG), Illinois Emergency Management Agency (IEMA)
Timeline:	Long-term

Mitigation Action #20:	Utilize inventory of non-federal dams/levees subject to high and significant hazard to determine current status and to notify owners of any deficiencies. Provide non-compliant owners with direction on complying with state planning and inspection requirements.
Goals Addressed:	Goal #1 - Protect and secure life and property. Goal #2 - Continue to improve and enhance county-wide emergency management programs and develop relationships county-wide. Goal #4 - Develop, promote, and integrate mitigation actions.
Problem/Opportunity:	Failure of significant and high hazard dams would cause significant loss of life and property damage.
Implementation Strategy:	Focus on category 1 (potential loss of life) and 2 (potential loss of infrastructure) dams/levees to determine current status of structure and emergency plan. Collaborate with the Illinois Department of Natural Resources – Office of Water Resources to determine inspection status of non-compliant dam owners.
Jurisdictions:	Will County EMA, Will County Land Use, and Dam/Levee Owners
Lead Agency:	Will County EMA and Land Use Department
Funding:	Operating Budget
Timeline:	Long-term

Mitigation Action #21:	Encourage & support shelters for all types of hazards in public spaces and high risk locations.
Goals Addressed:	Goal #1 - Protect and secure life and property. Goal #4 - Develop, promote, and integrate mitigation actions. Goal #5 - Take advantage of opportunities offered by growth while also protecting natural systems and resources.
Problem/Opportunity:	The exponential growth throughout the County has resulted in the inadequacies of providing enough shelter space. Community recreational and residential parks, golf courses, and nature preserves do not have adequate shelters for residents during a severe storm or tornado. Furthermore, many of the public buildings, schools, and critical facilities were built before advancements in shelter construction. Temperature extremes occasionally require the need to provide heating or cooling centers for public use, particularly for populations most susceptible to temperature extremes. Mobile home parks and manufactured home communities are vulnerable to high winds and tornados.
Implementation Strategy:	Encourage and support the increase of shelters through the construction of dual use, multi-hazard shelters in the community's most popular parks, golf courses, and other public venues. Community facilities should incorporate technological advancements for sheltering purposes and double as heating and cooling centers during severe temperatures. Evaluate the existing shelters in public buildings county-wide to determine needs and improvements necessary to adequately shelter inhabitants during a storm or tornado.
Jurisdictions:	Will County EMA, Will County Building and Zoning, and Jurisdictional EMAs and Zoning Staff
Lead Agency:	Will County EMA
Funding:	FEMA - HMGP; county/jurisdiction operating budgets
Timeline:	Long-term/Ongoing

Mitigation Action #22:	Target regulatory, development, and preparedness efforts of Tier II hazardous material facilities and coordinate the development and maintenance of applicable community and facility emergency plans.
Goals Addressed:	Goal #1 - Protect and secure life and property. Goal #2 - Continue to improve and enhance county-wide emergency management programs and develop relationships county-wide. Goal #3 - Ensure economic stability, preserve cultural resources, and improve quality of life throughout Will County.
Problem/Opportunity:	Will County has many oil refineries, chemical manufacturers, and other businesses that use hazardous materials in their processing. Chemicals and materials in use vary in toxicity. There are a large number of known facilities that store large quantities of reportable hazardous materials that are required for their industrial process. Communities should be aware of the hazardous materials being used for industrial processes within their jurisdiction. By working together, industry and communities can coordinate emergency plans to identify the location of facilities, transportation routes of hazardous materials, procedures for immediate response, a community-wide evacuation plan, a public notification plan, facility point of contacts, and a plan for exercising simulations.
Implementation Strategy:	Continue to support efforts to assess and monitor Tier II facility release contingency plans by using geospatial data to help manage information on Tier II facilities, on-site hazardous material types and quantities, site configuration, and compliance status. Implement methods to regulate these facilities and to provide incentives for facilities to share information on an annual basis. Incorporate Risk Management Plans developed by those facilities that are required by U.S. EPA regulations for sites that manufacture, store, or handle hazardous materials into the community's emergency plan to ensure the safety of the public.
Jurisdictions:	Will County EMA, Will County LEPC, and Jurisdictional EMAs (all but Godley, Homer Glen, and Symerton)
Lead Agency:	Will County EMA
Funding:	IEPA, US EPA, Operating Budget, and Private Funds
Timeline:	Long-term/Ongoing

Mitigation Action #23: Encourage the development of continuity planning for both public and private sectors.

Goals Addressed: Goal #1 -

evelop, promote, and integrate mitigation actions.

Problem/Opportunity: Planning for contingencies before an event and developing strong partnerships have enabled businesses to alleviate damage and to recover from disasters quickly and ensure economic stability throughout Will County and the region.

Implementation Strategy: Execute a Continuity of Operations Plan for Will County to ensure that essential functions of Will County and its Protect and secure life and property.

Goal #2 - Continue to improve and enhance county-wide emergency management programs and develop relationships county-wide.

Goal #3 - Ensure economic stability, preserve cultural resources, and improve quality of life throughout Will County.

Goal #4 - Dcommunities can be performed and are not interrupted during an emergency or disaster. The Continuity of Operations Plan will identify alternate facilities, delegations of authority, orders of succession, and notification and check-in procedures.

Develop and/or support a business contingency organization, such as the Great Lakes Partnership. Secure chambers of commerce and business associations' support and identify potential business participants. Develop a forum to educate, provide technical assistance, and encourage development of business continuity plans.

Jurisdictions: Will County EMA, Jurisdictional EMAs and Staff

Lead: Will County EMA and Center for Economic Development

Funding: Operating Budgets and Private Funds

Timeline: Short-term/Ongoing

Mitigation Action #24:	Develop a drought contingency plan that educates the public on water saving techniques and identifies criteria/triggers for drought related actions.
Goals Addressed:	Goal #1 - Protect and secure life and property. Goal #3 - Ensure economic stability, preserve cultural resources, and improve quality of life throughout Will County.
Problem/Opportunity:	In the summer of 2005, Will County experienced a severe drought that created severe hardships on the farming community throughout the County. A drought contingency plan can help anticipate the needs and actions to take during future droughts. Additionally, public education on water saving techniques and identifying criteria/triggers for drought for implementing drought response measures can help minimize problems during droughts.
Implementation Strategy:	Leverage the experience of the 2005 drought to develop a county-wide drought contingency plan and public education for future events.
Jurisdictions:	Will County EMA and Jurisdictional EMAs and Staff
Lead Agency:	Will County EMA
Funding:	US Department of Agriculture and Operating Budget
Timeline:	Long-term

Mitigation Action #25:	Develop a "Post-Disaster Recovery" ordinance and planning document to prepare communities for an orderly recovery operation.
Goals Addressed:	Goal #1 - Protect and secure life and property. Goal #2 - Continue to improve and enhance county-wide emergency management programs and develop relationships county-wide. Goal #3 - Ensure economic stability, preserve cultural resources, and improve quality of life throughout Will County. Goal #4 - Develop, promote, and integrate mitigation actions.
Problem/Opportunity:	Post-disaster recovery is an arduous process that can have a heavy toll on communities. Disasters can often destroy the community's fundamental markets. Disasters can also create a severe loss of income, unemployment, a disruption of life, a reduction in property values, and cause communities to fail. A quick and orderly recovery process is essential to ensure a community's future. A post disaster recovery ordinance regulates repair activity, generally depending on property location. It prepares a community to respond to a disaster in an orderly fashion by requiring citizens to: 1) obtain permits for repairs, 2) refrain from making repairs, or 3) make repairs using standard methods. A post disaster recovery plan outlines the roles and responsibilities during the recovery efforts, identifies needs for debris management operations, incorporates pre-identified mitigation measures, and integrates other mechanisms to adequately manage the local recovery efforts of a disaster.
Implementation Strategy:	Educate public officials on the need for a "Post Disaster Recovery" ordinance by citing past examples of where lack of ordinances restricted recovery efforts and where ordinances expedited the recovery process. Develop and pass a Post Disaster Recovery ordinance. Develop a county-wide Post Disaster Recovery Plan that integrates other county-wide emergency planning doctrine.

	Pass the ordinance.
Jurisdictions:	Will County Board, Will County EMA, and Jurisdictional Boards/Councils, EMAs and Staff
Lead Agency:	Will County EMA
Funding:	Operating budget, DHS – EMPG, FEMA – HMGP, and IEMA 404 Mitigation funds
Timeline:	Long-term

Mitigation Action #26: Implement and conduct surveillance programs to identify or mitigate emerging public health emergencies. Develop partnerships and coordinate emergency plans with public and private sectors to effectively prepare, mitigate, respond, and recover from public health emergencies.

Goals Addressed:

Goal #1 - Protect and secure life and property.

Goal #2 - Continue to improve and enhance county-wide emergency management programs and develop relationships county-wide.

Goal #3 - Ensure economic stability, preserve cultural resources, and improve quality of life throughout Will County.

Goal #4 - Develop, promote, and integrate mitigation actions.

Problem/Opportunity: If left unchecked, various diseases or environmental conditions can result in widespread illness and threats to life. Public health emergencies can occur as a result of natural, technological and societal hazards. Systems for surveillance and communication are required to identify public health emergencies and warn the public of potential threats to life. Along with surveillance, public health programs must be in place to prevent or mitigate occurrences. Partnerships with private and public sectors are necessary to coordinate plans, educate the public, and implement emergency plan strategies.

Implementation Strategy: Maintain and enhance emergency plans that address public health hazards and partnerships with public and private sectors to implement emergency plans that safeguard lives and enhance healthy lifestyles.

Jurisdictions: Will County Health Department and EMA
Lead Agency: Will County Public Health Department
Funding: CDC, HRSA, and Operating Budget

Timeline: Long-term / Ongoing

CHAPTER 7: MITIGATION PLAN MAINTENANCE

Will County and the participating jurisdictions and communities will ensure that goals, objectives, and action items described in this document will remain relevant by maintaining, monitoring, evaluating, and updating the *Will County County-Wide All Hazard Mitigation Plan*.

Monitoring, Evaluation, and Updating the Plan

To assure that the All Hazard Mitigation Plan continues to provide an appropriate path for risk reduction throughout the County, it is necessary to regularly evaluate and update it. The participating jurisdictions throughout the County would like to make mitigation a more predominant component of emergency management activities. The communities of Will County will call on the Hazard Mitigation Steering Committee to convene on an annual basis to determine the progress of the *Will County County-Wide All Hazard Mitigation Plan*. The Committee involved in producing this original plan will be invited to be an active participant in the plan update. As the *Will County County-Wide All Hazard Mitigation Plan* matures, new stakeholders will be identified to join the existing Committee.

Will County EMA is responsible for contacting committee members and organizing the annual meeting. The committee will be responsible for:

- Re-assessing hazards and risks to ensure emerging hazards are identified and addressed.
- Annually reviewing each goal and objective to determine its relevance to the changing situation.
- Monitoring and evaluating the mitigation strategies in this plan to assure that the document reflects current hazard analyses, development trends, code changes and risk analyses and perceptions.
- Assuring the appropriate implementation of the 5-year action plan, described below. The committee will hear progress reports from the parties responsible for the various implementation actions to monitor progress.
- Creating future action plans and mitigation strategies. These should be carefully assessed and prioritized using benefit-cost analysis (BCA) methodology that FEMA has developed. More information about FEMA's BCA is provided in Appendix G.

- Assuring a continuing role for public comment and involvement as the mitigation plan evolves.
- Reassessing the plan in light of any major hazard event. The Committee will convene within 45 days of any major event to review all applicable data and to consider the risk assessment, plan goals, objectives, and action items given the effects of the hazard event. Applicable hazard-dependent action items, which are listed below, should be implemented at that time.
- Review the hazard mitigation plan in connection to other plans, projects, developments and other significant initiatives.
- Coordinate with internal departments, neighboring municipalities, and local authorities to incorporate regional initiatives that transcend the boundaries of the County.
- Update the plan every five years and submit to IEMA for FEMA approval.

The Five-Year Action Plan

This section outlines the implementation agenda that the Hazard Mitigation Steering Committee should follow for the five years following adoption of this plan.

The mitigation action items summarized in Chapter 5 from pages 5-7 through 5-12 have been identified based on input from the Committee and other participants. More information about each of the items listed can be found in Chapter 6 and identifies the risks they address and their potential to reduce loss. The benefit to cost was not done for the mitigation strategies listed in this plan. Rather, this analysis using the Department of Homeland Security / Federal Emergency Management Agency (DHS/FEMA) approved Benefit Cost Methods shall be used at the time of a given strategy's development and implementation. The decision to do the benefit to cost to analysis at the time of a strategy's development is due to the fact of the unknown variables for each listed strategy. The Hazard Mitigation Steering Committee will consider the following an action plan for the 5-year planning cycle.

Criteria for Evaluation

In addition to implementing the action plan described above, the Hazard Mitigation Steering Committee will be responsible for evaluating the plan. One of the first tasks of the committee will be to determine the criteria to be used for evaluation of the plan. Included among these criteria should be:

- Are the goals and objectives still relevant?
- Is the risk assessment still appropriate, or has the nature or magnitude of the hazard and/or vulnerability changed over time?
- Are current resources appropriate for implementing this plan?
- Have lead agencies participated as originally proposed?
- Have outcomes been adequate?
- What problems have occurred in the implementation process?
- Have members of the public been adequately involved in the process? Are their comments being heard?

Implementation through Existing Programs

The communities of Will County have recognized the importance of incorporating hazard mitigation practices within existing plans, projects, and programs. The Committee will strive to involve all jurisdictions and departments, as well as local non-participating jurisdictions and neighboring counties to find mitigation opportunities with existing or planned projects and programs. To execute this, Will County EMA will provide strategic outreach to coordinate activities and implement mitigation actions that meet the goals and objectives identified in this plan.

Some of the mitigation strategies suggested are more accurately defined as preparedness, response, and recovery actions. Although a hazard mitigation plan is to address mitigation actions, participating jurisdictions recognize the importance of integrating overlapping functions into all phases of emergency management. The preparedness, response, and recovery actions identified support the goals and objectives of this plan. Emergency management agencies throughout the County recognize that DHS/FEMA mitigation funds may not be used to fund these actions. However, these actions are considered important in achieving the overall goals and objectives of this plan.

In recent years, the financial resources for mitigation activities have declined with the reduction in funds for the Pre-Disaster Mitigation Program and the hazard mitigation grant program. The jurisdictions of Will County intend on leveraging DHS initiatives into mitigation actions in order to ensure efficiency in public funding. The 2006 *Emergency Management Performance Grants – Program Guidance and*

Application Kit states that "emergency managers at all levels should leverage all available funding and resources from multiple sources wherever possible…(and)…should not restrict their activities to only Federal funding to achieve the goals outlined within their strategies. Rather, special attention should be given to leveraging relevant funding sources and resources that support"… mitigation activities. [1]

DHS' Interim National Preparedness Goal (INPG) lends itself the opportunity to be integrated into *Will County County-Wide All Hazard Mitigation Plan*. The seven national priorities as identified by DHS consist of:

- Implement the National Incident Management System and National Response Plan
- Expand regional collaboration
- Implement the Interim National Infrastructure Protection Plan
- Strengthen information sharing and collaboration capabilities
- Strengthen interoperable communications
- Strengthen CBRNE detection, response, and decontamination capabilities
- Strengthen medical surge and mass prophylaxis capabilities

In addition to these priorities, DHS also initiated an additional national priority which was a result of 2005 Hurricane Katrina.

- Strengthen emergency operations planning and citizen capabilities.

Continued Public Involvement

Although the Disaster Mitigation Act of 2000 requires local governments to only address natural hazards, the County thought it was imperative to address all hazards, including technological and societal hazards. Despite the security issues, public involvement is critical to the success of any strategic planning process, including hazard mitigation. It is important for hazard mitigation plans to target concerns, comments, and perception of risk as factors in the creation of mitigation strategies. To facilitate the goal of continued public involvement in the planning process, the Committee will assure that the following steps are taken:

---

[1] "The Subcommittee on Economic Development, Public Buildings, & Emergency Management Hearing on The National Preparedness System: What are we preparing for?" April 14, 2005. http://www.house.gov/transportation/pbed/04-14-05/04-14-05memo.html

- The public will be directly involved in the update and review of the plan as members of the All Hazard Mitigation Planning Committee.
- Copies of the plan will be catalogued and kept on hand at appropriate agencies throughout the County. Will County EMA will also post portions of the plan on Will County EMA maintained websites. Sensitive information on technological and political hazards will be "For Official Use Only – Not for Public Distribution".
- Will County EMA will initiate a forum to educate public officials, jurisdiction officials, and the public on hazard mitigation.
- A meeting with jurisdictions will be held annually to provide the public with a forum for discussing concerns, opinions, and ideas with the All Hazard Mitigation Steering Committee.

APPENDIX A

RESOLUTION OF ADOPTION

RESOLUTION OF ADOPTION

RESOLUTION

ADOPTING THE EMERGENCY MANAGEMENT
COUNTYWIDE ALL-HAZARDS MITIGATION PLAN, JULY, 2008 EDITION

WHEREAS, The County of Will, in conjunction with its municipalities, desires to minimize the impacts caused by disasters; and,

WHEREAS, the process of identifying hazards, risks, and mitigation opportunities is an important part of the County's Emergency Management posture; and,

WHEREAS, County, municipal, and other governmental agencies and organizations have participated in this process in order to develop a Countywide All-Hazards Mitigation Plan; and,

WHEREAS, the County of Will originally adopted an initial Plan in 2006; and,

WHEREAS, the Plan requires periodic review and revision in order to reflect the changing needs of the County and to ensure continued compliance with the Federal Disaster Mitigation Act of 2000; and,

WHEREAS, maintenance of the plan in accordance with Federal mitigation planning requirements will ensure that the County of Will and participating municipalities may remain eligible for Federal pre-disaster and post-disaster mitigation funds; and,

WHEREAS, municipalities in Will County that have participated in the development of the Plan and that adopt the Plan by municipal resolution may also fulfill their mitigation planning requirements. Now, therefore, be it

RESOLVED, that the Countywide All-hazards Mitigation Plan, July, 2008 Edition be adopted by the County of Will. And, be it further

RESOLVED, that this resolution be made part of the Plan.

Adopted by the Will County Board this 21st day of August, 2008

Vote: Yes ______ No ______ Pass ______

(SEAL) ________________________________
Nancy Schultz Voots
Will County Clerk

Approved this _______ day of August, 2008. ________________________________
Lawrence M. Walsh
Will County Executive

APPENDIX B

HAZARD MODELING

November, 2013

Will County Hazard Risk Assessment Overbank Flooding Results

Disclaimer:
The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software and which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific hazard. This analysis is intended to provide conceptual information that can be used to identify mitigation opportunities. These information.

January 6, 2006

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The Polis Center
We bring things into perspective.[SM]

Overbank Flood Hazards

The HAZUS-MH Flood Model determines the flood risk to a community based on nationwide GIS data sets. The model allows users to characterize flood levels and estimate the expected amounts of damage to buildings and infrastructure as well as the amount of displaced population, shelter requirements, and a variety of other outputs. The FEMA Flood Insurance Rate Maps (FIRM) indicate that most of Will County's built environment is outside of the Base Flood Elevation area. The Base Flood Elevation (BFE) is defined as the area that has a 1% chance of flooding in any given year. Overbank flooding of Will County was modeled using FEMA's GIS-based HAZUS-MH risk assessment application. The flood hazard modeling was based on areas that are potentially vulnerable to flooding as indicated on the digital flood maps provided by Will County.

Review Existing Information

Existing maps were used to identify the areas of study. Will County has digitized copies of the hardcopy FEMA Flood Insurance Rate Maps (FIRMS). Hydrologic analysis was performed for all reaches identified in the Will County flood GIS data.

Analysis

The HAZUS-MH Flood model can be used in a variety of ways for the purpose of predicting flooding and assessing the impacts of that flooding. Model options range from having HAZUS perform all necessary hydrologic and hydraulic calculations based solely upon a user provided digital elevation model to integrating selected output from other flood models for the purpose of developing what are typically more accurate flood depth grids.

The analysis conducted for Will County used two different approaches that took advantage of the capabilities of the HAZUS model. In both cases, we studied the potential impacts of overbank flooding along the Calumet River which were based upon the Base Flood Elevation (BFE) defined on the flood maps for that area. The BFE is defined as the area that has a 1% chance of flooding in any given year. For the first type of analysis we applied a level 2 methodology which used discharges from the Will County FEMA Flood Insurance Study, Revised March 2003. This study utilized discharges for streams studied in detail.

For the second type of HAZUS-MH analysis, a Level I methodology was applied for the remaining flood prone stream segments. A Level I methodology performs the entire hydrologic and hydraulic analysis based upon a user provided digital elevation model. For this project we used the elevation model obtained from Will County. This digital elevation model consists of elevation points at approximately 1 meter intervals.

Assumptions:

HAZUS generates a combination of site specific and aggregated loss estimates depending upon the analysis options that are selected and upon the input that is provided by the user. Aggregate inventory loss estimates – which include building stock analysis - are based upon the assumption that building stock is evenly distributed across census blocks. Therefore, it is possible that overestimates of damage will occur in some areas while underestimates will occur in other areas. With this in mind, total losses tend to be more reliable over larger geographic areas than for individual census blocks.

Site specific analysis is based upon loss estimations for individual structures. Analysis of site specific structures takes into account the depth of water in relation to the structure. It also takes into account the actual dollar exposure to the structure for the costs of building reconstruction, content, and inventory. However, damages are based upon the assumption that each structure falls into a structural class – for example, small versus large hospitals - and that structures in each class will respond in similar fashion to a specific depth of flooding. Site specific analysis is also based upon a point location rather than a polygon and therefore the model does not account for the percentage of a building that is inundated. These assumptions suggest that the loss estimates for site specific structures as well as for aggregate structural losses need to be viewed as approximations of losses that are subject to considerable variability rather than as exact engineering estimates of losses to individual structures.

Results

The total economic loss is included in Table 1 and depicted by census block in Figures 1 and 2. The majority of the estimated building losses, 88%, were related to flooding of residential structures. As expected, the majority of the flood damage occurs in the western half of the county in the urban areas near the City of Joliet. Figures 3, 4, and 5 include five flood prone areas with orthophotos the HAZUS-MH calculated flood boundary (in red), Will County digitized flood map boundary (in blue), and census block outlines (in black) shown. These census blocks have the highest calculated economic losses. These 9 census blocks had estimated total losses exceeding $6 million each**.** The two census blocks in Figure 3 are located near Route 59 in the Village of Plainfield, and are impacted by flooding from the DuPage River. Figure 4 shows a census block in Joliet near the intersection of I-55 and Caton Farm. A number of the residential units are within both the digitized and calculated flood boundary areas, and are also impacted by flooding from the DuPage River. Figure 5 census blocks are located on the banks of the Kankakee River NW of Lorenzo near County Line Road and Blodgett.

Table 1. Will County Total Economic Loss - 100-Year Flood

General Occupancy	Estimated Total Buildings	Total Damaged Buildings	Total Building Exposure X $1,000	Total Economic Loss X $1,000	Building Loss X $1,000
Commercial	1,004	6	$2,549,025	$100,806	$10,482
Education	20	0	$230,858	$14,191	$405
Government	37	0	$47,902	$32,956	$708
Industrial	246	0	$772,712	$10,495	$3,162
Religious/Non-Profit	36	0	$132,948	$3,608	$119
Residential	147,744	1,485	$27,315,338	$179,631	$114,572
Total	**149,087**	**1,491**	**$31,048,783**	**$341,687**	**$129,448**

Note: The estimated total buildings number is a calculated value based on total square footage of damage in each census block. For a given census block damage, the number of buildings can equal 0 and incur damage if the total square footage of damage does not add up to one equivalent structure.

***Building Losses (see above table)**
Building losses (structural and non structural repair costs for damaged and destroyed buildings)
Content Losses (Costs of damage to building contents)
Inventory losses (Losses of building inventory contents related to business activities)

***Total Economic Losses (see above table)**

Building losses
Wage losses (consistent with income loss)
Capital-related income losses (a measure of the loss of productivity, services or sales)
Rental income losses (to building owners)
Relocation expenses (for businesses and institutions)

Figure 1. Will County Total Economic Loss – 100-Year Flood

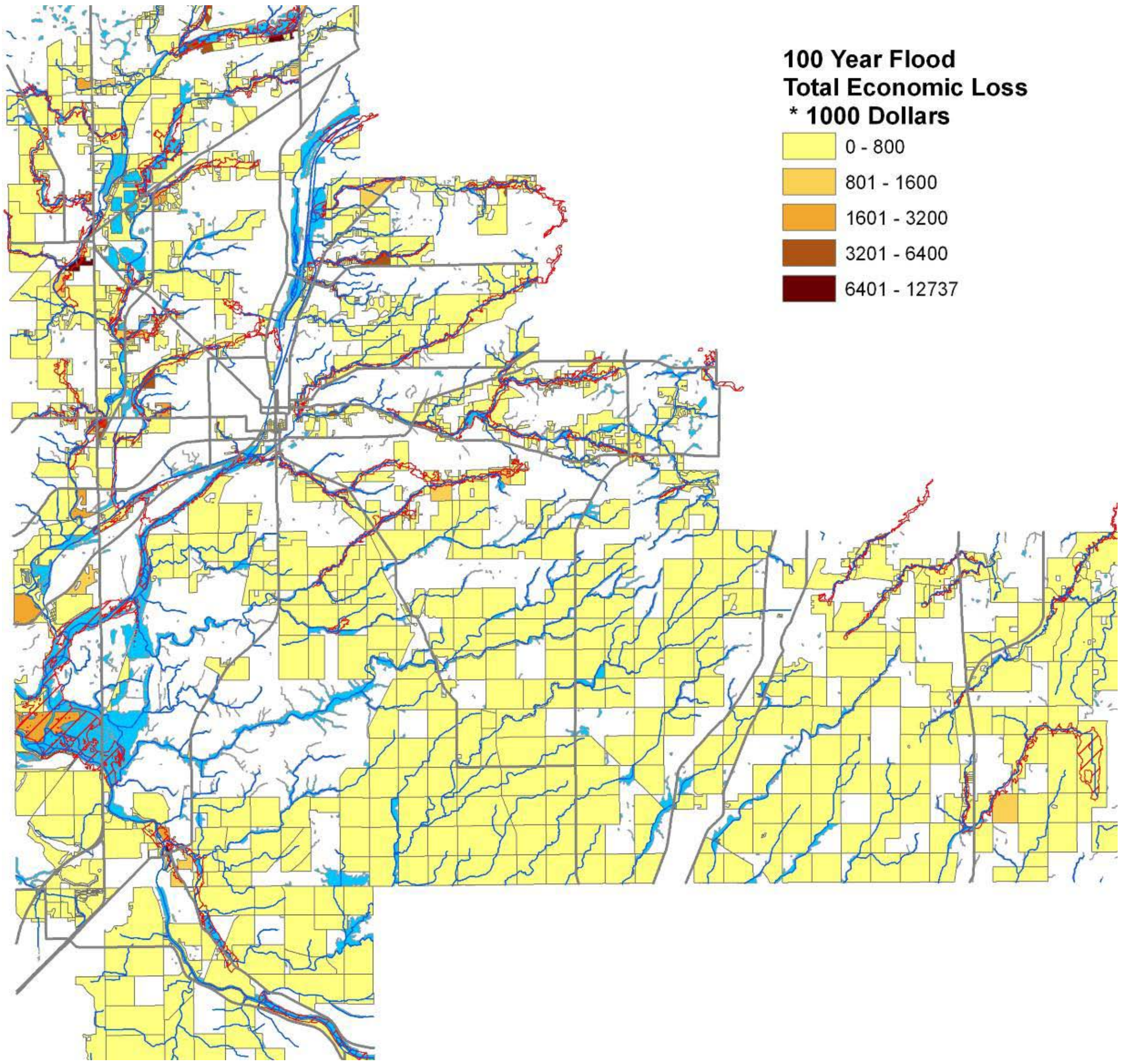


Figure 2. Will County Urban Areas (Joliet) Total Economic Loss - 100-Year Flood

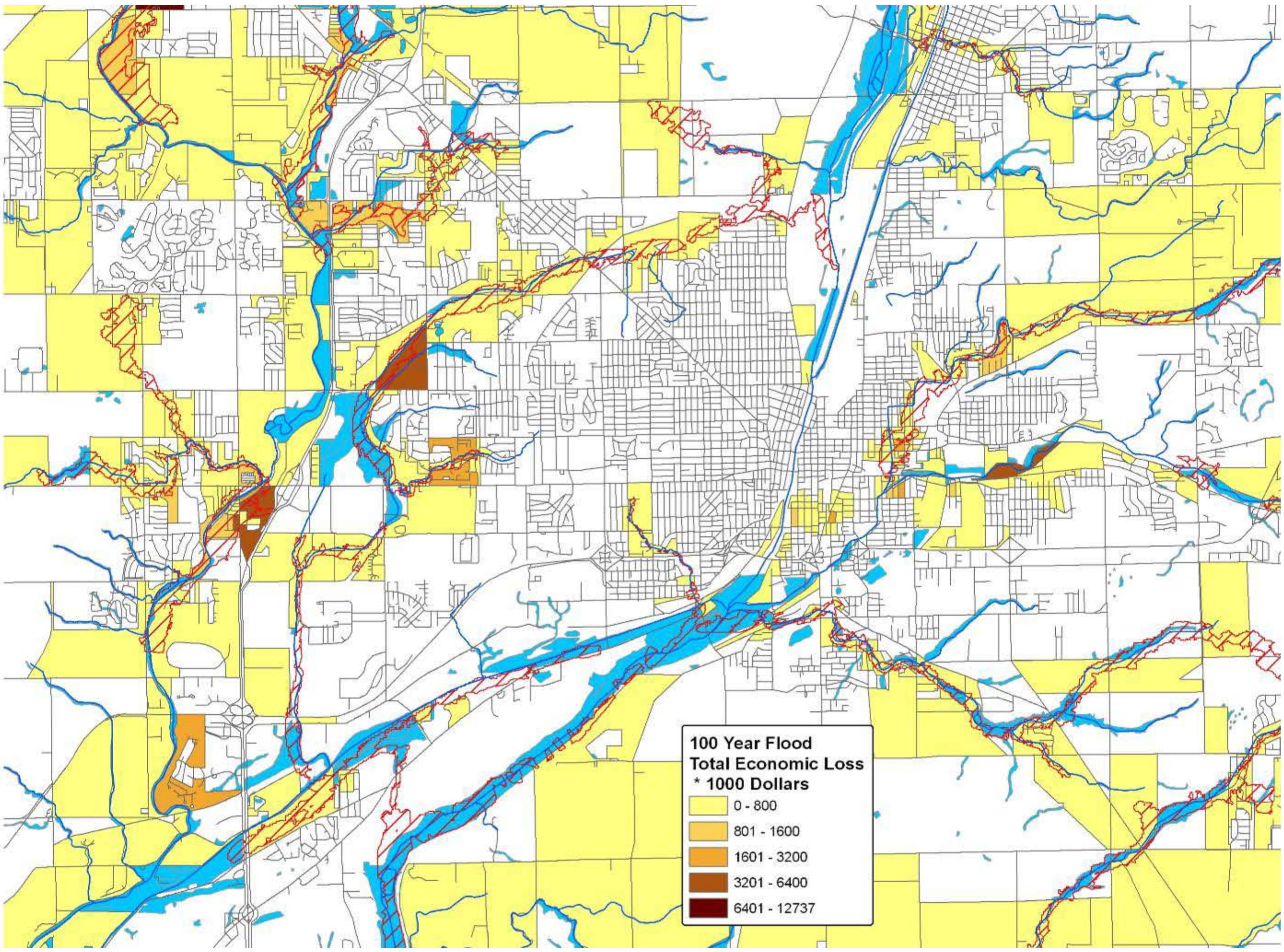


Figure 3. Detail census blocks (Plainfield) identified as having significant damage

