Randolph County, Illinois

All Hazards Mitigation Plan

All Hazard Mitigation Planning Committee

November 2005

Randolph County, Illinois

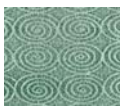
All Hazards Mitigation Plan

Including:

Village of Baldwin
City of Chester
Village of Coulterville
Village of Ellis Grove
Village of Evansville
Village of Prairie du Rocher
City of Red Bud
Village of Rockwood
City of Sparta
Village of Steeleville
Village of Tilden

Hazard Mitigation Planning Committee

November 2005



This *All Hazards Mitigation Plan* was prepared with the technical support of Molly O'Toole & Associates, Ltd., 450 S. Stewart Avenue, Lombard, IL 60148-2851. OToole450@aol.com

Randolph County
All Hazards Mitigation Plan

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November 2005

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Executive Summary

Overview

The *Randolph County All Hazards Mitigation Plan* identifies activities that can be undertaken by both the public and the private sectors to reduce safety hazards, health hazards, and property damage caused by natural and manmade hazards. The *Plan* focuses on the five major natural hazards facing Randolph County: floods, earthquakes, winter storms, tornadoes, severe summer storms, and extreme heat, along with manmade hazards, including utility interruption, transportation incidents and radiological incidents. The most recent disasters in Randolph County, Illinois struck in 1993, 1995 and 2002. These disasters impacted people, property owners and businesses in the County.

This *Plan* fulfills the Federal mitigation planning requirements, and provides the County and its municipalities with a blueprint for reducing the impacts of these natural and manmade hazards on people and property. This *Plan* meets the requirements for federal mitigation funds, according to Section 104 of the Disaster Mitigation Act of 2000 (42 USC 5165)and 44 CFR (Code of Federal Regulations) Part 201 for funding under the Federal Emergency Management Agency's (FEMA) Pre-Disaster Mitigation Program and the Hazard Mitigation Grant Program. This *Plan* also meets the requirements of Stafford Act (42 USC 5165) and 44 CFR Part 78.5 for FEMA's Flood Mitigation Assistance Program.

This *Plan* was prepared by the Randolph County All Hazards Mitigation Planning Committee, created by a resolution of the Randolph County Board on September 3, 2004. The Committee's members include representatives of County offices, interested municipalities, and public and private stakeholder organizations.

Randolph County Courthouse

The *Plan* identifies activities that can be undertaken by both the public and the private sectors to reduce safety hazards, health hazards, and property damage caused by natural and manmade hazards.

Randolph County and the natural and manmade hazards that can impact the County have been assessed in Chapters 1 and 2. Goals and guidelines established by the Committee are the focus of Chapter 3. Six mitigation strategies are the subjects of Chapters 4 – 9 in this *Plan*.

- Preventive
- Property protection
- Resource protection
- Emergency services
- Structural projects
- Public information

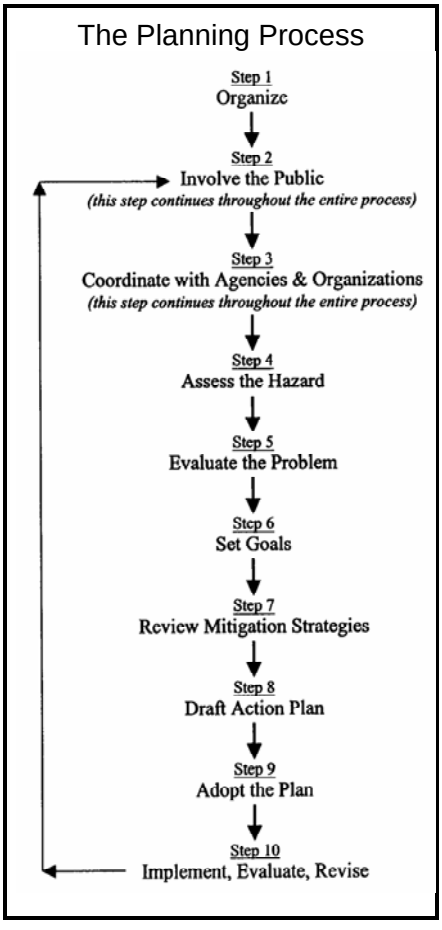
Chapter 10 presents the Action Plan for implementation of this *Plan*. The Action Plan also includes items for plan maintenance.

1. Introduction

Randolph County is located along the Mississippi River in southern Illinois. The County Seat is Chester which is located about 60 miles southwest of St. Louis, Missouri. Randolph County is approximately 595 square miles. Randolph County is bordered by Monroe, St. Clair and Washington, Perry and Jackson Counties in Illinois, and Ste. Genevieve and Perry Counties in Missouri on the other side of the Mississippi River. A map of Randolph County is provided on page ES-8.

In 2000, Randolph County had a population of 33,893. Political jurisdictions include 14 municipalities and four road districts. The 2000 Census estimates that there are approximately 12,000 housing units in Randolph County. The labor force is about 14,800 people and the school enrollment is around 7,400. Major employers in Randolph County include the Baldwin Power Plant (Dynergy-Midwest Generation), GML, Spartan Light Metals, the Menard State Correctional Facility and the Chester Mental Health Facility. Randolph County is also the second largest producer of coal in Illinois.

The Hazard Mitigation Planning Committee followed a standard 10-step process, based on guidance and requirements of the Federal Emergency Management Agency (FEMA). The Committee met eight times from December 2004 through November 2005. It reviewed the hazards and their effects on people and property, considered a variety of ways to reduce and prevent damage, and recommended the most appropriate and feasible measures for implementation. Existing plans and programs were reviewed during the planning process. It should be underscored that this *Plan* does not replace other planning efforts, such as the County's drafting of a comprehensive plan, or the Local Emergency Planning Committee. This *Plan* complements those efforts.



The public was invited to participate through several concurrent means, including contact with Committee members and their organizations, press releases provided to four Randolph County local newspapers, advertisement of Committee meetings on Randolph County's website, and a public meeting was held on November 3, 2005 at the Randolph County Courthouse.

Randolph County critical facilities have been identified in this *Plan* and categorized as hazardous materials sites, health facilities (hospitals and

nursing homes), emergency response facilities (police and fire stations, public works sites), utilities, schools, places of assembly, and bridges. Table 1-3 in Chapter 1 summaries the County's critical facilities.

2. Hazard Analysis

The Committee reviewed a wide range of natural and manmade hazards, and evaluated them based on what causes them, their likelihood of occurring, and their impact on people, property, critical facilities, and the local economy. The information was based on available technical studies, reports by the participating agencies and communities on their past experiences, and from the HAZUS Multi-Hazard Loss Estimation Software.

Natural hazards were prioritized as floods, earthquakes, winter storms, tornadoes, severe summer storms and extreme heat. Manmade hazards were prioritized as utility interruptions, transportation incidents, and radiological incidents. The following table is from Chapter 2 and summarizes the natural and manmade hazards that are the focus of this *Plan*:

Summary of Randolph County Hazards

Hazard	Annual Chance	Impact Location	Square miles Affected	Safety Hazard	Property Damage	Vulnerable Critical Facilities	Economic Impact
Natural Hazards:							
Floods	1%	Floodplains	A Zone	Medium	Major	Police stations, schools	Businesses, transportation
Earthquakes	< 1%	Countywide	595	Medium	Major	Police and fire stations, schools	Businesses, transportation, safety, utilities
Winter Storms	100%	Countywide	595	Medium	Minor	Power losses, transportation	Health, utilities, livestock
Tornadoes	55%	Countywide	595	High	Major	Schools and buildings with large spaces	Safety, utility lines
Tornado	0.0009 %	Single Location	1	High	Major	Schools and buildings with large spaces	Safety, utility lines
Severe Storms	100%	Countywide	10	High	Moderate	Power and communication losses	Safety, hail damage to crops, power utilities
Extreme Heat	100%	Countywide	595	High	Minor	Power losses	Health, utilities, livestock
Manmade Hazards:							
Utility Interruption	---	Region of County	200	Medium/ Low	Low	Power stations, communication stations, pipeline systems	Utilities
Transportation Incident	---	Single Location	1	Medium/ Low	Low	Airfields, rails roads, barge	Transportation
Radiological Incident	---	Region of County	50	High	Major	Facilities and transportation	Safety, health, livestock, transportation

3. Goals

The Committee established the following hazard mitigation goals and guidelines for the planning process:

The overall direction of this *Plan* can be summarized under the six goals established in Chapter 3:

Goal 1. Protect the lives, health, and safety of the citizens of Randolph County from the effects of natural hazards and manmade hazards.

Goal 2. Protect critical facilities and public infrastructure with public funds.

Goal 3 Mitigate to protect against economic and transportation losses due to natural and manmade hazards.

Goal 4. Mitigate potential damage to buildings and structures through efforts that allow property owners to help themselves.

Goal 5. Identify specific projects to mitigate damage where cost-effective and affordable.

Goal 6. Protect historic, cultural, and natural resources from the effects of natural hazards and manmade hazards.

The eight guidelines from Chapter 3 set the direction or the strategy for the mitigation activities developed or recommended in Chapters 4 through 9. The guidelines also set the direction for the action items in this Chapter.

Guideline 1. Focus natural hazards mitigation efforts on floods, earthquakes, winter storms, tornadoes, summer storms, and extreme heat.
Guideline 2. Focus manmade hazard mitigation efforts on utility disruption, transportation related incidents and radiological release incidents.
Guideline 3. Make people aware of the hazards they face and encourage people to assume some responsibility for their own protection.
Guideline 4. New developments should not create new exposures to damage from natural hazards or manmade hazards.
Guideline 5. Local initiatives should focus on protecting citizens and public property.
Guideline 6. Use available local funds, when necessary, in efforts that protect the lives, health, and safety from natural and manmade hazards.
Guideline 7. Seek state, and federal support for mitigation initiatives and special projects.
Guideline 8. Strive to improve housing and business opportunities in Randolph County in conjunction with planned mitigation efforts.

4. Preventive Measures

The Committee reviewed a variety of mitigation measures to protect new construction from hazards and see that future development does not increase potential losses. It was concluded that all communities should, if not already, adopt the International Building Codes. Land use plans, zoning ordinances and subdivision standards could better address natural hazards. Training would improve enforcement of codes and ordinances.

5. Property Protection

Property protection measures are used to modify buildings or property subject to damage. Most measures are implemented by the property owners, so appropriate government

activities include public information, technical assistance and financial support. Special attention should be given to designated repetitively flooded areas, earthquake retrofitting, and safe rooms for tornadoes. Government offices and other critical facility owners need to protect their own properties, including making sure they are adequately insured for all hazards.

6. Resource Protection

Resource protection activities are generally aimed at preserving (or in some cases restoring) natural areas. They include preserving wetlands and farmland, erosion and sedimentation control, preventing dumping in streams and urban forestry. Urban forestry programs are encouraged to protect utility lines during wind and ice storms. Attention has also been given to the many natural and historic areas in the County.

7. Emergency Services

It was concluded that the flood threat warning system is best for the Mississippi River, but it is limited in other watersheds. Outdoor warning systems are limited in the County. Emergency operation plans are being revised throughout the County and it is recommended that those plans include more on the natural and manmade hazards discussed in this *Plan*.

8. Structural Projects

The Committee concluded that structural projects, such as levees and the Kaskaskia Lock and Dam have been used effectively to reduce flooding. The Committee recommended setting criteria to ensure structural projects do not adversely affect other properties or natural functions. It also recommended each community establish a formal and regular of drainage system maintenance program.

Kaskaskia River at Rte. 154

9. Public Information

The Committee identified numerous subject areas that would benefit from a public information program, including mosquito protection, earthquake safety, safety in buildings during emergencies, and protecting water quality. The Committee reviewed outreach projects, providing background information to libraries and on websites, and providing technical assistance. Top messages to convey were identified along with the types of media that should be used to convey those messages.

10. Action Plan

After the many recommendations from Chapters 4 – 9 were reviewed, the Committee created an "Action Plan" that specifies recommended projects, who is responsible for implementing them, and when they are to be done. The Action Plan is included in

Chapter 10 of this *All Hazards Mitigation Plan*. A table summarizing the action items and the responsible agencies is presented on page ES-7.

There are 22 action items. Fourteen of the action items are mitigation program items. Most require staff time of the County staff, with assistance from municipal ESDA offices. Seven of those action items identified funding needed from state and federal mitigation agencies.

Six of the 22 action items are public information activities. These items are aimed directly at the Committee established planning guideline to make people aware of the hazards that they face.

The last three action items are administrative in nature, but very important for the continued success of hazard mitigation in Randolph County. These items call for the formal adoption of this *Plan*, the conversion of the All Hazards Mitigation Planning Committee to a permanent advisory body, and plan maintenance procedures. Formal adoption ensures that County and municipal staffs are authorized and instructed to implement the action items. Adoption is also a requirement for recognition of the *Plan* by mitigation funding programs. The Committee will provide the mechanism and a vehicle for the *Plan* to be implemented, monitored, evaluated and updated. The Committee will provide a means for continued public involvement. The Committee will report to the County Board annually, and a five year update to the *Plan* is required for FEMA's mitigation funding programs.

Plan Adoption

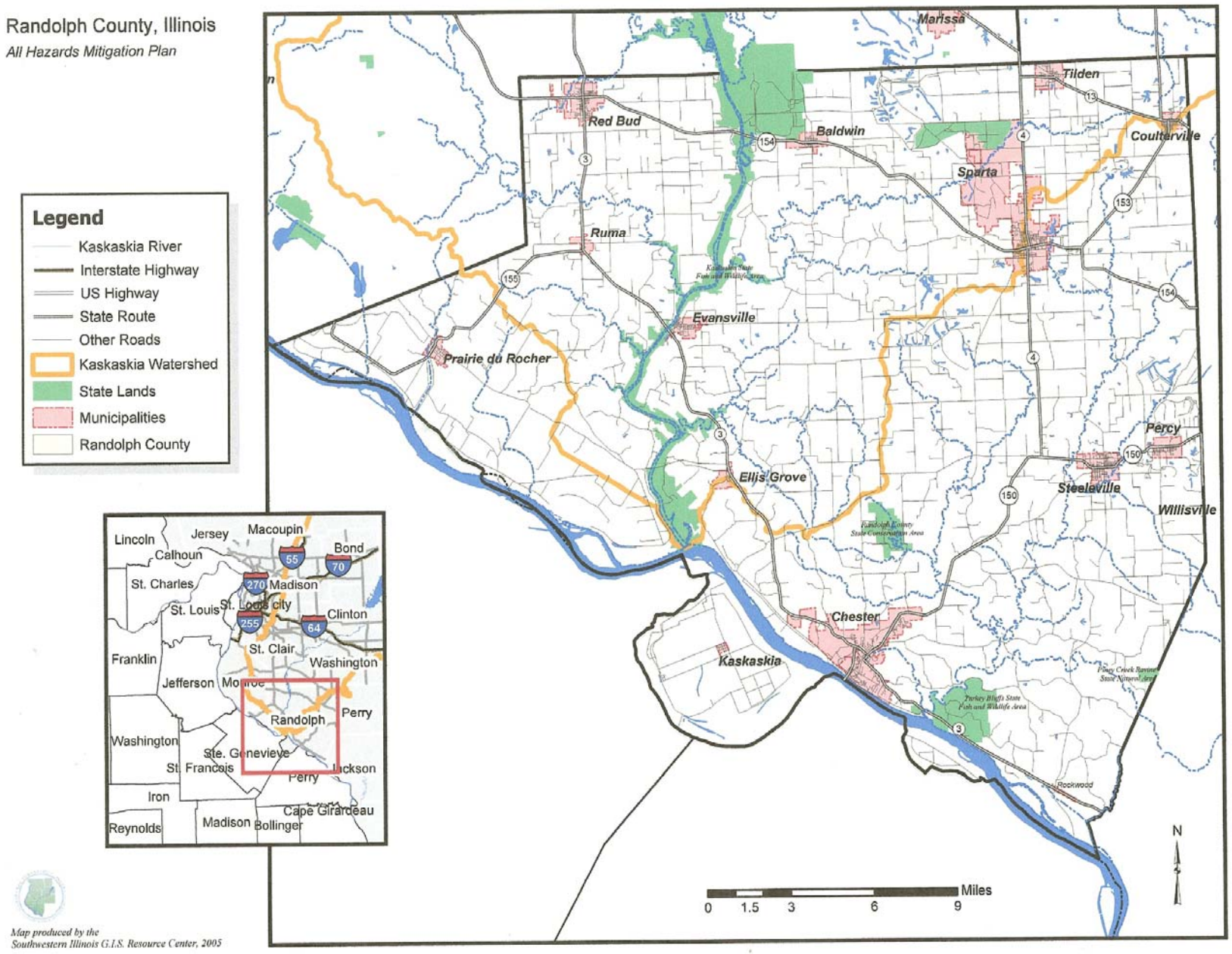
This *Plan* serves to recommend mitigation measures. Implementation of these recommendations depends on adoption of this *Plan* by the Randolph County Board and the city council or board of trustees of each participating municipality. It also depends on the cooperation and support of the offices designated as responsible for each action item.

Formal adoption of the *Plan* ensures that County and municipal staffs are authorized and instructed to implement the action items. Adoption is also a requirement for recognition of the *Plan* by mitigation funding programs.

The County and participating communities should adopt this *Randolph County All Hazards Mitigation Plan* by passing a resolution. The County's resolution creates the permanent Mitigation Planning Committee. The municipal resolutions adopt each action item that is pertinent to the community and assigns a person responsible for it.

Table 10-1 Action Items, Responsible Agencies and Deadlines

	Mitigation Program													Public Information						Administrative		
Responsible Agency	1. Building Code Improvements	2. Code Administration and Enforcement Training	3. Critical Facility Design with All Hazards Protection	4. Mapping of Hazards	5. Structural Evaluation of Buildings for Earthquake Hazards	6. Retrofitting of Buildings for Earthquake Hazards	7. Mitigation for Floodplain Properties and Critical Facilities	8. Include the All Hazards Plan into Other Plans	9. Grant Funding for Safe Rooms	10. NOAA Weather Radios	11. Improved Hazard Warning and Resp. Capab.of Emerg. Vehicles	12. Improved Threat Recognition	13. Improved Emergency Response	14. Information for Floodplain Property Owners	15. Educate Property Owners on Safe Rooms	16. Educate Property Owners on Earthquake Retrofitting	17. Public Information - Hazard Mitigation Materials	18. Public Information - Outreach Projects	19. Property Protection References	20. Plan Adoption	21. Hazard Mitigation Planning Committee	22. Plan Maintenance and Monitoring
Randolph County																						
County Board	X							X												X		X
ESDA				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Zoning	X	X	X				X	X						X								
Economic Development								X														
911 Office								X														
Transportation								X														
Other Designated Departments	X	X	X					X									X	X	X			
Municipalities																						
City Council/Village Board	X							X												X	X	X
ESDA Office								X	X	X	X	X	X	X	X	X	X	X	X		X	X
Designated department(s)	X	X	X					X						X			X	X	X			
Regional Office of Education			X															X				
Bi-County Health Department			X															X				
Road Districts			X																			
Planning Agencies				X													X	X				
Drainage Districts			X																			
Illinois Agencies			X																			
American Red Cross																	X	X	X			
Deadline for first product (months)	18	24	--	12	36	48	24	--	36	24	36	18	18	18	24	24	6	12	12	2	--	--


Randolph County, Illinois
All Hazards Mitigation Plan
Legend
Kaskaskia River
Interstate Highway
US Highway
State Route
Other Roads
Kaskaskia Watershed
State Lands
Municipalities
Randolph County
Marissa
Tilden
Red Bud
Baldwin
Coulterville
Sparta
Ruma
Evansville
Prairie du Rocher
Percy
Ellis Grove
Steeleville
Willisville
Chester
Kaskaskia
Rockwood
Lincoln
Jersey
Macoupin
Calhoun
Bond
St. Charles
Madison
St. Louis
St. Louis city
Clinton
St. Clair
Franklin
Washington
Jefferson
Monroe
Randolph
Perry
Ste. Genevieve
St. Francois
Jackson
Iron
Cape Girardeau
Reynolds
Madison
Bollinger
0 1.5 3 6 9
Miles
N
Map produced by the
Southwestern Illinois G.I.S. Resource Center, 2005

Chapter 1. Introduction

1.1 Overview

Randolph County, Illinois is subject to natural hazards that threaten life and health, and have caused extensive property damage. The county is also subject to various manmade hazards. Major floods struck in 1969, 1974, and 1993, with the most recent flooding in 1995. Tornadoes caused damage in 2002 and 2003. A major earthquake has not occurred since 1812, but six earthquakes over a 4.0 magnitude have occurred over the last 18 years. To better understand these hazards and their impacts on people and property, and to identify ways to reduce those impacts, Randolph County and the participating municipalities have developed this *All Hazards Mitigation Plan.*

1993 Flood Fort Chartres
Mississippi River Floodplain

"Hazard mitigation" does not mean that all hazards are stopped or prevented. It does not suggest complete elimination of the damage or disruption caused by such incidents. Natural forces are powerful and most natural hazards are well beyond our ability to control. Natural hazards can be compounded manmade hazards and vice versa. Hazard mitigation does not mean quick fixes. Hazard mitigation means a long-term approach to reduce hazard vulnerability. Hazard mitigation also means a comprehensive approach to minimizing the impact of hazards.

Purpose of planning: Every community faces different hazards and every community has different resources and interests relating to its problems. There are many ways to deal with hazards, there are many agencies that can help, and there are many solutions for managing or mitigating hazards.

Planning is one of the best ways to assess hazards and resources in order to produce a program of activities that will best mitigate the impact of hazards and, often times, meet other needs. A well-prepared plan will ensure that all possible activities are reviewed and implemented so that the problem is addressed by the most appropriate and efficient solutions. It can also ensure that activities are coordinated with each other and with other goals and activities, preventing conflicts and reducing the costs of implementing each individual activity.

"Hazard mitigation is defined as any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event.

Source: Federal Emergency Management Agency

Mitigation activities need funding. A mitigation plan is now a requirement for Federal mitigation funds. Section 104 of the Disaster Mitigation Act of 2000 (42 USC 5165) states that after November 1, 2003, local governments applying for *pre*-disaster mitigation funds must have an approved local mitigation plan. Also, after November 1,

2004, a plan is needed for *post*-disaster mitigation funds under the Hazard Mitigation Grant Program. These requirements are contained in 44 CFR (Code of Federal Regulations) Part 201.

Therefore, a mitigation plan will both guide the best use of mitigation funding and meet the prerequisite for obtaining such funds from the Federal Emergency Management Agency (FEMA). FEMA also recognizes plans through its Community Rating System, a program that reduces flood insurance premiums in participating communities.

Purpose of this *Plan*: This *Plan* identifies activities that can be undertaken by both the public and the private sectors to reduce safety hazards, health hazards, and property damage caused by natural hazards. The *Plan* focuses on the six major natural hazards facing Randolph County: floods, earthquakes, winter storms, tornadoes, severe storms and extreme heat, and manmade hazards, including utility disruptions, transportation incidents and radiological incidents.

This *Plan* fulfills the federal mitigation planning requirements for mitigation funding, and it provides the County and its municipalities with a blueprint for reducing the impacts of these natural and manmade hazards on people and property.

1.2 Planning Approach

This *Plan* reviews alternatives and selects and designs those that will work best for the situation. This process is an attempt to avoid the need to make quick decisions based on inadequate information. It provides carefully considered directions to the County government and to the participating municipalities by studying the overall damage potential and ensuring that public funds are well spent.

Planning Committee: This *All Hazards Mitigation Plan* was developed under the guidance of a Hazard Mitigation Planning Committee, created by a resolution of the Randolph County Board on September 3, 2004. The municipalities within Randolph County were invited to participate and interested municipalities passed a resolution stating their commitment to the plan development. The Committee's members include representatives of County offices, interested municipalities, and public and private stakeholder organizations.

The member organizations and each participant who attended meetings are shown in Table 1-1. All of the participants are listed in Appendix A.

Table 1-1

Randolph County
All Hazards Mitigation Planning Committee

County Departments:	
ESDA	Nancy Schilling
Zoning	Diane Mudd
Progress Committee	Edward R. Crow
911 Office	Sherry Craig
Municipalities:	
Baldwin	Trustee Michael Turnure
Chester	Terry Knop Timothy P. Crow Daniel R. Hecht
Coulterville	
Ellis Grove	Charles M. Hanton
Evansville	Mayor Erwin C. Becker Chief Glen Simpson Chief Edward Braun
Prairie du Rocher	Trustee Ernie Dorian Trustee James Sirtak
Red Bud	Chief Reginald L. Hammonds Pamela Kempfer
Rockwood	Sherry Johnson
Sparta	Chief Tom Ashley Chief Rob Soderlund
Steeleville	Chief Jeff Glenn Asst. Chief Lyn Tihes
Tilden	Trustee Earl Dorf
Stakeholders:	
Randolph County Road Districts	Larry Meyerhoft
Bi-County Regional Office of Schools	Marc L. Kiehna
Monroe-Randolph Bi-County Health Department	Krista Mulholland
Illinois Emergency Management Agency	Gary L. Poshard Chris Pulley
Southwestern Illinois Metropolitan Planning Commission	Linda Tragesser
MedStar Ambulance	Charles R. Kelley Lee Davis
American Red Cross – Little Egypt Network	Patrick Creek
Randolph County RC&D	Ed Weilbacher

Randolph County All Hazard Mitigation Planning Committee Meeting

The Committee met eight times during the ten month period from December 2004 through October 2005. It reviewed the hazards and their effects on people and property, considered a variety of ways to reduce and prevent damage, and recommended the most appropriate and feasible measures for implementation.

Technical support for the planning effort was provided by the ESDA office and Molly O'Toole & Associates, Ltd., a hazard mitigation planning consulting firm.

Planning process: The Hazard Mitigation Planning Committee followed a standard 10-step process, based on FEMA guidance and requirements. Step 1 of the planning process was to organize, which the Hazard Mitigation Planning Committee did in November and December 2004.

Public Involvement: Step 2 of the planning process was to obtain input from the public, particularly residents and businesses that have been affected by natural hazards. The public was invited to participate through several concurrent means, including:

– Contact with Committee members and their organizations

– A standing invitation to attend Committee meetings

– Press releases provided to four Randolph County local newspapers

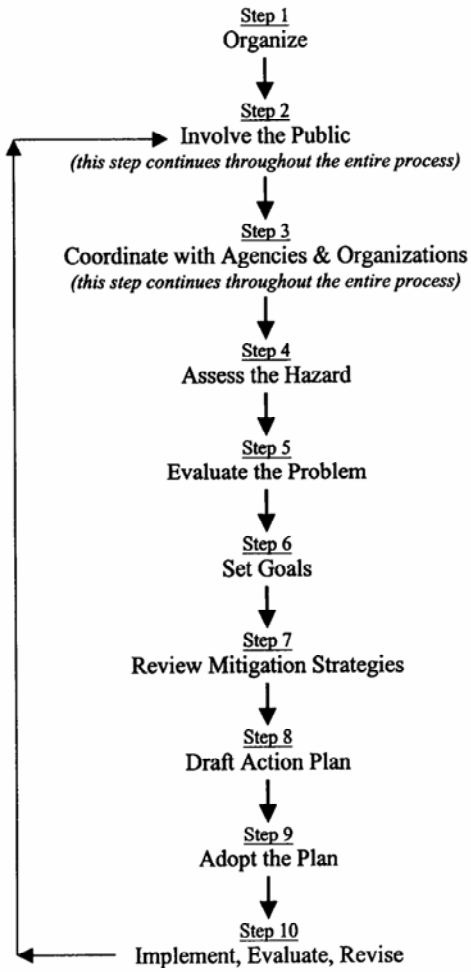
– Advertisement of Committee meetings on Randolph County website

– A public meeting was held on November 3, 2005 at the Randolph County Courthouse to receive comments on the draft plan

Examples of public involvement efforts are provided in Appendix B.

Coordination: Existing plans and programs were reviewed during the planning process. It should be underscored that this *Plan* does not replace other planning efforts, such as the County's drafting of a comprehensive plan, or

The Planning Process



the Local Emergency Planning Committee. This *Plan* complements those efforts.

During the planning process, contacts were made with regional, state, and federal agencies and organizations. November 2004, a letter was sent to a variety of stakeholder organizations as well as the following agencies to determine how their programs affect or could support the County's mitigation efforts.

- U.S. State Geological Survey
- U.S. Army Corps of Engineers
- National Weather Service
- Federal Emergency Management Agency
- Illinois Emergency Management Agency
- Illinois Department of Natural Resources
- Illinois State Water Survey

In most cases, these agencies did not provide any information or comments in response to this effort. Direct discussions with several of them did prove quite helpful. During the planning process, the above agencies were sent mailings that included the upcoming meeting agendas and the previous meeting's minutes.

In December 2004 a letter went out to adjoining counties, including Monroe, St. Clair, Washington, Perry, and Jackson County, Illinois, and St. Genevieve and Perry County, Missouri.

At the end of the planning process, each of these agencies will be sent a notice requesting their review of the draft *Plan*. They were asked to provide any comments in time for the public meeting.

Hazard assessment and problem evaluation: The Committee undertook steps 4 and 5 of the planning process during February and March 2004. The potential hazards reviewed were based on the natural and manmade hazard identified by the County ESDA Coordinator. Each hazard was scored for its likelihood of occurring or frequency, its potential impact or consequences, and the vulnerability of the County to them. It found six natural hazards had an overall score of "high" or "medium," and three categories of manmade hazards to be of concern.

Randolph County All Hazard Mitigation Planning Committee Meeting

The hazard data and the Committee's findings and conclusions are covered in Chapter 2 of this *Plan*. Chapter 2 examines the hazards, including a hazard assessment – what causes the hazard and the likelihood of occurrence, and a vulnerability assessment – and the impact of the hazard on life, health, and property.

Goals: Mitigation planning goals were developed by the Hazard Mitigation Planning

Committee. A goal setting exercise was conducted at the February 2005 meeting, then the goals were reviewed and revised at the March 2005 meeting. The goals are presented anddiscussed in Chapter 3 of this *Plan.* Objectives or guidelines to go with the goals were developed as the Committee examined the mitigation strategies. The guidelines are presented in Chapter 10 with the Action Plan.

Mitigation Strategies: The Hazard Mitigation Planning Committee considered a wide range of hazard mitigation alternatives. The Committee examined current mitigation efforts and then considered a variety of measures that could affect the impact of the hazards. The mitigation strategies have been divided into six general categories and all measures were reviewed in relationship to the developed mitigation goals. The mitigation strategies are the subject of Chapters 4 – 9 in this *Plan.*

– Structural projects – such as, levees, reservoirs, channel improvements
– Property protection – such as, relocation out of harm's way, retrofitting buildings, insurance.
– Preventive – such as, zoning, building codes, and other development regulations.
– Emergency services – such as, warning, sandbagging, evacuation.
– Resource protection – such as, wetlands protection, urban forestry programs.
– Public information – such as, outreach projects, technical assistance to property owners.

Action plan: After the many alternatives were reviewed, the Committee drafted an "action plan" that specifies recommended projects, who is responsible for implementing them, and when they are to be done. The action plan is included in Chapter 10 of this *All Hazards Mitigation Plan.*

It should be noted that this *Plan* serves only to recommend mitigation measures. Implementation of these recommendations depends on adoption of this *Plan* by the Randolph County Board and the city council or board of trustees of each participating municipality. It also depends on the cooperation and support of the offices designated as responsible for each action item.

1.3 Randolph County

Randolph County is located along the Mississippi River in southern Illinois. The County Seat is Chester, Illinois, which is located about 60 miles southeast of St. Louis, Missouri. Randolph County is approximately 595 square miles. Randolph County is bordered by Monroe, St. Clair and Washington Counties, to the west and north, and Perry and Jackson Counties to the east. To the south and west, on the other side of the Mississippi River are Ste. Genevieve and Perry Counties in Missouri.

A map of Randolph County is included on the following page. Much of Randolph County is farmland. Transportation facilities in the county include seven primary State highways and two major railroads. Barge transportation service is available on the Mississippi and Kaskaskia Rivers.

Randolph County includes the floodplain and the bluff of the Mississippi River. From the top of the bluffs, the topography of Randolph County generally slopes from the south and west to the north and east end of the County. The highest portions of the County are near Rockwood, Chester and Prairie du Rocher. The major land resources are southern Illinois and Indiana thin loess and till plains in the northern portion of the County, and central Mississippi valley wooded slopes in the southern portion. Soils in Randolph County are predominately silt loams (Homen, Marine, Bunkum and Menfro) with silty clay loams. The northeast portion of the County is a significant producer of coal in Illinois.

Average temperatures in Randolph County range from about 32 degrees Fahrenheit in January to about 79 degrees Fahrenheit in July. The average annual temperature is 56 degrees Fahrenheit. Average annual precipitation is 35 inches and June in generally the wettest month of the year.

A portion of Randolph County is within the Mississippi River Valley including the communities of Prairie du Rocher and Rockwood. The Kaskaskia River meets the Mississippi River in Randolph County. The Kaskaskia River originates in Champaign County, Illinois, and has a drainage area of 5,801 square miles. Less than a mile from its confluence with the Mississippi Rivers is the Kaskaskia Lock and Dam (Kaskaskia Navigation Project) which provide a navigation pool up the Kaskaskia River (north through Randolph County) into St. Clair County. About half of Randolph County is part of the Kaskaskia River watershed. The remaining portion of the County flows into the Mary's River watershed, which is located on the eastern side of the County.

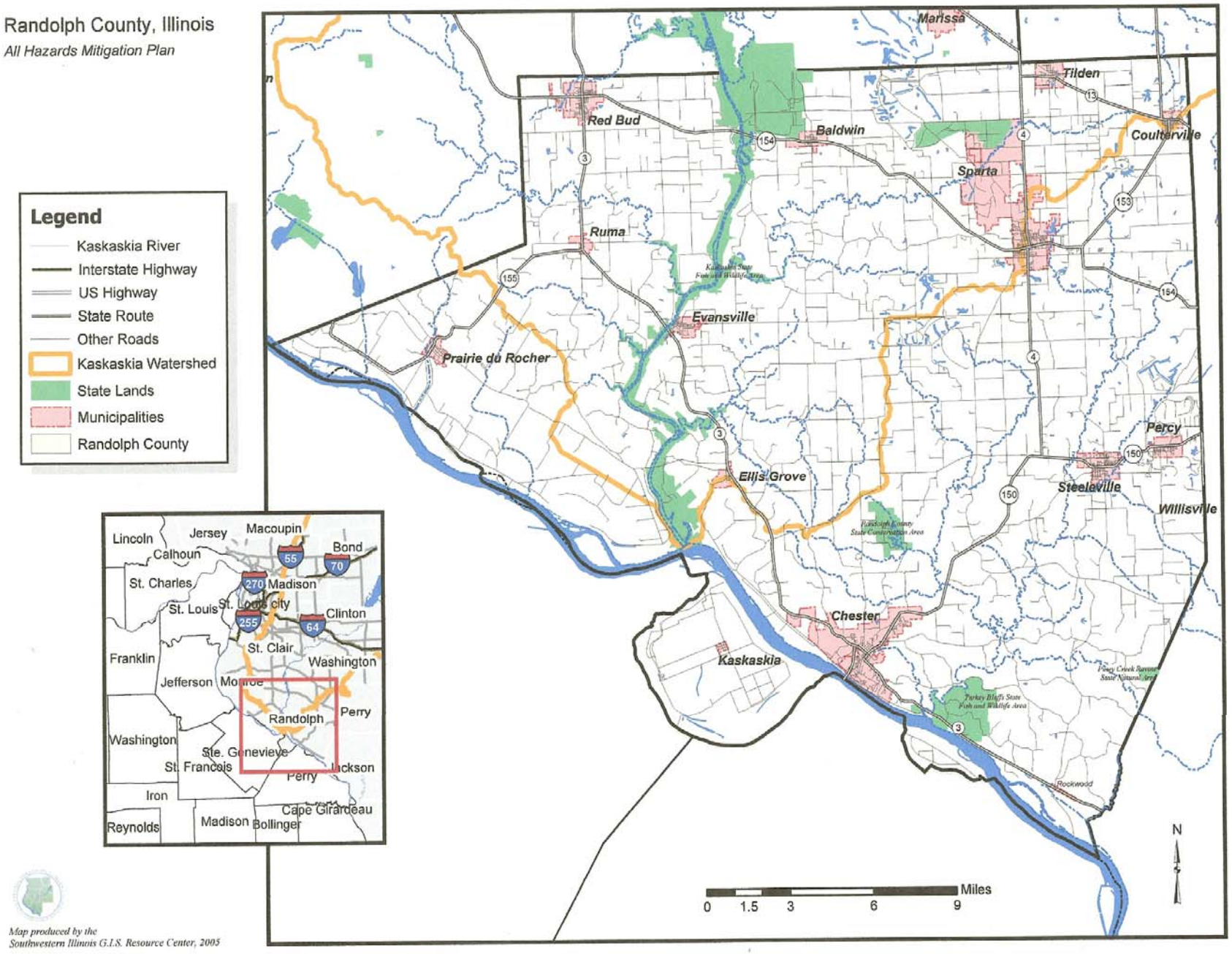
Randolph County Climate

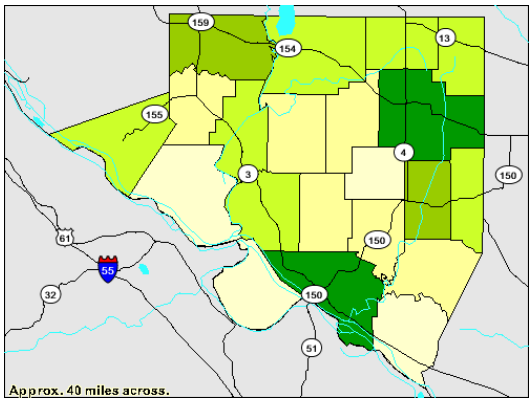
"The total annual precipitation is 41.62 inches. Of this total, 22.5 inches, or 54 percent, usually falls in April through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall on record was 5.84 inches at Sparta on August 17, 1959. Thunderstorms occur on about 50 days each year, and most occur between April and August.