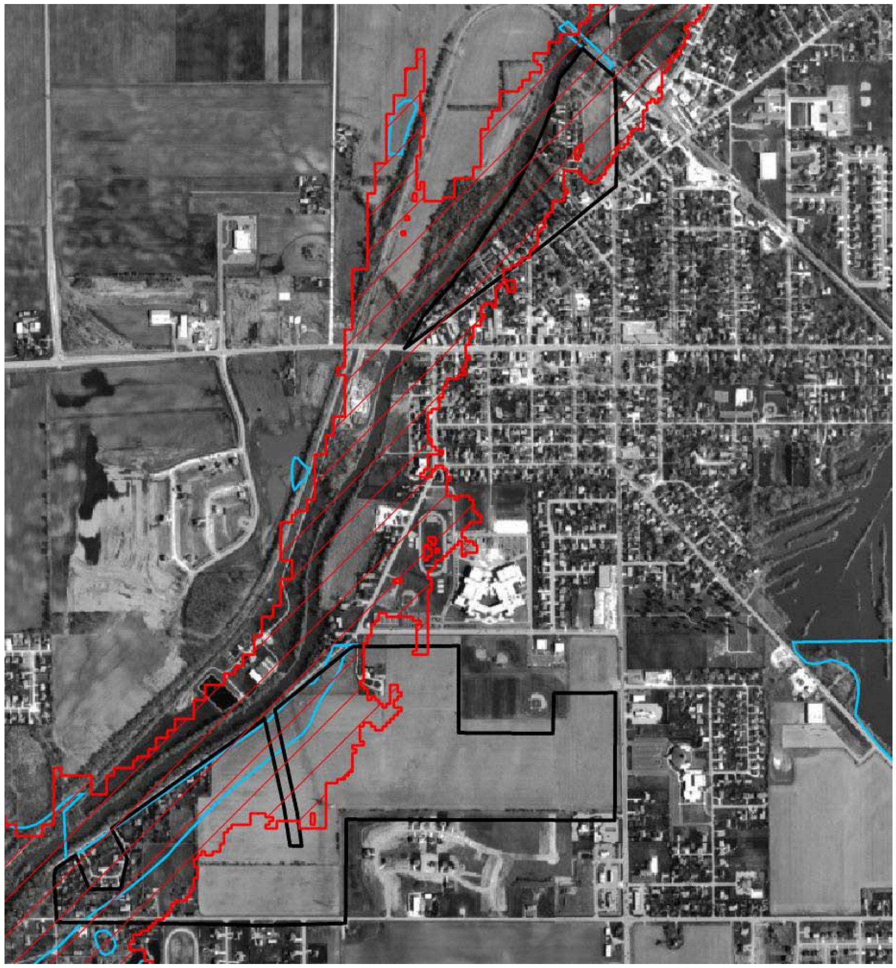


Figure 4. Detail census block (Joliet) identified as having significant damage

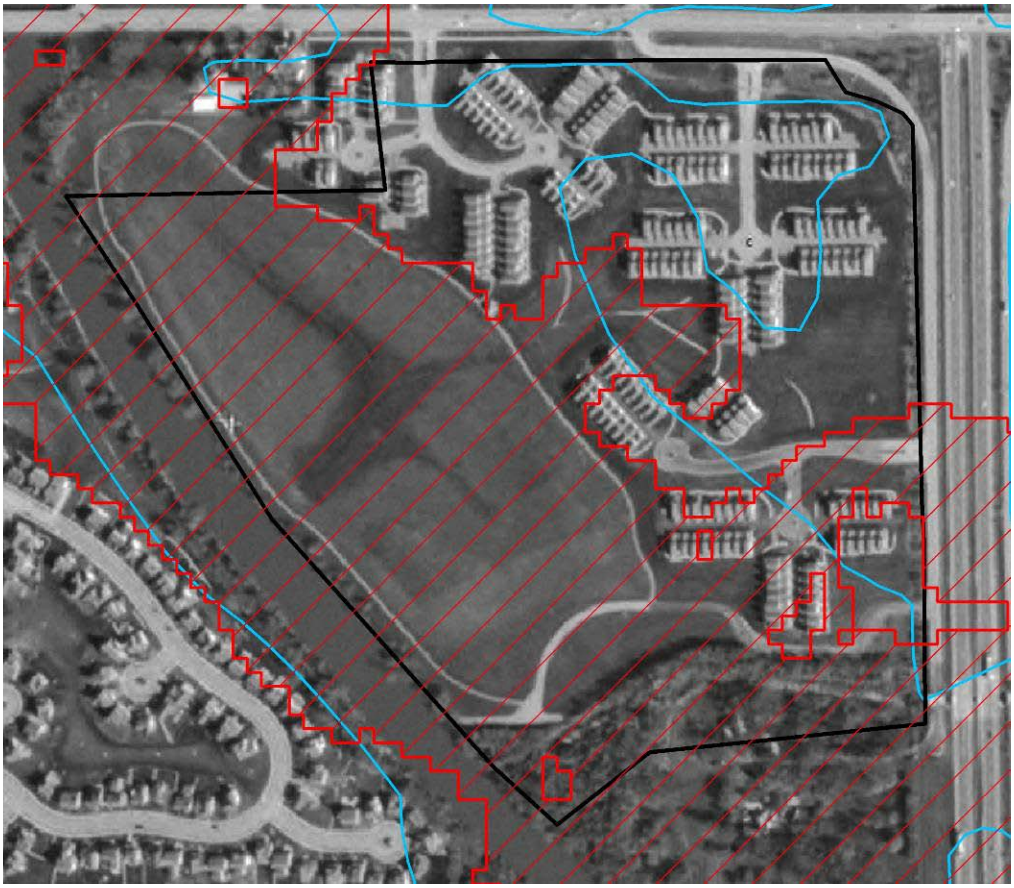
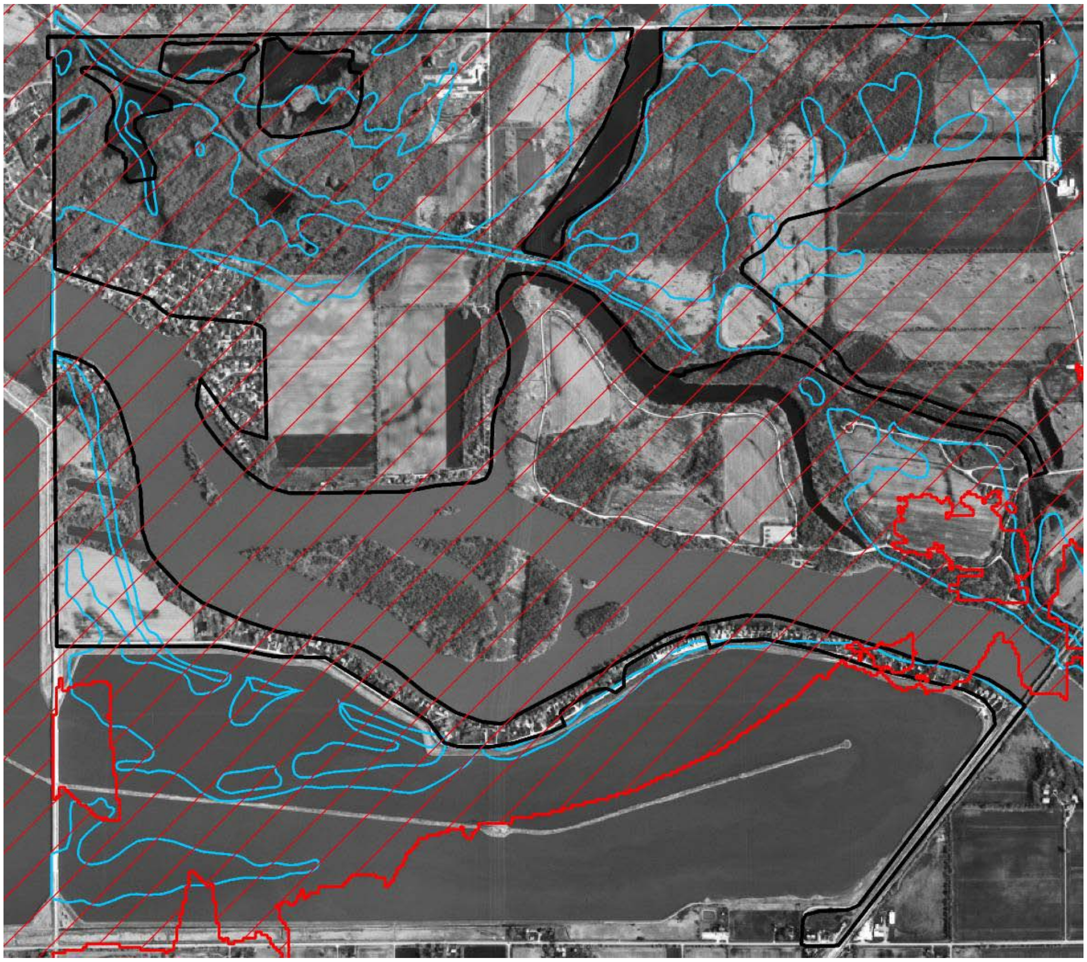


Figure 5. Detail census blocks (Lorenzo) identified as having significant damage



Essential Facility Losses

The HAZUS analysis identified essential facilities that may be subject to flooding. These are identified in table 2. An additional analysis was performed to identify essential facilities within the digitized flood map boundaries. This analysis identified Joliet FD #4, Crete Township FPD #2, Custer Park FPD, Liberty Elementary, and Three Rivers School as possibly prone to flood damage.

Table 2. Will County Essential Facilities – 100-Year Flood

TYPE	NAME	ADDRESS	HAZUS_ID
Fire Stations	Beecher FPD #1	711 Penfield St	IL001022
Fire Stations	Channahon FPD #1	24929 S Center St	IL001029
Fire Stations	Crete Township FPD #2	25048 S Klemme Rd	IL001056
Fire Stations	Custer Park FPD	21750 Highway 113	IL001031
Fire Stations	Joliet FD #3	319 Grover St	IL001063
Fire Stations	Joliet FD #4	868 Draper Ave	IL001062
Fire Stations	Joliet FD #8	2293 Essington Rd	IL001058
Schools	B Noonans Child Care (Lockport)	947 Division St	IL005440
Schools	Crete-Monee Alt. Prgm. CAP JR/CAP	1500 Sangamon St	IL005368
Schools	Crete-Monee Ed. Center	1500 Sangamon St	IL005367
Schools	Liberty Elem.	1401 Essington Rd	IL005375
Schools	Shorewood	210 School Rd	IL005291
Schools	Three Rivers	24150 S Minooka Rd	IL005286

Will County Hazard Risk Assessment
Historical Tornado Scenario Results

Disclaimer:
The estimates of social and economic impacts contained in this report were produced using limited GIS and HAZUS loss estimation data. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific hazard. This analysis is intended to provide conceptual information that can be used to identify mitigation opportunities. These results can be improved by using enhanced inventory data and h

January 9, 2006

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The Polis Center
We bring things into perspective.[SM]

Tornado Hazards

GIS analysis was utilized to determine the impacts of the 1990 Plainfield, Illinois F4 tornado that skipped through Will County during mid afternoon. Although the track of this tornado was identified, detailed information on the area damaged could not be determined. HAZUS-MH data, updated with GIS data provided by Will County, was utilized to identify structures within the damaged area. The potential loss from this event was projected based on today's built environment and in today's economy.

Review Existing Information

GIS analysis was used to determine the potential impacts of an F4 tornado similar to the 1990 tornado, the path of which was determined from a map provided in the 2003 Will County Hazard Analysis. The tornado path is shown in Figure 1.

This analysis used tornado widths determined by the Fujita-Pearson Tornado Rating scale. These tornado widths were based on guidelines developed by Impact Forecasting, a wholly owned subsidiary of Aon Corporation. It should be noted that these numbers and descriptions are just guidelines and are based on conceptual wind speeds, path widths, and path lengths. There is no guarantee that every tornado will fit exactly into one of these six categories. Table 1 is a recreation of the Fujita-Pearson Number table developed by Impact Forecasting.

Figure 1: Historical tornado path

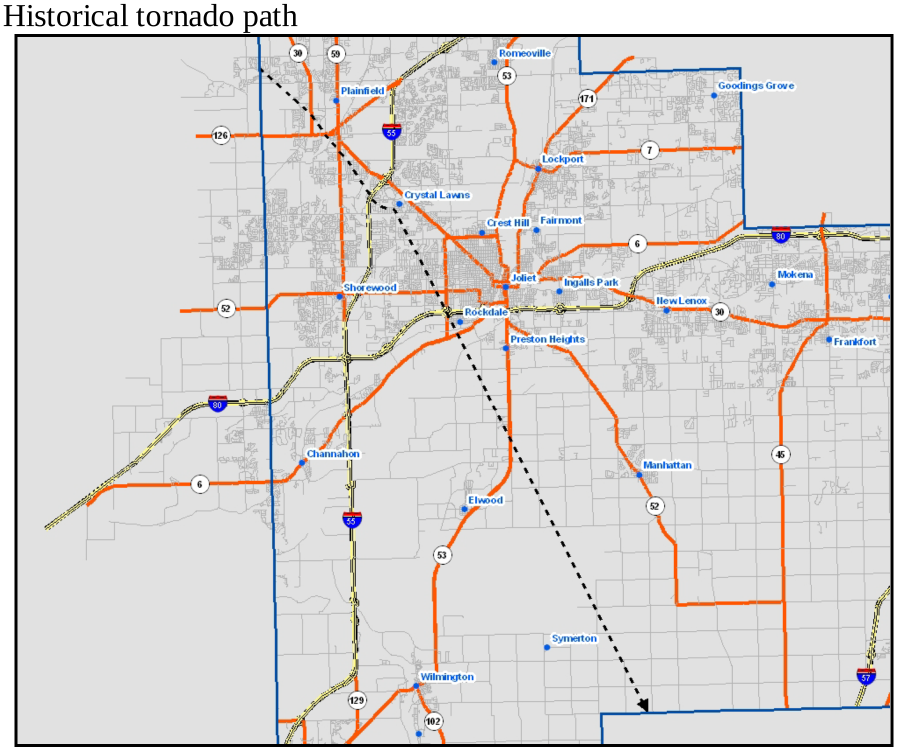


Table 1: Fujita-Pearson Tornado Rating

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

Analysis

According to the Impact Forecast methodology, a F4 tornado will have a width of 0.3 to 0.9 miles. The Fujita-Pearson scale describes the impact as “Complete damage, well-constructed houses leveled, structures with weak foundations blown off for some distance, large missiles generated.” Once the historical path was digitized, two buffers were created. The first was 0.3 miles in width (the yellow buffer) and the second was 0.9 miles in width (the orange buffer).The buffers are depicted in Figure 2.

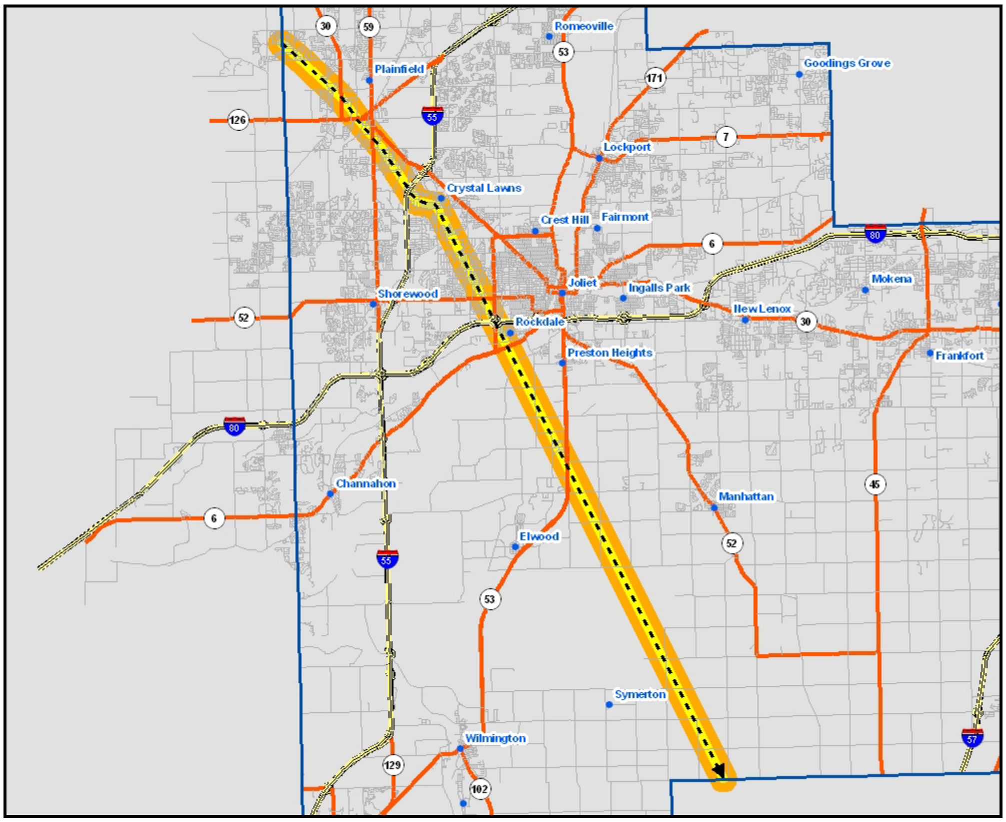
The 2000 Census Block layer that is provided with HAZUS was then added to ArcMap. For each of the two buffers, HAZUS-MH data consisting of the 2000 Census Block layer, the building count layer, and the building dollar exposure were “clipped” thus creating two new layers, each one the same geometric size and shape as the buffer. For each of these new layers, the shape’s area field was updated.

A field was added to the table to denote the percentage of each Census Block that fell inside the buffer. To populate this field, the area of each clipped Census Block was divided by the area of the original Census Block. The percentages were then multiplied by the original building count, exposure, and population values.

Assumptions:

- It was assumed that all buildings and population were evenly distributed across each census block. Thus, if 50% of a census block fell within the buffer area, it was assumed that 50% of the structures and population also fell within that area.

Figure 2: F4 tornado path and buffer



Results

The results of the analysis are depicted in Tables 2, 3, and 4. The figures for exposure are an estimate of building replacement costs and assume the buildings are completely destroyed.

Table 2 shows the estimated building damage by type and dollar loss within 0.3 miles of the tornado path. An estimated 2,413 buildings would be damaged, totaling over 574 million. Of the buildings damaged, 2,368 are residential structures, totaling almost 486 million.

Table 3 shows the estimated building damage by type and dollar loss within 0.9 miles of the tornado path. An estimated 6,718 buildings would be damaged, totaling almost 1.6 billion. Of the buildings damaged, 6,590 are residential structures, totaling over 1.3 billion.

Table 4 shows the estimated number of people affected. Within 0.3 miles of the tornado path, there would be almost 9,000 people. Within 0.9 miles of the tornado path, there would be over 23,000 people.

It is important to note that these estimates are based on an area weighted analysis. In this analysis it was assumed that all buildings and population were evenly distributed across each census block. Thus, if 50% of a census block fell within the buffer area, it was assumed that 50% of the structures and population also fell within that area. In reality, the actual number of buildings and people could be much higher or lower than estimated.

Table 2: Estimate of Damage within 0.3 Miles

Occupancy Type	Building Counts	Exposure (thousands of dollars)
Residential	2,368	485,896
Commercial	44	77,249
Industrial	1	6,901
Agriculture	0	276
Religious	0	1,956
Government	0	58
Education	0	2,015
Total	2,413	574,351

Table 3: Estimate of Damage within 0.9 Miles

Occupancy Type	Building Counts	Exposure (thousands of dollars)
Residential	6,590	1,319,027
Commercial	115	218,931
Industrial	9	28,020
Agriculture	0	1,296
Religious	2	12,143
Government	2	3,070
Education	0	4,414
Total	6,718	1,586,901

Table 4: Estimated Number of People Affected

Distance	Within 0.3 Miles	Within 0.9 Miles
Population	8,638	23,341

Essential Facilities Damage

Within 0.3 miles of this historical tornado path, there is one care facility, one fire station, and four schools. The name, address, and HAZUS ID of these facilities are provided in Table 5. Within the 0.3 to 0.9 miles, there is one emergency center, three fire stations, and eight schools. The name, address, and HAZUS ID of these facilities are provided in Table 6. Based on the Fujita-Pearson Number table, facilities located within 0.3 to 0.9 miles of this tornado path would be completely destroyed. The locations of these facilities in relation to the tornado path and width are depicted in Figure 3.

Table 5: Essential Facilities within 0.3 Miles of Historical Tornado Path

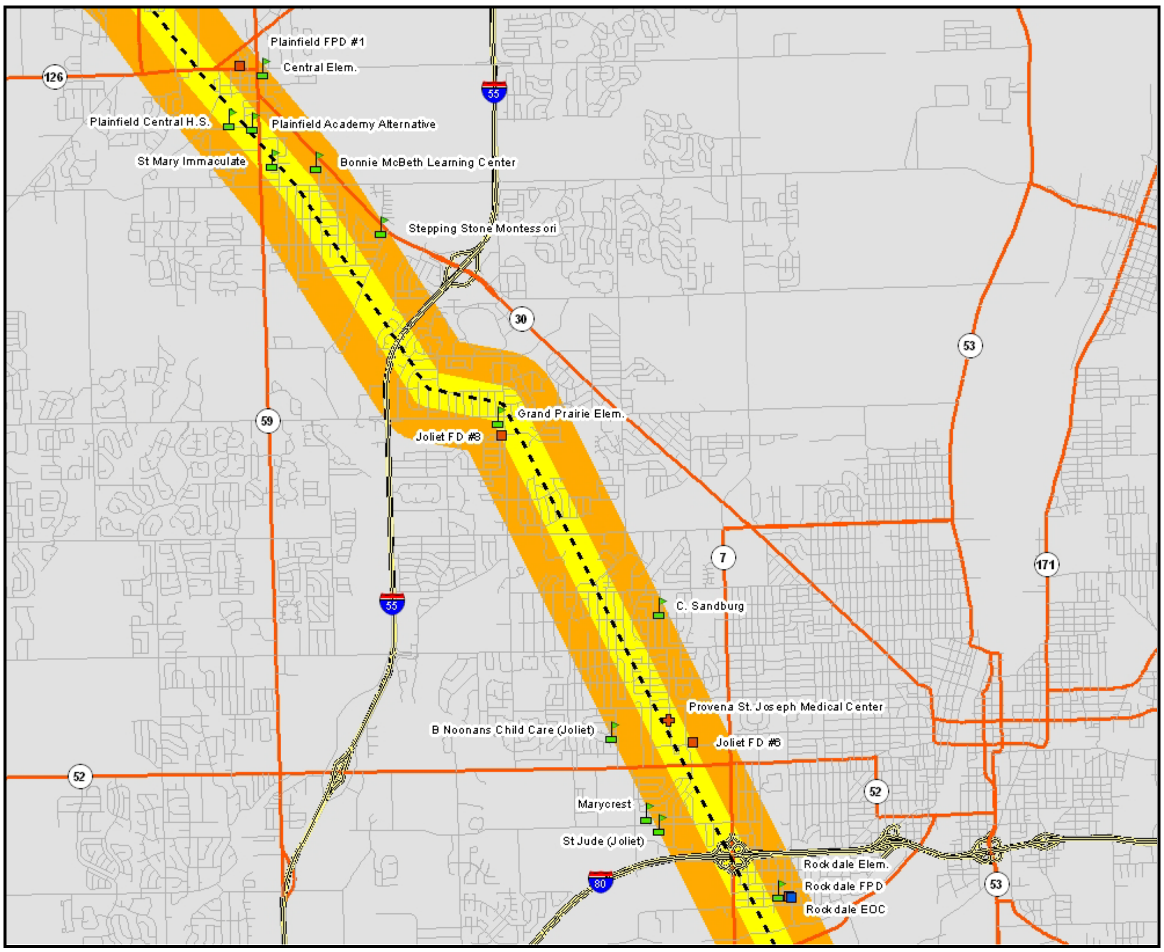
TYPE	NAME	ADDRESS	HAZUS_ID
Care Facilities	Provena St. Joseph Medical Center	333 N Madison St	IL000228
Fire Stations	Joliet FD #8	2293 Essington Rd	IL001058
Schools	Grand Prairie Elem.	3100 Caton Farm Rd	IL005373
Schools	Plainfield Academy Alternative	500 W Fort Beggs Dr	IL005392
Schools	Plainfield Central H.S.	611 W Fort Beggs Dr	IL005389
Schools	St Mary Immaculate	15629 S Route 59	IL005472

Table 6: Essential Facilities within 0.3 to 0.9 Miles of Historical Tornado Path

TYPE	NAME	ADDRESS	HAZUS_ID
Emergency Centers	Rockdale EOC	603 Otis Ave	IL000168
Fire Stations	Joliet FD #6	2049 Oneida St	IL001060
Fire Stations	Plainfield FPD #1	703 N Des Plaines St	IL001011
Fire Stations	Rockdale FPD	603 Otis Avenue	IL001012
Schools	B Noonans Child Care (Joliet)	2504 Fairway Dr	IL005441
Schools	Bonnie McBeth Learning Center	15730 Howard St	IL005377
Schools	C. Sandburg	1100 Lilac Lane	IL005313

Schools	Central Elem.	305 W Lockport St	IL005369
Schools	Marycrest	303 Purdue Ct	IL005309
Schools	Rockdale Elem.	715 Meadow Ave	IL005300
Schools	St Jude (Joliet)	2204 McDonough	IL005467
Schools	Stepping Stone Montessori	23145 W Lincoln Hwy	IL005479

Figure 3: Essential Facilities within Historical Tornado Path Buffer



Will County Earthquake Risk Assessment Results

Disclaimer:
The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software and which is based on current scientific and engineering knowledge. . There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific hazard. This analysis is intended to provide conceptual information that can be used to identify mitigation opportunities. These results can be improved by using enhanced inventory data and hazard information.

January 6, 2006

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We bring things into perspective.℠

Introduction

The CTE team contacted Dr. Robert Bauer of the Illinois State Geological Survey (ISGS) to obtain existing geological information and recommendations for earthquake scenarios. Three earthquake scenarios were developed to provide a reasonable basis for earthquake planning in Will County.

These included one deterministic scenario based upon input from the ISGS. A deterministic scenario is based on a specific event without explicit consideration of the probability of its occurrence. The scenario for this study was based on the June 26, 1909 5.1 magnitude Aurora, Illinois (41.6N 88.1W) earthquake. According to the ISGS web site, this earthquake has been related to the La Salle anticline in the Illinois Basin. During the earthquake, many chimneys fell, a stove overturned, and gas line connections broke at Aurora. Several chimneys were downed at Forreston, Naperville, Streator, Triumph, and Troy Grove, and one fell at Waukegan. Brick walls cracked at Bloomington, and sidewalks cracked and many chimneys were damaged at Freeport. At Platteville, Wis., about 130 km northwest of Chicago, an old building was cracked; houses were jostled out of plumb at Beloit, Wisconsin about 240 km northwest of Chicago.

Additionally, the analysis included two different types of probabilistic scenarios. These types of scenarios are based on ground shaking parameters derived from U.S. Geological Survey probabilistic seismic hazard curves.

The first selected probabilistic scenario was a 500 year return period scenario. This scenario evaluates the average impacts of a multitude of possible earthquake epicenters with a magnitude that would be typical of that expected for a 500 year return period.

The second probabilistic scenario was one that allowed us to calculate an annualized loss. The annualized loss analysis in HAZUS-MH provides a means for averaging potential losses from future scenarios while considering their probabilities of occurrence. The HAZUS-MH earthquake model evaluates 8 different return period scenarios including those for the 100, 250, 500 750, 1000 1500, 2000, and 2500 year return period earthquake events. It then calculates the probabilities of these events as well as the interim events, calculates their associated losses, and sums these losses to calculate an annualized loss. These analysis options were chosen because they are useful for prioritization of seismic reduction measures and for simulating mitigation strategies.

Earthquake hazard modeling scenarios performed consisted of:

- A 5.3 magnitude earthquake in Aurora, Illinois (deterministic scenario)
- 500 year return period event (probabilistic scenario)
- Annualized Earthquake Loss (probabilistic scenario)

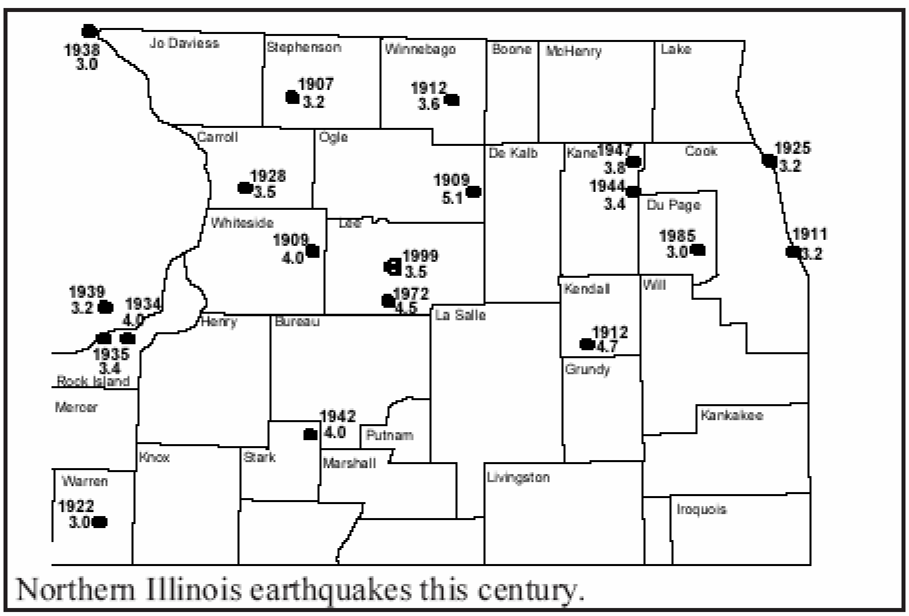
Review Existing Information

The ISGS team desires to model a large magnitude earthquake from the New Madrid fault in order to ascertain the potential impact on high rise structures in the Will County area. However, it was determined that such a model could not be run for the following reasons.

- First, HAZUS-MH will not model earthquakes whose epicenter occurs greater than 200 kilometers from the study region. While it is possible to provide ground motion maps to HAZUS which can then model the impact of such an earthquake event on the exposed inventory, such maps are not available for the Will County region at this time.
- Second, while this study did include updating of selected inventory components; additional detailed building data would be required to model these structures since the default HAZUS building mapping schemes assume all buildings are low-rise (1-3 stories) structures, distributed according to a default classification of structural materials (wood, concrete, steel, etc.) and designed to code. Because of the lack of detailed building data, HAZUS will likely assume greater damage to high rise structures than will realistically be produced given that it will assume that the maximum height of the structures is 3 stories and that the entire assumed exposure to the structures will be contained within that part of the structure

Given the limitations described above, the ISGS recommended modeling a magnitude 5.0- 5.5 earthquake at the location of a historic magnitude 5.1 epicenter in Aurora, Illinois that occurred in 1909. The coordinates of this earthquake were 41.6N 88.1W longitude as shown in the figure 1 below.

Figure1. Earthquakes in Northern Illinois



Northern Illinois earthquakes this century.

Analysis

To model a deterministic scenario, such as the historical event based in Aurora, Illinois, the user must input a variety of parameters. The parameters include the following:

One of the most critical sources of information that is required for accurate assessment of earthquake risk is soils. Unfortunately, NEHRP (National Earthquake Hazards Reduction Program) soil classification maps only exist for the southern portion of Illinois. NEHRP soil classifications portray the degree of shear-wave amplification that can occur during ground shaking. Because of the lack of soils data, the analysis used a default scenario with D class soils.

Dr. Bauer indicated that Will County and the surrounding area do not have a map for liquefaction potential that could be used by HAZUS-MH. However, according to literature, historical (moment magnitude 5.1-5.5) earthquakes should not generate liquefaction and therefore it was determined that no additional effort would be put forth to assess liquefaction potential for this study.

Will County has seasonal water table depths of 2 to 3 meters. These probably should not matter since liquefaction should not be expected with earthquake magnitudes below magnitudes of about 6.5. For the analysis we used a depth to water table of 3 meters. ISGS recommended an earthquake depth of 5.0 kilometers for the deterministic Aurora earthquake. The historical earthquake depths identified by ISGS ranged from 5 to 10 km.

HAZUS-MH also requires the user to define an attenuation (amplitude of the waves) function unless ground motion maps are supplied. Because Will County has experienced smaller earthquakes, ISGS made the decision to use the Toro et al. (1997) attenuation function for calculation of ground motion.

Assumptions:

The probabilistic analysis and the annualized loss analysis do not require user input of the variables listed above. The assumptions of the annualized loss analysis are as follows:

- Census tract-based analyses with the assumption that all aggregate inventory is concentrated at the centroid of the census tract for purposes of performing loss analysis
- HAZUS uses USGS probabilistic hazard maps
- Default soft soil (NEHRP Class D) conditions
- No ground failure effects
- 2000 demographic information
- 2002 square footage data for building occupancies
- 2002 Means Data for Building Replacement Cost
- Building-related economic losses only. Losses to lifelines not included Long term or indirect losses not considered

HAZUS-MH is a planning tool. The application is not intended as a substitute for detailed engineering analysis. The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific hazard event. These results can be improved by using enhanced inventory data and hazard information.

5.3 Magnitude with an Epicenter in Aurora, Illinois

HAZUS-MH Earthquake Risk Module provides estimates of damage and loss to buildings, essential facilities, transportation and utility lifelines, and population based on scenario or probabilistic earthquakes. In addition, the Earthquake Risk Module estimates the debris generated, fire, casualties, and shelter requirements following the disaster. Based on consultation with the Illinois State Geologic Survey, the May 26, 1909 5.1 magnitude earthquake that occurred in near Aurora, Illinois is the best scenario to model with the limitations on available data.

Results:

The results of the initial analysis, the 5.3 magnitude Earthquake with an Epicenter in Aurora, Illinois are depicted in Table 1 and 2 and Figure 1. Table 1 identifies the calculated number of damaged buildings by general occupancy classification. HAZUS estimates that about 12,369 buildings will be at least moderately damaged. This is over 8.00 % of the total number of buildings in the region. There are an estimated 405 buildings that will be damaged beyond repair.

Table 2 represents building economic losses in millions of dollars. The losses include capital losses as well as income losses. A description of the losses is included in the table. The total building-related losses were 1,137.82 (millions of dollars); 6 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 81 % of the total loss.

Figure 1 represents the building economic losses by census tracts in thousands of dollars. Analysis of this figure indicates that the most substantial damage would occur in the north part of the county. This is consistent with the area that is currently developed in the county.

Essential Facility Losses Aurora Event

The HAZUS analysis calculated no essential facility losses for this event. Essential facilities include police stations, fire stations, schools, medical care facilities, and emergency operation centers and are analyzed on a site by site basis.