"The average seasonal snowfall is 17.5 inches. The greatest snow depth at any one time during the period of record was 19 inches recorded on February 3, 1982. On an average, 19 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year. The heaviest 1-day snowfall on record was 13 inches recorded on March 8, 1978.

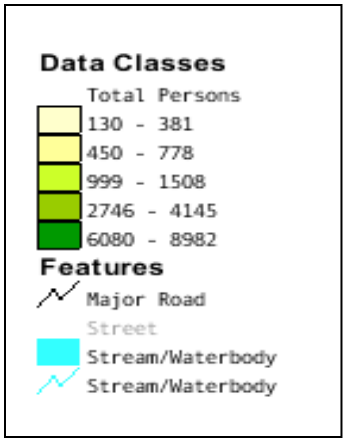
"The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 75 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the south in the summer and from the west and northwest in the winter and spring. Average wind speed is highest, 9 miles per hour, in March. "

Source: USDA-NRCS Soil Survey of Randolph County, Illinois, 2004 (excerpt)


Randolph County, Illinois
All Hazards Mitigation Plan
Legend
Kaskaskia River
Interstate Highway
US Highway
State Route
Other Roads
Kaskaskia Watershed
State Lands
Municipalities
Randolph County
Marissa
Tilden
Red Bud
Baldwin
Coulterville
Sparta
Ruma
Evansville
Prairie du Rocher
Percy
Ellis Grove
Steeleville
Willisville
Chester
Kaskaskia
Rockwood
Lincoln
Jersey
Macoupin
Calhoun
Bond
St. Charles
Madison
St. Louis
St. Louis city
Clinton
St. Clair
Franklin
Washington
Jefferson
Monroe
Randolph
Perry
Washington
Ste. Genevieve
St. Francois
Jackson
Perry
Iron
Cape Girardeau
Reynolds
Madison
Bollinger
Miles
0 1.5 3 6 9
N
Map produced by the
Southwestern Illinois G.I.S. Resource Center, 2005



Randolph County
Source: 1990 Census (due to population allocation error in the 2000 Census



In 2000, Randolph County had a population of 33,893, which was a decrease of 2 percent from the 1990 census. Political jurisdictions include 14 municipalities and four road districts. The incorporated municipalities are located throughout the County, and none of the municipalities are classified as urban by the U.S. Census Bureau. Approximately 45 percent of the County's population resides within the 14 municipalities. The density of people living in 14 municipalities averages 1,286 people to every square mile. The density of people living in the unincorporated area of the County is approximately 33 people per square mile.

The 2000 census estimates that there are approximately 12,000 housing units in Randolph County (9,600 owned and occupied; 2,500 rental units). The labor force is about 14,800 people and the school enrollment is around 7,400.

Major employers in Randolph County include the Baldwin Power Plant (Dynergy-Midwest Generation), GML, Spartan Light Metals, the Menard State Correctional Facility and the Chester Mental Health Facility. Randolph County is the second largest producer of coal in Illinois.

1.4 Land Use and Development

Hazard mitigation is primarily concerned with developed areas of communities - where the people are, where the buildings that they live and work in are. Also of concern is the infrastructure that serves the community.

The "Developed" land use category includes residential and commercial development, such as homes, businesses, and factories. Almost all (99%) of the residential development in Randolph County is single-family homes. The institutional/government category includes public facilities (primarily municipal), schools, churches, hospitals, and offices of federal, state, and regional agencies.

The "Undeveloped" land use category includes agricultural land, which is not really "undeveloped." Agricultural land includes things such as farmhouses, nurseries,

agricultural businesses, and improved farmland. However, there is not a concentration of buildings and infrastructure exposed to damage by natural hazards, so it is treated as undeveloped for this *Plan*'s purposes.

Table 1-2 Randolph County Land Uses

Land Use	Percent of County
Rural and Undeveloped Land:	
Agricultural	75.2
Mining/quarrying	5.1
Open Space/water/recreation	3.9
Forested	12.1
Vacant	0.3
Total Undeveloped	**96.6 %**
Urban and Built-Up Land:	
High Density	0.8
Low Density	0.9
Urban Open Space	1.7
Total Developed	**3.4 %**
Source: USDA,NRCS, IDOA, and Randolph County	

In keeping with population, development has been stable in Randolph County. Future development is anticipated in the northeastern portion of Randolph County. Development in the Red Bud is expected as the Metro-East area development continues to move east from Monroe County to Randolph County. Also, commercial and tourist growth is expected with the Illinois Department of Natural Resource's new World Shooting Complex that is currently under construction, in the Baldwin-Sparta area.

1.5 Critical Facilities

When dealing with natural disasters, some development is more important than others and these are considered to be "critical facilities." Critical facilities are buildings and infrastructure whose exposure or damage can affect the well being of a large group. For example, the impact of a flood or tornado on a hospital is greater than on a home or most businesses.

Generally, critical facilities fall into two categories:

- Buildings or locations vital to public safety and the disaster response and recovery effort, such as police and fire stations and telephone exchanges, and
- Buildings or locations that, if damaged, would create secondary disasters. Examples of such buildings or locations are hazardous materials facilities and nursing homes.

Critical facilities are not strictly defined by any agency. For this mitigation planning effort, seven categories of critical facilities were used:

1. Hazardous materials sites. These have been broken into two categories based on USEPA classifications: those with "extremely hazardous substances" (EHS) and those without. These definitions are in 40 CFR Part 355, Appendices A and B, which also defines their "threshold planning quantities," i.e., how much of the substance qualifies as being a concern. EHS includes well over 100 substances, from acetone to zinc phosphide.

2. Health facilities: hospitals and nursing homes.
3. Emergency response facilities: police and fire stations, public works sites, etc.
4. Utilities: water and wastewater treatment plants, electrical substations, etc.
5. Schools.
6. Places of assembly, such as theaters and casinos.
7. Bridges that would be inundated during the base or 100-year flood. These are discussed more in Chapter 2.

Critical facilities were identified by each community participating in this *Plan*. These facilities are categorized and tallied, by municipality, on the Table 1-3. The full list of Randolph County critical facilities is provided in Appendix D.

Table 1-3 Randolph County Critical Facilities

Type of Critical Facility: / Municipality:	HazMat-EHS	HazMat-non EHS	Health/ Special Needs	Municipal/ Emergency	State	Federal	Utilities	Educational/ Schools	Assembly/ Religious	Bridges	Total
Baldwin	2			7		1	3	1	4		18
Chester			7	11	1		4	6	4		33
Coulterville			2	6		1	3	2	1		15
Ellis Grove				2							2
Evansville			1	12				5	6		24
Kaskaskia											
Percy											
Prairie Du Rocher				7			2	2	2		13
Red Bud	3	5	3	5			1	5	7		29
Rockwood				1		1					2
Ruma				1					1		2
Sparta	3		4	11		1	3	6	2		30
Steeleville				1		1		4	1		7
Tilden				1		1		1	1		4
Unincorporated Area									3	3	6
Totals	8	5	17	65	1	6	16	32	32	3	**185**

Source: Municipal surveys, Randolph County ESDA, CFS from Illinois Emergency Management Agency

FEMA HAZUS software for assessing the impact of hazards, such as floods and earthquakes, was used in this *Plan*. HAZUS provides a count of critical facilities based on default data for Randolph County included in the software. The list of critical facilities in Appendix D is more comprehensive than the list used by HAZUS. HAZUS

does not provide detailed information on the default critical facilities, but it does provide an estimate of facilities located in the 100-year floodplain, plus the estimated damage to critical facilities during an earthquake.

Currently, Randolph County is developing a GIS. When based maps have been completed for the County, critical facilities will be mapped and incorporated into this *Plan*.

Chapter 2 discusses critical facilities that are impacted by each natural hazard. Hazard mitigation measures for critical facilities are identified in Chapters 4 through 9.

1.6 References

1. Critical facility data supplied by the Illinois Emergency Management Agency.
2. Critical facilities data supplied by municipalities and County offices.
3. Example Plans, FEMA/Community Rating System, 2002.
4. Getting Started – Building Support for Mitigation Planning, FEMA, FEMA-386-1, 2002.
5. State and Local Plan Interim Criteria Under the Disaster Mitigation Act of 2000, FEMA, 2002.
6. Survey of County offices and municipalities, January 2005.
7. U.S. Census Bureau website.
8. Illinois Emergency Management Agency.
9. Randolph County Flood Insurance Study, FEMA, June 3, 1986.
10. Illinois Department of Agriculture, Land Cover of Illinois Statistical Summary 1999-2000.
11. Southwestern Illinois GIS Resource Center, GIS mapping.

Chapter 2. Hazard Analysis

2.1 Identified Hazards

Randolph County is subject to a wide range of natural and manmade hazards. The County has experienced flood, severe weather, tornado, and earthquake events. A tornado event occurred in the Chester area in 2003. The most recent flooding occurred on the Kaskaskia River in 1995. The last major earthquake event occurred in 1812.

Flooding and tornado damage have warranted federal disaster declaration over the past 35 years. Table 2-1 lists the presidential, or federal, disaster declaration for the County since 1969. The table shows that disasters have most frequently occurred in the spring and summer.

Table 2-1 State and Federal Disaster Declarations for Randolph County

	Fall	Winter	Spring	Summer	Declaration Date	FEMA Disaster Number	Location	Public Assistance*
Flood				X	8/30/1969	276	Mississippi River	---
Flood			X		4/27/1973	373	Kaskaskia and Mississippi River	---
Flood				X	6/13/1974	438	Kaskaskia and Mississippi River	---
Flood			X		5/4/1979	583	Kaskaskia and Mississippi River	---
Severe Storm		X			1/6/1983	674		---
Severe Storm			X		6/6/1983	684		---
Flood				X	7/27/1993	997	Mississippi River	$2,029,000
Severe Storm				X	6/16/1995	1053		202,000
Tornado Flood			X		6/6/2002	1416	Evansville	74,000

* Dollar amount of public assistance communities received. This estimate does not include individual assistance provided to individual property owners.

Table 2-2 shows the natural and manmade hazards that Randolph County could potentially experience. Randolph County has a history with some of the listed hazards, such as floods, winter storms and tornadoes. Others hazards have not yet impacted the County or been experienced in recent years, such as, landslides or radiological incidents.

Using available data, Table 2-2 shows the past frequency of the listed hazards.

Table 2-2 Randolph County Identified and Potential Hazards

Hazard	Area affected or potentially affected (Location)	Past Frequency		
		Occurrences in the last number of years		
		Last 5 years	Last 10 years	Last 20 years
Civil Disorder	Menard Prison and Chester Mental Health	--	--	--
Dam Failure	Carlisle or Kaskaskia	0	0	0
Drought	Countywide	0	0	*
Earthquake	Countywide	0	0	0
Extreme heat	Countywide	13	18	--
Flood –				
Heavy rain	Countywide	3	7	--
Upstream event	South and west	5	7	13+
Ice jam		--	--	--
Hail	Countywide	32	56	75+
HAZMAT	Baldwin Plant	--	--	--
Landslide – earthquake	Mississippi River Bluffs	0	0	0
Landslide – heavy rain	Mississippi River Bluffs	--	--	**
Lightning	Countywide	1	--	--
Military Accident	Army National Guard and/or Munitions	--	--	--
Radiological release – transportation	Railroads	--	--	--
Subsidence – sinkhole	Mines	--	--	--
Thunderstorm-microburst	Countywide	26	56	86+
Tornado	Countywide	4	9	13
Transportation incident				
Air	Airfields	--	--	--
Rail	Countywide	--	--	--
Local road	Countywide	--	--	--
Utility interruption				
Communication	Cellular towers	--	--	--
Electricity	Countywide	--	--	--
Natural gas	Countywide	--	--	--
Other fuel	Pipelines	--	--	--
Wildland fire	Shawnee Forest and bluff areas	0	0	0
Winter Storm - Ice	Countywide	1	1	--
Winter Storm - Snow	Countywide	8	15	--

*Drought conditions experienced in Randolph County 1976, 1977, 1980, 1983 and 1984.
** 6 landslides since 1937.
-- No data available.

Hazard Mitigation Committee undertook an exercise to evaluate the listed hazards in order to determine the level of attention that the hazard warranted in this Plan. In the evaluation the Committee looked at the expected frequency, impact or consequences of the event and the area of the County that is vulnerable to the hazard. The Committee works in small groups to assign points to each hazard for each of the evaluation categories.

The results from the small groups were totaled and examined in two ways:

Method 1: (Frequency + Impact) x Area = Ranking
and
Method 2: (Impact + Area) x Frequency = Ranking

The two equations above provided similar results and rankings. Therefore, the points given to each hazard were evaluated based on the sum:

Method 3: Frequency + Impact + Area = Ranking

This approach gave almost the same ranking as Method 1. Therefore, the Committee concluded the rank for natural hazards was quite straightforward. The manmade hazards could not be prioritized as clearly as the natural hazards, but the most significant manmade hazards are in the categories of utility disruption and transportation incidents. A summary of the Committee's ranking of hazard is shown in Table 2-4.

From a review of the ranking results, the Committee prioritizes the natural and manmade hazards as follows:

Table 2-3 Randolph County Prioritized Natural and Manmade Hazards

Natural Hazards:		**Manmade Hazards**	
1.	Flood	1.	Utility disruption:
2.	Earthquake		Electric
3.	Winter Storm		Communications
4.	Tornado		Natural Gas (and pipelines)
5.	Summer Storms	2.	Transportation accidents:
6.	Extreme Heat		Air
			Rail
			Truck
			Barge
		3.	Radiological Incidents

The natural hazards listed in Table 2-3 are discussed in detail in this chapter, and mitigation activities for each hazard are identified in Chapters 4 through 9. Other natural hazards have been recognized, but not addressed in detail, at this time. The manmade hazards, while identified, are briefly discussed and will be further examined as the Committee work continues in upcoming years.

Table 2-4 Randolph County Committee Ranking of Identified and Potential Hazards

Natural Hazards:		Future Frequency:	Impact:	Area Affected:
Priority	**Floods**	Likely	Moderate	Community
	Earthquake	Seldom	Severe/Catastrophic	Large
	Winter Storm - Snow and Ice	Likely	Severe	Large
	Tornado	Likely	Severe-Catastrophic	Community
	Summer Storm – Thunder, Lightning, Hail, Microburst	Likely-Frequent	Moderate	Community
	Extreme Heat	Occasional	Moderate	Large
Other	Wildland Fire	Occasional	Moderate	Large
	Drought	Seldom	Low-Moderate	Community-Large
	Dam Failure	Seldom	Low	Community
	Ice Jam	Seldom	Low	Site-Community
	Sinkhole	Seldom	Low	Site-Community
	Landslide-Earthquake	Occasional	Severe	Community-Large
Manmade Hazards:		Future Frequency	Impact	Area Affected
Priority	**Utility Disruption**			
	- Electric	Likely	Moderate-Severe	Community-Large
	- Communications	Likely	Moderate	Community
	- Natural Gas	Occasional	Moderate-Severe	Community-Large
	Transportation Incidents			
	- Air	Occasional	Moderate	Site-Community
	- Rail	Occasional-Likely	Severe	Large
	- Local Road	Occasional	Moderate	Community
	- Barge	Seldom	Moderate	Site-Community
	Radiological	Seldom-Occasional	Severe-Catastrophic	Large
Other	Civil Disorder	Occasional	Moderate	Site-Community
	Pipelines	Seldom	Moderate	Site-Community
	HAZMAT	Seldom	Moderate	Community
	Military	Seldom	Low	Community

2.2 Natural Hazards

Floods, earthquakes, severe winter storms, tornadoes, severe summer storms and extreme heat will be discussed in detail for the hazard analysis chapter. Information and data was collected from the municipalities, regional, state and federal agencies for much of the analysis. A primary source of information on recorded events was the National Climate Data Center (NCDC) at the U.S. National Oceanic and Atmospheric Administration. For the vulnerability analysis, FEMA's HAZUS software was used to examine Randolph County's exposure to floods and earthquakes.

2.2.1 Flood

There are three major watersheds in Randolph County - the Mississippi River watershed, the Kaskaskia River watershed, and the Mary's River watershed. Watersheds are formed by nature. A watershed is the land area that all rain or snow melt will drain or "runoff" to. Within each watershed there are smaller rivers and creeks that are divided into subwatersheds. All watersheds in the County eventually drain into the Mississippi River. Table 2-5 shows the County's watersheds and subwatersheds.

Table 2-5 Randolph County Watersheds

Watershed	Stream Name	Tributary to	Approximate Area Square miles
Mississippi River	Mississippi River	Atlantic Ocean	712,600 at Chester
Kaskaskia River	Kaskaskia River	Mississippi River	5,801
	Nine Mile Creek	Kaskaskia River	43.9
	Camp Creek	Kaskaskia River	12.2
	Horse Creek	Kaskaskia River	94.0
	Plum Creek	Kaskaskia River	89.7
	Baldwin Lake	Kaskaskia River	4.9
Mary's River	Mary's River	Mississippi River	243
	Mary's River Trib.	Mary's River	.65
	Mill Creek	Mary's River	--
	Little Mary's River	Mary's River	--
	Piney Creek	Mary's River	--
	Cox Creek	Mary's River	--
	Lick Branch	Mary's River	1.22
	Gravel Creek	Little Mary's River	--

Table 2-6 shows the 100-year flood elevations for the major rivers in Randolph County, which is included in the FEMA Flood Insurance Studies.

Table 2-6 Randolph County 100-year Flood Elevations

River	Location	Approximate 100-year Flood Elevation
Mississippi River at south end of the County	At Perry County line	385 feet
Mississippi River	At Chester, State Rte 51	389.2 feet
Mississippi River at the north end of the County	At Monroe County line	403.5 feet
Kaskaskia River	At Mississippi River	394 feet
Mary's River	At Mississippi River	388 feet

Source: FEMA Flood Insurance Study 1985

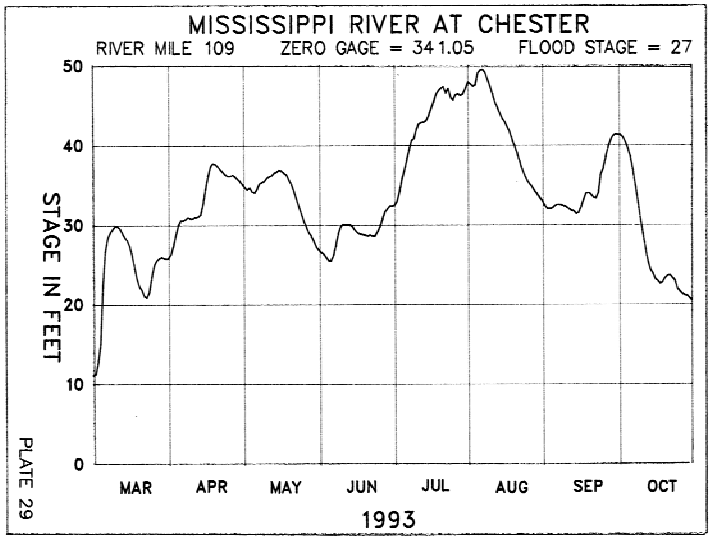
The Great Midwest Flood of 1993

The historic flooding of the Mississippi River in the summer of 1993 provides the best depiction of riverine flooding for the Mississippi and Kaskaskia Rivers in Randolph County. The Mary's River has been mainly impacted by severe storms and flash flooding, which will be discussed later in this chapter.

Along with 39 other counties in Illinois, Randolph County received a federal disaster declaration as a result of the record high stages of the Mississippi River. At Chester the Mississippi reached a peak stage of 49.58 feet on August 7, 1993. The highest historical peak before 1993 was 43.32 feet in April 1973. The Flood of 1993 brought the Mississippi over six feet higher than it had ever been recorded at Chester. At Chester, the peak flood elevation during the Flood of 1993 was 390.6 feet, or about the FEMA 500-year flood elevation.

The Kaskaskia River peaked at a stage of 394.41 feet on August 6, 1993 at the Kaskaskia River Lock and Dam and at Red Bud. The previous stage of record was 387.30 in April of 1973.

Source: U.S. Army Corps of Engineers



Mississippi flood waters flowed up into the Kaskaskia River watershed and the Kaskaskia Lock and Dam was inundated and Evansville received severe flooding. Prairie du Rocher, Kaskaskia, Chester and Rockwood were impacted directly by the Mississippi River. The Flood of 1993 impacted all the residents of the County due to the closure of businesses, the closing of the Chester Bridge, and the flooding in the entire region of the State.

The National Weather Service (NWS) gives the dates of flooding for Randolph County during the Flood of 1993 as April 3rd to May 31st, and June 8th through October 12th, for a total of 186 days of flooding.

The Great USA Flood of 1993

Excerpts of paper by Lee W. Larson on the NOAA National Weather Service, 1996.

From May through September of 1993, major and/or record flooding occurred across North Dakota, South Dakota, Nebraska, Kansas, Minnesota, Iowa, Missouri, Wisconsin, and Illinois. Fifty flood deaths occurred, and damages approached $15 billion. Hundreds of levees failed along the Mississippi and Missouri Rivers.

The magnitude and severity of this flood event was simply over-whelming, and it ranks as one of the greatest natural disasters ever to hit the United States. Approximately 600 river forecast points in the Midwestern United States were above flood stage at the same time. Nearly 150 major rivers and tributaries were affected. It was certainly the largest and most significant flood event ever to occur in the United States (Fig. 1).

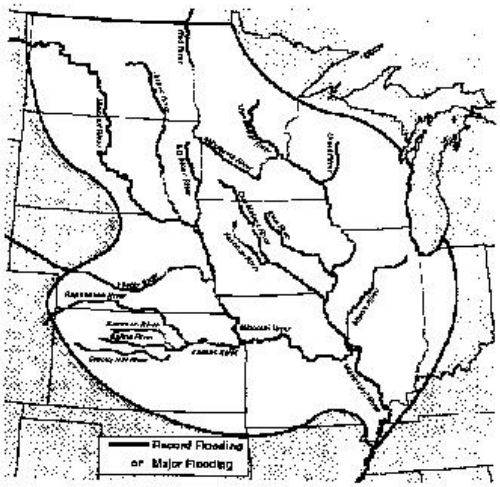


Figure 1. Area Impacted by the 1993 Midwest Flood

Tens of thousands of people were evacuated, some never to return to their homes. At least 10,000 homes were totally destroyed, hundreds of towns were impacted with at least 75 towns totally and completely under flood waters. At least 15 million acres of farmland were inundated, some of which may not be useable for years to come.

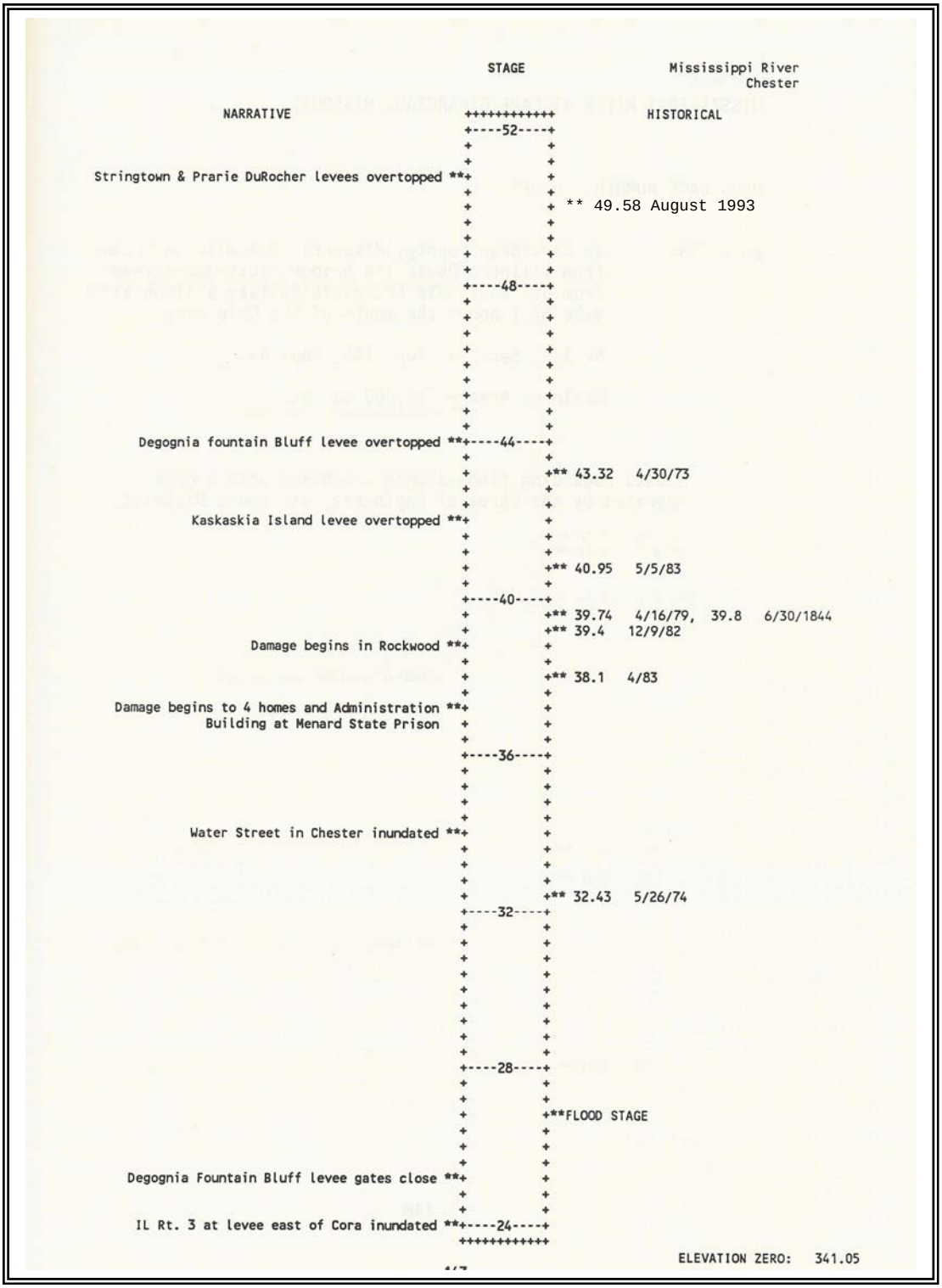
Transportation was severely impacted. Barge traffic on the Missouri and Mississippi Rivers was stopped for nearly 2 months. Bridges were out or not accessible on the Mississippi River from Davenport, Iowa, downstream to St. Louis, Missouri. On the Missouri River, bridges were out from Kansas City, downstream to St. Charles, Missouri. Numerous interstate highways and other roads were closed. Ten commercial airports were flooded. All railroad traffic in the Midwest was halted. Numerous sewage treatment and water treatment plants were destroyed (Larson, 1993).

Significant rainfall in June and July in the Upper Midwest, combined with wet soil conditions, was the cause of severe flooding in the Upper Mississippi River basin. In mid-June, 8 inches of precipitation fell across the Upper Midwest. This resulted in flooding on rivers in Minnesota and Wisconsin and eventually pushed the Mississippi River to a crest at St. Louis on July 12th of about 43 feet, equaling the previous stage of record.

In early July, Iowa was hit with numerous record rainfalls. Storm totals of up to 8 inches were again common. Record flooding occurred on the Skunk, Iowa, and Des Moines Rivers. The city of Des Moines, Iowa, was particularly hard hit by flooding on July 9th. The flow from these rivers combined with already near-record flows on the Mississippi River to push the stage at St. Louis up to a new record high stage of 47 feet on July 20th.

In mid to late July, heavy rains began further west in North Dakota, Nebraska, Kansas, and Missouri. Record flooding began on rivers in Missouri, Nebraska, Kansas, North Dakota, and South Dakota. The Missouri River crested at 48.9 feet at Kansas City on July 27th breaking the previous record crest, set in 1951, by 2.7 feet. This crest pushed on down the Missouri River setting new records at Boonville, Jefferson City, Hermann, St. Charles, and other locations. This record flow joined the already full Mississippi River just north of St. Louis, and pushed the Mississippi to another record crest of 49.47 feet at St. Louis on August 1st (Parrett, 1993).

The Great Flood of 1993 was unusual in other respects. It was wide spread covering nine states and 400,000 square miles. Fifty deaths occurred as a result of the flood. Over 1,000 levees were topped or failed. Also, the flood was of extremely long duration lasting at some locations for nearly 200 days.



Chester Gage Description:

USGS Gage Number: 07020500

Location: In Randolph County, on downstream side of the left pier of main truss of highway bridge at Chester, 8.1 miles downstream from Kaskaskia River, and at mile 109.9 above Ohio River.
SW ¼, Section 24, Township 7S, Range 7W
Drainage Area = 708,600 square miles

[*Source: Illinois Gage Data, IDOT*]

Mississippi River Levees: There are three federal levees in Randolph County: the Stringtown Fort Chartres & Ivy Landing Levee, the Prairie du Rocher and Modoc Levee, and the Kaskaskia Island Levee. All three levees are federal levees, which means that federal funds were used to construct the levees and federal funds can be used to repair the levees. The Kaskaskia Island Levee was breached in previous floods, including 1973 and 1985 and the levee was repaired. Table 2-7 summarizes the performance of the levees during the 1993 flood:

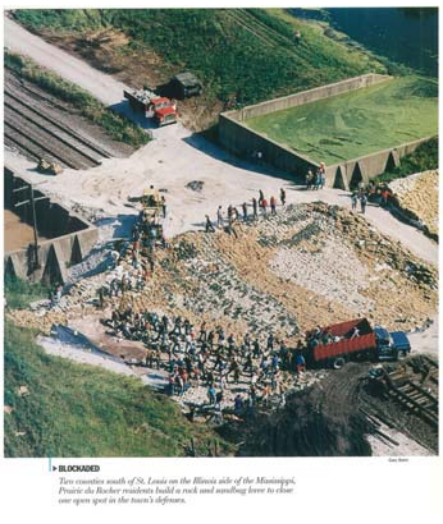
Table 2-7 Randolph County Levees

Levee/District	Level of Protection	Year District Organized	Acres of Land Protected	Flood of 1993 Performance	Date
Kaskaskia Island	50 year	1916	9,460	Breach (1) 600 feet	July 22, 1993
Fort Chartres & Ivy Landing	50 year	1884	15,900	Controlled Breach (4) 2,600 feet	August 3, 1993
Prairie du Rocher & Modoc	50 year	1945	13,000	Successfully Reinforced	---

Source: U.S. Army Corps of Engineers, St. Louis District

A description of the breach of the Kaskaskia Island Levee during the flood of 1993 is on page 2-10. Limited information is available on the controlled breach at Fort Chartres, but on August 3rd the Mississippi River had not yet crested. The River had already surpassed the flood of record flood at the Chester gage, and it was felt that the Fort Chartres Levee, constructed to a 50-year flood level, if breached would protect the Village of Prairie du Rocher. The levee was breached in four locations. Included in the inundated area behind the levee was the Fort de Chartres Historic Site.

Fort Chartres, August 1993



BLOCKADED

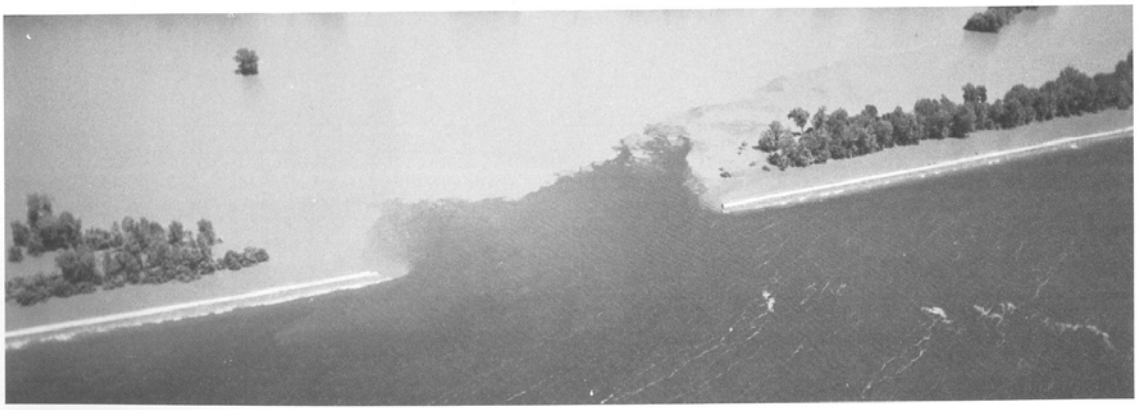
Ten counties south of St. Louis on the Illinois side of the Mississippi, Prairie du Rocher residents build a rock and sandbag levee to close one open spot in the town's defenses.

Source: St. Louis Post-Dispatch

For the Prairie du Rocher Levee there was concern for a possible failure near Fort Chartres. Therefore, the Village of Prairie du Rocher was evacuated on July 26, 1995. Flood fighting continued and a sandbag ring levee was constructed around a sand boil and where there was a sluff in the berm (and the Fort Chartres Levee breached).

The Prairie du Rocher Levee was able to withstand the peak stage and the numerous days that the Mississippi River remained above flood stage.

Kaskaskia Island looking north. Circled area shows broken levee.



Broken levee at Kaskaskia Island

Source of Photos: Illinois State Water Survey

Kaskaskia Island Levee Breach - 1993

On July 21, flood-fighters at the Kaskaskia Levee spotted a threatened section of levee shortly after midnight. Some 125 families were awakened and warned to evacuate. At 9:48 a.m., July 22, the levee was undermined and breached. The island's 252 year-old "Liberty Bell" tolled, warning anyone left on the 9,460 acre island to flee. Within a few hours, the island was completely submerged.

Two surveyors, under contract with the Corps, were inspecting the levee just minutes before it breached. Twenty minutes before the levee broke, they reported seeing a large sand boil that "looked like a fountain of sand and water" surrounded by smaller sand boils.

The Kaskaskia Levee broke when the river exceeded the levee design elevation but not the top of the levee. The water surface was in the levee freeboard when breaching occurred. The Kaskaskia Levee break had an immediate impact on local river stages. The Mississippi River fell 19.5 inches in four hours at the Chester Bridge after the levee break. However, this was only temporary. After the island filled, the river continued to rise.

Source: U.S. Army Corps of Engineers, St. Louis District

Kaskaskia River: The Kaskaskia Lock and Dam was constructed by the U.S. Army Corps of Engineers as part of the Kaskaskia River Navigation Project. During the Flood of 1993 backwater from the Mississippi River nearly submerged the entire facility.