Table 1 Aurora, Illinois Earthquake 5.3 Magnitude Building Count Damages by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	1	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	701	0.62	164	0.67	106	1.07	30	1.42	4	1.08
Education	14	0.01	3	0.01	2	0.02	1	0.03	0	0.03
Government	27	0.02	5	0.02	4	0.04	1	0.04	0	0.04
Industrial	181	0.16	33	0.13	24	0.24	7	0.33	1	0.18
Other Residential	4,828	4.30	1,034	4.22	518	5.25	90	4.28	15	3.63
Religion	24	0.02	6	0.02	4	0.04	1	0.06	0	0.05
Single Family	106,419	94.85	23,279	94.92	9,206	93.33	1,971	93.85	385	94.99
Total	**112,195**		**24,525**		**9,864**		**2,100**		**405**	

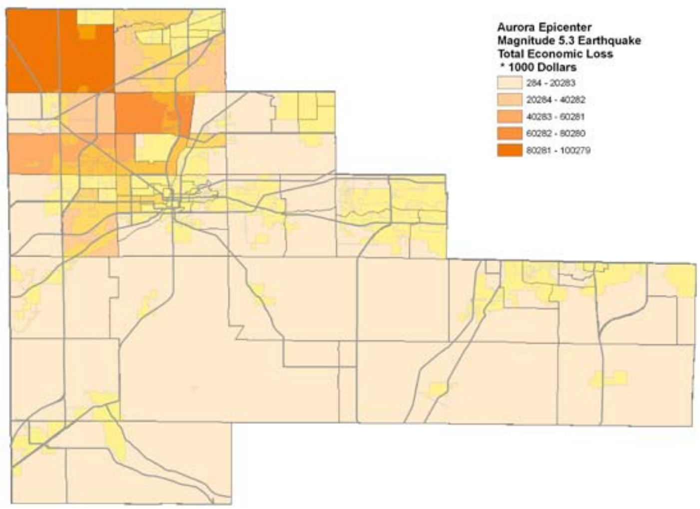
Table 2 Aurora, Illinois Earthquake 5.3 Magnitude Building Economic losses in Millions of Dollars

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Loses							
	Wage	0.00	0.67	13.01	0.68	0.88	15.24
	Capital-Related	0.00	0.29	11.39	0.41	0.26	12.34
	Rental	17.63	8.43	7.78	0.24	0.31	34.39
	Relocation	1.82	0.19	0.43	0.02	0.12	2.58
	Subtotal	**19.45**	**9.58**	**32.61**	**1.36**	**1.56**	**64.55**
Capital Stock Loses							
	Structural	110.65	12.47	19.15	3.58	2.77	148.61
	Non_Structural	464.50	81.47	57.50	16.70	10.38	630.56
	Content	200.61	27.78	40.27	12.71	8.34	289.70
	Inventory	0.00	0.00	1.70	2.63	0.08	4.41
	Subtotal	**775.76**	**121.72**	**118.61**	**35.62**	**21.57**	**1,073.27**
	Total	**795.20**	**131.29**	**151.22**	**36.98**	**23.13**	**1,137.82**

***Income Losses (see above table)**
Wage losses (consistent with income loss)
Capital-related income losses (a measure of the loss of productivity, services or sales)
Rental income losses (to building owners)
Relocation expenses (for businesses and institutions)

*** Capital Stock Losses (see above table)**
Structural losses (structural repair costs for damaged and destroyed buildings)
Non_structural Losses (non structural repair costs for damaged and destroyed buildings)
Content Losses (Costs of damage to building contents)
Inventory losses (Losses of building inventory contents related to business activities)

Figure 1. Aurora Earthquake 5.3 Magnitude Building Economic losses in Thousands of Dollars



500 Year Probabilistic Event

HAZUS-MH Earthquake Risk Module provides estimates of damage and loss to buildings, essential facilities, transportation and utility lifelines, and population based on scenario or probabilistic earthquakes. In addition, the Earthquake Risk Module estimates the debris generated, fire, casualties, and shelter requirements following the disaster. This scenario evaluates the average impacts of a multitude of possible earthquake epicenters with a magnitude that would be typical of that expected for a 500 year return period.

Results:

The results of the 500 year probabilistic analysis are depicted in Table 3 and 4 and Figure 2. Table 3 identifies the calculated number of damaged buildings by general occupancy classification. HAZUS estimates that about 1,524 buildings will be at least moderately damaged. This is over 1.00 % of the total number of buildings in the region. There are an estimated 18 buildings that will be damaged beyond repair.

Table 4 represents building economic losses in millions of dollars. The losses include capital losses as well as income losses. A description of the losses is included in the table. The total building-related losses were 66.46 (millions of dollars); 12 % of the estimated losses were related to the business interruption of the region.

Figure 2 represents the building economic losses by census tracts in thousands of dollars. Analysis of this figure indicates that the majority of damage is predicted to occur in only one census tract in the far northwest part of the county

Essential Facility Losses 2500 Year Probabilistic Event

The HAZUS analysis calculated no essential facilities losses for this event

Table 3. 500 Year Probabilistic Building Count Damages by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	1	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	934	0.65	48	1.04	18	1.40	3	1.52	0	1.02
Education	19	0.01	1	0.02	0	0.03	0	0.03	0	0.03
Government	35	0.02	2	0.04	1	0.05	0	0.05	0	0.05
Industrial	228	0.16	12	0.26	5	0.38	1	0.41	0	0.16
Other Residential	6,013	4.21	340	7.35	124	9.41	8	4.05	1	2.65
Religion	33	0.02	2	0.04	1	0.05	0	0.06	0	0.05
Single Family	135,673	94.92	4,224	91.26	1,168	88.68	175	93.88	18	96.04
Total	**142,936**		**4,629**		**1,318**		**187**		**19**	

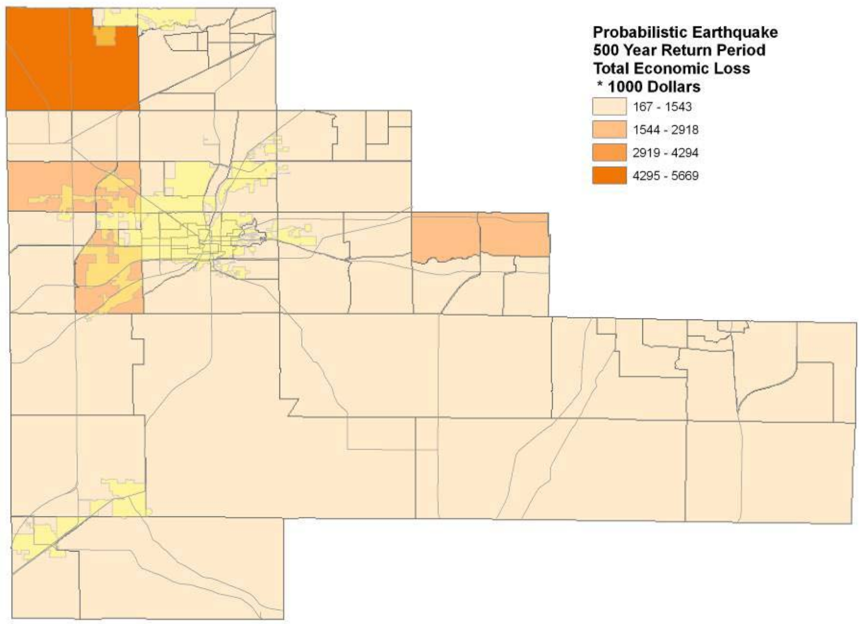
Table 4. 500 Year Probabilistic Building Economic losses in Millions of Dollars

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Loses							
	Wage	0.00	0.09	1.69	0.12	0.14	2.04
	Capital-Related	0.00	0.04	1.49	0.07	0.04	1.64
	Rental	1.88	0.78	0.97	0.03	0.03	3.69
	Relocation	0.19	0.02	0.06	0.00	0.02	0.28
	Subtotal	**2.07**	**0.92**	**4.21**	**0.22**	**0.23**	**7.65**
Capital Stock Loses							
	Structural	12.58	1.36	2.56	0.60	0.42	17.52
	Non_Structural	25.45	3.52	3.21	0.89	0.73	33.79
	Content	4.69	0.58	1.25	0.52	0.29	7.34
	Inventory	0.00	0.00	0.05	0.11	0.00	0.17
	Subtotal	**42.72**	**5.45**	**7.07**	**2.13**	**1.43**	**58.82**
	Total	**44.79**	**6.37**	**11.29**	**2.35**	**1.66**	**66.46**

*** Income Losses (see above table)**
Wage losses (consistent with income loss)
Capital-related income losses (a measure of the loss of productivity, services or sales)
Rental income losses (to building owners)
Relocation expenses (for businesses and institutions)

***Capital Stock Losses (see above table)**
Structural losses (structural repair costs for damaged and destroyed buildings)
Non_structural Losses (non structural repair costs for damaged and destroyed buildings)
Content Losses (Costs of damage to building contents)
Inventory losses (Losses of building inventory contents related to business activities)

Figure 2. 500 year Probabilistic Building Economic losses in Thousands of Dollars



Annualized Loss

HAZUS-MH Earthquake Risk Module provides estimates of damage and loss to buildings, essential facilities, transportation and utility lifelines, and population based on scenario or probabilistic earthquakes. In addition, the Earthquake Risk Module estimates the debris generated, fire, casualties, and shelter requirements following the disaster. The annualized loss analysis in HAZUS-MH provides a means for averaging potential losses from future scenarios while considering their probabilities of occurrence. The HAZUS-MH earthquake model evaluates 8 different return period scenarios including those for the 100, 250, 500 750, 1000 1500, 2000, and 2500 year return period earthquake events. It then calculates the probabilities of these events as well as the interim events, calculates their associated losses, and sums these losses to calculate an annualized loss.

Results:

The results of the annualized analysis are depicted in Table 5 and 6 and Figure 3. Table 5 indicates identifies the average annual estimated number of buildings at risk to be damaged by general occupancy classification. HAZUS estimates that about 1,202 buildings will be at least moderately damaged. This is over 1.00 % of the total number of buildings in the region. There are an estimated 1 buildings that will be damaged beyond repair.

Table 6 identifies the average annual estimated economic risk in millions of dollars. The risk includes capital losses as well as income losses. A description of the losses is included in the table. The total building-related losses were 0.25 (millions of dollars); 27 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 55 % of the total loss.

Figure 3 represents the average annual estimated building economic risk by census tracts in thousands of dollars. As expected the losses reflect the same distribution as the 500 year probabilistic analysis.

Essential Facility Losses Annualized

The HAZUS analysis calculated no essential facility losses for this event.

Table 5. Annualized Building Count Damages by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	224	0.16	0	0.00	0	0.00	0	0.00	0	0.00
Education	3	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	2	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	29	0.02	0	0.00	0	0.00	0	0.00	0	0.00
Other Residential	5,625	3.98	222	5.18	72	6.56	0	0.00	0	0.00
Religion	2	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Single Family	135,508	95.84	4,061	94.82	1,025	93.44	104	100.00	1	00.00
Total	**141,393**		**4,283**		**1,097**		**104**		**1**	

Table 6. Annualized Building Economic losses in Millions of Dollars

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Loses							
	Wage	0.00	0.00	0.03	0.00	0.00	0.03
	Capital-Related	0.00	0.00	0.02	0.00	0.00	0.02
	Rental	0.01	0.00	0.00	0.00	0.00	0.01
	Relocation	0.00	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.01**	**0.00**	**0.05**	**0.00**	**0.00**	**0.07**
Capital Stock Loses							
	Structural	0.11	0.01	0.04	0.01	0.01	0.18
	Non_Structural	0.00	0.00	0.00	0.00	0.00	0.00
	Content	0.00	0.00	0.00	0.00	0.00	0.00
	Inventory	0.00	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.11**	**0.01**	**0.04**	**0.01**	**0.01**	**0.18**
	Total	**0.12**	**0.02**	**0.09**	**0.01**	**0.01**	**0.25**

*** Income Losses (see above table)**
Wage losses (consistent with income loss)
Capital-related income losses (a measure of the loss of productivity, services or sales)
Rental income losses (to building owners)
Relocation expenses (for businesses and institutions)

***Capital Stock Losses (see above table)**
Structural losses (structural repair costs for damaged and destroyed buildings)
Non_structural Losses (non structural repair costs for damaged and destroyed buildings)
Content Losses (Costs of damage to building contents)
Inventory losses (Losses of building inventory contents related to business activities)

Figure 3. Annualized Building Economic losses in Thousands of Dollars

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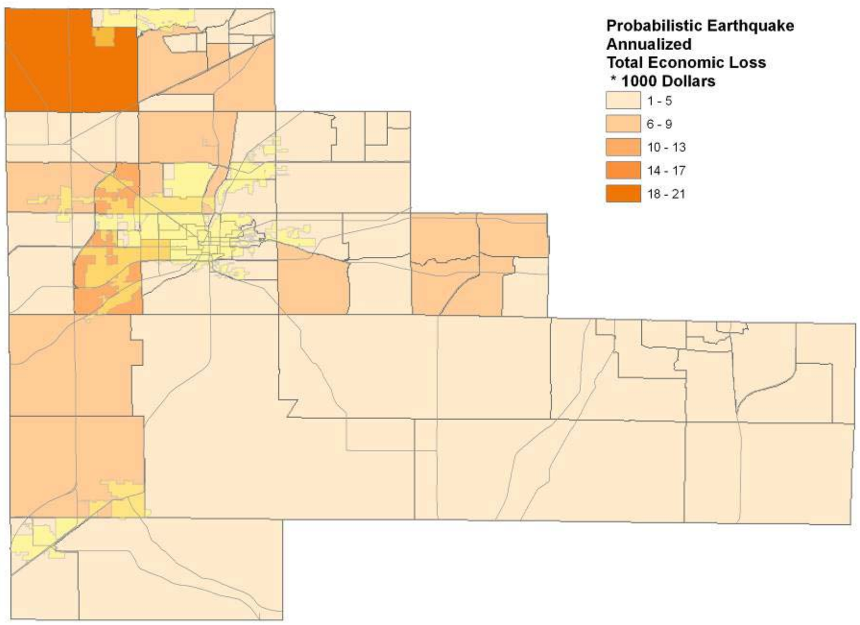

Will County Hazard Risk Assessment
Hazardous Materials Results (Arsenal Rd & I-55)

Disclaimer:
The estimates of social and economic impacts contained in this report were produced using limited GIS and HAZUS loss estimation data. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific hazard. This analysis is intended to provide conceptual information that can be used to identify mitigation opportunities. These results can be improved by using enhanced inventory data and hazard information.

December 20, 2005

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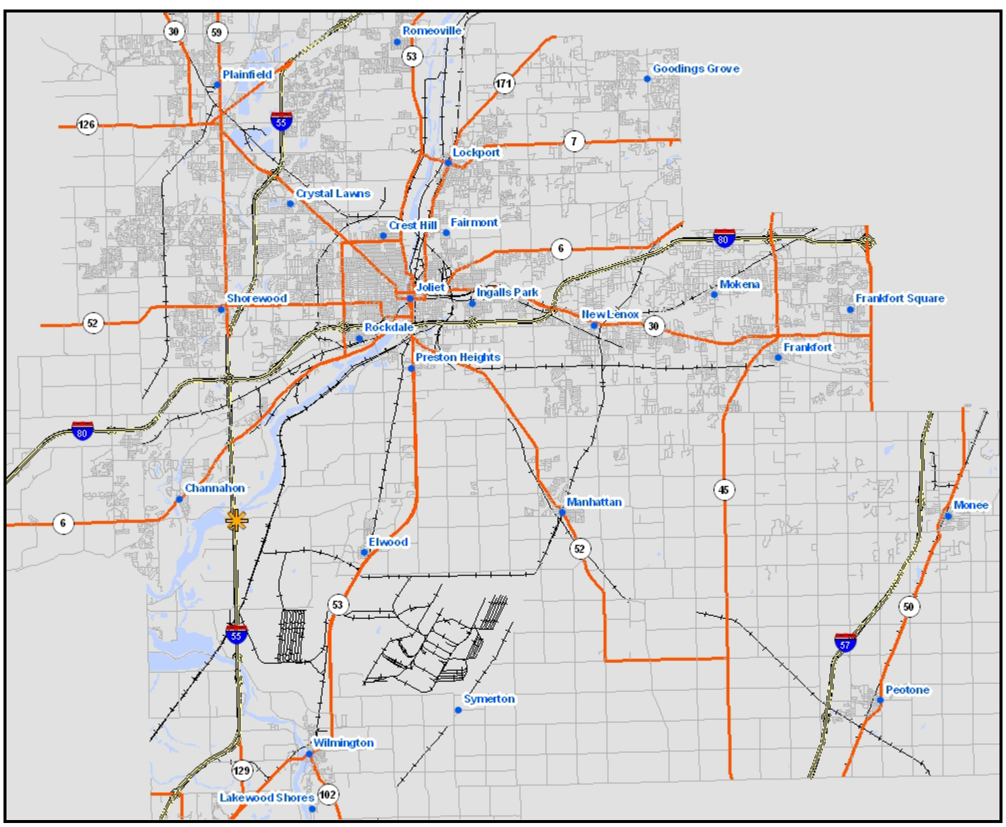
Hazardous Materials (Arsenal Rd & I-55)

The U.S. EPA's ALOHA (Areal Locations of Hazardous Atmospheres) model was utilized to assess the area of impact for a chlorine release near a large industrial facility located southwest of Joliet near Arsenal Road and Interstate 55. ALOHA is a computer program designed especially for use by people responding to chemical accidents, as well as for emergency planning and training. Chlorine is a common chemical used in industrial operations that can be found in either liquid or gas form. Rail, truck tankers, and barges commonly haul chlorine, as well as other hazardous materials, to and from facilities. For this scenario, moderate atmospheric and climatic conditions with a slight breeze from the west were assumed. The target area of Arsenal Rd and I-55 was chosen due to its large industrial facilities, rail and truck hubs, and the presence of a large number of large quantity hazardous material generators.

Review Existing Information

The 2000 Census Block boundaries and population figures, as well as the values for building counts and building replacement cost were extracted from the HAZUS-MH provided inventory. The geographic area covered in this analysis is depicted in Figure 1.

Figure 1: Location of Chlorine Release



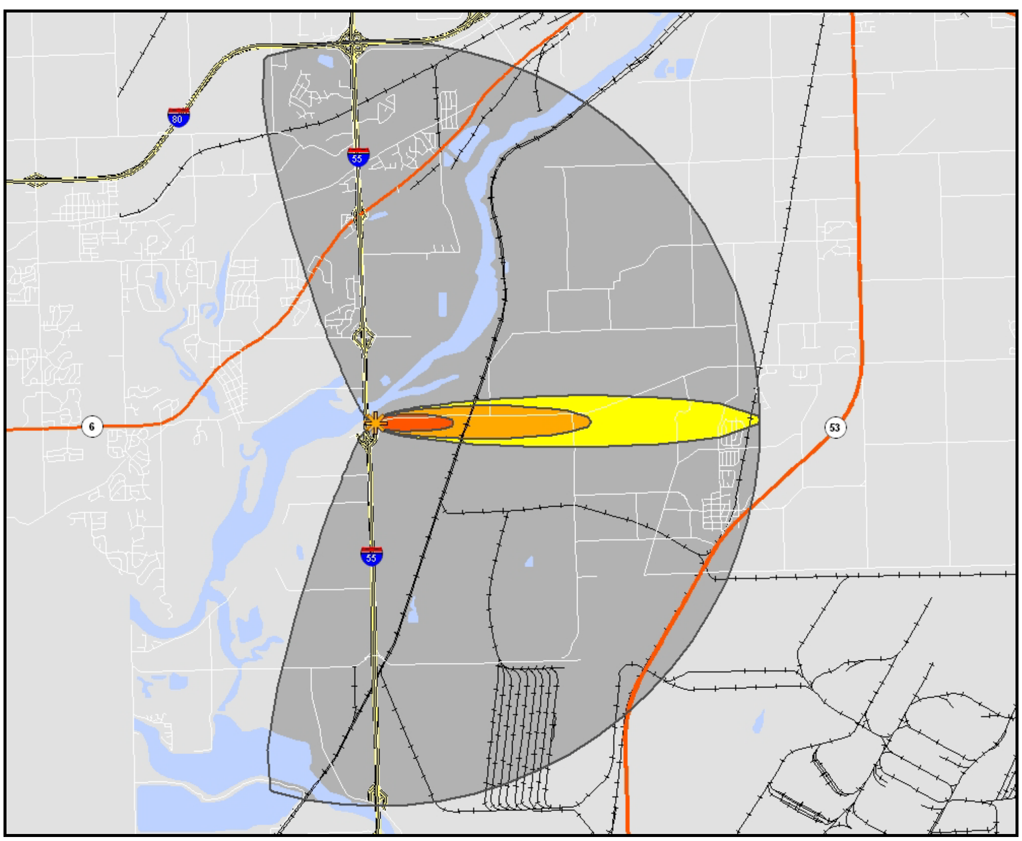
Analysis

In terms of the atmospheric conditions, ALOHA was setup with a wind speed of 5 mph at a westerly direction. The temperature was set for 68° F with a medium level of humidity and partly cloudy skies.

In terms of the source conditions, a horizontal, cylindrical-shaped tank was selected. The diameter of the tank was set to 9 feet. The length of the tank was set to 66 feet. These settings created a tank with a volume of 31,409 gallons. At the time of this release, the tank was estimated to be 80% full. The chlorine in this tank is in its liquid state. This release was based on a leak from a hole, a little less than ½" in diameter and 12 inches above the bottom of the tank.

Using the settings above, approximately 20,450 pounds of material would be released. The image in Figure 2 depicts the plume footprint generated by ALOHA. As the substance moves away from the source, the level of concentration of that substance decreases. Each color-coded area depicts a level of concentration. These concentrations are measured in parts per million, or ppm.

Figure 2: Plume Footprint Generated by ALOHA



The area in red, at 20 ppm, would extend no more than 1,647 yards out from the point of release. The area in orange, at 3 ppm, would extend no more than 2.6 miles out from the point of release. The area in yellow, at 1 ppm, would extend no more than 4.6 miles out from the point of release. The gray area depicts what ALOHA refers to as "uncertainty lines", which means that within the confines of the entire plume footprint, the ALOHA model is 95% confident that the release will stay within this boundary.

The 2000 Census Block layer was added to ArcMap and overlaid with the plume footprint. The 2000 Census Block layer was then clipped against each of the four footprint areas. Clipping could be defined as the process of extracting features from one layer, in this case the 2000 Census Block layer, based on the boundary of another layer, in this case one of the four footprint areas. Figures 3 and 4 depict the 2000 Census Block areas before and after the "clipping" process.

Figure 3: The 2000 Census Block Areas before the "Clipping" Process

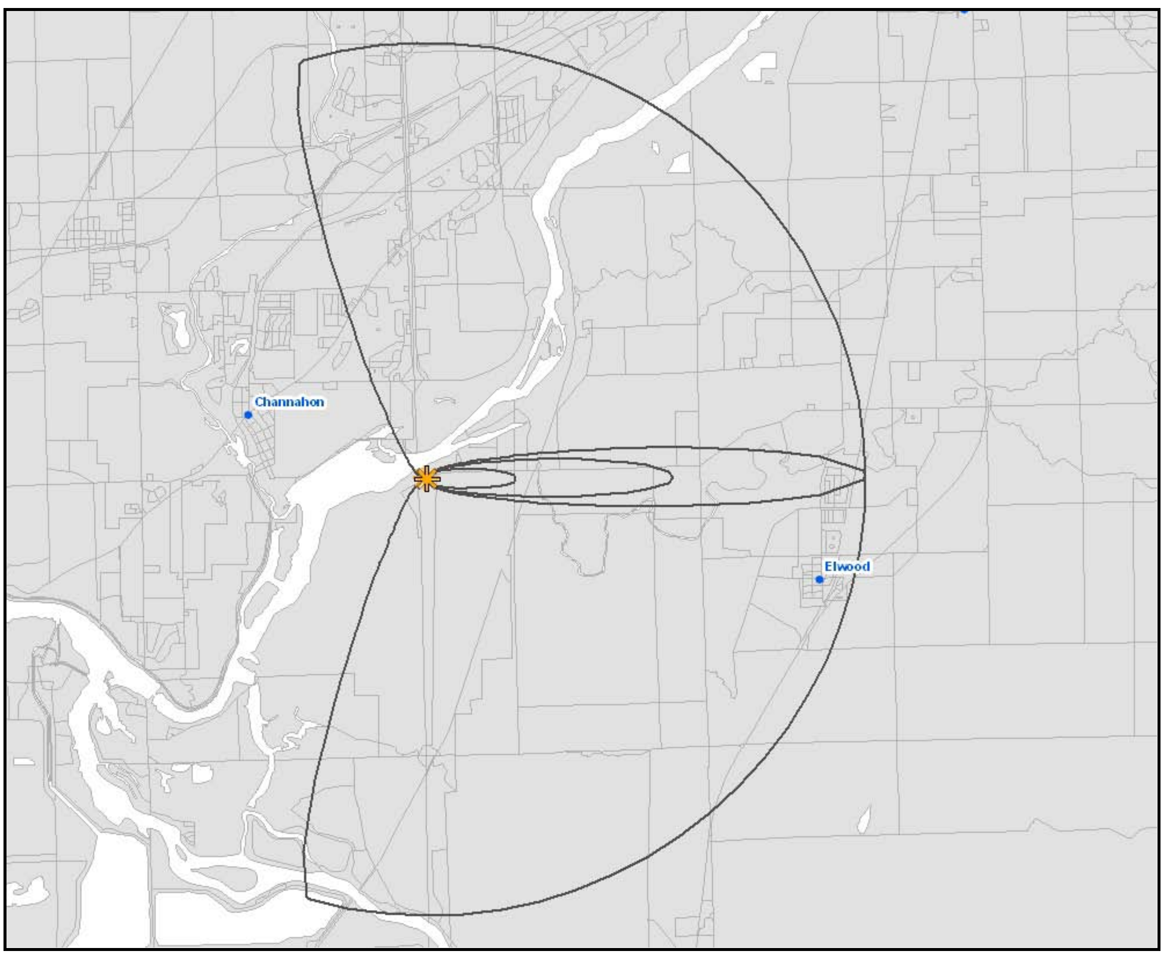
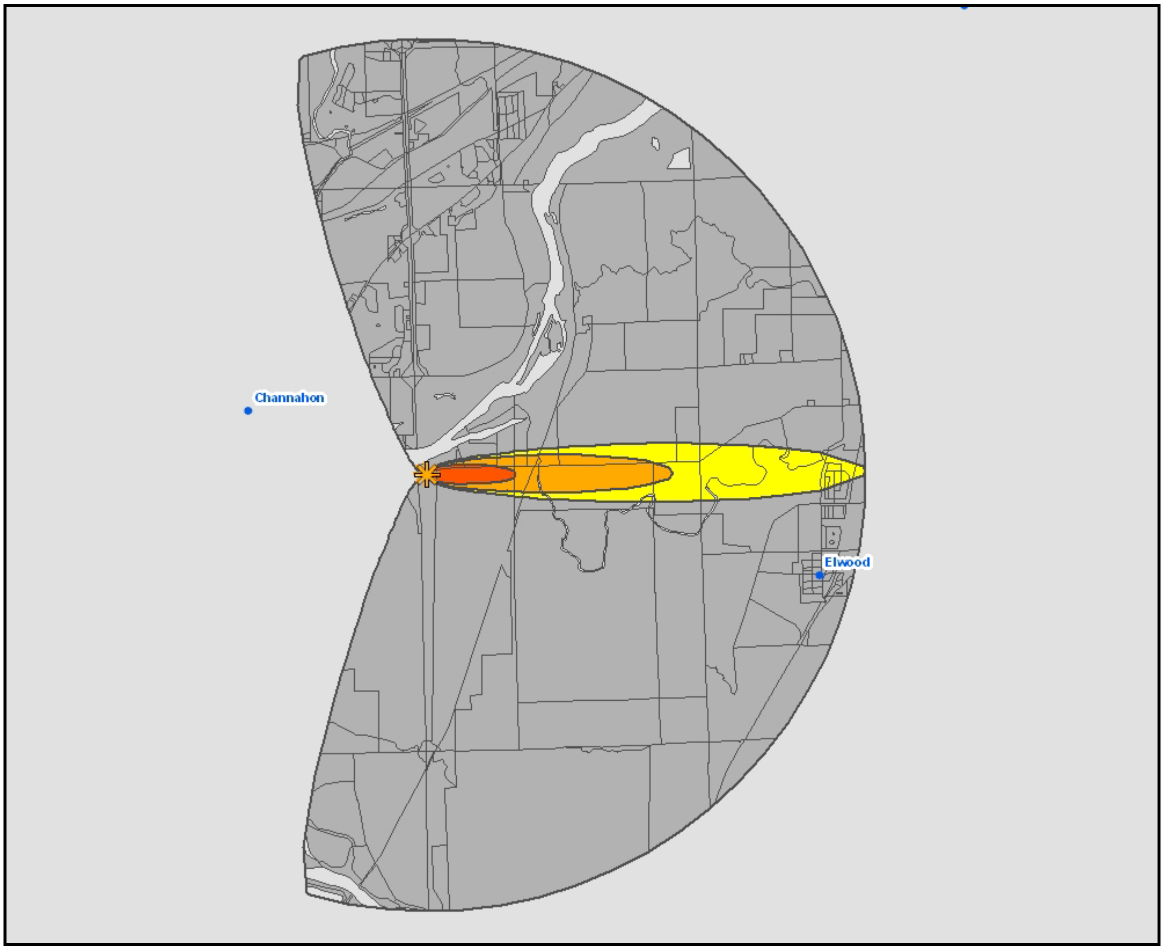


Figure 4: The 2000 Census Block Areas after the "Clipping" Process



A field was added to the table to denote the percentage of each Census Block that fell inside each of the four footprint areas. To populate this field, the area of each clipped Census Block was divided by the area of the original Census Block. The percentages were then multiplied by the building count and exposure values.

Assumptions:

- For this analysis it was assumed that all buildings and population were evenly distributed across each census block. Thus, if 50% of a census block fell within the buffer area, it was assumed that 50% of the structures and population also fell within that area.

Results

By summarizing the results of each of the four footprint areas, the GIS analysis estimates that as many as 1,783 buildings could be exposed. The inventory data upon which these estimates are based was obtained from the HAZUS-MH provided dataset. This dataset was compiled through a combination of 2000 Census data and information compiled by Dun and Bradstreet for the HAZUS-MH application. Based on population figures from the 2000 Census, approximately 5,427 people would be affected.

As noted earlier, it is important to note that these estimates are based on an area weighted analysis. In this analysis it was assumed that all buildings were evenly distributed across each census block. Thus, if 50% of a census block fell within the buffer area, it was assumed that 50% of the structures and population also fell within that area. In reality, the actual number of buildings could be much higher or lower than estimated.

The results of the analysis are depicted in Tables 1 through 6. Table 1 summarizes the results of the four footprint areas in terms of buildings counts and replacement costs. Table 2 summarizes the results of the four footprint areas in terms of population. Tables 3 through 6 depict the results for each of the four footprint areas.

Table 1: Estimated Number of Buildings Exposed and Replacement Cost (Total)

Occupancy Type	Building Counts	Exposure (thousands)
Residential	1,771	292,350
Commercial	9	21,360
Industrial	3	13,549
Agriculture	0	263
Religious	0	1,965
Government	0	99
Education	0	0
Total	1,783	329,586

Table 2: Estimated Population (By Area and Total)

Plume Area	Population
Red	0
Orange	0
Yellow	155
Gray	5,272
Total	5,427

Table 3: Estimated Number of Buildings Exposed and Replacement Cost (Red Area)

Occupancy Type	Building Counts	Exposure (thousands)
Residential	0	13
Commercial	0	228
Industrial	0	0
Agriculture	0	0
Religious	0	0
Government	0	0
Education	0	0
Total	0	241

Table 4: Estimated Number of Buildings Exposed and Replacement Cost (Orange Area)

Occupancy Type	Building Counts	Exposure (thousands)
Residential	0	6
Commercial	0	101
Industrial	0	0
Agriculture	0	0
Religious	0	0
Government	0	0
Education	0	0
Total	0	107

Table 5: Estimated Number of Buildings Exposed and Replacement Cost (Yellow Area)

Occupancy Type	Building Counts	Exposure (thousands)
Residential	43	6,495
Commercial	0	135
Industrial	0	134
Agriculture	0	42
Religious	0	0
Government	0	0
Education	0	0
Total	43	6,806

Table 6: Estimated Number of Buildings Exposed and Replacement Cost (Gray Area)

Occupancy Type	Building Counts	Exposure (thousands)
Residential	1,728	285,836
Commercial	9	20,896
Industrial	3	13,415
Agriculture	0	221
Religious	0	1,965
Government	0	99
Education	0	0
Total	1,740	322,432

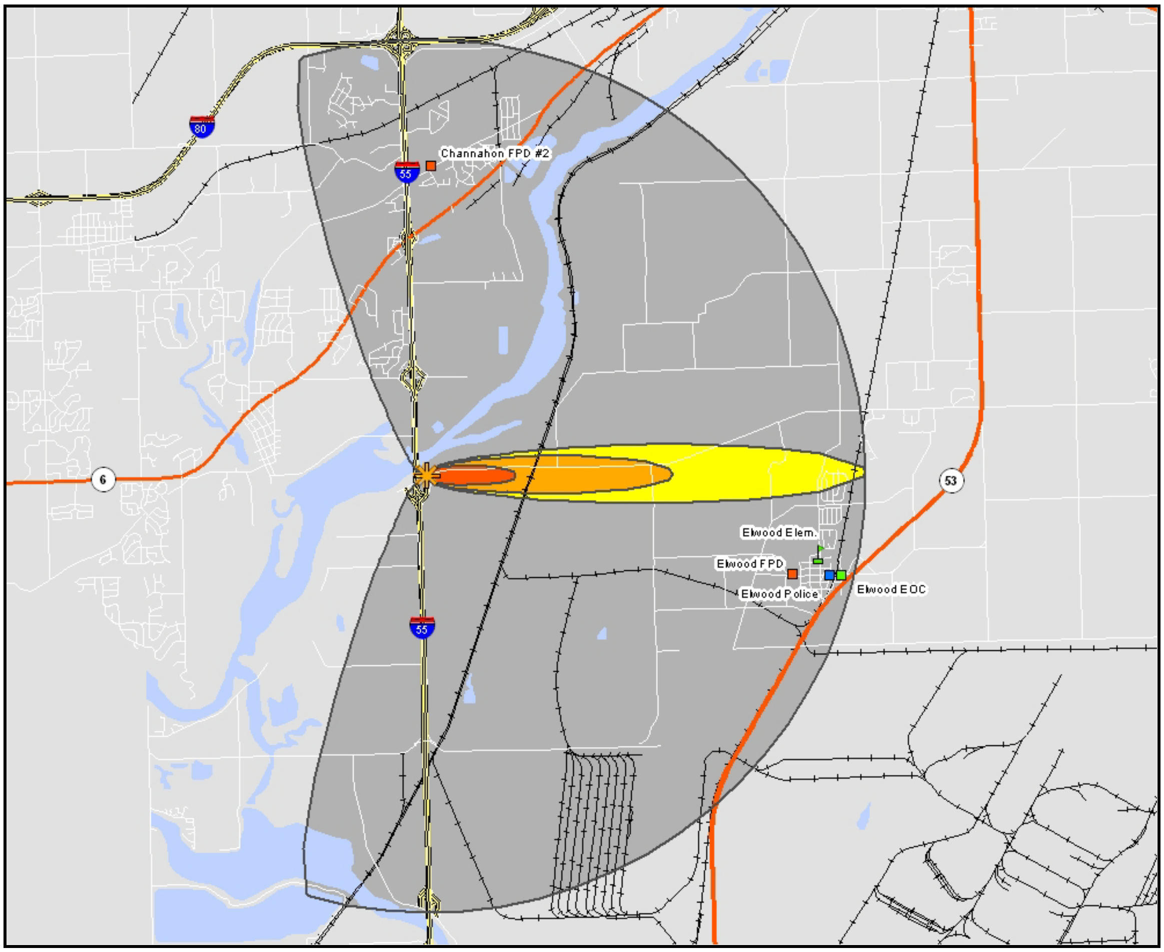
Essential Facilities Damage

Fortunately, in this scenario, there are no essential facilities that fall within any of the concentration areas (i.e., the red, orange, or yellow areas); all of the affected essential facilities fall within the confines of the confidence boundary. Within this area, there is one emergency center, two fire stations, one police station, and one school. The affected facilities are identified in Table 7. Their geographic locations are depicted in Figure 5.