Backwater flooding extended north through the Village of Evansville and to the Village of Baldwin.

Kaskaskia Lock & Dam Visitor's Center at normal pool (2004).

Other Historic Flood Event and Recent Flooding

Other historic flooding: The Chester Gage Description sheet on page 2-8 shows the highest known flood stages for the Mississippi River at the Chester gage, including the 1993 flood.

Kaskaskia Lock & Dam Visitor's Center In August 1993 (courtesy of Corps of Engineers Staff)

Recent flooding: The most recent flooding was in 1995 at the Kaskaskia River due to backwater from the Mississippi. There was some minor flooding at the Kaskaskia Lock and Dam in 2003. The Lock and Dam is situated 0.8 miles above the confluence of the Kaskaskia River and Mississippi River. The Lock and Dam was out of operation, but due to flood fighting efforts, the Corps of Engineer's facility suffered relatively little damage. Around 450 residents were affected by the flooding in the Village of Baldwin. The water plant was flooded leaving residents without drinking water.

Hazard Assessment

HAZUS – Flood Model: 100-year flood risk was analyzed for Randolph County using FEMA's HAZUS-MH Multi-Hazard Loss Estimation Software. The output and report for the HAZUS model are included in Appendix C of this Plan. There were a number of data limitations that affect the HAZUS results. First, floodplain data for Randolph County is not available in any digital format. Randolph County flood panels were manually digitized to create georeferenced ArcGIS shapefiles. Second, U.S. Census 2000 data is included in the model, and the population for the Menard Correctional Facility in Chester was mis-assigned to Baldwin by the Census Bureau in the 2000 Census. Menard Prison was impacted by the Flood of 1993, so it is likely that the estimate of the 100-year flood risk is low.

Flood Considerations and Terminology

Riverine flooding: The most common and most damaging floods occur along rivers and streams and this is called overbank flooding. The major sources of riverine or overbank flooding in Randolph County are the Mississippi River and the Kaskaskia River. Often, the flooding along the Kaskaskia River is due to backwater flooding from the Mississippi River. The Mary's River Watershed is a relatively small watershed, compared to the Mississippi and the Kaskaskia Rivers, and very little of the Mary's River floodplain is not developed.

Overbank flooding of rivers and streams can be caused by one or more of three factors:

- Too much precipitation in the watershed for the channels to convey
- Obstructions in a channel, such as an ice jam or beaver dam, and
- Large release of water when a dam or other obstruction fails.

IDNR's
"Flood Surveillance Bookmarks" Website:

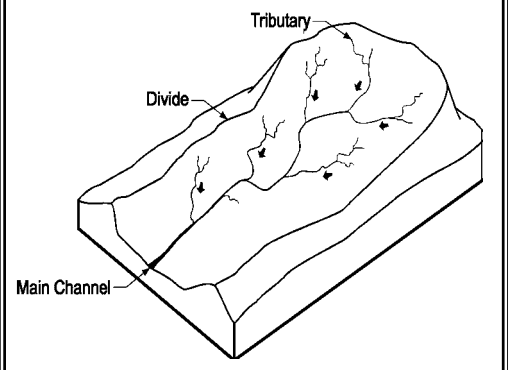
http://dnr.state.il.us/owr/Surveillance.htm

Gives stage and precipitation records and forecasts.

Most floods are caused by too much precipitation in the watershed. Flooding can also occur in streets when rainwater can't flow into a storm sewer. Basements can flood when rainwater can't flow away from the house or when the sewers back up. These problems are usually caused by heavy local rains and are often not related to overbank flooding or floodplain locations. Data on these sewer backup and local drainage problems are included in the later section on thunderstorms.

Precipitation: Randolph County receives an average of 41 to 42 inches of total precipitation each year. From April to September, rainfall averages 22.5 inches. Average annual snowfall is 17.5 inches (generally, 7 inches of snow has the equivalent water content of one inch of rain).

Watersheds: In a watershed, runoff from rain or snowmelt is collected by smaller channels (tributaries), which send the water to larger channels and eventually to the lowest body of water in the watershed (main channel). When a channel receives too much water, the excess flows over its banks and into the adjacent area – causing a flood.



A watershed includes all land that drains to a common channel

Watershed topography and development: The condition of the land in the watershed affects what happens to the precipitation. For example, more rain will run off the land and into the streams if the terrain is steep, if the ground is already saturated from previous rains, if the watershed is significantly covered with impervious pavement and parking lots, or if depressional storage areas have been filled in.

Flash floods: Flash floods are generated by severe storms that drop much rainfall in a short time. All flash floods strike quickly and end swiftly. 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. In urban areas, flash flooding can occur where impervious surfaces, gutters and storm sewers speed runoff. Flash floods also can be caused by dam failure, the release of ice-jam flooding, or the collapse of a debris dam.

Obstructions: Obstructions can be channel obstructions, such as small bridge openings or log jams, or floodplain obstructions, such as road embankments, fill and buildings. Channel obstructions will cause smaller, more frequent floods, while floodplain obstructions impact the larger, less frequent floods where most of the flow is overbank, outside the channel.

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.

Obstructions can be natural or man made. Natural obstructions, like log jams, can be cleared out or are washed away during larger floods. The greater problem is man made obstructions, which tend to be more permanent. They are discussed in Chapter 4's section on floodways.

Flood risk: Past floods are indications of what can happen in the future, but flood studies and mitigation plans are based on the *risk* of future flooding. Flood studies extrapolate from historical records to determine the statistical potential that storms and floods of certain magnitude will recur. Such events are measured by their "recurrence interval," i.e., a 10-year storm or a 50-year flood.

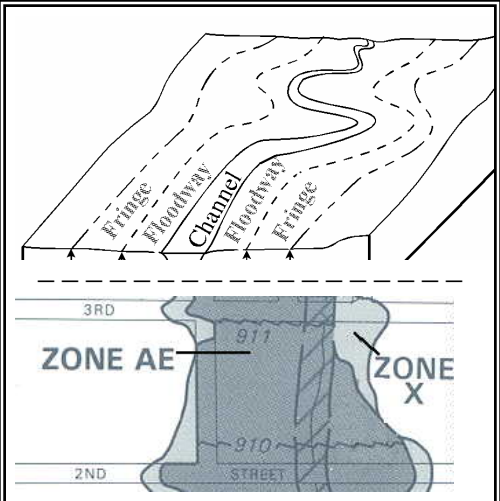
These terms are often misconstrued. Commonly, people interpret the 50-year flood definition to mean "once every 50 years." This is incorrect. Statistically speaking, a 50-year flood has a 1/50 (2 percent) chance of occurring in any given year. In reality, a 50-year flood could occur two times in the 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. This *Plan* uses the base flood, too. The base flood is the one percent chance flood, i.e., the flood that has a one percent (one out of 100) chance of occurring in any given year. The one percent chance flood has also been called the 100-year flood.

Another term used is the "500-year flood." This has a 0.2 percent 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.

The base floodplain: The area inundated by the base flood is the "base floodplain." FEMA maps (called Flood Insurance Rate Maps, or FIRMs) also call this the Special Flood Hazard Area or A Zone. An example of a FIRM is shown on the next page.

The central part of the floodplain is called the floodway. The floodway is the channel and that portion of the adjacent floodplain which must remain open to permit passage of the base flood. Floodwaters generally are deepest and swiftest in the floodway, and anything in this area is in the greatest danger during a flood. The remainder of the floodplain is called the fringe, where water may be shallower and slower.



Floodplain/Floodway Delineation

The upper schematic identifies the channel, floodway and fringe portions of the base floodplain, which is shown in the lower map as a Zone AE on the Flood Insurance Rate Map (FIRM). The floodway is shown on the FIRM with diagonal lines. The Zone X is the area mapped as higher than the base floodplain, but it may still have local drainage and flooding problems.

The map on page 2-15 is from the HAZUS model and it shows the 100-year floodplain for the 100-year event for Randolph County. FIRM maps are needed to determine particular flood zones, but the HAZUS map provides a countywide view of the flood hazard.

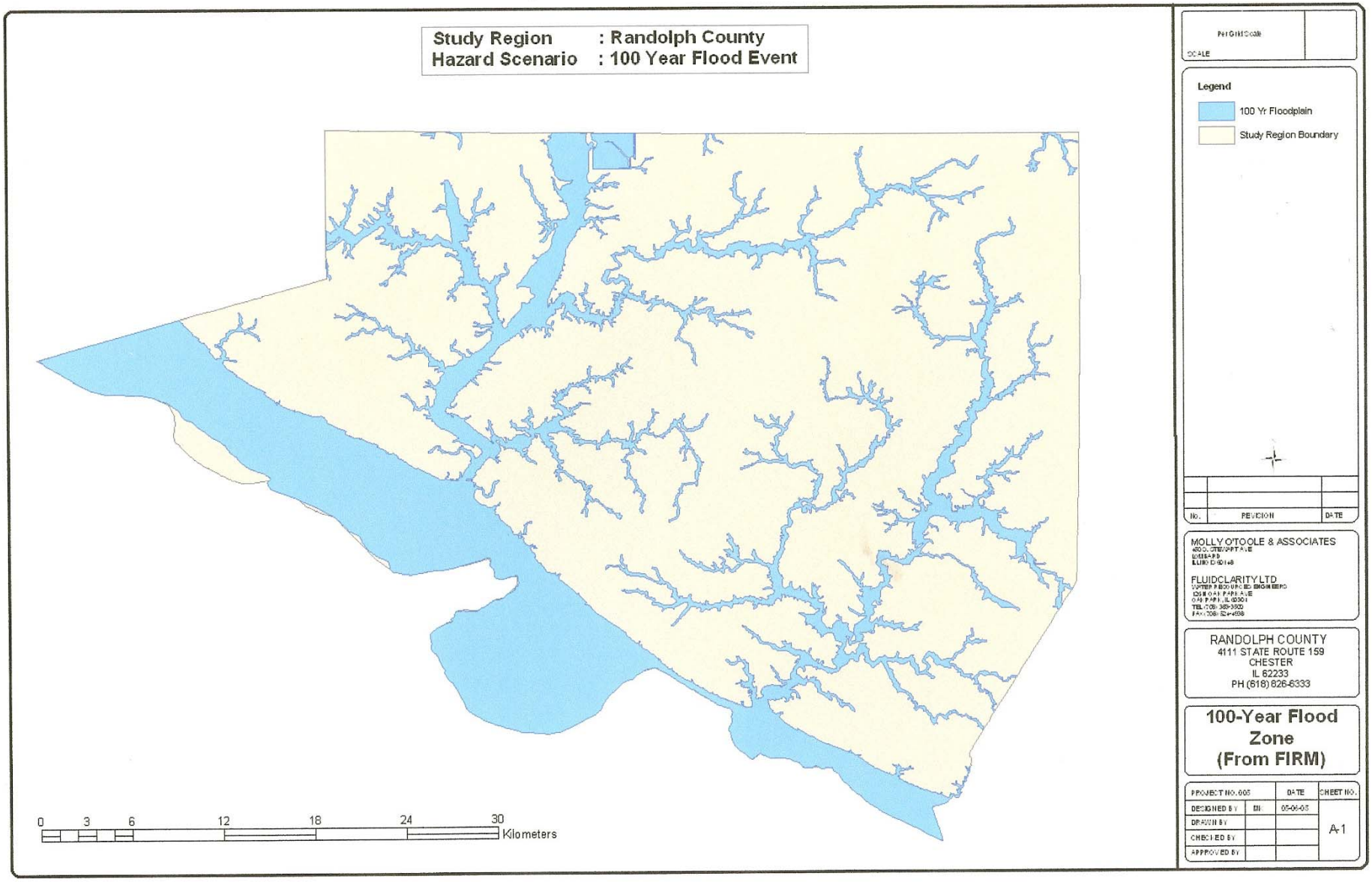
Velocity: The speed of moving water, or velocity, is measured in feet per second. Flood velocity is important to mitigation because the faster water moves, the more pressure it puts on a structure and the more it will erode stream banks and scour the earth around a building's foundation. The FEMA Flood Insurance Study typically includes the "average floodway velocity" for those streams that were studied in detail. This figure is helpful in determining the relative hazard of an area, but is not an accurate indication of the velocity of a flood at any individual site.

Depth: The Chester gage description on page 2-8 shows flood stage on the Mississippi River beginning at elevation 368.0 feet (Elevation Zero 341.05 feet plus 27 feet gage reading). The table below shows average difference between flood stage, the 10-year and the 100-year flood. For other locations in the County, the comparison is limited to the difference between the 10- and 100-year elevations.

Table 2-8 shows that when the Mississippi River level reaches flood stage at the Chester gage, it will rise another 11.4 feet before reaching the 10-year flood elevation. There is an average of 7 feet difference between the 10-year and 50-year levels, and there is only around 3 feet in difference between the 50-year and 100-year flood levels.

Table 2-8 Randolph County Comparison of Flood Elevations

Stream	Flood Stage	10-Year	*Difference 10-yr to flood stage*	50-year	*Difference 10-yr to 50-yr*	100-Year	*Difference 50-yr to 100-yr*
Mississippi River at Prairie du Rocher		391.5	---	398.0	*6.5*	400.5	*2.5*
Mississippi River at Chester	368.0	379.4	*11.4*	386.5	*7.1*	389.2	*2.7*
Mississippi River at Rockwood		375.0	---	382.5	*7.5*	385.5	*3.0*
Kaskaskia River at Evansville		384.5	---	391.7	*7.2*	395.0	*3.3*


Study Region : Randolph County
Hazard Scenario : 100 Year Flood Event
Per Grid Scale
SCALE
Legend
100 Yr Floodplain
Study Region Boundary
No.
REVISION
DATE
MOLLY O'TOOLE & ASSOCIATES
FLUIDCLARITY LTD
RANDOLPH COUNTY
4111 STATE ROUTE 159
CHESTER
IL 62233
PH (618) 826-6333
100-Year Flood Zone (From FIRM)
PROJECT NO. 005
DATE
SHEET NO.
DESIGNED BY
DRAWN BY
CHECKED BY
APPROVED BY
05-06-05
A-1
0 3 6 12 18 24 30
Kilometers

Safety, Health and Damage Considerations

In Randolph County, the average floodway velocities were not included in the Flood Insurance Study reports. This information should be included when IDNR and FEMA complete the Flood Map Modernization for Randolph County in 2006.

Safety: A car will float in less than 2 feet of moving water and can be swept downstream into deeper waters. This is one reason floods kill more people trapped in vehicles than anywhere else (see table). Victims of floods have often put themselves in perilous situations by ignoring warnings about travel or mistakenly thinking that a washed-out bridge is still there.

Flood Related Deaths, Illinois and United States

	Vehicle		Outdoors		Indoors		Total	
	IL	US	IL	US	IL	US	IL	US
1995		39	1	35		6	1	80
1996		79	2	39		13	2	131
1997	1	46		60		12	1	118
1998		75	1	40		21	1	136
1999		26	1	34		8	1	68
2000	3	24	1	13			4	37
2001	1	24		20		4	1	48
Total	5	313	6	241	0	64	11	618

Deaths are from river and flash floods. Most of the deaths are from flash floods. *Source: National Weather Service*

People die of heart attacks, especially from exertion during a flood fight. Electrocution is a cause of flood deaths, claiming lives in flooded areas that carry a live current created when electrical components short out. Floods also can damage gas lines, floors, and stairs, creating secondary hazards such as gas leaks, unsafe structures, and fires. Fires are particularly damaging in areas made inaccessible to fire-fighting equipment by high water or flood-related road or bridge damage.

Warning and evacuation: The threat to life posed by a flood can be avoided if people can evacuate before the waters reach their buildings or close their evacuation routes. This requires advance notice that a flood is coming and a system to disseminate flood warnings. Flood warning programs are discussed in Chapter 7. On the Mississippi and Kaskaskia Rivers is there lead time to allow protective steps, such as sandbagging, to be organized and undertaken.

Other, smaller, streams rise so fast during a heavy local rain, that expensive systems of remote rain and stream gages would be needed to provide adequate notice to emergency managers. Even then, there would be little time for people to do much more than escape to high ground.

Bridges: A key evacuation and safety concern is when roads and bridges go under water. Generally, the larger the road, the more likely it will not flood, but this is not always the case.

A bridge does not have to be under water to be damaged or to cut off an evacuation route. In some cases the bridge is high, but the access road may be flooded. This was the case with the Chester Bridge during the 1993 flood. In other cases, the bridge or culvert can be washed out. This is especially dangerous if a person drives on a flooded road and assumes that the bridge is still there.

Health: While such problems are often not reported, three general types of health hazards accompany floods. The first comes from the water itself. Floodwaters carry whatever was on the

ground that the upstream runoff picked up, including dirt, oil, animal waste, and lawn, farm and industrial chemicals. Pastures and areas where cattle and hogs are kept can contribute polluted waters to the receiving streams.

Flood waters saturate the ground which leads to infiltration into sanitary sewer lines. When wastewater treatment facilities are flooded, there is nowhere for the sewage to flow. Infiltration and lack of treatment lead to overloaded sewer lines which back up into low lying areas and some homes. Even though diluted by flood waters, raw sewage can be a breeding ground for bacteria, such as E. coli, and other disease-causing agents. Because of this threat, tetanus shots are given to people affected by a flood.

The second type of health problem comes after the water is gone. Stagnant pools become breeding grounds for mosquitoes, and wet areas of a building that have not been cleaned breed mold and mildew. A building that is not thoroughly and properly cleaned becomes a health hazard, especially for small children and the elderly.

Another health hazard occurs when heating ducts in a forced-air system are not properly cleaned after inundation. When the furnace or air conditioner is turned on, the sediments left in the ducts are circulated throughout the building and breathed in by the occupants.

If the water system loses pressure, a boil order may be issued to protect people and animals from contaminated water.

The third problem is the long-term psychological impact of having been through a flood and seeing one's home damaged and irreplaceable keepsakes destroyed. The cost and labor needed to repair a flood-damaged home puts a severe strain on people, especially the unprepared and uninsured. There is also a long-term problem for those who know that their homes can be flooded again. The resulting stress on floodplain residents takes its toll in the form of aggravated physical and mental health problems.

> "These follow-up studies show a consistent pattern of increased psychological problems among flood victims for up to 5 years after the flood. The findings regarding non-psychiatric morbidity are less consistent, but many of the reported morbidity problems such as hypertension and cardiovascular disease-and even leukemia and lymphoma-may be stress related." – *The Public Health Consequences of Disasters*, page 74.

Building damage: Deep or fast moving waters will push a building off its foundation. Structural damage can also be caused by the weight of standing water, known as "hydrostatic pressure."

Basement walls and floors are particularly susceptible to damage by hydrostatic pressure. Not only is the water acting on basement walls deeper, a basement is subjected to the combined weight of water and saturated earth. In addition, water in the ground underneath a flooded building will seek its own level, resulting in uplift forces that can break a concrete basement floor.

Another common type of damage inflicted by a flood is caused by soaking. When soaked, many materials change their composition or shape. Wet wood will swell and, if dried too quickly, will

crack, split or warp. Plywood can come apart. Gypsum wallboard will fall apart if it is bumped before it dries out. The longer these materials are wet, the more moisture, sediment and pollutants they will absorb.

Soaking can cause extensive damage to household goods. Wooden furniture may become so badly warped that it cannot be used. Other furnishings such as upholstery, carpeting, mattresses, and books usually are not worth drying out and restoring. Electrical appliances and gasoline engines will not work safely until they are professionally dried and cleaned.

In short, while a building may look sound and unharmed after a flood, the waters can cause a lot of damage. To properly clean a flooded building, the walls and floors should be stripped, cleaned, and allowed to dry before being recovered. This can take weeks and is expensive.

Vulnerability Analysis - Floods

Past and future flood impacts in terms of people and costs will be discussed in this section. Impacts being considered are summarized under four categories: impact on people (e.g., safety and health), damage to buildings, damage to critical facilities, and economic disruption (damage to businesses and infrastructure).

Though, from gage records and other reports and documents, there is a lot of data on past floods in Randolph County, there is a limited amount of information on losses and damages. This is one of the reasons why Randolph County opted to have FEMA's HAZUS software run for floods. Table 2-9 shows the public assistance dollars received in Randolph County for the last three FEMA disaster declarations.

Impact on people: HAZUS estimates that 1,920 people in Randolph County live within the 100-year floodplain boundaries. The total County population is 33,893, which means that about six percent of the County are floodplain residents.

Table 2-9 Randolph County Public Assistance Received In Recent Federal Disaster Declarations

	FEMA Assistance Received:		
Community:	1993 (DR997)	1995 (DR1053)	2002 (DR1416)
Baldwin	$ 31,374	$ 5,825	$
Chester *	$ 147,754	$ 5,161	$
Coulterville	$	$	$
Ellis Grove	$ 4,919	$ 1,947	$
Evansville	$ 189,694	$ 35,224	$ 6,282
Kaskaskia**	$ 247,312	$ 47,071	$ 17,128
Percy	$ 5,388	$	$
Prairie du Rocher**	$ 132,221	$ 25,195	$ 8,335
Red Bud*	$ 2,930	$	$
Rockwood	$ 73,462	$ 1,423	$
Ruma	$	$	$
Sparta	$ 4,972	$ 32,209	$
Steeleville	$ 3,634	$	$
Tilden	$	$	$
Randolph County***	$ 1,163,141	$ 48,083	$ 42,705
Local Agencies	$ 21,727	$	$
Randolph County Total	$ 2,028,528	$ 202,138	$ 74,450
* Including School Districts **Including Levee District ***Including Road Districts			
Source: Illinois Emergency Management Agency			

HAZUS is not able to determine the total number of people affected during times of flooding since in cannot predict where people travel to work or to do business. During the 1993 Flood, the Route 51 Bridge at Chester (Chester Bridge) was closed and people had to drive to Cape Girardeau to cross the Mississippi River.

There have not been any recorded deaths or injuries in Randolph County associated with flooding. This may be attributed to the relatively long warning time that people have when flooding is predicted for the Mississippi or Kaskaskia Rivers.

Damage to buildings: Table 2-11 summarizes the HAZUS finding for buildings and contents exposed to the 100-year flood event and the estimate of losses. HAZUS shows that 730 buildings are exposed to the 100-year flood. Of those, 725 buildings are residential structures. The total value of buildings and content of property impacted the 100-year flood is $10,490,300. The total value of all contents and property identified in the floodplain is $152,786,300. Therefore, around 7 percent losses can be anticipated of the total floodplain value in a 100-year event.

The HAZUS map on page 2-23 presents the 100-year floodplain overlaid on a count of occupied buildings in Randolph County.

Another source of damage data is past claims paid by the National Flood Insurance Program. The figure to the right summarizes flood insurance claims in Randolph County. Table 2-10 summarizes flood insurance claims made in Randolph County from the beginning of the program through 2003. Flood insurance claims figures do not include items not covered by a flood insurance policy, such as landscaping and automobiles, and the value of lost family heirlooms. They also do not include damage to uninsured or underinsured properties.

Repetitive Losses: There are several different definitions of a "repetitive loss property." This *Plan* uses FEMA's Community Rating System definition, in part because data is readily available: a repetitive loss property is one which has received two flood insurance claim payments for at least $1,000 each since 1978. These properties are important to the National Flood Insurance Program and the Community Rating System because even though they comprise 2 percent of the policy base, they account for 33 percent of the country's flood insurance claim payments.

Table 2-10 Randolph County Flood Insurance Claims 1978 to 2003

Chester	no claims
Evansville	22 claims for $308,466
Kaskaskia	45 claims for $255,830
Prairie du Rocher	33 claims for $340,484
Uninc. Randolph Co.	209 claims for $2,202,068
Rockwood	8 claims for $4,903
Sparta	no claims
Steeleville	no claims
County total	**317 claims for $3,111,751**

Source: IDNR Office of Water Resources

There are several FEMA programs that encourage communities to identify the causes of their repetitive losses and develop a plan to mitigate the losses (this *Plan* meets FEMA's repetitive loss planning criteria).

There are 11 repetitive loss properties in Randolph County municipalities and the unincorporated areas. Some properties on the list might have been acquired after the 1993 flood. All eleven addresses should be visited to determine any appropriated flood mitigation alternatives.

Transportation: Additional HAZUS results are shown in Table 2-12, including those for transportation systems. HAZUS estimates 125 road bridges and six railway bridges in the 100-

year floodplain. The impact of the Chester Bridge being closed during a flood event is significant but difficult to place a dollar value with the loss. Seven port facilities were also found to be in the floodplain.

Critical facilities: Critical facilities that could be impacted by flooding are, of course, located in the floodplain. Mapping of critical facilities is planned for Randolph County when the County has its GIS system assembled. Table 2-12 provides the HAZUS results for critical facilities. HAZUS shows three police stations and one fire station within the 100-year floodplain, but HAZUS's default data was not updated to the recent FEMA map change that removes the Prairie du Rocher police station and fire station from the 100-year floodplain.

Also, HAZUS identified three water treatment plants (WTP) and six wastewater treatment plants (WWTP) in the floodplain. No utility facilities were identified in the floodplain by HAZUS.

Economic Impact: Flood damage to businesses is difficult to estimate. Businesses that are disrupted by floods often have to be closed. They lose their inventories, customers cannot reach them, and employees are often busy protecting or cleaning up their flooded homes. It is worth noting that business can be disrupted regardless of the business being located in the floodplain. Many businesses around the County have been impacted by flooding, but there is insufficient data to determine a dollar impact.

Impact on taxes: As with flooded roads, public expenditures on flood fighting, sandbags, fire department calls, clean-up and repairs to damaged public property affect all residents of the County, not just those in the floodplain.

Trends: Flood problems can increase if floodprone areas are developed without accounting for the hazard. Chapter 4 discusses activities that can help ensure that new development does not aggravate existing flooding and create flood problems.

Table 2-11 HAZUS Assessment for a 100-year Flood Risk in Randolph County – by Building Type

Exposure (100 Year Event)								
	Building Exposure (x$1000)							
	Population	Residential	Commercial	Industrial	Agriculture	Religion	Government	Education
	1,920	88,825.40	6,584.50	1,305.50	521.5	993.5	0	0
	Content Exposure (x$1000)							
	Population	Residential	Commercial	Industrial	Agriculture	Religion	Government	Education
	1,920	44,416.40	6,823.40	1,801.10	521.5	993.5	0	0
	Building Count							
		Residential	Commercial	Industrial	Agriculture	Religion	Government	Education
		725	3	1	0	1	0	0

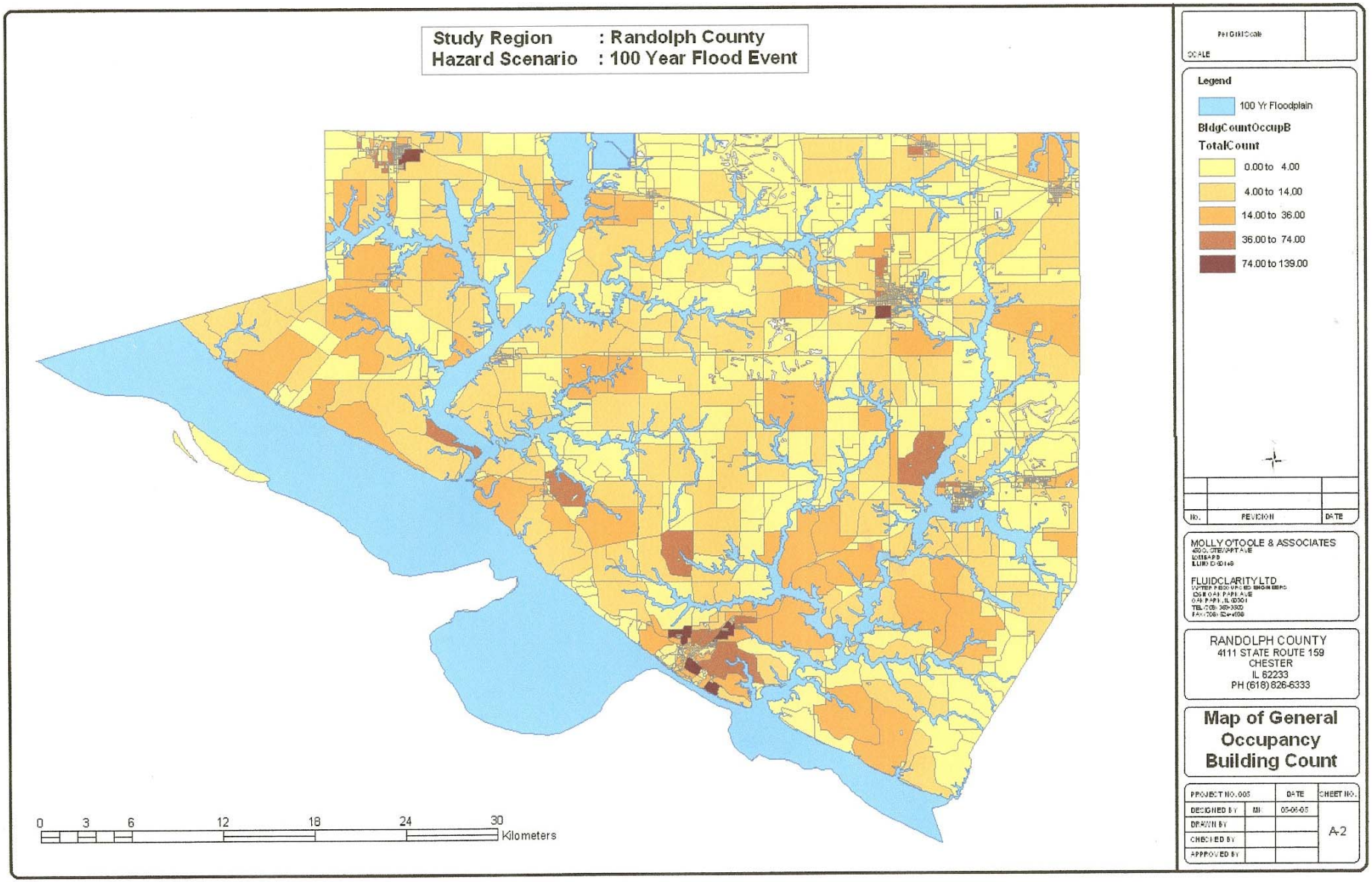
Loss Estimate (100 Year Event)								
	Building Loss (x$1000)							
Building Structure		Residential	Commercial	Industrial	Agriculture	Religion	Government	Education
		2,285.60	1,455.10	403.4	113.1	200	0	0
	Content Loss (x$1000)							
Building Contents		Residential	Commercial	Industrial	Agriculture	Religion	Government	Education
		4,441.20	1,154.80	184.1	92.4	160.3	0	0

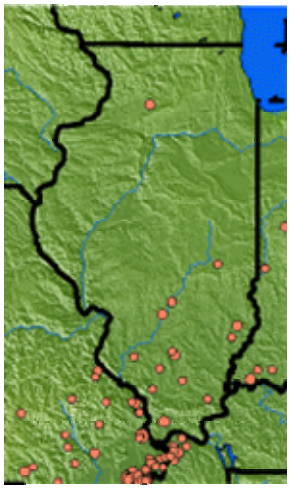
Table 2-12 HAZUS Assessment for a 100-year Flood Risk in Randolph County – By Facility Type

100 Year Flood Exposure	Number of Facilities									
	Transportation Systems				Utility Systems					
	Highway Bridges	Railway Bridges	Airports	Port Facilities	WTP	WWTP	Oil Facilities	Natural Gas Facilities	Electric Power Facilities	Communication Facilities
	125	6	0	7	3	6	0	0	0	0

100 Year Flood Exposure						Number of Critical Infrastructures				
	Category of Critical Facilities					Medical Care Facilities	Fire Stations*	Police Stations*	Emergency Response Centers	Schools
						0	0	2	0	5

* Modified after HAZUS computer assessment.


Study Region : Randolph County
Hazard Scenario : 100 Year Flood Event
Per Grid Scale
SCALE
Legend
100 Yr Floodplain
BldgCountOccupB
TotalCount
0.00 to 4.00
4.00 to 14.00
14.00 to 36.00
36.00 to 74.00
74.00 to 139.00
No.
REVISION
DATE
MOLLY O'TOOLE & ASSOCIATES
FLUIDCLARITY LTD
RANDOLPH COUNTY
4111 STATE ROUTE 159
CHESTER
IL 62233
PH (618) 826-6333
Map of General Occupancy Building Count
PROJECT NO. 005
DATE
SHEET NO.
DESIGNED BY
DRAWN BY
CHECKED BY
APPROVED BY
05-06-05
A-2
0 3 6 12 18 24 30
Kilometers



2.2.2 Earthquakes

Hazard Assessment

Earthquakes are one of nature's most damaging hazards. Earthquakes, and the potential damage from earthquakes, are more widespread than people realize. Earthquakes are caused by the release of strain between or within the Earth's tectonic plates. The severity of an earthquake depends on the amount of strain, or energy, that is released along a fault or at the epicenter of an earthquake. The energy released by an earthquake is sent to the earth's surface and released.

There are several common measures of earthquakes, including the Richter Scale and the Modified Mercalli Intensity (MMI) scale. The Richter Scale is a measurement of the magnitude, or the amount of energy released by an earthquake. Magnitude is measured by seismographs. The Modified Mercalli Intensity is an observed measurement of the earthquake's intensity felt at the earth's surface. The MMI varies, depending on the observer's location to the earthquake's epicenter.

An earthquake's intensity depends on the geologic makeup of the area and the stability of underlying soils. The effects of earthquakes can be localized near its epicenter or felt significant distances away. For example, a 6.8-magnitude earthquake in the New Madrid Fault in Missouri would have a much wider impact than a comparable event on the California Coast. The thick sandstone and limestone strata of the central United States behave as "conductors" of the earthquake's energy, and tremors can be felt hundreds of miles away. By contrast, the geology of the West Coast allows the energy to be dissipated relatively quickly which keeps the affects of the earthquake more localized.

USGS Earthquake Hazards Program
http://earthquake.usgs.gov/

Earthquakes can trigger other types of ground failures which could contribute to the damage. These include landslides, dam failures, and liquefaction. In the last 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.

The Modified Mercalli and Richter Scales are compared in the table on page 2-27, but it is important to note that the Mercalli Intensity varies based on the observer's proximity to the epicenter. Using the example of a 6.8-magnitude earthquake event at the New Madrid Fault, the intensity in St. Louis may be "IX", but in Chicago the intensity may be observed as a "VI."

Measuring Earthquakes:

For many years, the Richter Scale was the most common and familiar earthquake magnitude scale. As recording instruments have become increasingly sophisticated, more accurate calculations have evolved to determine magnitude. Today, the Richter Scale is seldom used, and scientists prefer to designate any given earthquake with just the word "magnitude," which can represent a number of different scales used in the calculation process.

There are two important things to remember about earthquake magnitude:

- The size of an earthquake increases by a factor of 10 as magnitude increases by one whole number. So, a magnitude 6.0 earthquake is 10 times larger than a 5.0; a magnitude 7.0 is 100 times larger, and a magnitude 8.0 is 1,000 times larger than a 5.0.
- The amount of energy released, however, increases by a factor of about 32. Looking at the same magnitudes, a magnitude 6.0 earthquake releases 32 times more energy than a magnitude 5.0; a 7.0 releases about 1,000 times more energy, and a magnitude 8.0 releases about 32,000 times more energy than a 5.0. It is easy to see why magnitude 7.0 and 8.0 earthquakes cause such widespread damage and destruction.

From these numbers it can also be observed that even when a fault produces many small earthquakes, there is simply not enough energy released to prevent a large one. A fault would have to have 1,000 4.0 earthquakes to prevent the occurrence of one 6.0 earthquake, or a million 4.0 events to prevent a single 8.0 earthquake.

Historical events: In the United States, the most frequent reports of earthquakes come from the West Coast, but the largest earthquakes felt in the U.S. occurred in Missouri in 1811 and 1812 along the New Madrid Fault. 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.