Table 7: Essential Facilities within Plume Footprint

TYPE	NAME	ADDRESS	HAZUS_ID
Emergency Centers	Elwood EOC	309 W Mississippi St	IL000156
Police Stations	Elwood Police	201 E Mississippi Ave	IL000873
Fire Stations	Channahon FPD #2	23341 W McClintock Rd	IL001030
Fire Stations	Elwood FPD	309 W Mississippi St	IL001057
Schools	Elwood Elem.	409 N Chicago Ave	IL005393

Figure 5: Essential Facilities within Plume Footprint



Will County Hazard Risk Assessment
Hazardous Materials Results (Barge)

Disclaimer:
The estimates of social and economic impacts contained in this report were produced using limited GIS and HAZUS loss estimation data. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific hazard. This analysis is intended to provide conceptual information that can be used to identify mitigation opportunities. These results can be improved by using enhanced inventory data and hazard information.

January 9, 2006

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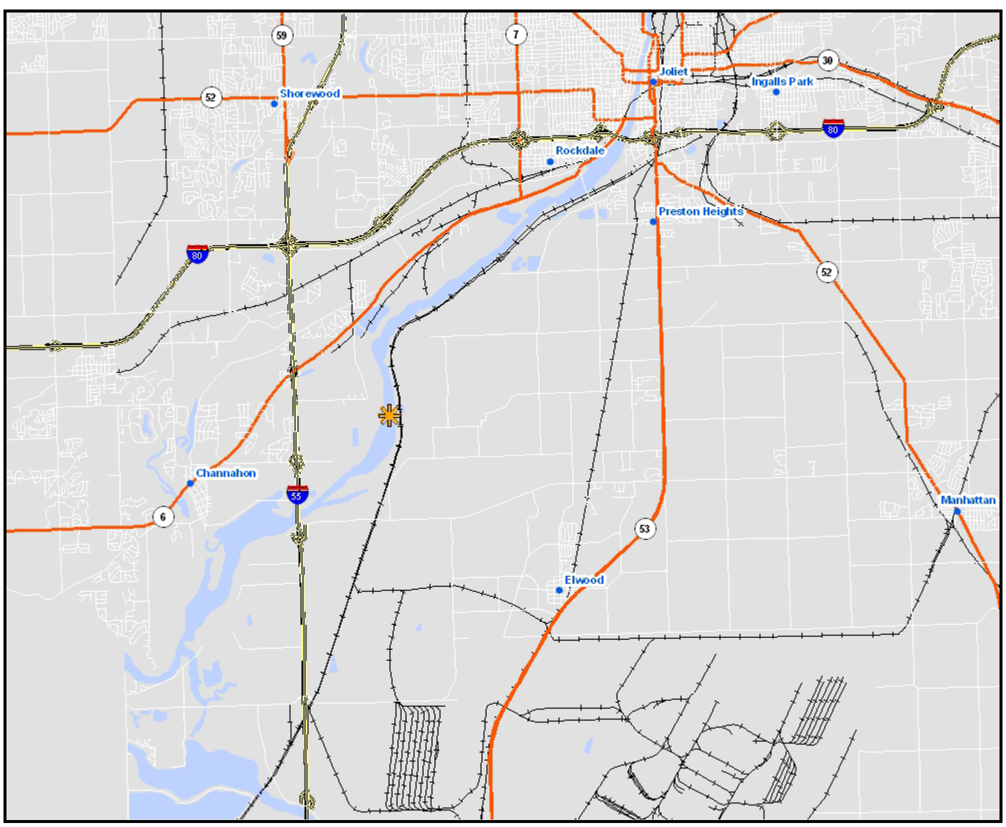
Hazardous Materials (Barge)

The U.S. EPA's ALOHA (Arial Locations of Hazardous Atmospheres) model was utilized to assess the area of impact for a chlorine release from a barge traveling on the Des Plaines River near US Route 6 and I-55. ALOHA is a computer program designed especially for use by people responding to chemical accidents, as well as for emergency planning and training. Chlorine is a common chemical used in industrial operations that can be found in either liquid or gas form. Rail, truck tankers, and barges commonly haul chlorine, as well as other hazardous materials, to and from facilities. For this scenario, moderate atmospheric and climatic conditions with a slight breeze from the west were assumed. The target area of the US Route 6, I-55, and the Des Plaines River was chosen due to its heavy barge traffic, large rail and truck hubs, as well as the presence of a large number of large quantity hazardous material generators.

Review Existing Information

The 2000 Census Block boundaries and population figures, as well as the values for building counts and building replacement cost were extracted from the HAZUS-MH provided inventory. The geographic area covered in this analysis is depicted in Figure 1.

Figure 1: Location of Chlorine Release

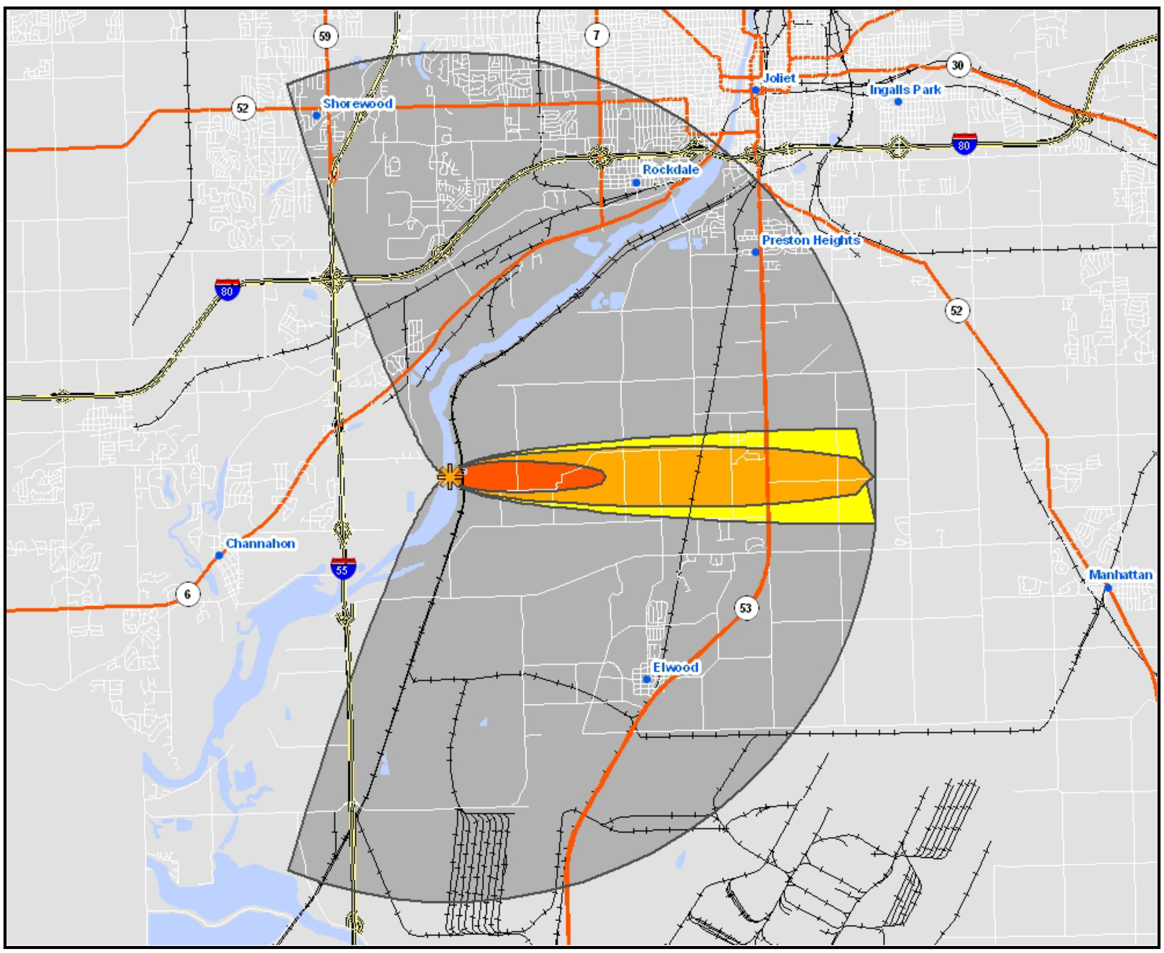


Analysis

In terms of the atmospheric conditions, ALOHA was setup with a wind speed of 5 mph at a westerly direction. The temperature was set for 68° F with a medium level of humidity and partly cloudy skies.

This scenario was setup as a direct release at a rate of 50 tons per hour for a period (i.e., duration) of 60 minutes. The source height for this release was set to 0. Using these settings, approximately 100,000 pounds of material would be released at a rate of 1,670 pounds per minute. The image in Figure 2 depicts the plume footprint generated by ALOHA. As the substance moves away from the source, the level of concentration of that substance decreases. Each color-coded area depicts a level of concentration. These concentrations are measured in parts per million, or ppm.

Figure 2: Plume Footprint Generated by ALOHA



The area in red, at 20 ppm, would extend no more than 2.2 miles out from the point of release. The area in orange, at 3 ppm, would extend no more than 6 miles out from the point of release. The area in yellow, at 1 ppm, would extend more than 6 miles out from the point of release. The gray area depicts what ALOHA refers to as "uncertainty lines", which means that within the confines of the entire plume footprint, the ALOHA model is 95% confident that the release will stay within this boundary.

The 2000 Census Block layer was added to ArcMap and overlaid with the plume footprint. The 2000 Census Block layer was then clipped against each of the four footprint areas. Clipping could be defined as the process of extracting features from one layer, in this case the 2000 Census Block layer, based on the boundary of another layer, in this case one of the four footprint areas. Figures 3 and 4 depict the 2000 Census Block areas before and after the "clipping" process.

Figure 3: The 2000 Census Block Areas before the "Clipping" Process

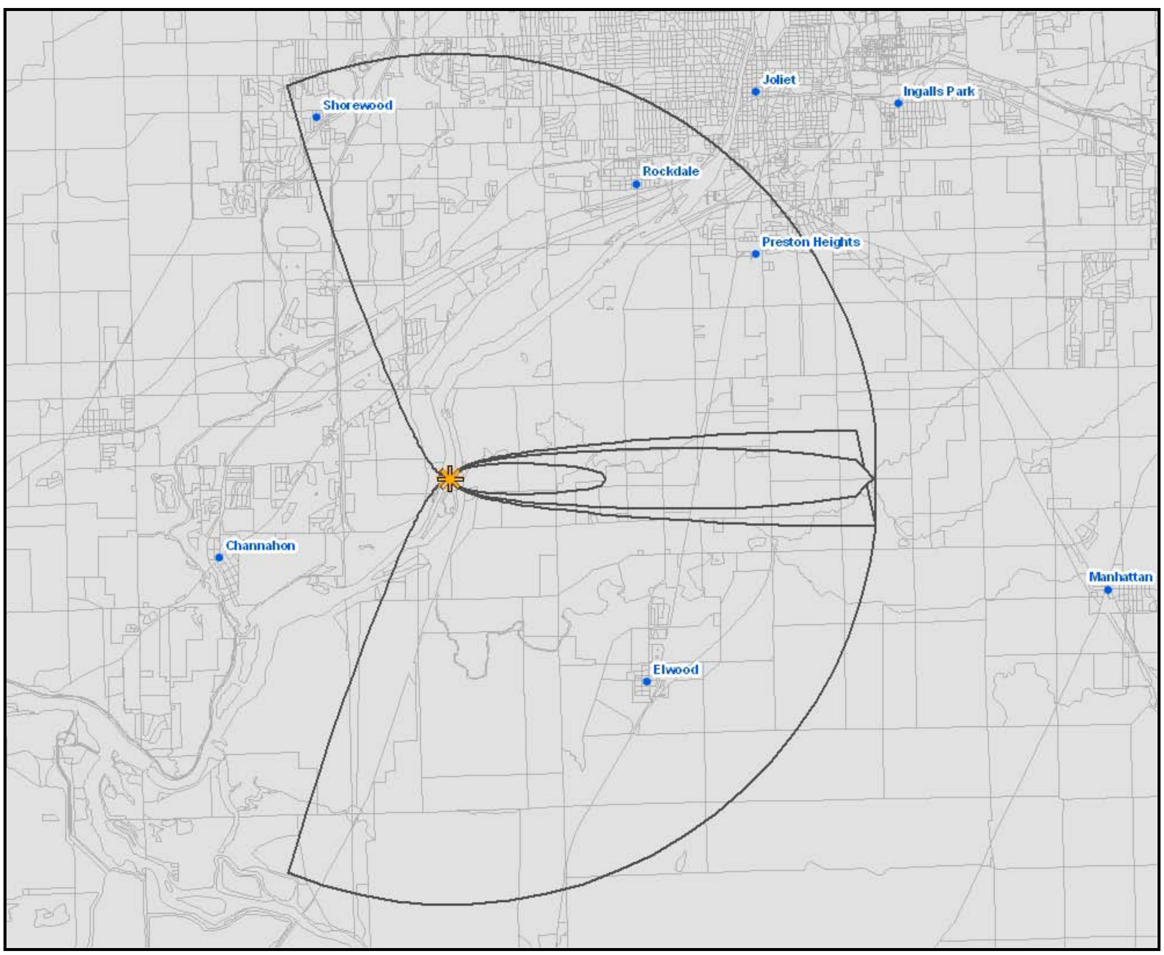
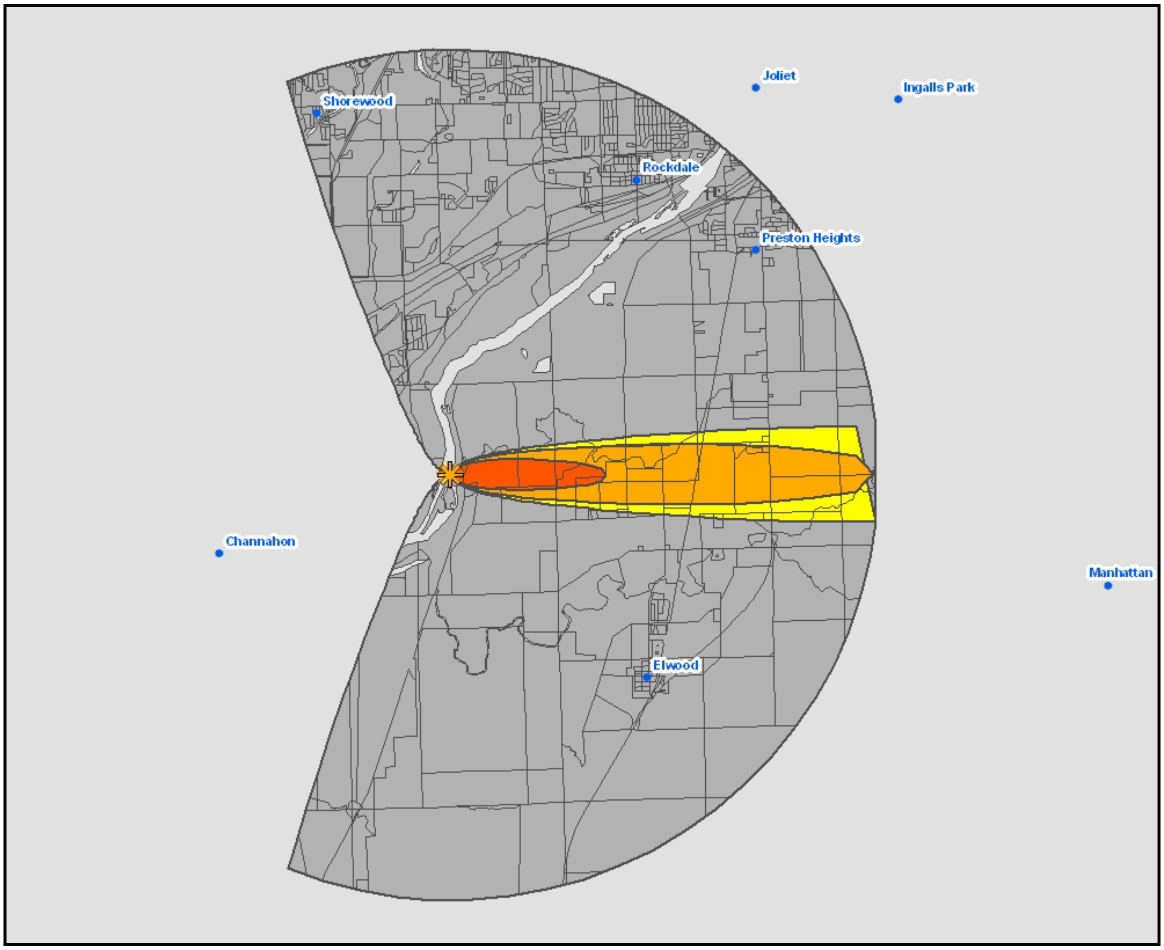


Figure 4: The 2000 Census Block Areas after the "Clipping" Process



A field was added to the table to denote the percentage of each Census Block that fell inside each of the four footprint areas. To populate this field, the area of each clipped Census Block was divided by the area of the original Census Block. The percentages were then multiplied by the building count and exposure values.

Assumptions:

- For this analysis it was assumed that all buildings and population were evenly distributed across each census block. Thus, if 50% of a census block fell within the buffer area, it was assumed that 50% of the structures and population also fell within that area.

Results

By summarizing the results of each of the four footprint areas, the GIS analysis estimates that as many as 8,205 buildings could be exposed. The inventory data upon which these estimates are based was obtained from the HAZUS-MH provided dataset. This dataset was compiled through a combination of 2000 Census data and information compiled by Dun and Bradstreet for the HAZUS-MH application. Based on population figures from the 2000 Census, approximately 27,722 people would be affected.

As noted earlier, it is important to note that these estimates are based on an area weighted analysis. In this analysis it was assumed that all buildings were evenly distributed across each census block. Thus, if 50% of a census block fell within the buffer area, it was assumed that 50% of the structures and population also fell within that area. In reality, the actual number of buildings could be much higher or lower than estimated.

The results of the analysis are depicted in Tables 1 through 6. Table 1 summarizes the results of the four footprint areas in terms of buildings counts and replacement costs. Table 2 summarizes the results of the four footprint areas in terms of population. Tables 3 through 6 depict the results for each of the four footprint areas.

Table 1: Estimated Number of Buildings Exposed and Replacement Cost (Total)

Occupancy Type	Building Counts	Exposure (thousands)
Residential	8,024	1,545,565
Commercial	144	386,566
Industrial	13	51,382
Agriculture	0	1,954
Religious	4	15,049
Government	10	11,965
Education	10	69,448
Total	8,205	2,081,929

Table 2: Estimated Population (By Area and Total)

Plume Area	Population
Red	18
Orange	288
Yellow	180
Gray	27,236
Total	27,722

Table 3: Estimated Number of Buildings Exposed and Replacement Cost (Red Area)

Occupancy Type	Building Counts	Exposure (thousands)
Residential	6	1,093
Commercial	0	0
Industrial	0	0
Agriculture	0	0
Religious	0	0
Government	0	0
Education	0	0
Total	6	1,093

Table 4: Estimated Number of Buildings Exposed and Replacement Cost (Orange Area)

Occupancy Type	Building Counts	Exposure (thousands)
Residential	95	16,090
Commercial	0	818
Industrial	0	786
Agriculture	0	47
Religious	0	0
Government	0	0
Education	0	0
Total	95	17,741

Table 5: Estimated Number of Buildings Exposed and Replacement Cost (Yellow Area)

Occupancy Type	Building Counts	Exposure (thousands)
Residential	59	10,139
Commercial	0	446
Industrial	0	287
Agriculture	0	39
Religious	0	0
Government	0	0
Education	0	0
Total	59	10,911

Table 6: Estimated Number of Buildings Exposed and Replacement Cost (Gray Area)

Occupancy Type	Building Counts	Exposure (thousands)
Residential	7,864	1,518,243
Commercial	144	385,302
Industrial	13	50,309
Agriculture	0	1,868
Religious	4	15,049
Government	10	11,965
Education	10	69,448
Total	8,045	2,052,184

Essential Facilities Damage

Fortunately, in this scenario, there are no essential facilities that fall within any of the concentration areas (i.e., the red, orange, or yellow areas); all of the affected essential facilities fall within the confines of the confidence boundary. Within this area, there is one care facility, two emergency centers, six fire stations, three police stations, and fifteen schools. The affected facilities are identified in Table 7. Their geographic locations are depicted in Figures 5 (Care Facilities, Emergency Centers, and Police Stations), 6 (Fire Stations), and 7 (Schools).

Table 7: Essential Facilities within Plume Footprint

TYPE	NAME	ADDRESS	HAZUS_ID
Care Facilities	Provena St. Joseph Medical Center	333 N Madison St	IL000228
Emergency Centers	Elwood EOC	309 W Mississippi St	IL000156
Emergency Centers	Rockdale EOC	603 Otis Ave	IL000168
Fire Stations	East Joliet FPD #2	102 E Zarley Blvd	IL001033
Fire Stations	Elwood FPD	309 W Mississippi St	IL001057
Fire Stations	Joliet FD #6	2049 Oneida St	IL001060
Fire Stations	Joliet FD #7	125 S Houbolt Rd	IL001059
Fire Stations	Rockdale FPD	603 Otis Avenue	IL001012
Fire Stations	Troy FPD	107 W Jefferson St	IL001017
Police Stations	Elwood Police	201 E Mississippi Ave	IL000873
Police Stations	Joliet Junior College Police	1215 Houbolt Rd	IL000888
Police Stations	Rockdale Police	79 Moen Ave	IL000881
Schools	B Noonans Child Care (Joliet)	2504 Fairway Dr	IL005441
Schools	Dirksen Jr. High	203 S Midland Ave	IL005318
Schools	Elwood Elem.	409 N Chicago Ave	IL005393
Schools	Heritage Trail	3389 Longford Dr	IL005290
Schools	Laraway Elem.	275 W Laraway Rd	IL005298
Schools	Lynne Thigpen Elem.	207 S Midland	IL005315
Schools	Marycrest	303 Purdue Ct	IL005309
Schools	Oak Valley	1705 Richards St	IL005299
Schools	Rockdale Elem.	715 Meadow Ave	IL005300
Schools	Shorewood	210 School Rd	IL005291
Schools	SOWIC Ed. Center	1705 Richards St	IL005436
Schools	St. Jude (Joliet)	2204 McDonough	IL005467
Schools	St. Paul the Apostle	130 N Woodlawn Ave	IL005476
Schools	Thomas Jefferson	2651 W Glenwood Ave	IL005306
Schools	United Cerebral Palsy of Will County	311 S Reed St	IL005483

Figure 5: Essential Facilities within Plume Footprint (Care, Emergency, and Police)

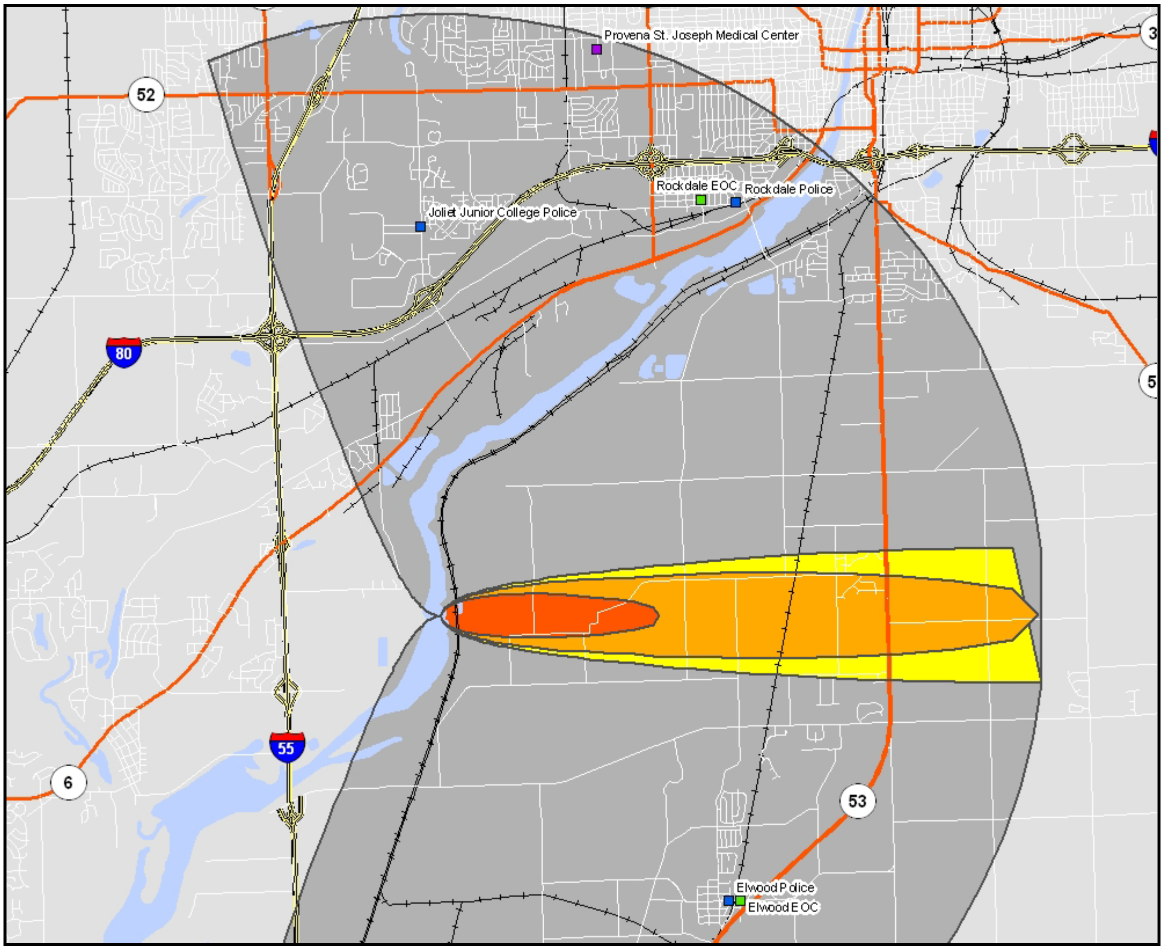


Figure 5: Essential Facilities within Plume Footprint (Fire)

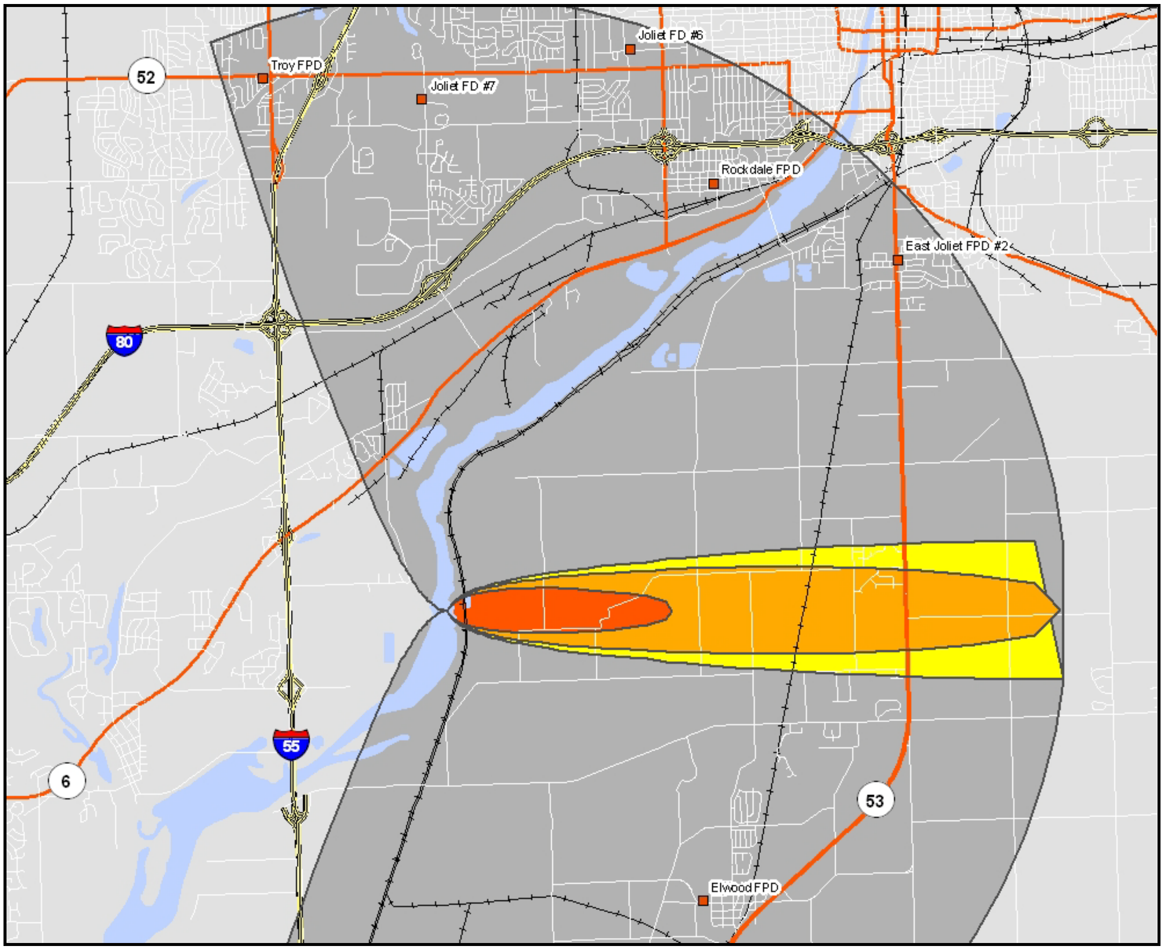
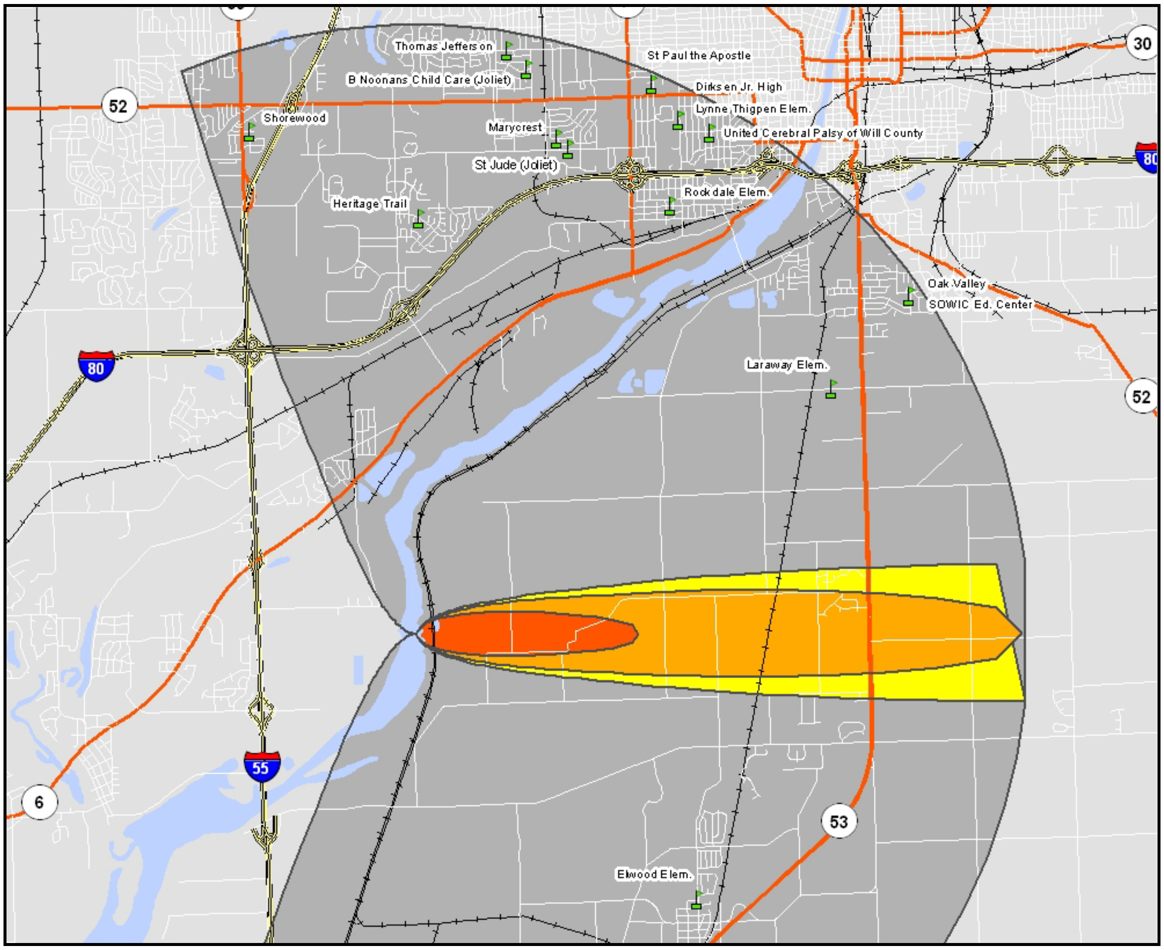