Table 2-13 Recent Earthquakes Felt in Illinois

Richter	Date	Epicenter
5.0	May 10, 1987	Near Lawrenceville IL
4.5	Sep. 28, 1989	15 miles south of Cairo, IL
4.7	Apr. 27, 1989	15 miles SW of Caruthersville, MO
4.6	Sep. 26, 1990	10 miles south of Cape Girardeau, MO
4.6	May 3, 1991	10 miles west of New Madrid, MO
4.2	Feb. 5, 1994	Lick Creek-Goreville Area
Source: Illinois Hazard Mitigation Plan 2000		

Five of these quakes were larger than a magnitude of 8.0 on the Richter Scale, which totally destroyed the town of New Madrid. The earthquakes caused the land to roll in visible waves that raised and sank 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.

There was a report of a quake at Fort Dearborn (Chicago) in August 1804. On October 31, 1895 an earthquake near Charlestown, Missouri measured 6.2 on the Richter Scale and caused damage up to level IX on the MMI Scale.

Magnitude	Mercalli Intensity	Abbreviated Modified Mercalli Intensity Scale
1.0 to 2.9	I	Not felt except by a very few under especially favorable conditions.
3.0 to 3.9	II	Felt only by a few persons at rest, especially on upper floors of buildings.
	III	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
4.0 to 4.9	IV	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
	V	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
5.0 to 5.9	VI	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
	VII	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
6.0 to 6.9	VIII	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
	IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
7.0 and higher	X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
	XI	Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
	XII	Damage total. Lines of sight and level are distorted. Objects thrown into the air.

*Typical Maximum Modified Mercalli Intensity – at epicenter

Frequency: About 200 earthquakes happen each year in the New Madrid seismic zone, but most are too small to be felt by people. The larger ones are listed in Table 2-13. None of these caused much damage in the affected areas of the state.

Although it is estimated that the earthquakes of 1811 and 1812 are likely to occur once every 500 to 600 years, it is still likely that a damaging earthquake (6.0 to 7.6 on the Richter Scale) is likely to occur in this lifetime. Table 2-14 shows the estimated probability of damaging earthquakes in Illinois.

Table 2-14 Probability of Earthquake Events in The New Madrid Seismic Zone

Richter	Year 2000	Year 2035
6.3	40% - 63%	86% - 97%
7.6	5.4% - 8.7%	19% - 29%
8.3	0.3% - 1.0%	2.7% - 4.0%

Source: Illinois State Geological Survey

The New Madrid Fault

The New Madrid seismic zone (NMSZ) extends more than 120 miles southward from Cairo, Illinois, at the junction of the Mississippi and Ohio rivers, into Arkansas and parts of Kentucky and Tennessee. It roughly follows Interstate 55 through Blytheville down to Marked Tree, Arkansas, crossing four state lines and the Mississippi River in three places as it progresses through some of the richest farmland in the country.

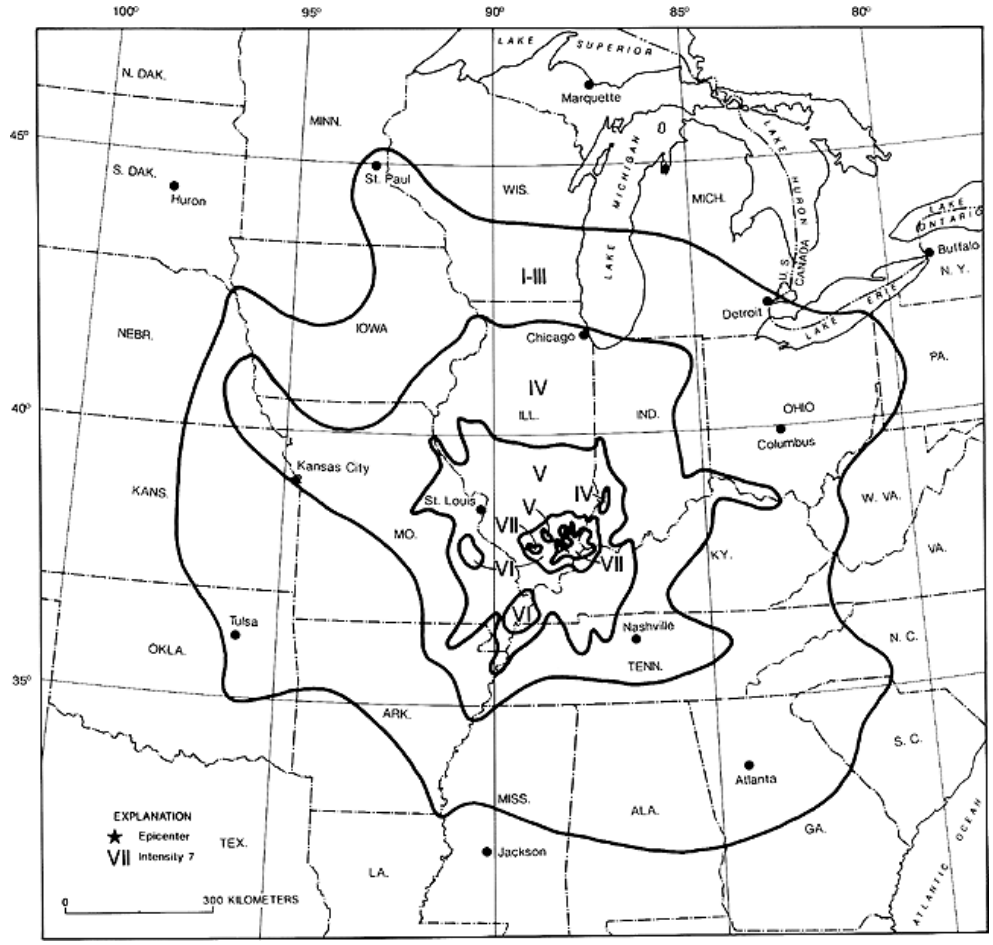
The greatest earthquake risk east of the Rocky Mountains is along the NMSZ. Damaging earthquakes are not as frequent as in California, but when they do occur, the destruction covers more than 15 times the area because of the underlying geology and soil conditions prevalent in the region. The zone is active, averaging about 200 earthquakes per year, though most of them are too small to be felt. With modern seismic networks, the capability to detect earthquakes has greatly increased, and many more very small earthquakes are being detected now than in the past. There is a common misconception that the number of earthquakes has increased over the years, but the increase is due to more sophisticated recording methods that can detect earthquakes that were previously unrecorded. The history of the region tells us, however, that the earthquake risk is the most serious potential disaster we could face.

In the winter of 1811-1812, a series of very large earthquakes occurred along the fault system buried deep within the NMSZ. Using felt information reported in newspapers and from eyewitness accounts of effects, magnitudes have been estimated to be 7.8, 8.0, and 8.1. In addition to the main shocks in December, January, and February, there were more than a thousand aftershocks, some of which were almost as large as the main shocks. The earthquakes were felt throughout the eastern United States and into Canada, ringing church bells as far away as Richmond, Virginia, and Charleston, South Carolina. Closer to home, much of the area was flooded, making it unfit for farming for many years, and most of the building infrastructure in the epicentral region was destroyed. In some areas, land rose or subsided as much as 20 feet, and small waterfalls or rapids were observed on the Mississippi River, causing part of the river to flow backwards for a short time. Seismologists now believe the New Madrid earthquakes represent the greatest known release of seismic energy in the world. As a result of the earthquakes, Congress passed the nation's first disaster assistance bill, offering arable land to farmers in exchange for ruined cropland, the initiation of a federal disaster policy that continues today.

Since 1811 and 1812, two more large earthquakes have occurred in the NMSZ – an estimated magnitude 6.4 near Marked Tree, Arkansas, in 1843, and an estimated magnitude 6.8 near Charleston, Missouri, in 1895. While scientists believe magnitude 8.0 earthquakes are very rare in this area, they are concerned about smaller but potentially damaging earthquakes similar in size to those in 1843 and 1895, which occur more frequently. With the older infrastructure in our region and the relatively unprepared population, even a magnitude 6.0 event could be devastating to people and communities in the epicentral region.

Scientists have also learned that the New Madrid fault system may not be the only fault system in the Central U.S. capable of producing damaging earthquakes. The Wabash Valley fault system in Illinois and Indiana shows evidence of large earthquakes in its geologic history, and there may be other, as yet unidentified, faults that could produce strong earthquakes.

Source: Illinois Emergency Management Agency



November 9, 1968 Earthquake of magnitude 5.3 and an intensity of VII. Intensity felt in Randolph County estimated to be V. *Source: USGS*

This [the November 9, 1968 earthquake] was the strongest felt earthquake in southern Illinois since the 1895 Missouri event. Property damage in the area consisted mainly of fallen bricks from chimneys, broken windows, toppled television aerials, and cracked or fallen plaster. In the epicentral area, near Dale, Hamilton County, MM intensity VII was characterized by downed chimneys, cracked foundations, overturned tombstones, and scattered instances of collapsed parapets.

Most buildings that sustained damage to chimneys were 30 to 50 years old. A large two-story brick house near Dale, Illinois, sustained several thousand dollars damage. About 10 kilometers west of Dale, near Tuckers Corners, a concrete and brick cistern collapsed. A large amount of masonry damage occurred at the City Building at Henderson, Kentucky, 80 kilometers east-southeast of the epicenter. Moderate damage to chimneys and walls occurred in several towns in south-central Illinois, southwest Indiana, and northwest Kentucky

City building near Henderson, KY damaged by the November 9, 1968 earthquake.

Photo by: *The Gleaner Journal*

Safety: Approximately 1,600 people have been killed by earthquakes in the US since colonial times, 1,000 of them were in California and 700 of those were in the 1906 San Francisco quake. "Trauma caused by partial or complete collapse of human-made structures is the overwhelming cause of death and injury in most earthquakes." (*The Public Health Consequences of Disasters, pages 18 – 19.*)

US Earthquakes Deaths since 1970

Year	Location	Richter	Deaths
1971	Los Angeles, CA	6.4	65
1975	Hawaii	7.2	2
1983	Coalinga, CA	6.5	1
1987	Whittier, CA	5.9	8
1989	Loma Prieta, CA	7.1	62
1991	Arcadia, CA	6.0	2
1992	Big Bear Lake, CA	7.4	2
1994	Northridge, CA	6.9	57

Source: Citizen's Guide to Geologic Hazards

Vulnerable buildings, roads, bridges and utility lines and the unpredictability and instantaneous nature of earthquakes can result in enormous losses of life. The table to the right shows the number of deaths from the larger quakes in the United States over the last 30 years. Note that some earthquakes with high Richter ratings, such as the one at Big Bear Lake, have low death counts because they occurred in unpopulated areas.

Because the greatest potential for loss of life is to people within a collapsing building, the threat to Randolph County residents is directly related to the condition of the buildings. This is discussed below under building damage. Other life safety threats include collapsing roads and bridges, flooding from dam breaches, fires from ruptured gas lines, and release of hazardous chemicals from broken storage tanks or trucks.

Health: The main health concerns from earthquakes arise from sheltering people and caring for injuries. These would be the same as other quick and destructive hazards, such as tornadoes.

Building damage: 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:

- Unreinforced masonry structures,
- Older buildings with some degree of deterioration,
- Buildings without foundation ties.
- Multi-story structures with open or "soft" first floors, and

Most building codes have standards related to the first three concerns. This means that the most threatened buildings are older ones (built before current codes), masonry ones, and taller ones with open first floors.

In addition to the building type, damage is related to the underlying soils. Buildings on solid ground fare better, while those on loose or sandy soils will suffer more from shaking. These can be found in floodplains. If there is enough water present, the shaking can liquefy the underlying soils, which removes the support under the foundation.

The threat to buildings in Randolph County is high due to the number of older, unreinforced masonry structures, including residences and downtown buildings.

Critical Facilities: Damage to critical facilities would be similar to damage to other types of buildings. However, sometimes, just a little damage can render the facility useless. Example: a minor shift in a fire station can effectively clamp the doors shut. If the fire trucks cannot get out, the fire department's critical duties cannot be performed.

Economic Impact: The major impact of an earthquake on the local economy is damage to businesses and infrastructure. 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.

Damage to infrastructure and utilities can be very high. Roads and bridges can suffer substantial damage. Subsurface pipes, such as water and gas lines, can break. Water supply dams can be breached. Power poles can fall. While these can all be repaired, it may take a long time depending on how widespread the damage is. The longer it takes, the greater the economic impact and likelihood that some businesses will not recover.

Vulnerability Assessment - Earthquakes

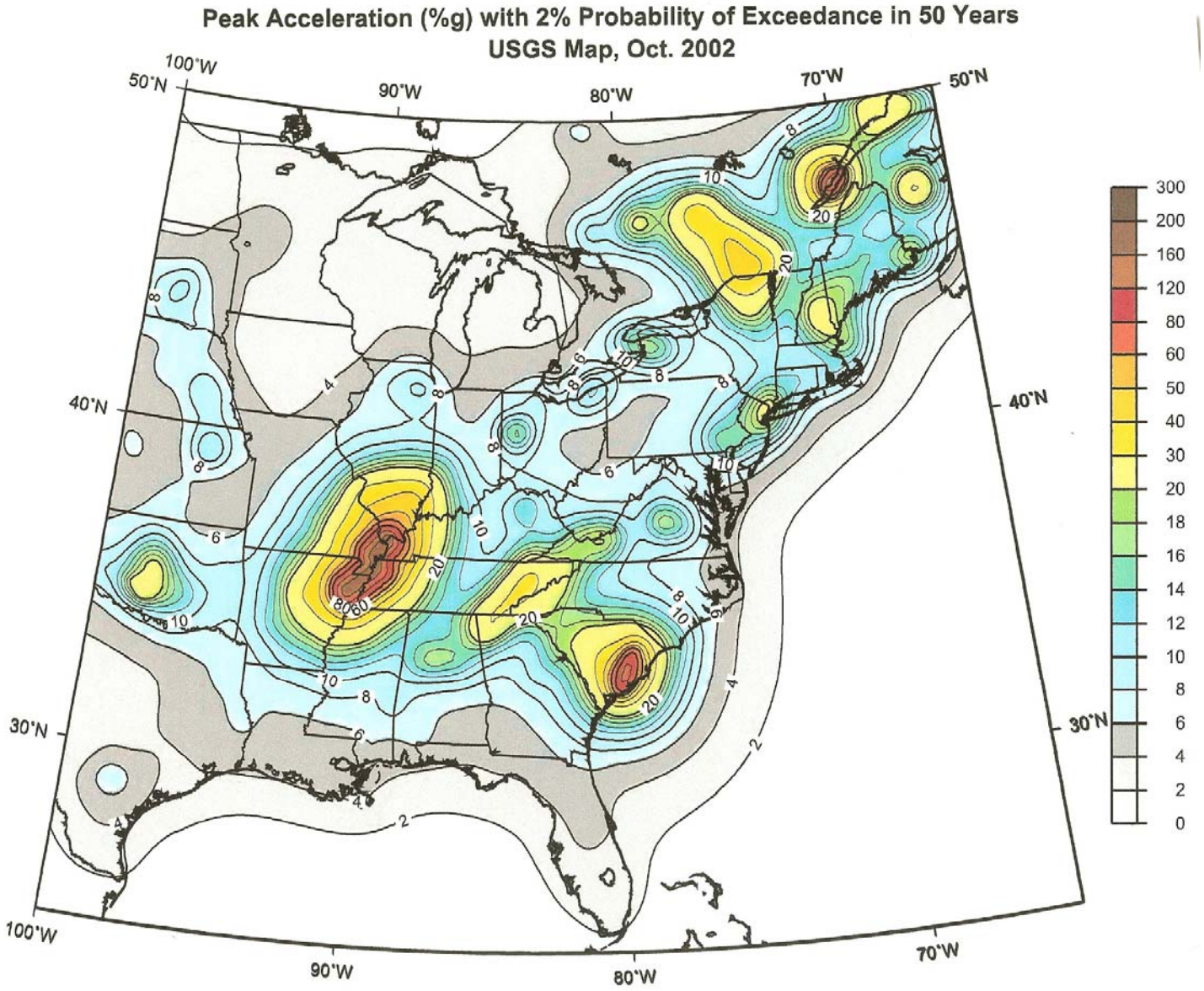
Earthquake Frequencies in the Central United States	
Earthquake Magnitude	Expected Rate (Years)
5	10-12
6	70-90
7	250-500
8	550-1200

The figure on page 2-32, from the USGS website shows the peak acceleration for the eastern United States in a *percent g* (%g). The scenario on the U.S. map is for a 2 percent probability of exceedance in 50 years, which has a return period higher that 750 years. In the figure, Randolph County is predicted to have a peak ground acceleration of approximately 30%g. The figure on page 2-33 is from HAZUS and shows peak ground acceleration as a number value rather that a percent. To compare the U.S. map to the Randolph County map, decimals should be moved to place values. For example, a "g" equal to 0.27 equals "g%" of 27 percent.

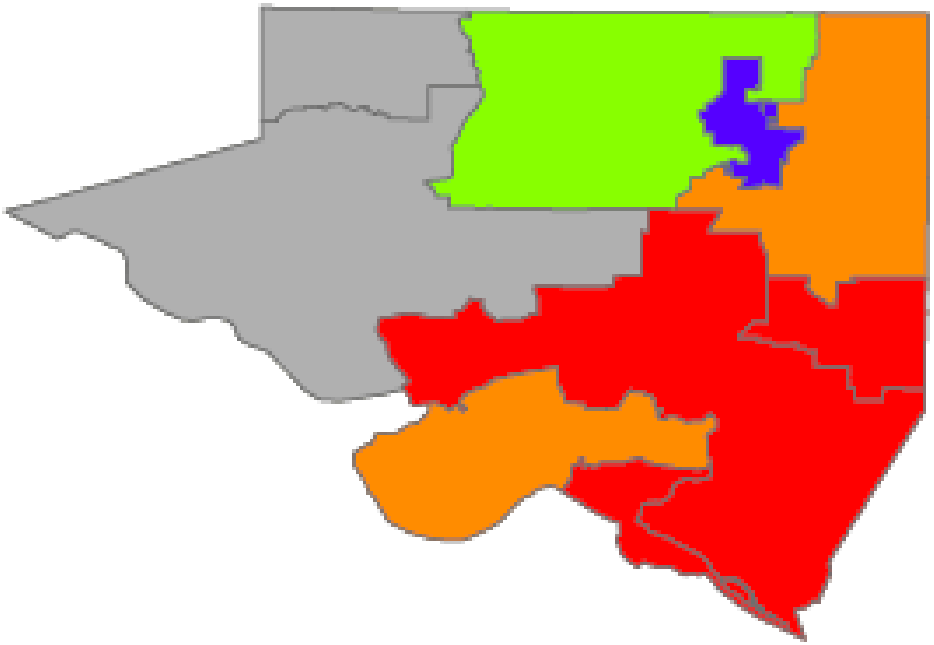
The U.S. and the County map are offered here in order to put the results of the HAZUS model in relative terms to the Central United States region.