Figure 5: Essential Facilities within Plume Footprint (Schools)



Will County Hazard Risk Assessment
Munitions Results

Disclaimer:
The estimates of social and economic impacts contained in this report were produced using limited GIS and HAZUS loss estimation data. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific hazard. This analysis is intended to provide conceptual information that can be used to identify mitigation opportunities. These results can be improved by using enhanced inventory data and h

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We bring things into perspective.[SM]

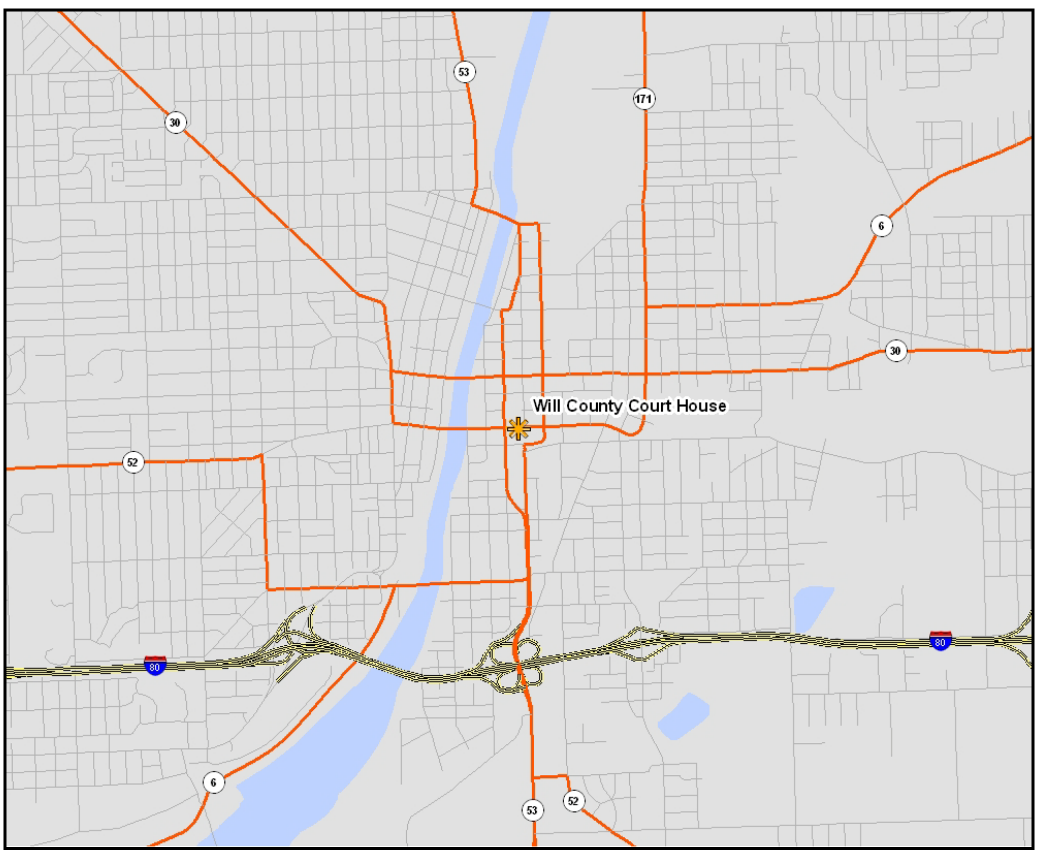
Munitions

GIS analysis was utilized to determine the impacts of a bombing near a critical piece of county government infrastructure, similar in magnitude to the April 19, 1995 Oklahoma City Bombing. In the Oklahoma City Bombing, a Ryder rental truck was loaded with approximately 5,000 pounds of ammonium nitrate fertilizer and detonated outside of the Murrah Federal Building. The explosion generated a pressure blast of 500,000 psi, destroyed one-third of the Murrah Federal Building, and created a crater thirty feet wide and eight feet deep. The target analyzed in this hazard modeling is the Will County Court House. This identified target is consistent with Will County's Infrastructure Security Buffer Zone Protection Plan, which utilizes the Carver Scoring system to identify high-profile targets.

Review Existing Information

The 2000 Census Block boundaries and population figures, as well as the values for building counts and building replacement cost were extracted from the HAZUS-MH provided inventory. The geographic area covered in this analysis is depicted in Figure 1.

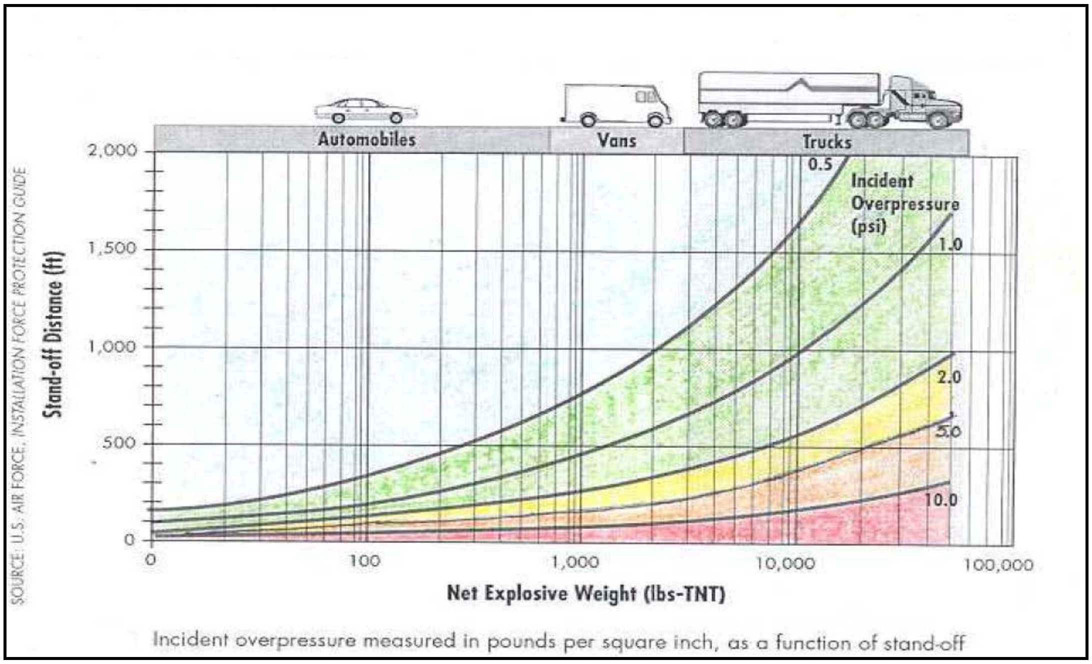
Figure 1: Location of the Will County Court House Building



Analysis

Buffers were created at 100 feet, 200 feet, 350 feet, 650 feet, and 1,150 feet, using the Will County Court House as the point-of-origin. These distances were selected based on the diagram in Figure 2. The distances listed above are where 5,000 pounds of explosives intersect the incident overpressure curves.

Figure 2: Damage Impact as a Function of Distance and Weight



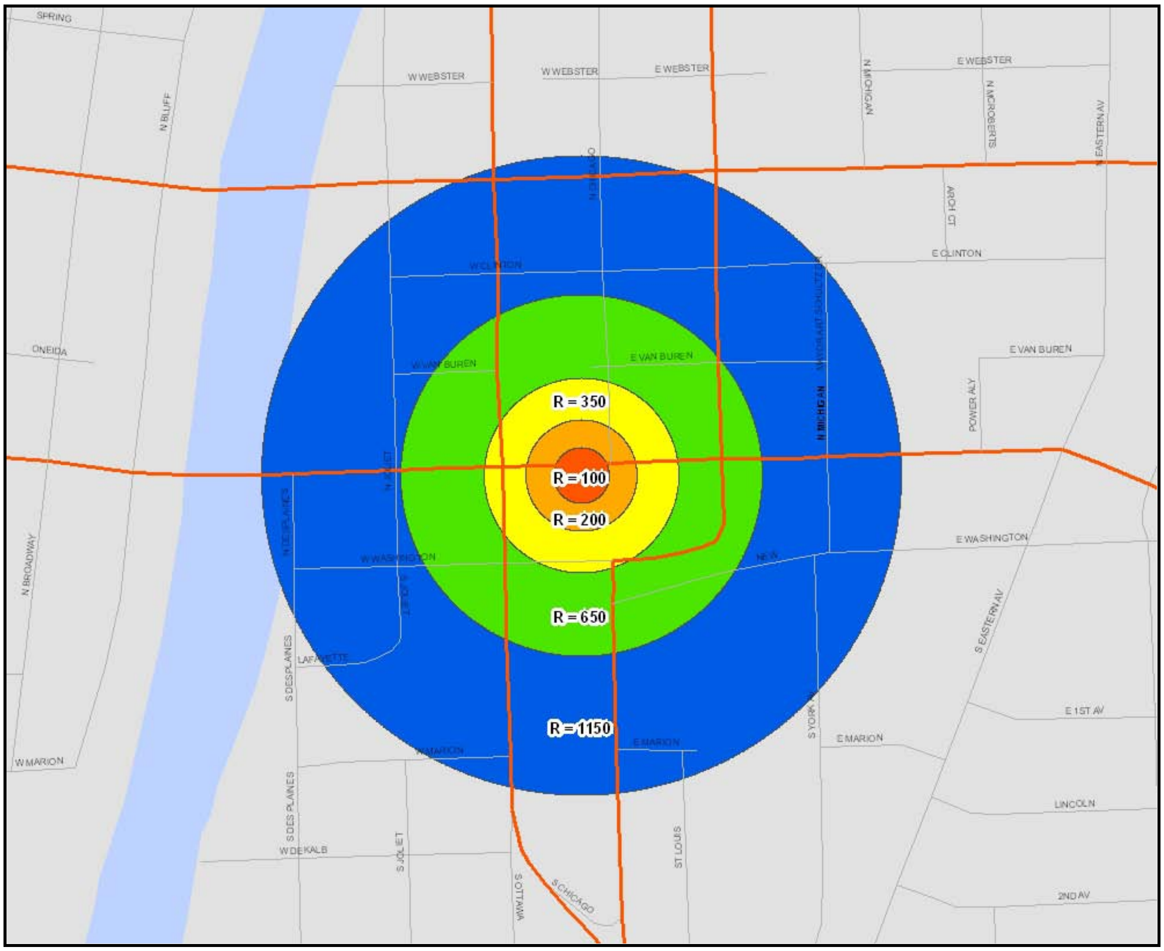
Each incident overpressure curve represents the amount of blast pressure emitted from an explosive device. The area between each curve represents the amount of damage that can be expected. As the incident overpressure increases (stated in pounds per square inch or PSI), so too does the amount of damage. For each level of potential damage, a percentage was applied when calculating the number of buildings damaged and replacement cost. Those percentages are depicted in Table 1.

Table 1: Percent Damage Factor per Amount of Damage

Damage Type	Percent Damaged	Description
Severe Damage	100%	Total destruction of most buildings
Heavy Damage	75%	Over 50% of major structural and secondary
Unrepairable Damage	50%	Sections of structure may collapse or lose structural capacity
Repairable Damage	25%	Minor to major structural and non-structural deformation
Minimal Damage	5%	No permanent deformation, minor damage

As stated above, buffers were created at 100 feet, 200 feet, 350 feet, 650 feet, and 1,150 feet, using the Will County Court House as the point-of-origin. The image in Figure 3 depicts the Will County Court House building and its surroundings, with the five buffer regions emanating outward.

Figure 3: Affected Area around the Will County Court House Building



The 2000 Census Block layer was added to ArcMap and overlaid with the five buffer areas. The 2000 Census Block layer was then clipped against each of the five buffer areas. Clipping could be defined as the process of extracting features from one layer, in this case the 2000 Census Block layer, based on the boundary of another layer, in this case one of the five buffer areas. Figures 4 and 5 depict the 2000 Census Block areas before and after the "clipping" process.

Figure 4: The 2000 Census Block Areas before the "Clipping" Process

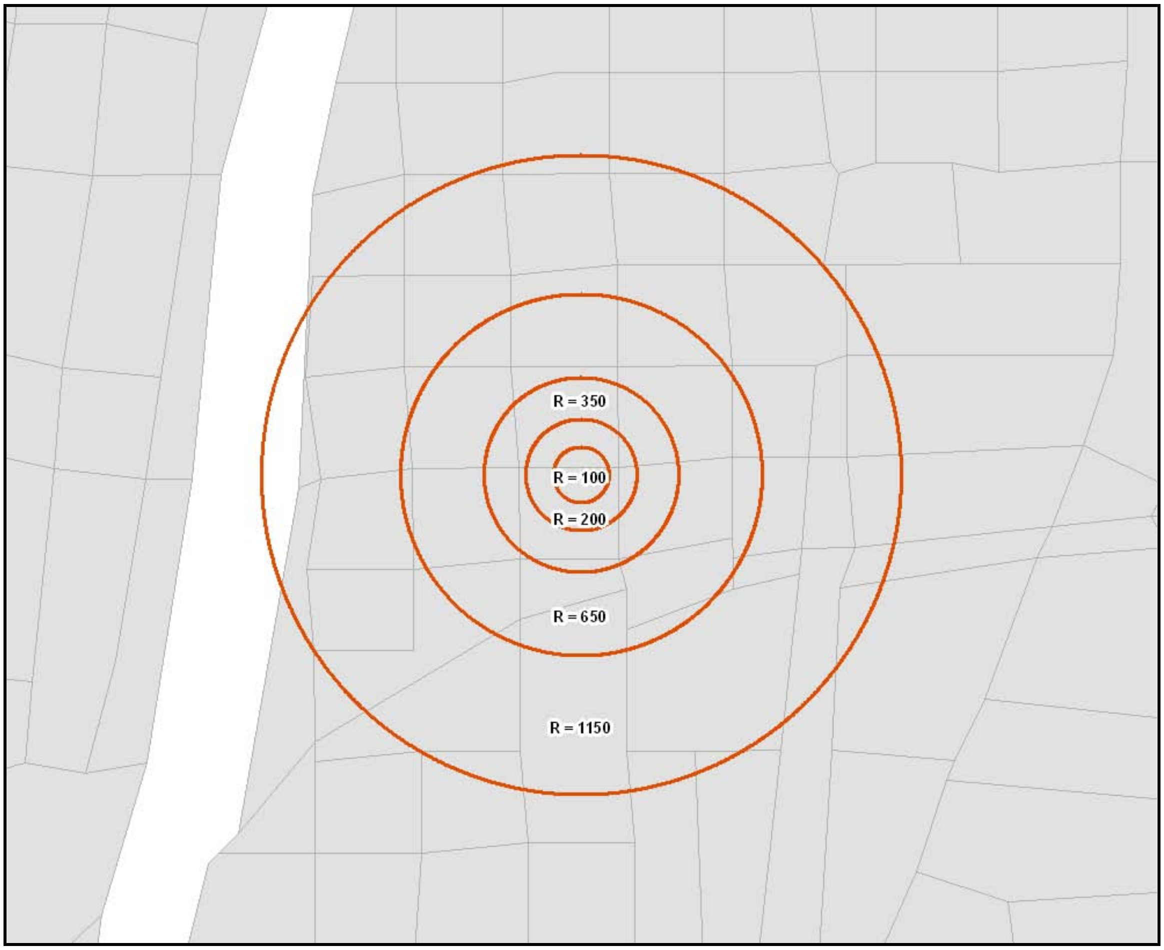
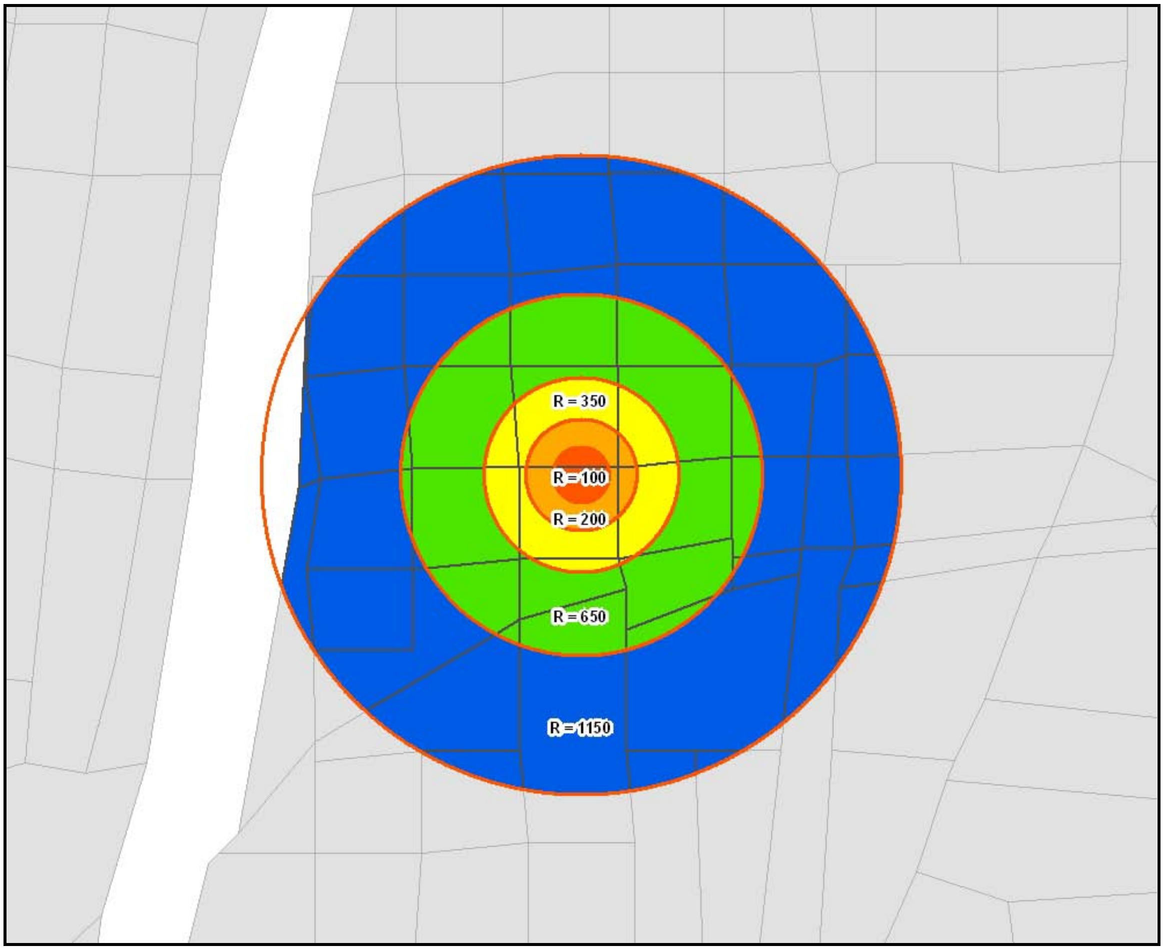


Figure 5: The 2000 Census Block Areas after the "Clipping" Process



A field was added to the table to denote the percentage of each Census Block that fell inside each of the five buffer areas. To populate this field, the area of each clipped Census Block was divided by the area of the original Census Block. The percentages were then multiplied by the building count and exposure values.

Assumptions:

- For this analysis it was assumed that all buildings and population were evenly distributed across each census block. Thus, if 50% of a census block fell within the buffer area, it was assumed that 50% of the structures and population also fell within that area.

Results

By summarizing the results of each of the five buffer areas, the GIS analysis estimates that as many as 19 buildings could be damaged at a replacement cost of $53,590,000. The inventory data upon which these estimates are based was obtained from the HAZUS-MH provided dataset. This dataset was compiled through a combination of 2000 Census data and information compiled by Dun and Brandstreet for the HAZUS-MH application. The building exposure is an estimate of building replacement costs.

As noted earlier, it is important to note that these estimates are based on an area weighted analysis. In this analysis it was assumed that all buildings were evenly distributed across each census block. Thus, if 50% of a census block fell within the buffer area, it was assumed that 50% of the structures and population also fell within that area. In reality, the actual number of buildings could be much higher or lower than estimated.

The results of the analysis are depicted in Tables 2 through 7. Table 2 summarizes the results of the five buffer areas. Tables 3 through 7 depict the results for each of the five buffer areas.

Table 2: Estimated Number of Buildings Damaged and Replacement Cost (Total)

	Building Counts	Exposure (thousands)
Residential	3	9,135
Commercial	13	33,634
Industrial	0	847
Agriculture	0	116
Religious	1	1,959
Government	2	4,615
Education	0	3,284
Total	19	53,590

Table 3: Estimated Number of Buildings Damaged and Replacement Cost (Within 100 ft)

	Building Counts	Exposure (thousands)
Residential	0	0
Commercial	1	1,586
Industrial	0	64
Agriculture	0	9
Religious	0	56
Government	0	125
Education	0	0
Total	1	1,840

Table 4: Estimated Number of Buildings Damaged and Replacement Cost (Within 200 ft)

	Building Counts	Exposure (thousands)
Residential	0	0
Commercial	2	5,540
Industrial	0	225
Agriculture	0	31
Religious	0	195
Government	0	436
Education	0	0
Total	2	6,427

Table 5: Estimated Number of Buildings Damaged and Replacement Cost (Within 350 ft)

	Building Counts	Exposure (thousands)
Residential	0	0
Commercial	4	9,804
Industrial	0	391
Agriculture	0	55
Religious	0	338
Government	0	756
Education	0	0
Total	4	11,344

Table 6: Estimated Number of Buildings Damaged and Replacement Cost (Within 650 ft)

	Building Counts	Exposure (thousands)
Residential	0	885
Commercial	2	4,805
Industrial	0	150
Agriculture	0	21
Religious	0	130
Government	0	771
Education	0	0
Total	2	6,762

Table 7: Estimated Number of Buildings Damaged and Replacement Cost (Within 1,150 ft)

	Building Counts	Exposure (thousands)
Residential	3	8,250
Commercial	4	11,899
Industrial	0	17
Agriculture	0	0
Religious	1	1,240
Government	2	2,527
Education	0	3,284
Total	10	27,217

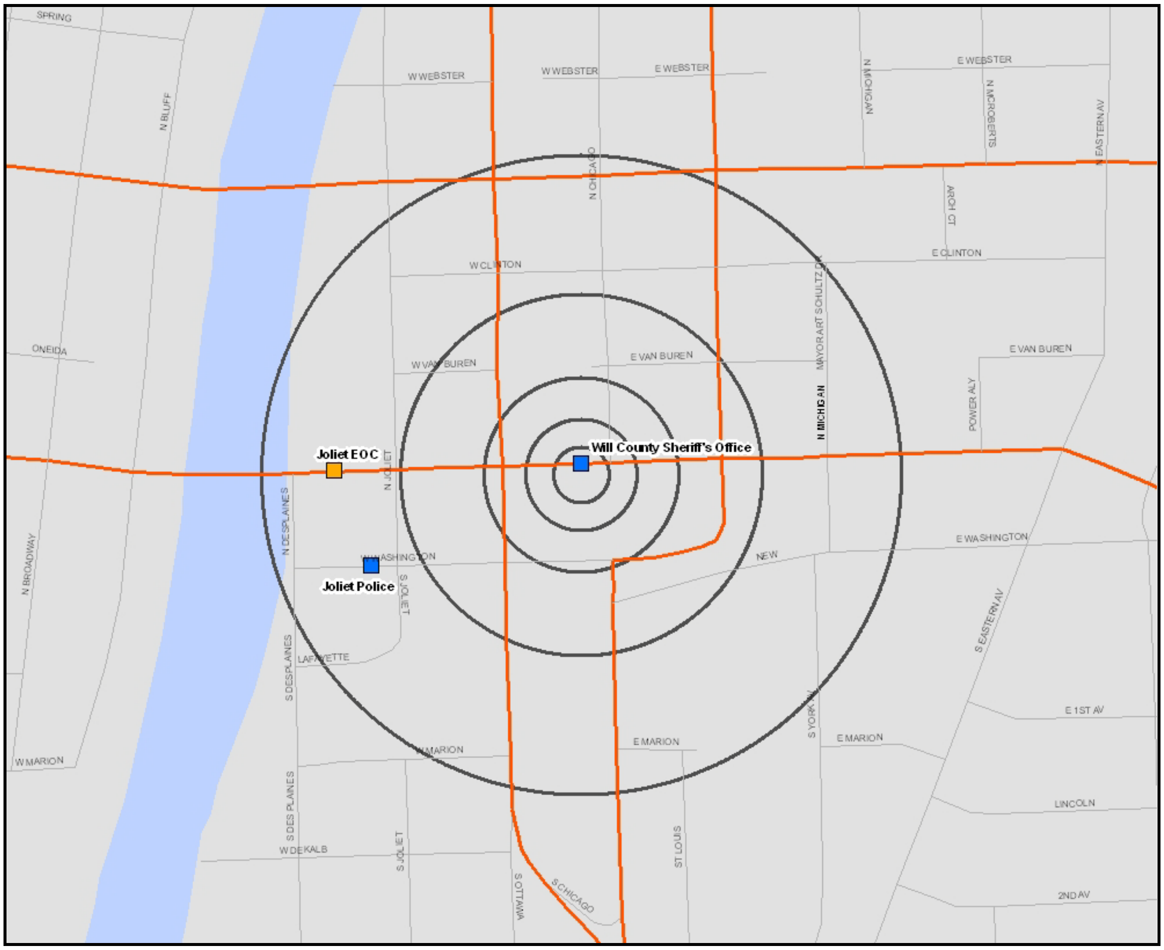
Essential Facilities Damage

Within 100 feet of the blast point, there is one Police Station, the Will County's Sheriff's Office. Within the last buffer area, or from 651 feet out to 1,150 feet from the blast point, there are one emergency center and one police station, the Joliet EOC and the Joliet Police respectively. The affected facilities and their addresses are identified in Table 8. Their geographic locations are depicted in Figure 6.

Table 8: Essential Facilities within Defined Blast Radius

TYPE	NAME	ADDRESS	HAZUS_ID
Emergency Centers	Joliet EOC	150 W Jefferson St	IL000160
Police Stations	Joliet Police	150 W Washington St	IL000874
Police Stations	Will County Sheriff's Office	14 W Jefferson St	IL000891

Figure 6: Essential Facilities within Defined Blast Radius



APPENDIX C

BENEFIT COST ANALYSIS GUIDANCE

BENEFIT COST ANALYSIS GUIDANCE

The following FEMA provided document provides an overview of the FEMA Benefit-Cost Analysis (BCA) process, its benefits, and the FEMA BCA Software available online.

September, 2012, FEMA released the Benefit Cost Analysis Tool version 4.8 which is available to be used to demonstrate cost-effectiveness for FEMA's HMA grant programs. A link is provided below to download the software. Due to the size of the toolkit, the installation files are separated into three separate .ZIP files.

- Tool available from: http://www.fema.gov/benefit-cost-analysis#0
- Training in the Benefit Cost Analysis process is available online from: http://training.fema.gov/EMIWeb/IS/courseOverview.aspx?code=IS-276
- Onsite training in the Benefit Cost Analysis process is available from the Emergency Management Institute with more information available from: http://training.fema.gov/EMIGrams/2013/1007%20-%20Training%20Opportunity%20-%20E0276%20Benefit-Cost%20Analysis%20Entry-Level%20Training%20Apr22-24%20%20Aug25-27%202014.pdf

APPENDIX B

Understanding the FEMA Benefit-Cost Analysis Process

The Stafford Act authorizes the President to establish a program to provide technical and financial assistance to state and local governments to assist in the implementation of hazard mitigation measures that are cost effective and designed to substantially reduce injuries, loss of life, hardship, or the risk of future damage and destruction of property. To evaluate proposed hazard mitigation projects prior to funding FEMA requires a Benefit-Cost Analysis (BCA) to validate cost effectiveness. BCA is the method by which the future benefits of a mitigation project are estimated and compared to its cost. The end result is a benefit-cost ratio (BCR), which is derived from a project's total net benefits divided by its total project cost. The BCR is a numerical expression of the cost effectiveness of a project. A project is considered to be cost effective when the BCR is 1.0 or greater, indicating the benefits of a prospective hazard mitigation project are sufficient to justify the costs. Although the preparation of a BCA is a technical process, FEMA has developed software, written materials, and training to support the effort and assist with estimating the expected future benefits over the useful life of a retrofit project. It is imperative to conduct a BCA early in the project development process to ensure the likelihood of meeting the cost-effective eligibility requirement in the Stafford Act.

B.1 Risk

Risk is defined in terms of expected probability and frequency of the hazard occurring, the people and property exposed, and the potential consequences. To estimate future damages (and the benefits of avoiding them), the probabilities of future events must be considered. The probabilities of future events profoundly affect whether a proposed retrofit project is cost effective. For example, the benefits of avoiding flood damage for a building in the 10-percent-annual-chance of flooding floodplain will be enormously greater than the benefits of avoiding flood damage for an identical building situated at the 0.001-percent-annual-chance of flooding level. In addition to the probability of the future flood events, it is just as important to consider the consequences associated with said event on a building. Estimated flood damages for a one-story building will typically be greater than that of a multi-story building or a building with a closed versus open foundation. The damages sustained by existing buildings exposed to flood hazards include site damage, structural and nonstructural building damage, destruction or impairment of service equipment, and loss of contents. These types of damage, along with loss of function are avoided if buildings are located away from flood hazard areas and/or built to exceed the minimum requirements.

Many people may not be aware of the hazards that could affect their property and may not understand the risk they assume through decisions they make regarding their property. Property owners must understand how the choices they make could potentially reduce the risk of it being damaged by natural hazards. Property owners often misunderstand their risk; therefore, risk communication is critical to help them understand the risk that they assume. One common misperception is the 1-percent-annual-chance flood, or 100-year flood. There is a 1-percent chance each year of a flood that equals or exceeds the 100-year flood event elevation. Many property owners believe that being in the 1-percent-annual-chance floodplain means that there is only a 1-percent chance of ever being flooded, which they deem a very small risk. Or, they may believe that the 100-year flood can only happen once every 100 years. Unfortunately, these misperceptions result in a gross underestimation of their flood risk. In reality, over the course of a 30-year mortgage, a residential building within the Special Flood Hazard Area has a 26-percent chance of being damaged by a flood, compared to a 10-percent chance of fire or 17-percent chance of burglary. The discussion of risk with the homeowner can be difficult. It is important to find methods to convey the natural hazard risks for a site and how those risks may be addressed by retrofitting the building. The best available information should be examined, including FEMA Flood Insurance Rate Maps (FIRM), records of historical flooding, and advice from local experts and others who can evaluate flood risks.

B.2 Benefits

The benefits considered in a retrofitting measure are the future damages or losses that are expected to be avoided as a result of the proposed mitigation project. Benefits cannot be determined exactly because the precise number and severity of future flood events is unknown. As a result, benefits are estimated based on experienced or hypothetical flood events of various magnitudes. Benefits for flood retrofit projects typically fall into the following categories:

- **Building:** reflect damages to the structure and are typically estimated using a depth damage function (DDF) and the building replacement value or historical damage records (e.g., flood insurance claim data); Figure B-1 illustrates that as floodwaters rise, more damage is done to the structure.
- **Content:** reflect damages to the contents within a building and are typically estimated using a DDF and the contents value or historical damage records (e.g., flood insurance claim data).
- **Displacement:** reflect the extra costs incurred when occupants of a residence are displaced to temporary housing due to a flood event. Displacement costs may be incurred for residential, commercial, or public buildings. Displacement occurs only when damages to a structure are sufficiently severe that the structure cannot be repaired with occupants in place.

NOTE

A depth damage function (DDF) is an estimation of direct damage to the building based on a depth of flooding calculated as the percent damage to structures. DDFs are compiled from a variety of sources, including FEMA and the U.S. Army Corps of Engineers (USACE). DDFs typically vary based on the building type (i.e., one-story versus two-story), foundation (i.e., open versus closed), and occupancy type (i.e., residential versus commercial).

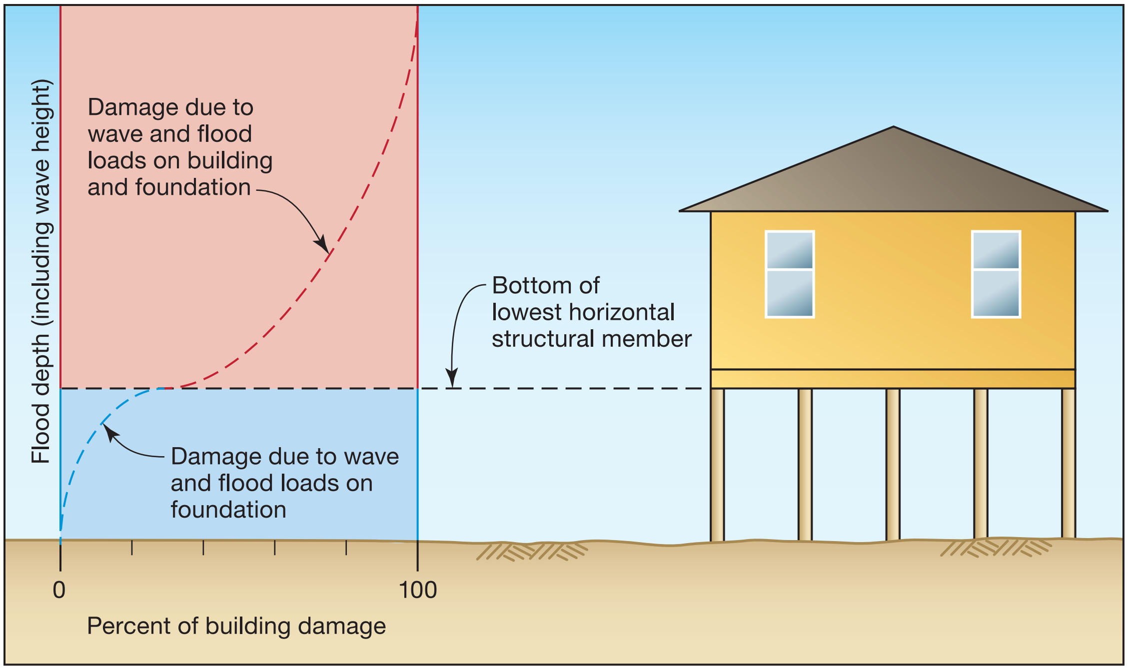


Figure B-1. The graph on the left illustrates how increases in flood depths increase the value of the DDF. The DDF is a relationship between the flood depth and the finished floor elevation of the building and not the elevation of the adjacent ground.

- **Loss of Business or Rental Income:** reflect the impact that may occur when damages are severe enough to result in a temporary closure of a business operating within a facility and estimated based on the net income lost during that closure.
- **Value of Service:** reflect the loss of function of a facility and quantify the service typically provided from the structure. Typical services include public services like law enforcement, fire rescue, medical, general government administrative operations, and public library, as well as utilities like electricity and water treatment.
- **Other:** reflect damages that are not usually estimated in the previous categories. Some typical benefits may include debris removal costs and emergency management costs.

B.3 Estimating Benefits

The calculation of benefits for a proposed mitigation project entails estimating the present value of the sum of the expected annual damages over the useful life. The process takes into consideration:

- probabilities of various levels of flooding events and associated damages;
- useful lifetime of the mitigation project; and
- time value of money.

Some helpful terms to consider when estimating benefits are:

- *Expected annual damages* are the damages per year expected over the life of the structure or useful life of the mitigation project. “Expected annual” does not mean that these damages will occur every year.
- *Scenario damages* indicate the estimated damages that would result from a single flood of a particular depth at the building under evaluation. For example, the scenario damages for a 3-foot flood are the expected damages and losses each time a 3-foot flood occurs at a particular site. Scenario damages do not depend on the probability of floods at that location.
- *Historical damages* are based on actual recorded damages (versus being estimated) and typically associated with a flood frequency to help estimate the probability of occurrence.

The scenario (or historical) damages and the expected annual damages before mitigation provide, in combination, a complete picture of the vulnerability of the building to flood damage before undertaking a mitigation project. Expected annual damages will generally be much smaller than scenario or historical damages because they are multiplied by the probabilities of occurrence. A building with high expected annual damages means that not only are scenario damages high, but also that flood probabilities are relatively high. If expected annual damages are high, then there will be high potential benefits in avoiding such damages. Damages after mitigation depend on the effectiveness of the mitigation measure in avoiding damages. The expected annual damages and losses after mitigation also depend very strongly on the degree of flood risk at the site under evaluation. For some mitigation projects, such as acquisition, the scenario damages and expected annual losses after mitigation will be zero. For other mitigation projects, such as elevation or flood barriers, scenario damages, and expected annual losses after mitigation will be lower than before mitigation, but there is always some chance of flooding so the after mitigation damages cannot be zero.

The expected annual benefit for a project is given by Equation B-1.

EQUATION B-1: EXPECTED ANNUAL BENEFIT

$$EAB = EAD_{Before\ Mitigation} - EAD_{After\ Mitigation}$$

where:

EAB = Expected annual benefit

$EAD_{Before\ Mitigation}$ = Expected annual damages before mitigation

$EAD_{After\ Mitigation}$ = Expected annual damages after mitigation

In order to compare the future benefits to the current cost of the proposed mitigation project, a discount rate is applied over the life of the project to calculate the net present value of the expected annual benefits. For FEMA-funded mitigation projects, the discount rate is set by the Office of Management and Budget. Equation B-2 shows how to calculate the project benefits using the annual discount rate.

EQUATION B-2: PROJECT BENEFITS

$$B = EAB\left[\frac{1-(1+r)^{-T}}{r}\right]$$

where:

B = project benefits

EAB = total expected annual net benefit

r = annual discount rate used to determine net present value of benefits

T = estimated time the project will be effective, Project Useful Life

To evaluate cost effectiveness, a project's total net benefits are divided by its total project cost, resulting in a project *BCR*, as shown in Equation B-3. A project is considered to be cost effective when the *BCR* is greater than or equal to 1.0, indicating the benefits are sufficient to justify the costs.

EQUATION B-3: BENEFIT-COST RATIO

$$BCR = \frac{Project\ Benefits}{Project\ Costs}$$

where:

BCR = benefit-cost ratio

Project Benefits = total project net benefits

Project Costs = total project cost

B.4 FEMA BCA Software

FEMA's BCA program is a key mechanism used by FEMA and other agencies to evaluate certain hazard mitigation projects to determine eligibility and assist in Federal funding decisions. Visit http://www.bcahelpline.com/ for the latest BCA guidelines, policies, software program, user guides, training materials, and other resources, including http://www.fema.gov/government/grant/bca.shtm#0.

APPENDIX D

HAZARD MITIGATION ACTION FORM

HAZARD MITIGATION ACTION FORM

The following form was provided at the Mitigation Steering Committee Workshop to facilitate the creation and organization of potential hazard mitigation actions that could be submitted by any of the meeting participants.

Will County Emergency Management Agency
County Wide All-Hazard Mitigation Plan
Mitigation Steering Committee Workshop

HAZARD MITIGATION ACTION

Hazard Category (Natural, Technological, or Political):____________________

Hazard Type (i.e. all-hazard, mutli-hazard, flood, hazardous material, etc):____________________

Priority (h*igh, medium, low*) and why? ____________________

____

Action Title: ____________________

Brief Description: ____________________

____

____

Mitigation Goal Addressed: ____________________

Problem/Opportunity: ____________________

____

Implementation Strategy (i.e. grants, resources, etc): ____________________

____

____

Lead Agency: ____________________

Supporting Agencies: ____________________

Funding Opportunities: ____________________

____

Implementation Timeline: ____________________

____

APPENDIX E

PUBLIC INVOLVEMENT

PUBLIC INVOLVEMENT

This appendix describes the sources of all information in this plan that came from the public through meetings, forms, individual personal contact, or web postings. The project team held three stakeholder committee meetings with representatives of the County, regional authorities, and local organizations. In addition, the project team met with subject matter experts, private and public sector professionals, and organizations.

All-Hazard Mitigation Steering Committee for the Update

The County-Wide All Hazard Mitigation Steering Committee is comprised of representatives from County departments and local organizations with expertise ranging from emergency management and floodplain management to engineering and planning. Periodic emails were sent to the Committee throughout the duration of the development and update of the *Will County County-Wide All Hazard Mitigation Plan*. Although invitations were extended to the entire Committee, attendance to meetings was variable. After each meeting, a follow up email was sent updating the Committee on the material covered. The absent Committee members were encouraged to contact Will County EMA if there were any questions, comments, or concerns. *NOTE:* A list of jurisdictional participants meeting participation requirements and their representatives is found on pages 1-6 through 1-8.

Steering Committee Members:

Harold Damron, Will County Emergency Management Agency

Brenda Lutz, Will County Emergency Management Agency

Rebecca Colwell, Will County ICT, GIS Division

Derek O'Sullivan, Will County Land Use Department

Jayne Ballun, Project Coordinator

Organizational Outreach and Input

Will County Stormwater Management Planning Committee – Representatives of the Will County Stormwater Management Planning Committee were actively involved in the All Hazard

Mitigation planning and reported the activities and development of the project. In 1993, the Will County Board authorized creation of a county Stormwater Management Planning Committee. In 1996, a full complement of 18 municipal and County representatives began meeting regularly and working with local planning commissions to develop a stormwater management plan.

Steering Committee Workshop Summaries

Workshop 1: August 27, 2013

This meeting was a 1½ hour kick-off meeting with Will Emergency Management Agency and the Mitigation Project Team to inform participants about the County-Wide All Hazard Mitigation Plan update and identify expectations of the project. The Mitigation Project Team was led by Harold Damron, Director of the Will County Emergency Management Agency. The project kick-off focused on the following:

- Welcome & Introductions
- Hazard Mitigation Defined
- Will County: County-Wide All Hazard Mitigation Plan – 2008
- What's in the 2008 Plan?
  - All Hazard Risk Assessment
  - Hazard Profiles & Vulnerability Assessment
  - Mitigation Goals, Objectives & Strategies
  - Mitigation Actions
- Mitigation Success Stories
- What Does It Mean to Participate?
- Benefits & Adoption of the Plan
- Future Meeting Dates
  - Second Meeting – Workshop
  - Third Meeting – Draft & Final Steps

Will County Emergency Management Agency
302 North Chicago Street
Joliet, Illinois 60432

Attendance Sign-in Sheet

ALL HAZARD MITIGATION PLAN UPDATE – WORKSHOP
Date: August 27, 2013
Location: New Lenox Public Library, New Lenox, Illinois

NAME	ORGANIZATION	PHONE NUMBER	EMAIL
Mike Lintrey	Romeoville	886-6108	mlintrey@romeoville.org
Ed Strobba	Lockport EMA	815-838-5173	ABLEDPR@ATT.NET
Dennis Housman	Wilmington ESDA	815 405-0008	dhousman@wilmington-il.com
Aaron Klima	Shorewood	815-791-6714	aklima@vil.shorewood.il.us
Tom Johnston	Steger EMA	708-359-8028	Tjohnston@villageofsteger.org
Daniel Martin	New Lenox P.D.	815-462-6128	dmartin@newlenox.net
Derek O'Sullivan	Will Co.		
Marty Blaccio	Crete EMA	708-672-1437	mblaccio@villageofcrete.org
Tom Durkin	Crete	708-672-5479	tdurkin@villageofcrete.org
Ken Ruggles	Plainfield EMA	815-267-7211	kruggles@plainfieldpd.com
Terry Kernc	Diamond	815/634-8149x13	mayor@diamond-illinois.gov
David Dornan	Lockport	815-272-4013	HoneyDog19@NetZero.Net
Joe Formhals	Joliet	815-724-3570	jformhals@jolietcity.org
Greg Sebben	Joliet	815 751 7866	GSebben@jolietcity.org

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Workshop 2: October 10, 2013

This was a two hour meeting, focused primarily on reviewing and updating the Goals, Objectives, and Mitigation Actions of the *Will County County-Wide All Hazard Mitigation Plan.* Input, comments, and recommendations were solicited on changes and additions to the mitigation goals, objectives, and action items. Mr. Harold Damron, Director of Will County EMA, provided introductory remarks. Ms. Jayne Ballun led the review and update process.

First, participants were asked to review the mitigation goals and objectives to determine if any changes were needed. Next, mitigation actions were reviewed identifying items that have been completed or need to be eliminated. Remaining action items were reviewed in detail and suggested updates were noted. Worksheets to facilitate the identification of additional mitigation initiatives were provided and participants were asked to submit their ideas for the next meeting.

The Mitigation Steering Committee was updated on the schedule of the All Hazard Mitigation Plan and their next steps as part of the steering committee. All jurisdictions were asked to link the public survey to their websites and Facebook pages as appropriate.

- All Hazards Risk Assessment Review
- Capability Assessment & THIRA
- Review of Mitigation Goals & Objectives
- Review & Update of Mitigation Actions
- Completed or Obsolete
- Ongoing / Continuing
- New
- Public Survey
- Future Meeting Date
- Questions

Will County Emergency Management Agency

302 North Chicago Street
Joliet, Illinois 60432

Attendance Sign-in Sheet

ALL HAZARD MITIGATION PLAN UPDATE – WORKSHOP

Date: October 10, 2013

Location: New Lenox Fire Department, New Lenox, Illinois

NAME	ORGANIZATION	PHONE NUMBER	EMAIL
[illegible] Spenker	LEMX	815-836-8008	Spenkeyee[illegible]@ATT.com
Phil Rittenhouse	Lockport EMA	815-671 9498	NW9V@Ameritech.Net
Mike Littrell	Romeoville	815-886-6108	MLittrell@Romeoville.[illegible]
Rod Kus	Orland Park ESDA	708-305-0060	RKUS@ORLANDPARK.IL.US
Joel Werner	Manhattan EMA	708-935-2983	joelema@comcast.net
Troy Kirch	Bolingbrook EMA	630-226-8540	tkirch@bolingbrook.com
Dennis Housman	Wilmington EM	815.405 0008	dhousman@Wilmington.IL
Steve Bobzin	Park Forest	708 748 4549	Sbobzin@vopf.com
John Robinson	Homer Glen EMA	708 576 6858	JRobinson@Homerglen.org
Harold Damron	Will Co EMA		
Derek O'Sullivan	Will County		
Allison Anderson	Will County H.D.		aanderson@willcountyhealth.org
Jackie Marshall	" "		jmarsholt@willcountyhealth.org
Aaron Klima	Shorewood	815 791-6714	
Joe Formhals	Joliet	815-724-3510	jformhals@jolietcity.org

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Will County Emergency Management Agency
302 North Chicago Street
Joliet, Illinois 60432

Attendance Sign-in Sheet

ALL HAZARD MITIGATION PLAN UPDATE – WORKSHOP
Date: October 10, 2013
Location: New Lenox Fire Department, New Lenox, Illinois

NAME	ORGANIZATION	PHONE NUMBER	EMAIL
Ken Ruggles	Plainfield PD/EMA	815-267-7211	kruggles@plainfieldpd.com
Terry Kernc	Diamond	815/634-8149 x13	mayor@diamond.illinois.gov
TOM DURKIN	VILLAGE OF CRETE	708-672-5479	tdurkin@villageofcrete.org
BRIAN CHELLIOS	VILLAGE OF UNIVERSITY PARK	708-235-4822	bchellios@university-park-il.com

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Workshop 3: November 19, 2013

The intent of this 1½ hour workshop was to finalize the county-wide mitigation goals, objectives, and mitigation actions. Participation from local jurisdictions was solicited by email and telephone. Prior to this meeting, the Mitigation Steering Committee and participating jurisdictions were provided a draft of Chapters 5 and 6 of the plan update. These two chapters detailed the update of the *Will County County-Wide All Hazard Mitigation Plan's* mitigation goals, objectives and action items. Each jurisdiction was asked to review these chapters in detail and come to the meeting to discuss the finalization of these chapters.

Days before this meeting, a tornado came through central and northern Illinois impacting several communities in Will County. A number of regular participants were unable to attend as a result. Mr. Harold Damron, Director of the Will County Emergency Management Agency, gave an overview of the current status of the tornado incident, needs being addressed, and shared pictures of the damages that were a result of the tornado. Ms. Jayne Ballun then led the review of the final draft of the *Will County County-Wide All Hazard Mitigation Plan's* mitigation goals, objectives and action items.

- Hazard Mitigation Plan Updates
  - Executive Summary – overview of mitigation actions
  - Chapter 1 – Mitigation Process
  - Chapter 2 – Community Overview
  - Chapter 3 – Hazard Risk Assessment Summary & Capability Assessment
  - Chapter 4 – Hazard Profiles
  - Chapter 5 – Mitigation Goals, Objectives & Strategies
  - Chapter 6 – Mitigation Actions
  - Chapter 7 – Mitigation Plan Updates & Maintenance
- Draft posted on WC EMA website for review by jurisdictions & public
- Submission to IEMA for approval – then to FEMA
- Once approved by FEMA, submit for adoption by boards
- Questions

Will County Emergency Management Agency
302 North Chicago Street
Joliet, Illinois 60432

Attendance Sign-in Sheet

ALL HAZARD MITIGATION PLAN UPDATE – WORKSHOP

Date: November 19, 2013

Location: Will County Emergency Management Agency, Joliet, Illinois

NAME	ORGANIZATION	PHONE NUMBER	EMAIL
Bill Mort	Peotone Pol	708-258-9236	
Dennis Housman	Wilmington ESDA	815-405-0008	
Aaron G. Klima	Shorewood	815-791-6714	
Bradley Hertzmann	Crest Hill P.D.	815-741-5115	
Ken Ruggles	Plainfield PD/EMA	815-267-7211	
Ed Stobba	Lockport EMA	815-838-5173	
Joe Formhals	Joliet EMA	815-724-3510	
Joel Werner	Manhattan EMA	708-935-2983	
Bob Barber	Beecher ESDA	708-946-2261	
Greg Szymanski	Beecher ESDA	" " "	
Donna Rodney	Beecher ESDA	" " "	
Ruben Bautista	Monee EMA	708-534-8301	
Harold Damron	Will Co	815 740 8351	
Jeff Weissgerber	Beecher PD	708-946-6388	
Steven Bobzin	Park Forest	708 481 4549	
Jayne Ballun	WC EMA	630-485-0607	
[illegible]	Channahon [illegible]	815-530-5611	

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JURISDICTIONAL PARTICIPATION

PARTICIPATION CRITERIA	City of Aurora *	Village of Beecher	Village of Bolingbrook	Village of Braceville *	City of Braidwood	Village of Channahon	Village of Coal City *	City of Crest Hill	Village of Crete	Village of Diamond *	Village of Elwood	Village of Frankfort	Village of Godley*	Village of Homer Glen	City of Joliet	Village of Lemont *	City of Lockport	Village of Manhattan	Village of Minooka *	Village of Mokena	Village of Monee	City of Naperville *	Village of New Lenox	Village of Orland Park *	Village of Park Forest *	Village of Peotone	Village of Plainfield	Village of Rockdale	Village of Romeoville	Village of Sauk Village *	Village of Shorewood	Village of Steger*	Village of Symerton	Village of Tinley Park *	Village of Univ. Park *	City of Wilmington	Village of Woodridge *	Will County
NOTE: A list of jurisdictional participants meeting participation requirements and their representatives is found on pages 1-6 through 1-8.																																						
Provide representation during at least one planning meeting		♦	♦			♦		♦	♦	♦				♦	♦		♦	♦			♦		♦	♦	♦	♦	♦		♦		♦	♦			♦	♦		♦
Submit an inventory of plans, data, and reports relevant to hazard mitigation planning		♦	♦		♦	♦	♦			♦	♦	♦		♦	♦	♦	♦	♦	♦	♦		♦	♦	♦	♦	♦	♦		♦			♦		♦	♦	♦		♦
Review and complete the Hazard Mitigation Action form																																						♦
Identify and delineate natural, technological, and societal hazards throughout Will County		♦			♦	♦	♦			♦		♦		♦	♦	♦		♦		♦		♦		♦		♦	♦							♦	♦			♦
Identify critical “at risk” structures and facilities		♦				♦			♦						♦		♦														♦							♦
Develop community wide mitigation goals		♦	♦			♦		♦	♦	♦				♦	♦		♦	♦			♦		♦	♦	♦	♦	♦		♦		♦	♦			♦	♦		♦
Submit techniques to plan for, reduce, and manage expected losses																																						
Provide technical and financial assistance and incentives to facilitate loss reduction projects																																						♦
Review and comment on the draft plan		♦	♦		♦	♦	♦	♦	♦	♦		♦		♦	♦		♦	♦		♦	♦	♦	♦	♦	♦	♦	♦		♦		♦	♦			♦	♦		♦
Incorporate the plan into existing planning efforts																																						♦
Formally adopt the plan																																						
Participate in plan maintenance through yearly reviews and five year updates		♦	♦			♦		♦	♦	♦		♦		♦	♦		♦	♦			♦		♦	♦	♦	♦	♦		♦		♦	♦			♦	♦		♦

* Jurisdictions that border or have only a portion of their corporate limits in Will County and may choose not to adopt this *Plan*.

After the third update workshop, the progress completed on the *Will County County-Wide All-Hazard Mitigation Plan* update consisted of:

- Review of all plan chapters and appendices of the *Will County County-Wide All-Hazard Mitigation Plan* updating the County profile, maps, hazard incident history, and other pertinent reference material.
- Review with each jurisdiction of their plans and ordinances
- Provision to each jurisdiction of website link to the draft plan update for final review by jurisdiction and public comment.

Target Expertise Input and Correspondence Summaries

HAZUS Installation and Integration

For the original plan, the Mitigation Project Team held a working meeting with Will County EMA and Will County GIS Division. The Polis Center installed and implemented the HAZUS-MH software on Will County equipment. To validate the installation and demonstrate the HAZUS-MH capabilities, the Mitigation Project Team performed an Earthquake risk assessment using the HAZUS-MH default data. Following the validation, the Mitigation Project Team demonstrated the software, data, and HAZUS-MH risk assessment reports to the staff.

Correspondence with FEMA on Past Disaster Declaration Information

For the original plan, the Mitigation Project Team contacted FEMA Mitigation Officer to provide input and data on past declarations in Will County. The Mitigation Project Team was soliciting information on the type of disaster, eligible federal costs reimbursed, types of Public Assistance project categories, and other pertinent information for this project. FEMA could not readily access this information and requested the Mitigation Project Team to contact IEMA.

Correspondence with IEMA on Past Disaster Declarations for Will County

For the original plan, the Mitigation Project Team contacted IEMA Mitigation Officer to provide input and data on past declarations in the County. IEMA provided data on all state declarations by County, the type of federal assistance received, and the federal costs. IEMA also provided weather data of past events.

For the update of the plan, information on past declarations was obtained from the IEMA Hazard Mitigation Plan and FEMA's website: http://www.fema.gov/disasters.

Correspondence with US Army Corps of Engineers

For the original plan, the Mitigation Project Team contacted the US Army Corps of Engineers to obtain information on hazardous material that is transported through the County via U.S Waterways, Harbors, and the Great Lakes. The US Army Corps of Engineers provided detailed historical information, type of materials, and insight on the County's busiest waterways.

For the update of the plan, much of this information is now available online through various websites of the US Army Corps of Engineers and National Transportation Safety Board.

GIS Integration Working Meeting and Correspondence

For the original plan, the intent of this meeting was to provide a brief tutorial on HAZUS-MH to Will County GIS Division staff and to identify County GIS data that will be incorporated into the HAZUS-MH model and GIS Analysis. The Polis Center provided the strategy of updating and integrating County GIS data and the data documentation that will be required. A review was conducted of each attribute (field) in the databases and identified the attributes that will be updated. The attributes are of four major types listed below.

- Mandatory for HAZUS to run correctly (i.e. building classes)
- Required for reports (i.e. number of beds)
- Not required (i.e. American hospital Association (AHA) ID)
- Data and information will come from another source (soil type from Illinois Geological Survey)

Will County Stormwater Management Committee Coordination

For the original plan, a coordination meeting was held with representatives of the Will County Stormwater Management Committee. This meeting was lead by a Mitigation Steering Committee member who is also a member of the Will County Stormwater Management Committee. A brief overview of FEMA's Mitigation Program and the requirements of the Disaster Mitigation Act of 2000 were provided. An overview of the All-Hazard Mitigation Plan was discussed, outlining the goals, strategies, and progress of the *Will County County-Wide All Hazard Mitigation Plan*. The Mitigation

Project Team solicited guidance from the Will County Stormwater Management Committee on what their greatest risks were and requested their input.

For the plan update, Mr. Derek O'Sullivan, Assistant Director of the Will County Land Use Department and member of the Stormwater Management Planning Committee, provided technical assistance in the review and update of the *Will County County-Wide All Hazard Mitigation Plan.*

Email and Telephone Correspondence with Dr. Bauer (Illinois State Geologic Survey)

For the original plan, the Mitigation Project Team began correspondence with Dr. Bauer with the Illinois State Geologic Survey to identify and quantify the risk of an earthquake to the communities of Will County. Dr. Bauer provided a plethora of input on the impacts of an earthquake originating from the New Madrid fault system, the Des Plaines impact structure, or the assorted fault traces in Northern Illinois. Dr. Bauer also provided input on the hazard modeling scenario most likely to occur and what would truly represent an event that would significantly impact the County.

Great Lakes Partnership (GLP) Coordination and General Meeting Attendance

For the original plan, the Mitigation Team held periodic meetings with representatives of the Great Lakes Partnership and attended their annual conference in October of 2005. GLP's mission is to bring business and government leaders together for cross-sector collaboration to address critical infrastructure interdependencies and related homeland and economic security challenges. Their goal is to proactively promote business continuity planning through the use of best practices, information sharing, and innovation.

The Mitigation Team attended the Great Lakes Partnership's General Meeting on October 20, 2005. The GLP General Meeting had the theme "Sustainable Preparedness" and was a day-long session attended by subject matter experts and representatives of the private and public sector. The Mitigation Project Team solicited input, recommendations, and ideas from private and public sector professionals, as well as subject matter experts.

Local Emergency Planning Commission (LEPC) Solicitation

Will County EMA solicited input from the Will County LEPC and extended invitations to attend the Committee Meetings. The Will County LEPC is an organization of industrial, governmental and citizen groups whose purpose is to provide a forum in which the local community and facilities can discuss issues related to hazardous substances.

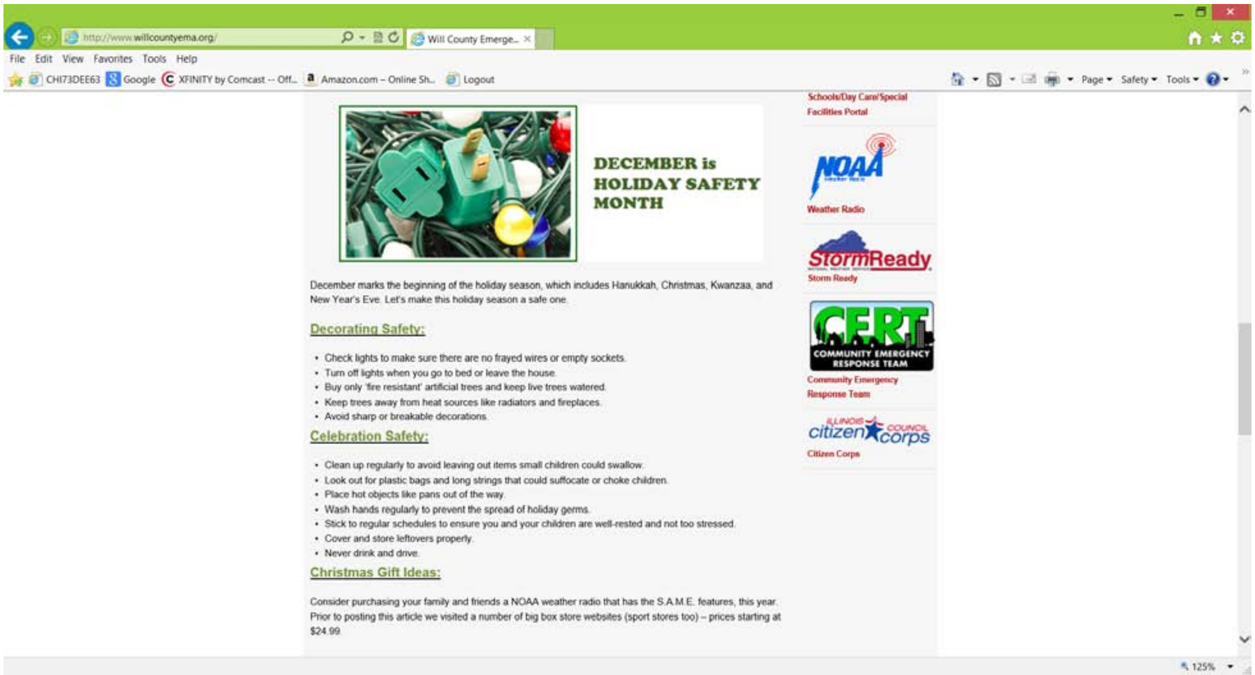
Launch of a New Public Will County EMA Website

To maintain public interest and to update them on the latest development in emergency management, Will County EMA updated their web-site in time for the 2006 Severe Weather Preparedness Season. Will County EMA provided a link to the latest development of the hazard mitigation project.

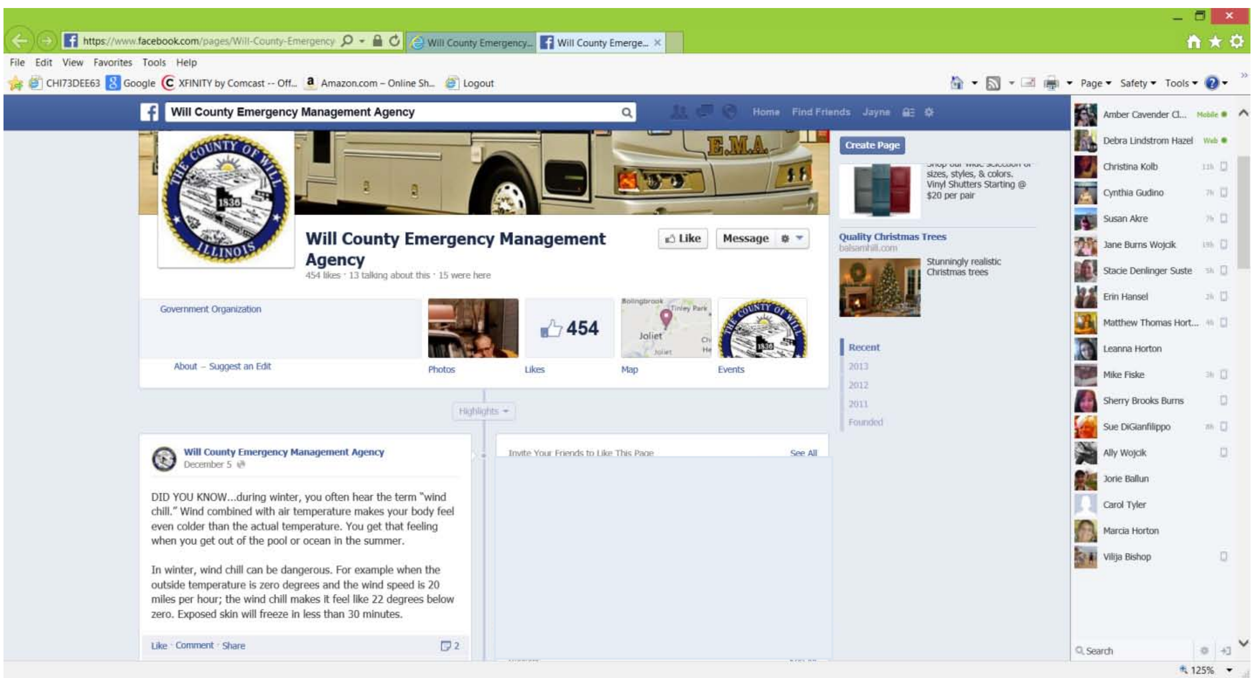
Since then, Will County EMA has maintained their website and added the social media Facebook tool to provide the public and response partners with information on the hazards, preparedness, weather alerts, special needs registry, and other valuable information to inform the public. Utilization of websites and social media has become an everyday tool for educating public about the hazards that face Will County and for the public to provide input on emergency management issues. Will County EMA has also participated in the Chicago Regional Catastrophic Planning Team's public information campaign called *Gear Up/Get Ready* which has provided the region with a wealth of emergency preparedness education materials and public activities.

Will County EMA Website

Will County EMA Website



Will County EMA Facebook



Public Outreach and Input on Hazard Mitigation

Despite the security issues, public involvement is critical to the success of any strategic planning process, including hazard mitigation. It is important for hazard mitigation plans to target public concerns, comments, and perception of risk as factors in the creation of mitigation strategies. To ensure consensus with the public, the Mitigation Team developed several mechanisms to secure sensitive information and to still reach out to the public to participate in the *Will County County-Wide All Hazard Mitigation Plan*. Public input was incorporated into the plan through various efforts.

Will County EMA held a public meeting to allow the public to participate in the 2008 *Will County County-Wide All Hazard Mitigation Plan*. This public meeting enabled the community to learn about their hazards and the mitigation planning process.

CERTIFICATE OF PUBLICATION

STATE OF ILLINOIS
County of Will SS

Copy of Notice Herein Referred to

I, Michael J. Cleary, do hereby certify that I am the publisher of the FARMERS WEEKLY REVIEW, which is now and has been for more than one year prior to the first publication of this notice hereto annexed, a weekly newspaper of general circulation, printed and published in the city of Joliet in said County, and that the said advertisement or notice relating to the matter of Notice of Public Meeting about the FEMA Mitigation Program on February 15, 2006

has been published in said paper every week consecutively of the issues commencing February 9, A.D. 2006 and ending February 9, A.D. 2006 which are the dates of the first and last papers containing the same.

Given under my hand this February 9, 2006.

Printer's Fee: $55.00

Date Paid: , 2006.

By:

Michael J. Cleary, Editor/Publisher, Farmers Weekly Review

NOTICE OF PUBLIC MEETING

The County of Will is providing opportunity for the public to learn about the Federal Emergency Management Agency's (FEMA) Mitigation Program, Will County's Hazard Mitigation Planning process, and to provide input on the draft Will County All Hazard Mitigation Plan.º This plan is designed to meet the requirements of federal Public Law 106-390, the Disaster Mitigation Act of 2000 (DMA2K) that requires jurisdictions to have an adopted, FEMA-approved Natural Hazard Mitigation Plan in order to be eligible for future hazard mitigation grant funds. The County of Will has expanded the scope of this requirement to include all hazards.

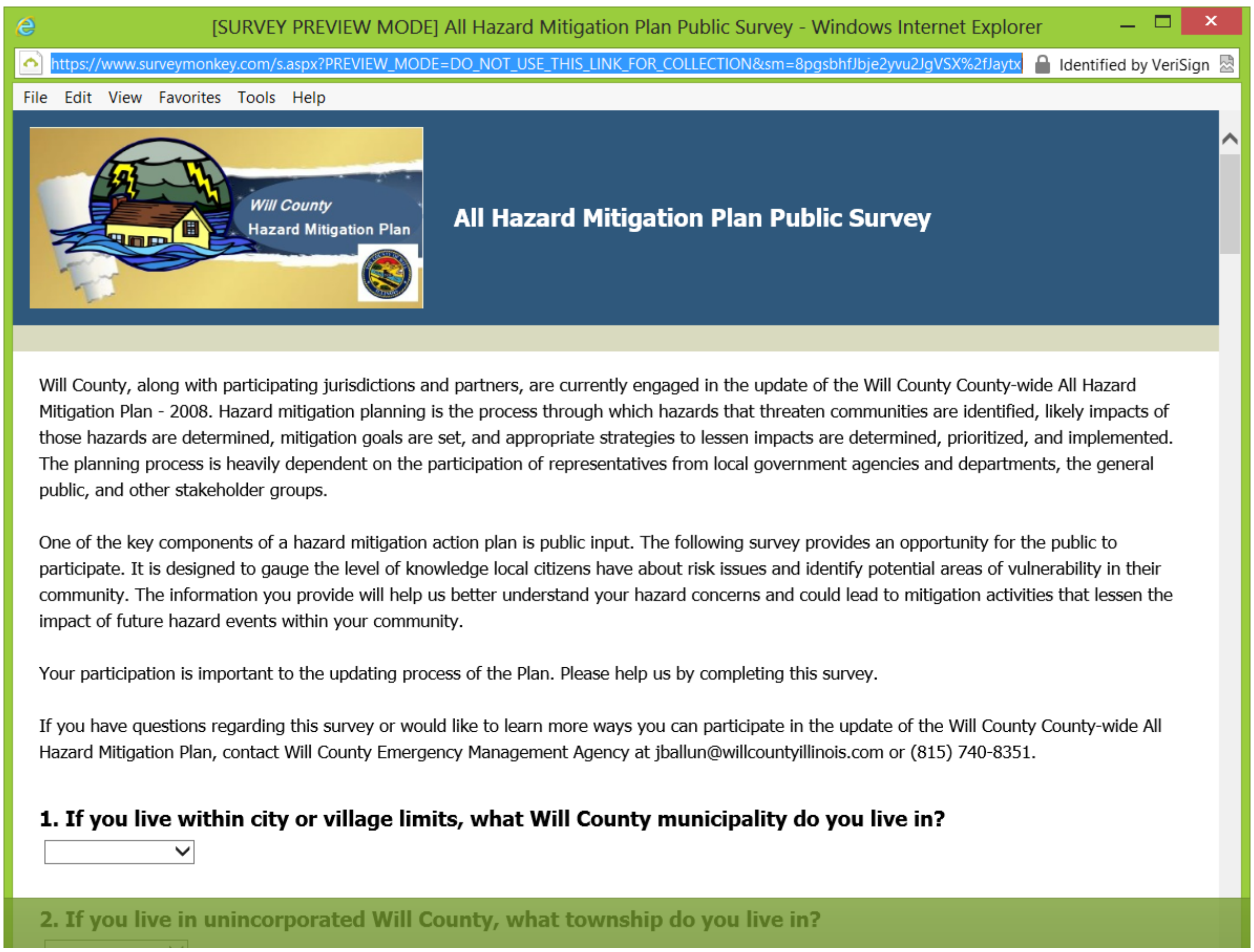
The Will County All Hazard Mitigation Plan fulfills the DMA2K requirements for Will County and participating municipalities. This plan represents the first step towards the community being disaster resilient specific to the hazards assessed in Will County.º The plan defines each hazard, assesses the risk of the hazard, and defines the specific mitigation actions the county can take to reduce loss in the event of a hazard event.

You can learn about the All-Hazard Mitigation Planning project and provide input before the public meeting by visiting the Will County Emergency Management Agency website at www.willcountyema.org.The public meeting will be held at the Will County Office Building, 302 North Chicago Street, Joliet, Illinois on Wednesday, February 15th, 2006 at 1:00 PM.

Will County
Emergency Management Agency
302 North Chicago Street
Joliet, IL 60432
(815) 740-8351

Public Survey

For the plan update, the Mitigation Team developed a public survey to gauge the concerns of the public, as well as provide feedback to help guide the Committee in identifying potential mitigation actions. The questionnaire targeted the public's thought on what their and their community's greatest risk is, what they have done to mitigate their home, and what they would do when a disaster strikes. This questionnaire was made available on the Will County EMA website (http://www.willcountyema.org) and Facebook page along with jurisdictional websites. This allowed the public to communicate their concerns, comments, and ideas on what their community and/or Will County can do to mitigate from all hazards.


[SURVEY PREVIEW MODE] All Hazard Mitigation Plan Public Survey - Windows Internet Explorer

https://www.surveymonkey.com/s.aspx?PREVIEW_MODE=DO_NOT_USE_THIS_LINK_FOR_COLLECTION&sm=8pgsbhfJbje2yvu2JgVSX%2fJaytx Identified by VeriSign

File Edit View Favorites Tools Help

Will County Hazard Mitigation Plan

All Hazard Mitigation Plan Public Survey

Will County, along with participating jurisdictions and partners, are currently engaged in the update of the Will County County-wide All Hazard Mitigation Plan - 2008. Hazard mitigation planning is the process through which hazards that threaten communities are identified, likely impacts of those hazards are determined, mitigation goals are set, and appropriate strategies to lessen impacts are determined, prioritized, and implemented. The planning process is heavily dependent on the participation of representatives from local government agencies and departments, the general public, and other stakeholder groups.

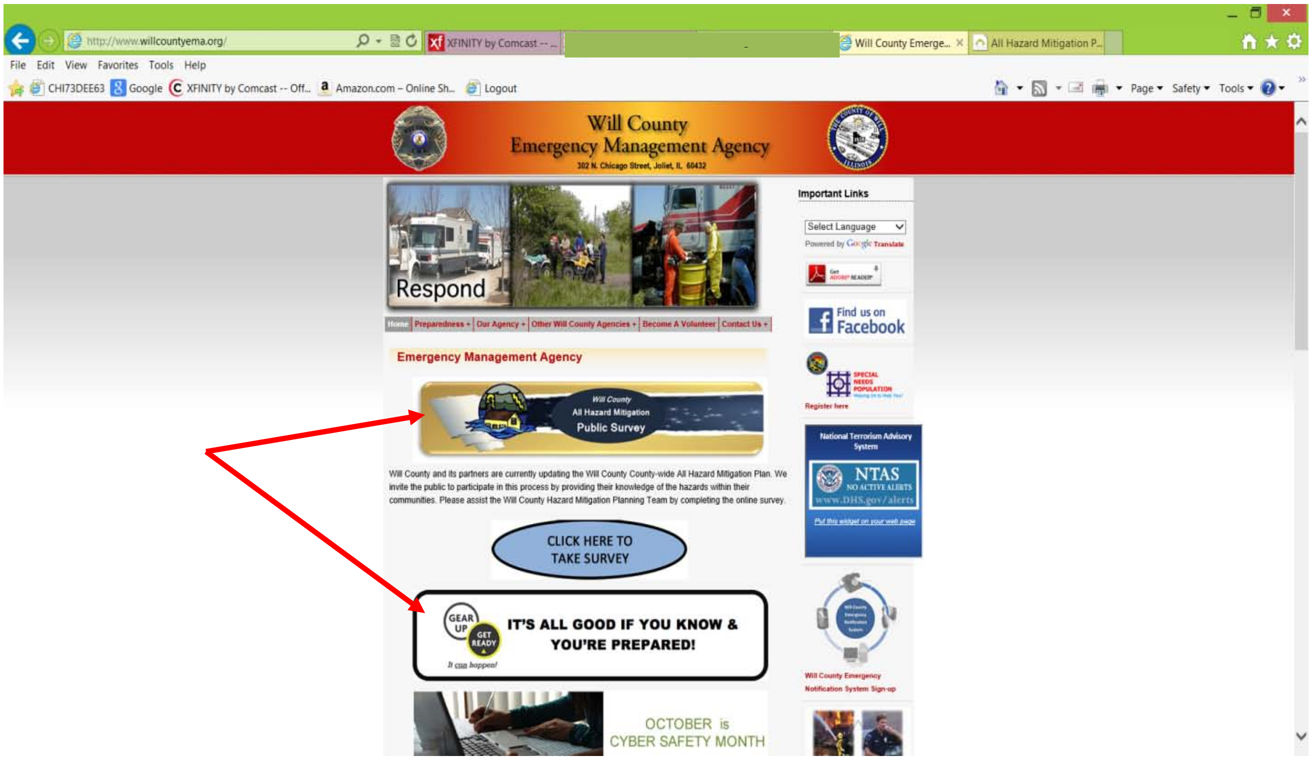
One of the key components of a hazard mitigation action plan is public input. The following survey provides an opportunity for the public to participate. It is designed to gauge the level of knowledge local citizens have about risk issues and identify potential areas of vulnerability in their community. The information you provide will help us better understand your hazard concerns and could lead to mitigation activities that lessen the impact of future hazard events within your community.

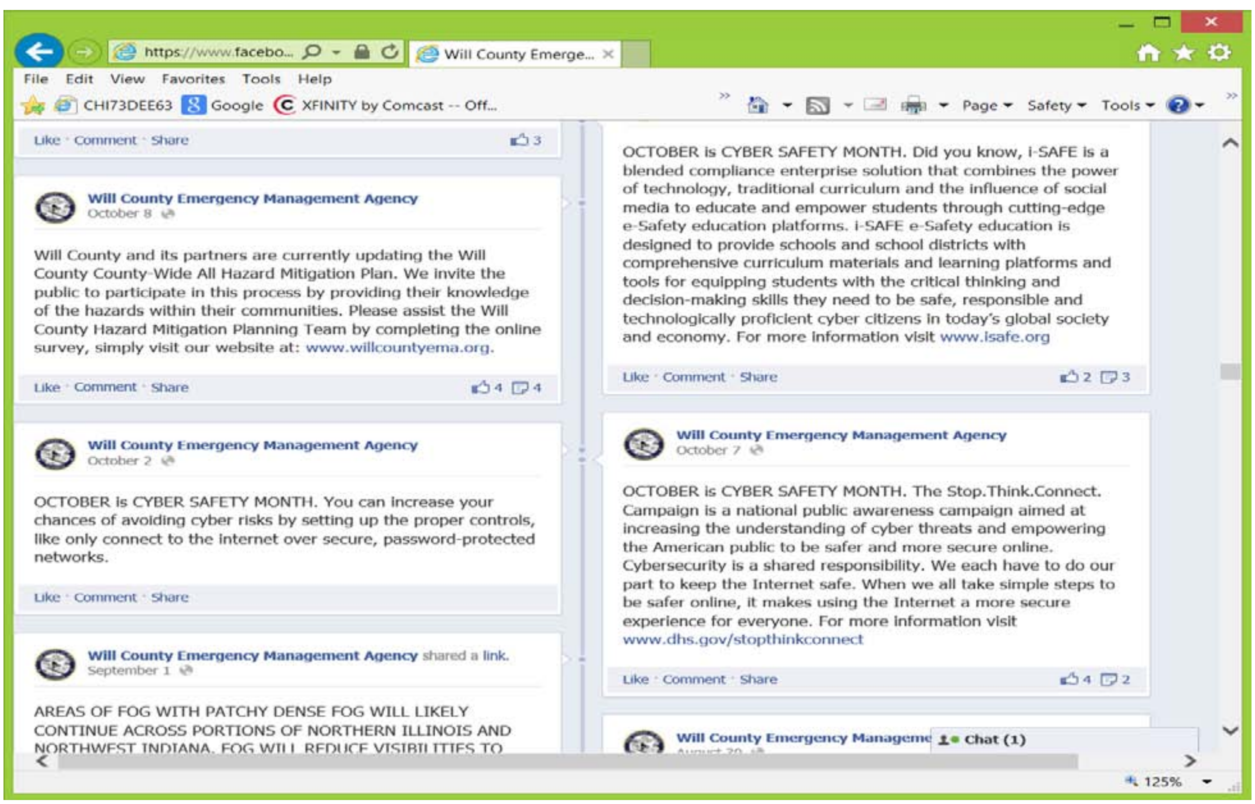
Your participation is important to the updating process of the Plan. Please help us by completing this survey.

If you have questions regarding this survey or would like to learn more ways you can participate in the update of the Will County County-wide All Hazard Mitigation Plan, contact Will County Emergency Management Agency at jballun@willcountyillinois.com or (815) 740-8351.

1. If you live within city or village limits, what Will County municipality do you live in?

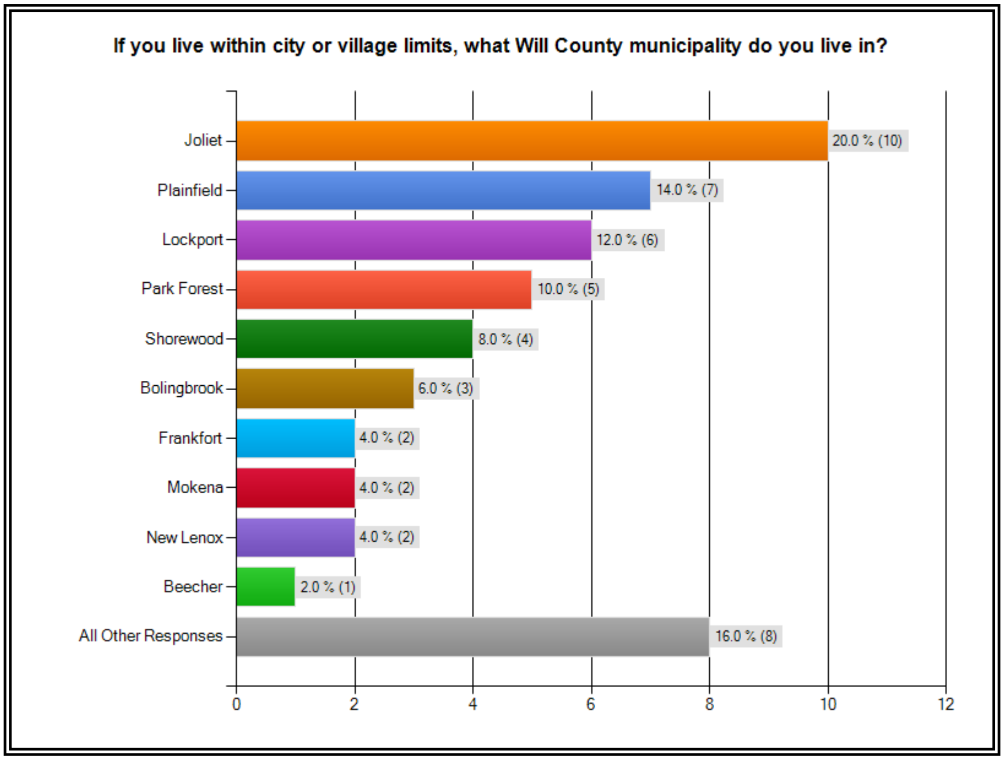
2. If you live in unincorporated Will County, what township do you live in?


Will County
Emergency Management Agency
302 N. Chicago Street, Joliet, IL 60432
Respond
Important Links
Find us on Facebook
Emergency Management Agency
Will County
All Hazard Mitigation
Public Survey
Will County and its partners are currently updating the Will County County-wide All Hazard Mitigation Plan. We invite the public to participate in this process by providing their knowledge of the hazards within their communities. Please assist the Will County Hazard Mitigation Planning Team by completing the online survey.
CLICK HERE TO TAKE SURVEY
IT'S ALL GOOD IF YOU KNOW & YOU'RE PREPARED!
National Terrorism Advisory System
NTAS
OCTOBER is CYBER SAFETY MONTH

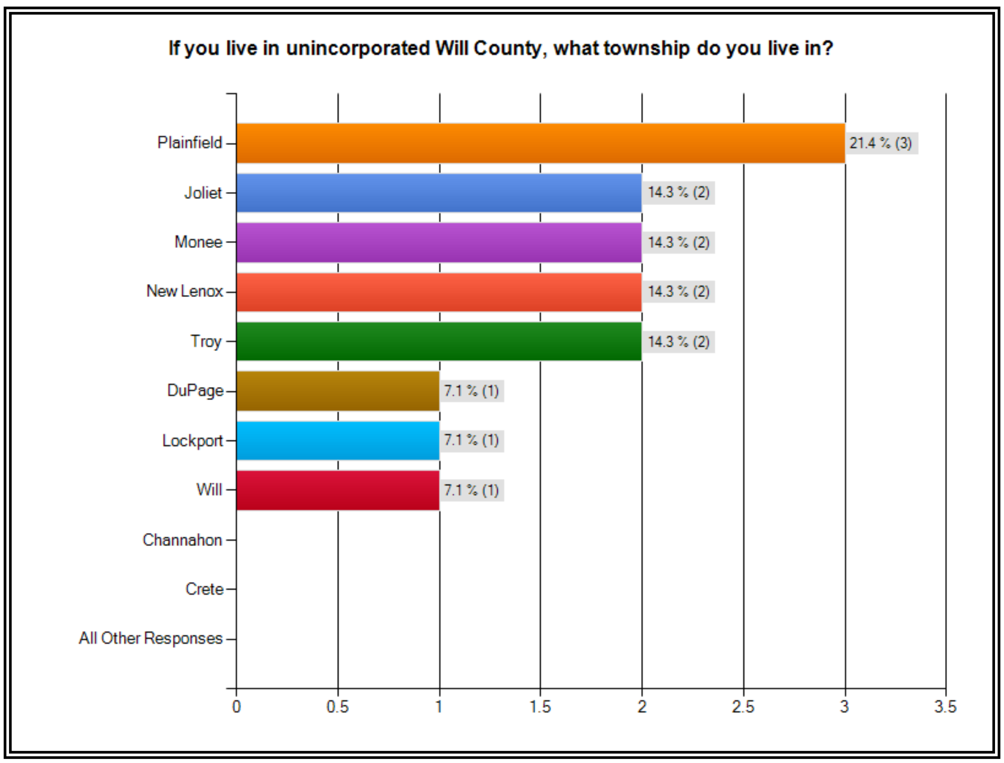

Will County Emergency Management Agency
October 8
Will County and its partners are currently updating the Will County County-Wide All Hazard Mitigation Plan. We invite the public to participate in this process by providing their knowledge of the hazards within their communities. Please assist the Will County Hazard Mitigation Planning Team by completing the online survey, simply visit our website at: www.willcountyema.org.
Like · Comment · Share
Will County Emergency Management Agency
October 2
OCTOBER is CYBER SAFETY MONTH. You can increase your chances of avoiding cyber risks by setting up the proper controls, like only connect to the internet over secure, password-protected networks.
Like · Comment · Share
Will County Emergency Management Agency shared a link.
September 1
AREAS OF FOG WITH PATCHY DENSE FOG WILL LIKELY CONTINUE ACROSS PORTIONS OF NORTHERN ILLINOIS AND NORTHWEST INDIANA. FOG WILL REDUCE VISIBILITIES TO
OCTOBER is CYBER SAFETY MONTH. Did you know, i-SAFE is a blended compliance enterprise solution that combines the power of technology, traditional curriculum and the influence of social media to educate and empower students through cutting-edge e-Safety education platforms. i-SAFE e-Safety education is designed to provide schools and school districts with comprehensive curriculum materials and learning platforms and tools for equipping students with the critical thinking and decision-making skills they need to be safe, responsible and technologically proficient cyber citizens in today's global society and economy. For more information visit www.isafe.org
Like · Comment · Share
Will County Emergency Management Agency
October 7
OCTOBER is CYBER SAFETY MONTH. The Stop.Think.Connect. Campaign is a national public awareness campaign aimed at increasing the understanding of cyber threats and empowering the American public to be safer and more secure online. Cybersecurity is a shared responsibility. We each have to do our part to keep the Internet safe. When we all take simple steps to be safer online, it makes using the Internet a more secure experience for everyone. For more information visit www.dhs.gov/stopthinkconnect
Like · Comment · Share

WILL COUNTY COUNTY-WIDE HAZARD MITIGATION PLAN PUBLIC SURVEY RESULTS

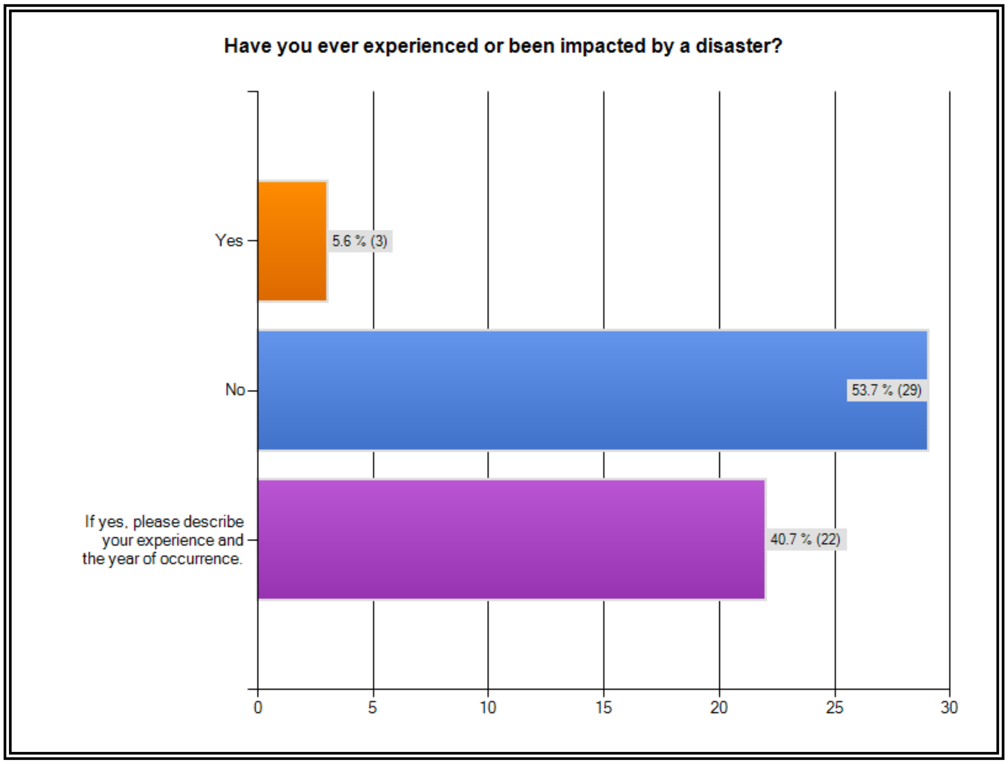
Question #1:



Question #2:



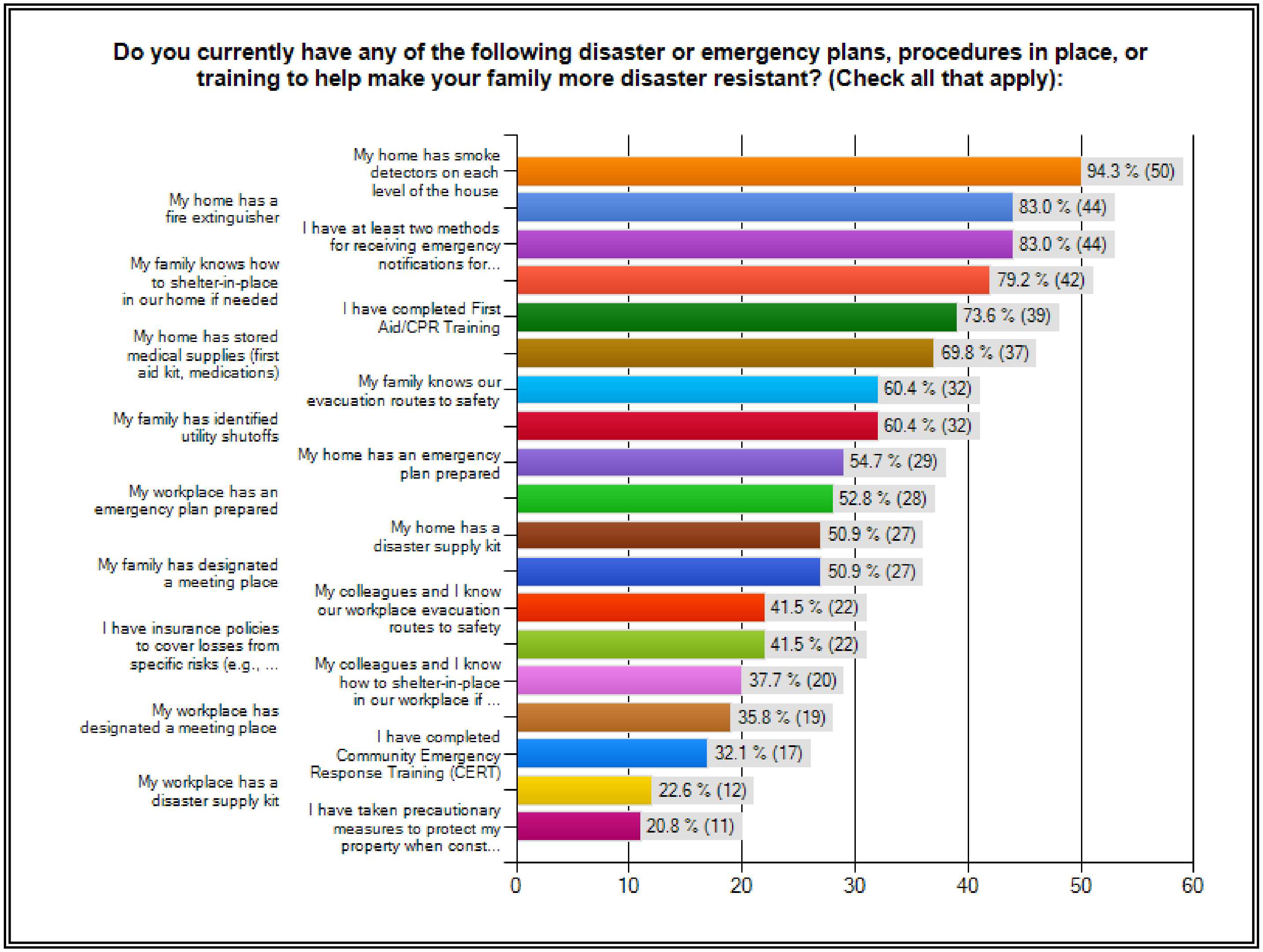
Question #3:



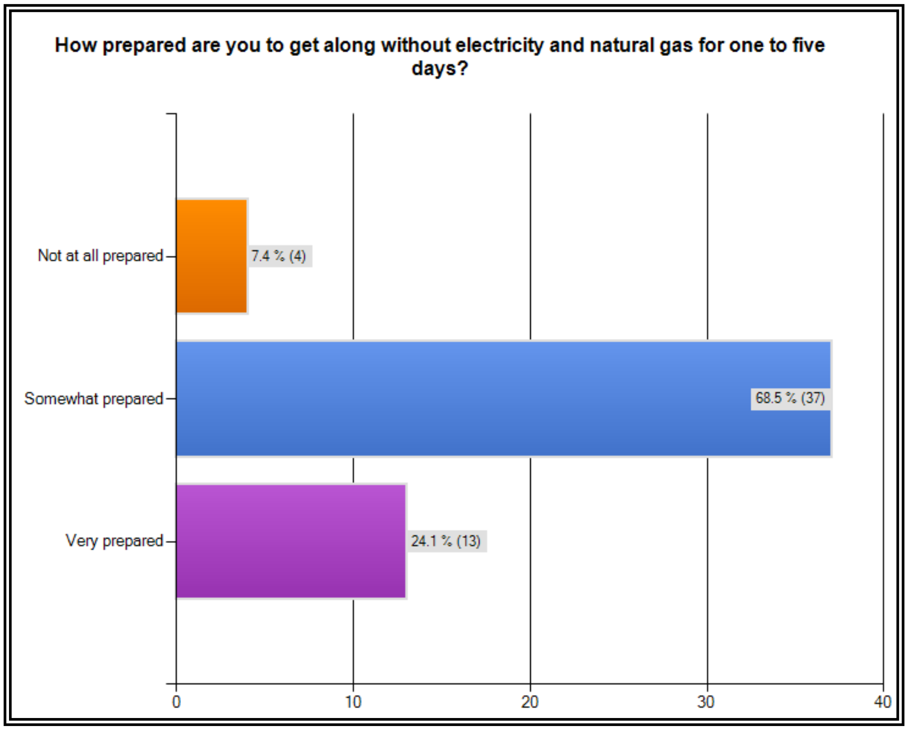
Disaster experience responses include:

- Summer Microburst
- Tornados
- Blizzards
- Floods
- Hurricane
- Snow Storm
- Earthquake
- Storm related power outage

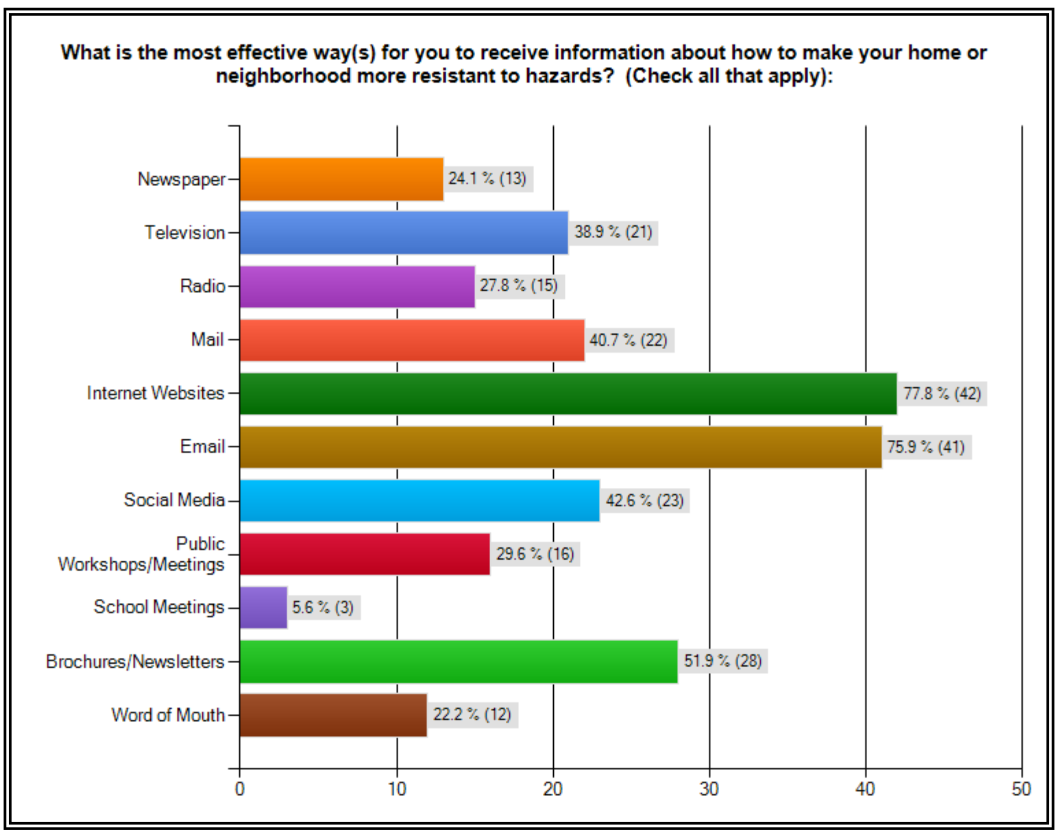
Question #4:


Do you currently have any of the following disaster or emergency plans, procedures in place, or training to help make your family more disaster resistant? (Check all that apply):
My home has smoke detectors on each level of the house
94.3 % (50)
My home has a fire extinguisher
83.0 % (44)
I have at least two methods for receiving emergency notifications for...
83.0 % (44)
My family knows how to shelter-in-place in our home if needed
79.2 % (42)
I have completed First Aid/CPR Training
73.6 % (39)
My home has stored medical supplies (first aid kit, medications)
69.8 % (37)
My family knows our evacuation routes to safety
60.4 % (32)
My family has identified utility shutoffs
60.4 % (32)
My home has an emergency plan prepared
54.7 % (29)
My workplace has an emergency plan prepared
52.8 % (28)
My home has a disaster supply kit
50.9 % (27)
My family has designated a meeting place
50.9 % (27)
My colleagues and I know our workplace evacuation routes to safety
41.5 % (22)
I have insurance policies to cover losses from specific risks (e.g., ...
41.5 % (22)
My colleagues and I know how to shelter-in-place in our workplace if ...
37.7 % (20)
My workplace has designated a meeting place
35.8 % (19)
I have completed Community Emergency Response Training (CERT)
32.1 % (17)
My workplace has a disaster supply kit
22.6 % (12)
I have taken precautionary measures to protect my property when const...
20.8 % (11)
0
10
20
30
40
50
60

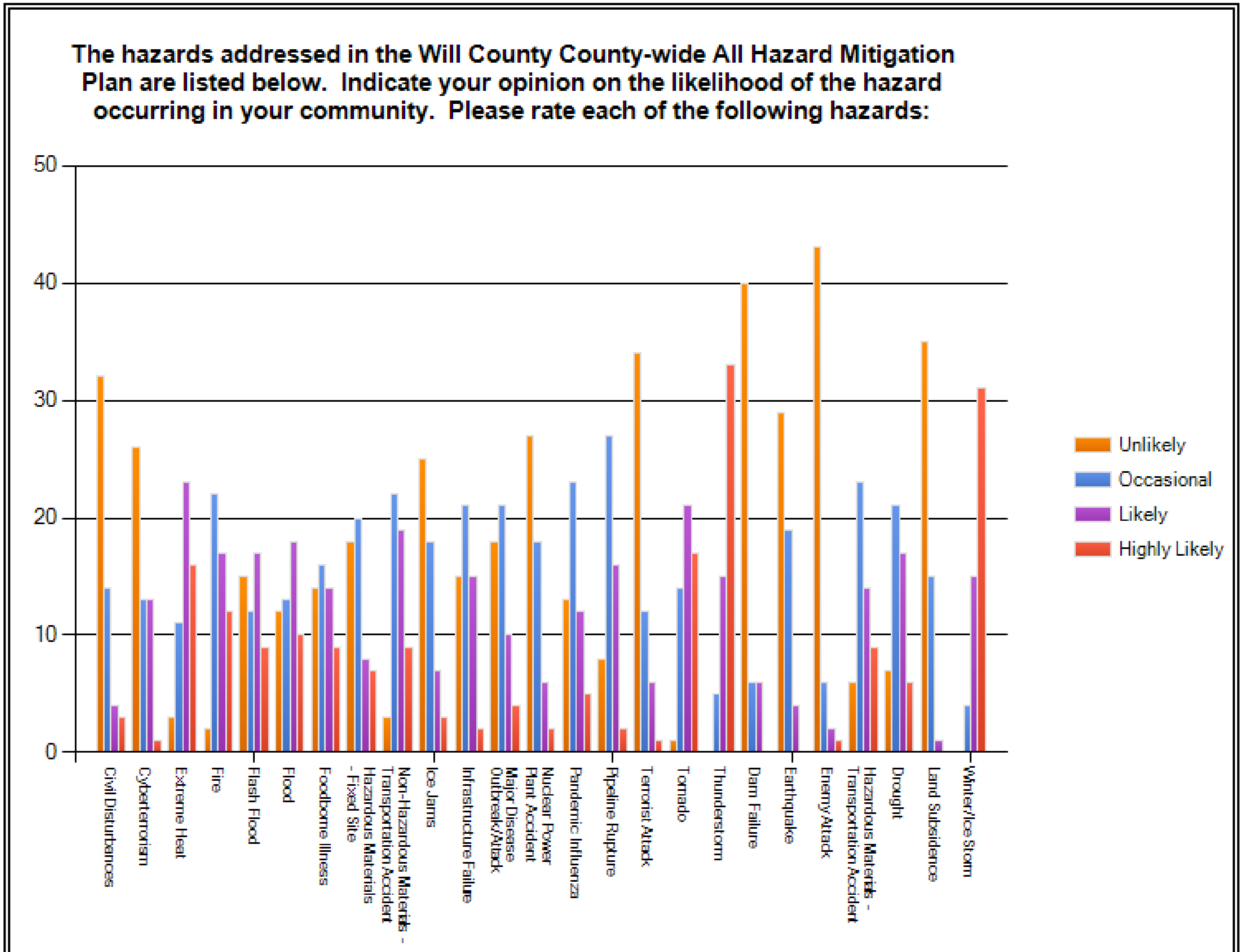
Question #5:



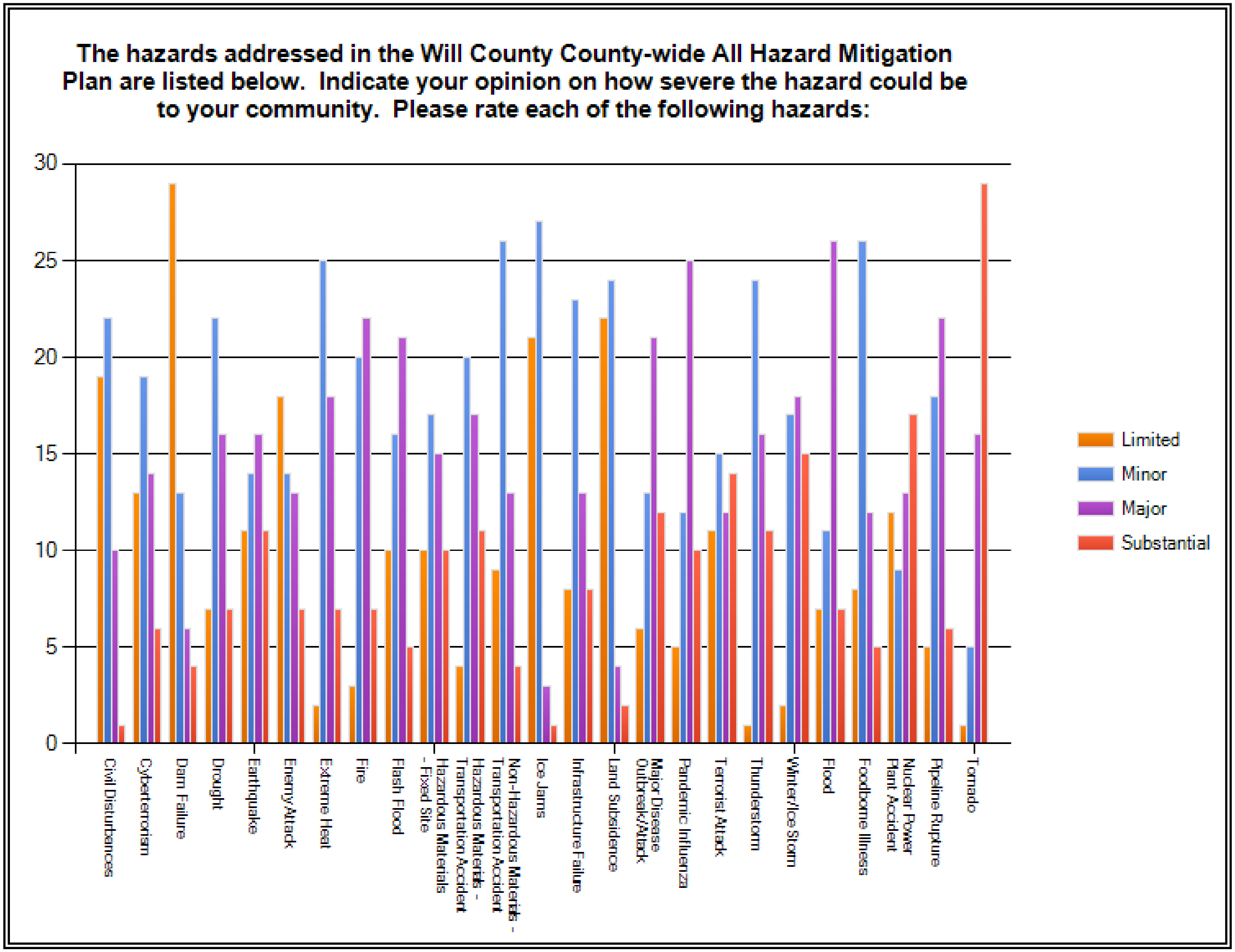
Question #6:



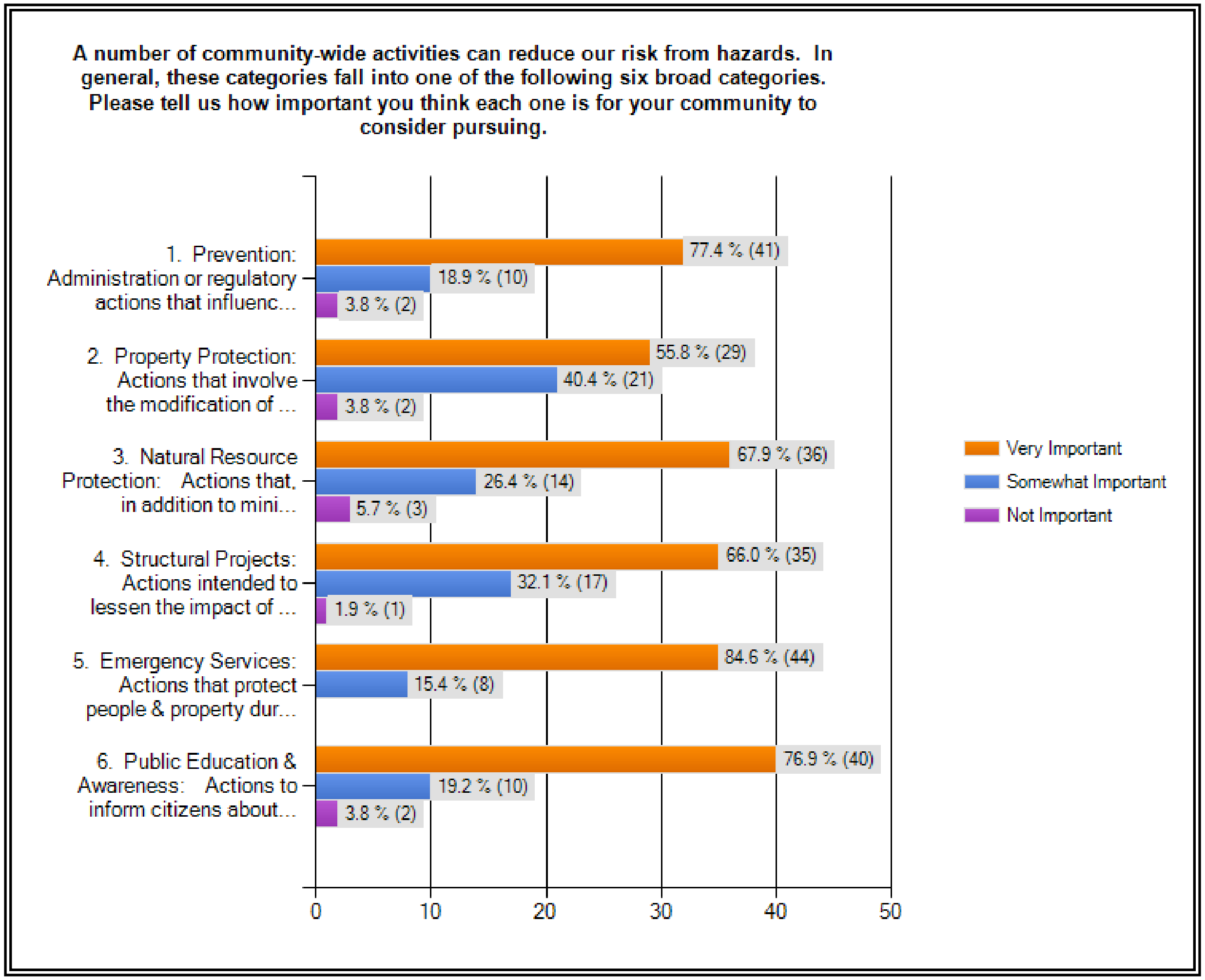
Question #7:


The hazards addressed in the Will County County-wide All Hazard Mitigation Plan are listed below. Indicate your opinion on the likelihood of the hazard occurring in your community. Please rate each of the following hazards:
50
40
30
20
10
0
Unlikely
Occasional
Likely
Highly Likely
Civil Disturbances
Cyberterrorism
Extreme Heat
Fire
Flash Flood
Flood
Foodborne Illness
Hazardous Materials - Fixed Site
Non-Hazardous Materials - Transportation Accident
Ice Jams
Infrastructure Failure
Major Disease Outbreak/Attack
Nuclear Power Plant Accident
Pandemic Influenza
Pipeline Rupture
Terrorist Attack
Tornado
Thunderstorm
Dam Failure
Earthquake
Enemy Attack
Hazardous Materials - Transportation Accident
Drought
Land Subsidence
Winter/Ice Storm

Question #8:


The hazards addressed in the Will County County-wide All Hazard Mitigation Plan are listed below. Indicate your opinion on how severe the hazard could be to your community. Please rate each of the following hazards:
30
25
20
15
10
5
0
Civil Disturbances
Cyberterrorism
Dam Failure
Drought
Earthquake
Enemy Attack
Extreme Heat
Fire
Flash Flood
Hazardous Materials - Fixed Site
Hazardous Materials - Transportation Accident
Non-Hazardous Materials - Transportation Accident
Ice Jams
Infrastructure Failure
Land Subsidence
Major Disease Outbreak/Attack
Pandemic Influenza
Terrorist Attack
Thunderstorm
Winter/Ice Storm
Flood
Foodborne Illness
Nuclear Power Plant Accident
Pipeline Rupture
Tornado
Limited
Minor
Major
Substantial

Question #9:


A number of community-wide activities can reduce our risk from hazards. In general, these categories fall into one of the following six broad categories. Please tell us how important you think each one is for your community to consider pursuing.
1. Prevention: Administration or regulatory actions that influenc...
2. Property Protection: Actions that involve the modification of ...
3. Natural Resource Protection: Actions that, in addition to mini...
4. Structural Projects: Actions intended to lessen the impact of ...
5. Emergency Services: Actions that protect people & property dur...
6. Public Education & Awareness: Actions to inform citizens about...
77.4 % (41)
18.9 % (10)
3.8 % (2)
55.8 % (29)
40.4 % (21)
3.8 % (2)
67.9 % (36)
26.4 % (14)
5.7 % (3)
66.0 % (35)
32.1 % (17)
1.9 % (1)
84.6 % (44)
15.4 % (8)
76.9 % (40)
19.2 % (10)
3.8 % (2)
0
10
20
30
40
50
Very Important
Somewhat Important
Not Important

Will County County-Wide All Hazard Mitigation Plan 2013 Update

The updated plan was posted on the Will County EMA and jurisdictional websites from mid-December through January giving the public the opportunity to review the updates and posts comments on a Survey Monkey link.

APPENDIX F

UPDATES TO 2008
Will County County-Wide All Hazard Mitigation Plan

UPDATES TO 2008 WILL COUNTY COUNTY-WIDE ALL HAZARD MITIGATION PLAN

The update of the *2008 Will County County-Wide All Hazard Mitigation Plan* consisted of a review of the data, hazards, and hazard incidents that have occurred over the last five years. The Will County Hazard Mitigation Planning Committee reviewed, analyzed and commented on every section of the 2008 Plan. Edits and comments were made to the introductory and profile sections. The Committee used Census 2010 data, where available, or the most current information in updating the demographics and land use in Will County for the profile section. Upon review of the introductory and overview sections of the risk assessment, the Committee decided to keep the same hazards in the 2008 Plan as no new hazards had affected the area that were not considered in 2008. Occurrence and probability data was updated as part of the plan's risk assessment.

For the vulnerability assessment, critical facilities, building counts and losses were updated to reflect changes over the past five years. The overall goals and objectives of the 2008 plan were reviewed and it was determined that a number of the same objectives and goals would remain in the Plan Update. Plan maintenance procedures were also reviewed and updated to reflect current changes in staff and annual/bi-annual meetings. A review of the mitigation actions by the Planning Committee was conducted on the actions identified in the 2008 Plan and any amendments thereto and provided an analysis as to whether each action is ongoing, has been completed or should be deleted from the Plan Update. A status of each has been provided in the update.

The following factors were taken into consideration when reviewing the 2008 Plan:

- Whether the goals address current and expected conditions;
- If the nature/magnitude of risks have changed;
- If there are current resources appropriate for implementing the Plan;
- Whether implementation problems, such as technical, political, legal or coordination issues hinder development;
- If outcomes have occurred as expected; and
- How communities, agencies and partners participated in the implementation process.

SUMMARY OF CHANGES IN WILL COUNTY COUNTY-WIDE ALL HAZARD MITIGATION PLAN		
2008 AHHMP	**Updated AHHMP**	**Summary of Changes**
Executive Summary	Executive Summary	Updated to reflect plan updates and modified goals
Chapter 1 - Introduction	Chapter 1 - Introduction	Updated to reflect plan updates and addition of list of Federal Declarations
Chapter 2 – Will County Community Overview	Chapter 2 – Will County Community Overview	Updated community overview to reflect census data and community changes along with other pertinent community information
Chapter 3 – All Hazard Risk Assessment	Chapter 3 – All Hazard Risk Assessment	Updated Historical Events
Chapter 4 – Hazard Profiles & Vulnerability Assessment	Chapter 4 – Hazard Profiles & Vulnerability Assessment	Updated data, historical events, maps, census material, watersheds and flood concerns, and other information as necessary
Chapter 5 – Mitigation Goals, Objectives, & Strategies	Chapter 5 – Mitigation Goals, Objectives, & Strategies	Updated to reflect modifications in goals, objectives, and mitigation actions made during workshops
Chapter 6 – Mitigation Actions	Chapter 6 – Mitigation Actions	Updated to reflect modifications in goals, objectives, and mitigation actions made during workshops
Chapter 7 – Mitigation Plan Maintenance	Chapter 7 – Mitigation Plan Maintenance	Minor updates made to reflect modifications in goals, objectives, and mitigation actions made during workshops
Appendices A through J	Appendices A through F	Incorporated pertinent information into the body of the plan

Representatives from Will County departments, local jurisdictions, and community partners came together in workshops to review the 2008 Goals, Objectives, and Mitigation Actions developed to determine current status of actions items, current needs, and changes within the counties communities. The result of the workshops and update of these Goals, Objectives, and Mitigation Actions is summarized in the following table.

Mitigation Success Stories

Will County endeavors to improve planning and implement effective mitigation actions for the safety of the public it serves and for the development of an inviting and successful place to live, work, and play.

County and local jurisdictions have come together to develop and implement the mitigation actions identified in the *2008 Will County County-Wide All Hazard Mitigation Plan*. Progress is being made daily with jurisdictions coming together to identify and address the identified issues. Highlights include:

Flood Mitigation

- C*ounty-Wide Stormwater Management Ordinance* and plan were updated in 2010 and supplemented with the *Technical Guidance Manual for County-Wide Stormwater Ordinance*. The ordinance was adopted by all communities within Will County, with twenty-nine communities meeting requirements to be delegated responsibilities for ordinance enforcement.
- Property Buyouts of approximately $10.6 million have resulted with funding from the 1996 and 2008 flood mitigation grants. This allows the County and communities to implement open space planning for areas in commercial and private developments with repetitive flooding.
- With a common ordinance and planning guidance, sixty-one stormwater projects have been identified and are being addressed by the WCSMPC.
- Flood Monitoring has improved as a result of the installation of additional stream gauges. Jurisdictions works with the National Weather Service to utilize the data to anticipate flooding issues and safeguard the public.

  See tools developed with NWS and USGS:
  - http://www.willcountylanduse.com/stormwater-management-planning-committee/will-county-stream-and-rain-gages-0
  - http://il.water.usgs.gov/ifhp/will

Collaborative Efforts

- The RCPGP has been an important initiative being several collaborative projects to the County which include the development of plans for a regional hub that includes mass care and evacuation elements, citizen preparedness through the *GearUp!GetReady!* Program, regional assessment of capabilities and an all hazard risk assessment plan, logistics and resource management planning, and animal sheltering projects.

- Participants from the IL-IN-WI CSA came together to participate in Whole Community conferences that provided training and opportunities to discuss issues.
- WC EMA and local jurisdictions have been very active in the RCPGP program.

Training and Public Awareness

- NIMS training has been an important tool in promoting professional development in emergency management throughout the County. Since 2009, thirteen people have obtained or renewed their IPEM and eight people have received their CEM designation.
- Public education has increased with the use of websites, Facebook pages,newsletters, and video/radio PSAs. WC EMA has implemented and supported a speaker's bureau and county-wide PIO group as outreach for public education.
- The WC EMA Public Preparedness Group and local jurisdictions are active in community events for public education and utilize the RCPCP's GearUp!Get Ready! Program.

GIS Use

- GIS is an important tool that is being integrated county-wide for planning, response, and recovery activities. Upon receipt of the updated DFIRMS, additional floodplain management projects will be implemented using this technology.

Storm Ready and Weather Radios

- The County has adopted the StormReady program and has encouraged local jurisdictions to also participate. StormReady is a nationwide community preparedness program to help community develop plans to handle all types of severe weather through the implementation of guidelines that improve their hazardous weather operations.
- WC EMA has worked with the school districts to help them prepare for weather hazards and has distributed 800 weather radios throughout the County as part of this program.

The following chart provides additional status reports on all of the 2008 Mitigation Actions along with the plans for the 2013 Mitigation Actions.

Action #	2008 Mitigation Actions	Action #	2013 Updated Mitigation Actions	Status	
1	Develop and adopt the *Will County County-Wide All Hazard Mitigation Plan* by resolution of the County Board, City Councils, Boards of Trustees, and other governing boards as appropriate. The municipal, fire protection districts, colleges, and other agencies' resolutions should adopt each action item that is pertinent to the community and assign a person responsible for it.	1	Revise and adopt the *Will County County-Wide All Hazard Mitigation Plan* by resolution of the County Board, City Councils, Boards of Trustees, and other governing boards as appropriate. The municipal, fire protection districts, colleges, and other agencies' resolutions should adopt each action item that is pertinent to the community and designate staff responsible for implementation.	Updated	Updated 2008 *Will County County-Wide All Hazard Mitigation Plan* to be submitted for adoption by the County and local jurisdictions.
2	Ensure thoroughness and NIMS/NRP compliance of emergency management planning documents, operations, and functions. Implement planning documents for recovery, debris management, continuity of operations, etc.	2	Ensure the thoroughness and NIMS/NRP compliance of emergency management planning documents, operations, and functions and integrate emergency management operations, functions, and initiatives with all levels of government and neighboring jurisdictions.	Updated	Considerable NIMS training has been conducted throughout the County. Local jurisdictions will assist by supporting continued training opportunities in their communities and applying what is learned in their emergency planning. Since 2009 – 13 people have obtained or renewed their Illinois Professional Emergency Manager (IPEM) designation from IEMA; 8 people have received their Certified Emergency Manager (CEM) from the International Association of Emergency Managers.
7	Expand regional collaboration by developing outreach programs and partnerships.	3	Expand regional collaboration by developing outreach programs and coordinating with neighboring jurisdictions, regional partnerships, businesses, non-profit, and universities.	Updated	Collaboration of sectors has been facilitated through Will County EMA. Partnerships developed through participation by WC EMA and local jurisdictions in the Regional Catastrophic Preparedness Grant Program (RCPGP). County and local level participants from the Illinois, Indiana, and Wisconsin Combined Statistical Area (IL-IN-WI CSA) have been guided by the Regional Catastrophic Planning Team (RCPT) to conduct a capabilities assessment and all hazard risk assessment plan and develop plans for catastrophic incident coordination, private sector integration, logistics and resource management, and citizens' preparedness. Whole community conferences provided the CSA training &opportunities for collaboration.

Action #	2008 Mitigation Actions	Action #	2013 Updated Mitigation Actions	Status	
5	Identify, incorporate, and integrate hazard mitigation into existing and future plans, programs, and projects.	4	Incorporate risk assessment and hazard mitigation principles into comprehensive planning efforts, programs, and projects in order to secure communities from all hazards.	Updated	FEMA/IEMA and RCPGP training/plans incorporated into County and local emergency planning. Through the RCPGP, County and local jurisdictions came together to assess capabilities and develop an all hazard risk assessment plan. These tools will be valuable in the development of a county-wide THIRA.
15	Expand the county-wide public awareness program and promote the understanding of each community's risks, vulnerability's, what to do during and after a disaster, and how we can mitigate the effects of disasters.	5	Expand the county-wide public awareness and education programs and promote the understanding of each community's risks, vulnerabilities, what to do during and after a disaster, and how to mitigate the effects of disasters.	Ongoing	County & Local Jurisdictions promote public education through: ▪ Increased use of websites, Facebook, newsletters, and video PSAs ▪ Utilization of RCPGP's *GearUp! GetReady!* Program ▪ WC EMA Public Preparedness Group and local jurisdictions participate in safety fairs ▪ WC EMA supports County and local Citizen Corps councils & provides CERT training to prepare the public ▪ WC EMA supports Higher Education Committee for developing emergency preparedness programs and training ▪ Developed speakers bureau ▪ County-wide PIO group ▪ Distribution of weather radios and weather threat awareness training
13	Strengthen infrastructure, build redundancies, and implement contingency plans for vulnerable populations and essential services and networks.	6	Continue to strengthen infrastructure, build redundancies, and implement contingency plans for vulnerable populations and essential services and networks.	Ongoing	Critical infrastructure and essential service agencies have been identified and mapped through Cameo and/or GIS. County highway and local jurisdictional public works departments continually work to maintain and strengthen infrastructure within the limits of funding.

Action #	2008 Mitigation Actions	Action #	2013 Updated Mitigation Actions	Status	
24 & 29	Develop/expand existing training platforms to educate officials and communities on risks, fundamental operations of emergency management, and mitigation. *And* Support the advancement of the emergency management profession.	7	Continue to support the delivery of education for existing and free training platforms to educate officials, critical personnel, first responders, and communities on risks and vulnerabilities, fundamental operations of emergency management, and mitigation for the purpose of strengthening planning and advancing professional development.	Ongoing	• Continue support of FEMA/IEMA training and encourage the pursuit of IPEM and CEM certification. • Identify additional training that can be brought to the local level for professional development and used in developing more robust emergency plans. • WC EMA supports Higher Education Committee for developing emergency preparedness programs & training • JJC secured grant to develop/expand emergency preparedness plan, acquire emergency equipment, train staff, & conduct exercises • Local jurisdictions are encouraged to identify/open facilities suitable for training purposes and encourage staff and community members to participate.
3	Relocate and/or harden critical facilities that are located within high-hazard areas.	8	Relocate and/or incorporate mitigation retrofits for critical facilities that are located within high-hazard areas.	Ongoing	Progress ongoing but limited by funding opportunities. Fire station located in floodplain area replaced with new station in new location. Awaiting updated DFIRMS (which are now being delayed until 2015) to accurately identify critical facilities in high hazard areas.
6	Support the use, development, and implementation of Geographic Information Systems (GIS) throughout the County.	9	Support the use, development, and implementation of Geographic Information Systems (GIS) throughout the County to track community vulnerability to hazards.	Ongoing	GIS use continues to increase as progress is made in flood mapping and development of flood mitigation planning. More can be done once updated DFIRM maps are received. The use of GIS has been valuable during response and recovery efforts, such as during the April, 2013 flood and November, 2013 tornado. WC GIS has agreements with 28 communities, 20 townships, fire districts, park districts, & other tax districts & agencies. Three communities have established their own GIS departments.
31	Update base flood elevations (BFE) throughout the County in accordance with the FEMA Region V Map Modernization program.	10	Update base flood elevations (BFE) throughout the County in accordance with the Flood Hazard Mapping Program.	Ongoing	Progress pending receipt of updated DFIRMS (2015 at earliest).

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11	Develop and adopt the county-wide floodplain ordinance.	11	Maintain or amend, as needed, the county-wide floodplain ordinance.	Updated	Ordinance updated in 2010 and supplemented by the *Technical Guidance Manual for County-Wide Stormwater Ordinance*. All County jurisdictions are subject to the ordinance and twenty-nine communities have met the requirements to be delegated the responsibility for ordinance enforcement as determined by the WC Stormwater Management Planning Committee (WCSMPC).
8	Participate in the Community Rating System to further reduce flood damage in the communities of Will County.	12	Participate in the Community Rating System to further reduce flood damage in the communities of Will County.	Unchanged	Limited progress
21	Incorporate floodplain mapping updates and improved county-wide GIS capabilities.	13	Integrate Flood Hazard Mapping Program updates with improved county-wide GIS capabilities.	Unchanged	WC GIS has agreements with 28 communities, 20 townships, fire districts, park districts, & other tax districts & agencies. Three communities have established their own GIS departments. Mapping of flood hazards will be further developed pending receipt of updated DFIRMS (2015 at earliest).
		14	Utilizing GIS, develop and maintain a county-wide database of flood controlled areas, purchased flood plain properties, and flood prone properties to be acquired.	New	Mitigation funding of approximately $10.6 million has been spent in securing repetitive loss properties in Will County from the 1996 and 2008 floods. Further database work will continue upon receipt of updated DFIRMS (2015 at earliest).
18	Improve existing storm drainage systems.	15	Continue stormwater management planning and ordinances to improve existing storm drainage systems.	Ongoing	The County's Stormwater Ordinance and technical guidance is supported by all of the local jurisdictions. Sixty-one projects have been identified and are being addressed by the WCSMPC – see: http://willcountylanduse.com/stormwater-management-planning-committee/stormwater-projects and http://willcountylanduse.com/sites/default/files/Stormwater%20Project%20List.pdf See p. 4-68 to 4-72 for overview of Watershed concerns to be addressed by the WCSMPC

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20	Map shallow flooding and urban ponding areas to prioritize stormwater infrastructure improvements.	16	Complete and maintain maps of shallow flooding and urban ponding areas to prioritize stormwater infrastructure improvements.	Ongoing	Close to completion, continued progress with more work planned pending receipt of updated DFIRMS (2015 at earliest).
4	Increase open space and conservation easements, as well as incorporate natural features, in high flood hazard areas throughout the County.	17	Increase open space and conservation easements, as well as incorporate natural mitigation features in high flood hazard areas throughout the County.	Ongoing	Open space areas have increased as a result of mitigation funding from the 1996 and 2008 floods. Open areas in commercial and private developments are now incorporated through County and local land use planning.
10	Capitalize on opportunities to acquire, relocate, or elevate flood prone properties.	18	Capitalize on opportunities to acquire, relocate, or elevate flood prone properties.	Ongoing	Mitigation funding of approximately $10.6 million has been spent in Will County from the 1996 and 2008 floods. Property buyouts are being completed as a result of mitigation funding from the 2008 flood.
27	Develop a flood warning system and integrate it with a county-wide communication strategy.	19	Expand and improve existing flood warning system capability and integrate it with a county-wide emergency communication strategy.	Ongoing	The use of stream gauge monitors has been increased with the addition of telemetry providing the National Weather Service (NWS) with accurate and updated data that improves their river forecasts and warning system for the protection of life and property. Real time data can be obtained online. See: http://www.willcountylanduse.com/stormwater-management-planning-committee/will-county-stream-and-rain-gages-0 WC Stormwater Committee has also been with the USGS to provide flood inundation maps. See: http://il.water.usgs.gov/ifhp/will
30	Develop an inventory of non-federal high and significant hazard dams to determine inspection status and to notify owners of status. Provide non-compliant owners with direction on obtaining an updated inspection and carrying out subsequent actions as declared by the state.	20	Utilize inventory of non-federal dams/levees subject to high and significant hazard to determine current status and to notify owners of any deficiencies. Provide non-compliant owners with direction on complying with state planning and inspection requirements.	Ongoing	Progress being made, continuing work to review all non-federal dams and work with owners to address any issues. WC EMA has a list of dams/levees & is focusing on dam levels 1 (potential loss of life) & 2 (potential loss of infrastructure). They are working with IDNR & WC Forest Preserve to identify status of these dams/levees & accompanying emergency plans.

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14	Build and improve existing shelters in public spaces and high risk locations.	21	Encourage & support shelters for all types of hazards in public spaces and high risk locations.	Ongoing	WC EMA continues to work with the American Red Cross to update and develop community shelters. WC EMA, WC Regional Office of Education, and WC Sheriff's Office work collaboratively to maintain ARC agreements, shelter profiles, and site maps. Other facilities are identified for warming/cooling centers. Local jurisdictions will focus on integrating shelters into new construction where possible.
9 & 19	Target regulatory, development, and preparedness efforts of Tier II hazardous material facilities. *And* Encourage communities located in areas at high-risk to a hazardous materials release to develop, maintain, and update emergency plans with cooperation from commercial and industrial facilities.	22	Target regulatory, development, and preparedness efforts of Tier II hazardous material facilities and coordinate the development and maintenance of applicable community and facility emergency plans.	Ongoing	Ongoing progress with the support of the Will County Local Emergency Planning Committee (LEPC). Will County has an active LEPC composed of state and local officials, fire, police, emergency management, emergency medical service, hospitals, media, and industry. The function of the WC LEPC is to develop emergency plans to protect the public in the event of chemical accidents and to communicate these plans to the public. The LEPC works closely with industry and includes industry representatives with their primary goal being to protect the public. The Risk Management Plan information for each facility has been woven into the LEPCs Comprehensive Chemical Contingency Plan to increase our effectiveness. Tier II facilities are mapped in Cameo.
25	Encourage the development of continuity planning for jurisdictions and the largest employers and companies headquartered in the County.	23	Encourage the development of continuity planning for both public and private sectors.	Ongoing	Ongoing progress requiring professional development of County and local emergency planners and collaboration with governing and private sector partners.
28	Develop a drought contingency plan that identifies and incorporates water saving measures.	24	Develop a drought contingency plan that educates the public on water saving techniques and identifies criteria/triggers for drought related actions.	Unchanged	Limited progress
16	Develop a "Post-Disaster Recovery" ordinance and planning document to prepare a community for an orderly recovery operation.	25	Develop a "Post-Disaster Recovery" ordinance and planning document to prepare a community for an orderly recovery operation.	Unchanged	Limited progress

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		26	Implement and conduct surveillance programs to identify or mitigate emerging public health emergencies. Develop partnerships and coordinate emergency plans with public and private sectors to effectively prepare, mitigate, respond, and recover from public health emergencies.	New	Will County Health Department (WCHD) is tasked with surveillance of potential public health emergencies and has been working with responder partners and the communities since 2003 to develop emergency plans. This action item addresses their continued work to improve planning, improve capabilities, and collaborate with community partners.
26	Promote controlled burn education			Deleted	Not a standalone item for mitigation action
12	Develop and integrate a traffic management system into existing emergency management operations and local jurisdictions			Deleted	Not a standalone item for mitigation action
17	Identify gaps and opportunities to develop mutual aid and interagency agreements between communities and partners throughout the County.			Deleted	Not a standalone item for mitigation action
22	Create a database of all available equipment and supplies.			Completed	Database completed through WC EMA
23	Install NOAA radios in schools county-wide.			Completed	Multiple grants supplied 800 Radios which were distributed to schools throughout the County along with weather hazard information.