HAZUS – Earthquake Model: Earthquakes were analyzed for Randolph County using FEMA's HAZUS-MH Multi-Hazard Loss Estimation Software. The findings of the earthquake scenario are in Appendix C.

The USGS Probabilistic Method was selected in HAZUS to quantify ground shaking. For the vulnerability assessment, the Illinois Emergency Management Agency recommended that Randolph County use the following earthquake scenario: **Earthquake magnitude of 8.0 and a probabilistic return period of 750 years.**


Peak Acceleration (%g) with 2% Probability of Exceedance in 50 Years
USGS Map, Oct. 2002
100°W
90°W
80°W
70°W
50°N
40°N
30°N
300
200
160
120
80
60
50
40
30
20
18
16
14
12
10
8
6
4
2
0

Study Region : Randolph County
Hazard Scenario : Event Moment 8 Return 750+



Legend
eqTract_PGA
PGA
0.27464 - 0.28049
0.28049 - 0.28644
0.28644 - 0.29239
0.29239 - 0.29834
0.29834 - 0.30429
0.30429 - 0.31025

30 15 0 30 Kilometers

N

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Map of peak ground acceleration by census tract

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HAZUS breaks critical facilities into essential (hospitals, medical clinics, schools, police and fire stations, and emergency operation facilities) and high potential loss (HPL) facilities (dams levees, military installations, nuclear power plants and hazardous material sites). The HAZUS model counts the loss of levees or dams, but it does not examine flood losses due to levee or dam failure caused by an earthquake. HAZUS worked with the following Randolph County data for assumptions about the County:

Table 2-15 HAZUS Earthquake Model – Randolph County Data and Determinations
Scenario: Magnitude 8.0 Earthquake with a 750 year Return Period

Factor:	Number:	Details
County Population	33,893	
Number of Households	12,000	
Area of County	597 square miles	
Number of U.S. Census Tracks	9	
Number of Buildings	10,000	
Value of Residential Buildings	$1,466 Million	
Value of Non-Residential Buildings	$252 Million	
Total Building Value	$1,718 Million	
Of Buildings, Percent Wood Frame	62 %	
Of Buildings, Other Than Wood Frame	38%	
Replacement Value of Transportation Lifeline Systems	$1,145 Million	7 Transportation Systems: highway, railways, light rail, bus, ports, ferry, airport
	122	Miles of highways
	136	Bridges
Replacement Value of Utility Lifeline Systems	$1,320 Million	6 Utility Systems: water treatment, wastewater treatment, natural gas, crude & refined oil, electric, communications
	2,764	Miles of pipes
Essential Critical Facilities:	3	Hospitals (514 beds)
	19	Schools
	8	Fire Stations
	9	Police Stations
	0	Emergency Operation Centers
High Potential Loss Facilities (HPL)	31	Dams (2 High Hazard)
	25	HazMat Sites
	0	Military Installations
	0	Nuclear Power Plants

Impact on people: Based on the data in Table 2-15 and U.S. Census data for Randolph County, HAZUS estimated injuries and casualties for the earthquake occurring at different times of the day. The HAZUS results for social impact are summarized in Table 2-16.

Table 2-16 Randolph County Earthquake Social Impact
Scenario: Magnitude 8.0 Earthquake with a 750 year Return Period

If earthquake at:	During:	Number of Injuries:	Number of Fatalities:
2:00 a.m.	Maximum residential use	205	9
2:00 p.m.	Maximum educational, commercial and industrial use	147	7
5:00 p.m.	Peak commute or transportation time	147	7

Since most injuries during an earthquake result from building damage or collapse, it is reasonable to expect the highest level of injuries while people are in their homes, as shown above. The total injuries for the 2:00 p.m. and 5:00 p.m. scenarios are the same, but HAZUS predicts higher injuries at schools at 2:00 p.m., and higher injuries at non-residential places at 5:00 p.m.

HAZUS categorized injuries into three different levels of severity and needed medical attention (see report in Appendix C). From the predicted or expected number of injuries and losses, coupled with a review of potential damage to medical facilities, emergency and medical officials can assess the medical response capability of the County.

HAZUS estimates that 359 households will be displace due to the earthquake.

Damage to buildings: The HAZUS results present the damage to building by their type of use (occupancy) and their building type. HAZUS estimates that about 4,153 thousand buildings will be at least moderately damaged. This is over 38 percent of the total number of buildings in the County. There are an estimated 285 buildings that will be completely destroyed.

Table 2-17 summarizes the building damage expected by HAZUS.

The building damage translates to a total building-related loss of $228 million. Ten percent of that figure accounts for business interruption. Over 77 percent of the building losses come from damage to residential structures.

The model also examined fires following an earthquake, but with limited data, results were quite uncertain and no dollar loss value was generated. For debris generations, HAZUS estimated 171,000 tons of debris, with 55 percent of the debris being brick and wood and 45 percent being concrete and steel. Debris removal would require 6,840 truckloads at 25 tons per truck.

Damage to critical facilities: For this discussion, critical facilities are limited to the definition used in HAZUS – essential facilities and high potential loss (HPL) facilities.

Table 2-17 Randolph County Earthquake
Expected Damage to Essential Critical Facilities
Scenario: Magnitude 8.0 Earthquake with a 750 year Return Period

	Total Number	Least Moderate Damage, less than 50%	Complete Damage, greater than 50%	Number Likely to be Functional on Day 1
Hospitals	3	0	0	3
Schools	19	13	0	6
EOCs	0	0	0	0
Police Stations	9	8	0	1
Fire Stations	8	6	0	2

A map of essential facilities with expected damage levels is provided on page 2-39, Data was not sufficient for HAZUS to make predictions for HPL facilities, (i.e. dams, levees, military installations, nuclear power plants and hazardous material sites).

Table 2-18 Randolph County Earthquake Expected Building Damage
Scenario: Magnitude 8.0 Earthquake with a 750 year Return Period

Expected Building Damage 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	18	0.55	17	0.52	23	0.81	12	1.11	4	1.34
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	6	0.17	4	0.13	6	0.21	2	0.24	1	0.30
Industrial	2	0.07	2	0.06	3	0.09	1	0.12	0	0.14
Other Residential	394	11.67	476	14.33	809	28.68	406	38.75	73	25.7
Religion	3	0.09	3	0.08	3	0.11	2	0.16	1	0.21
Single Family	2,951	87.46	2,817	84.87	1,976	70.10	625	59.62	206	72.2
Total	**3,374**		**3,320**		**2,819**		**1,049**		**285**	

Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	26	0.02	1	0.02	1	0.04	0	0.04	0	0.04
MH*	334	9.90	419	12.64	763	27.07	389	37.04	68	23.72
Precast	4	0.09	2	0.06	4	0.15	4	0.35	1	0.28
RM*	2	0.05	1	0.03	2	0.06	1	0.13	0	0.07
Steel	9	0.04	1	0.04	3	0.11	3	0.29	1	0.25
UM*	390	11.56	434	13.06	588	20.85	367	34.98	188	65.87
Wood	2,610	77.10	2427	73.12	1,410	50.02	262	25.02	24	8.43
Total	**3,374**		**3,320**		**2,819**		**1,049**		**285**	

*Note:
RM Reinforced Masonry
UM Unreinforced Masonry
MH Manufactured Housing

Damage to transportation and utility lifelines: Again, HAZUS divides the lifeline inventory between transportation and utility lifeline systems. There are seven transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six utility systems that include potable water, wastewater, natural gas, crude and refined oil, electric power and communications.

For transportation lifelines, HAZUS predicts that bridges and port facilities will be functional after Day 1 of a disaster. Failure of road segments or rail segments would be due to ground failures. HAZUS could not compute damages because ground failure maps are not available for Randolph County.

For utility lifelines HAZUS predicts one out of four water treatment plants will be operational after Day 1, along with one out of 13 wastewater treatment plants, and the electrical and communication systems. All utilities lines should be restored after Day 7, though it is expected that 395 households out of 12,000 households will still be without electric power.

Table 2-19 Expected Utility System Pipeline Damage
2,764 Total Miles of Pipeline

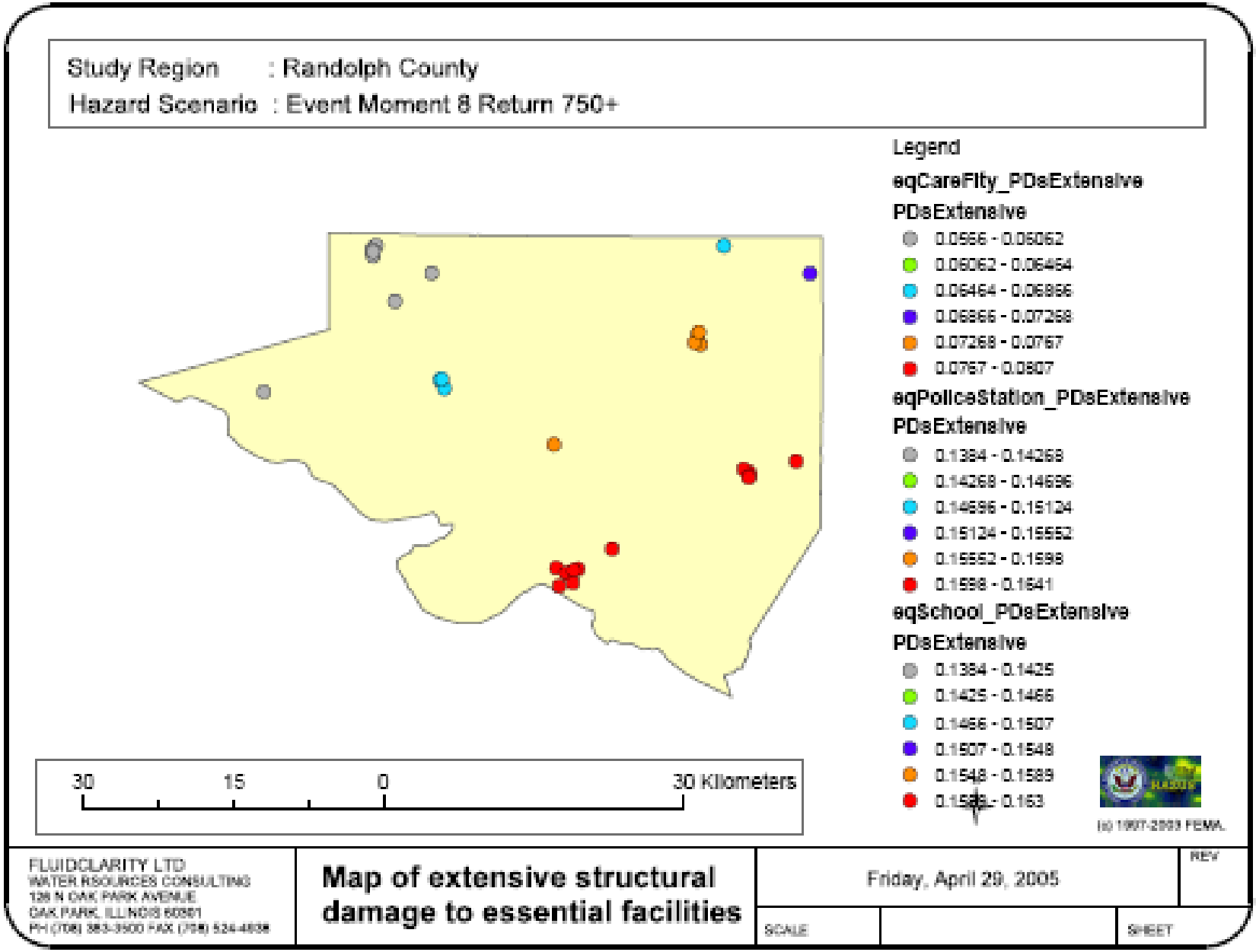
System	Total Pipeline Length (miles)	Number of Leaks	Number of Breaks
Potable Water	1,382	328	82
Wastewater	829	259	65
Natural Gas	553	277	69
Oil	0	0	0

Economic impact: The total economic loss estimated by HAZUS for Randolph County for the 8.0 magnitude earthquake in $397 million. This includes building damage and transportation and utility lifeline damages.

HAZUS did not show damage to agricultural facilities.

Table 2-20 Randolph County Earthquake Summary of Economic Losses
Scenario: Magnitude 8.0 Earthquake with a 750 year Return Period

	Inventory Value	Economic Loss	Percent Loss
Income Losses	---	23 million	---
Building Inventory	1,718 million	228 million	13 %
Transportation System	1,145 million	14 million	1 %
Utility System	1,320 million	155 million	12 %
Totals:	4,183 million	420 million	


Study Region : Randolph County
Hazard Scenario : Event Moment 8 Return 750+
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PDsExtensive
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0.06464 - 0.06866
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0.07268 - 0.0767
0.0767 - 0.0807
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PDsExtensive
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0.1598 - 0.1641
eqSchool_PDsExtensive
PDsExtensive
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30 15 0 30 Kilometers
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Map of extensive structural damage to essential facilities
Friday, April 29, 2005
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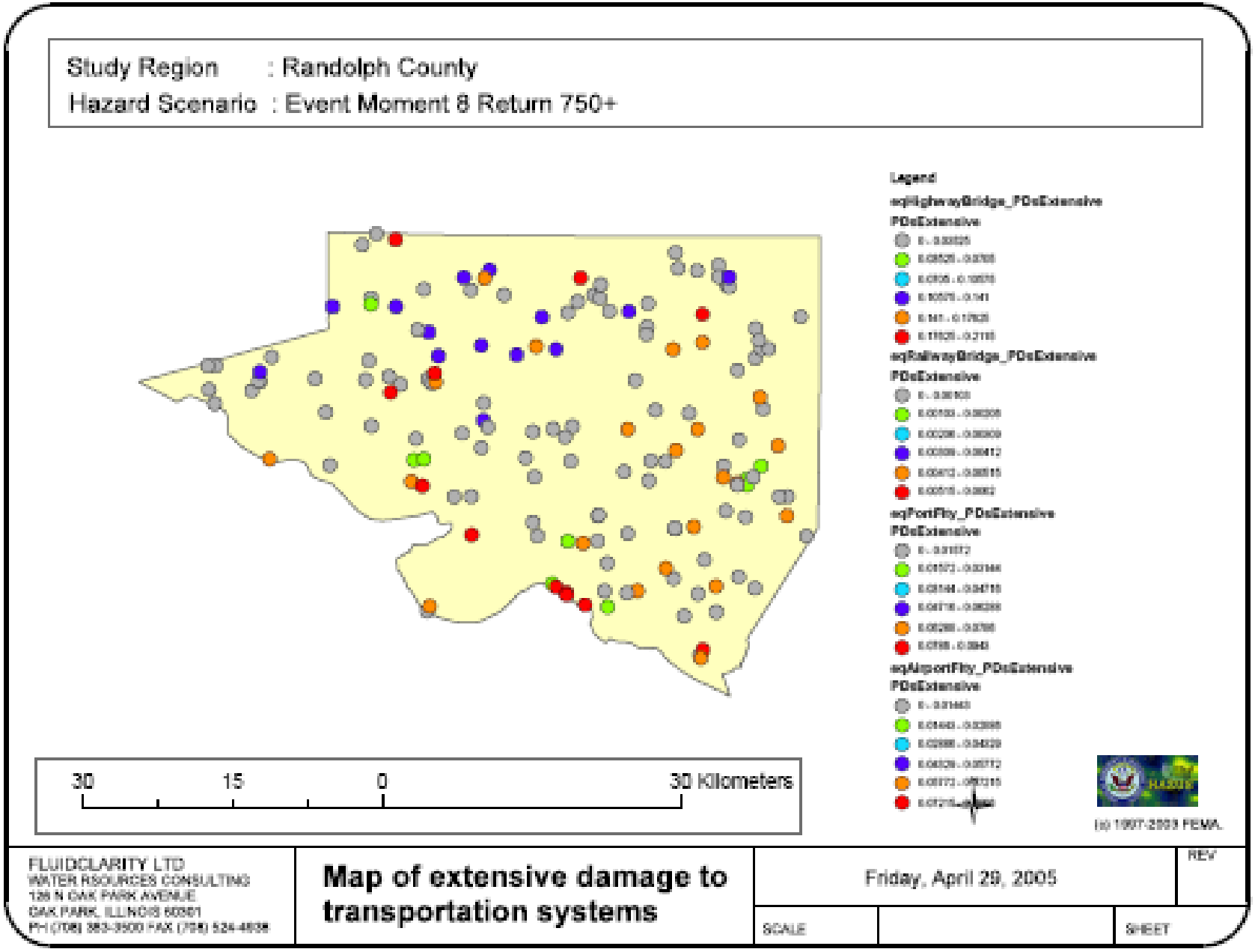
Study Region : Randolph County
Hazard Scenario : Event Moment 8 Return 750+
Legend
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PDsExtensive
eqRailwayBridge_PDsExtensive
PDsExtensive
eqPortFlty_PDsExtensive
PDsExtensive
eqAirportFlty_PDsExtensive
PDsExtensive
30
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30 Kilometers
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OAK PARK, ILLINOIS 60301
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Map of extensive damage to transportation systems
Friday, April 29, 2005
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2.2.3 Winter Storms

Hazard Assessment

The Illinois Emergency Management Agency defines a severe winter storm as a storm that meets one or more of the following criteria:

- A snowstorm that produces six inches or more of snow within 48 hours or less,
- An ice storm in which 10 percent of the cooperative National Weather Service stations in Illinois report glaze, and/or
- A snowstorm or ice storm in which deaths, injuries, or property damage occurs.

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. Then lift in the atmosphere causes the moisture to rise and form clouds of precipitation.

Winter storms in the Midwest are caused by Canadian and Arctic cold fronts that push snow and ice deep into the interior region of the United States. Our area is also subject to lake effect snowstorms that develop from the passage of cold air over the relatively warm surface of Lake Michigan which can cause heavy snowfall and blizzard conditions.

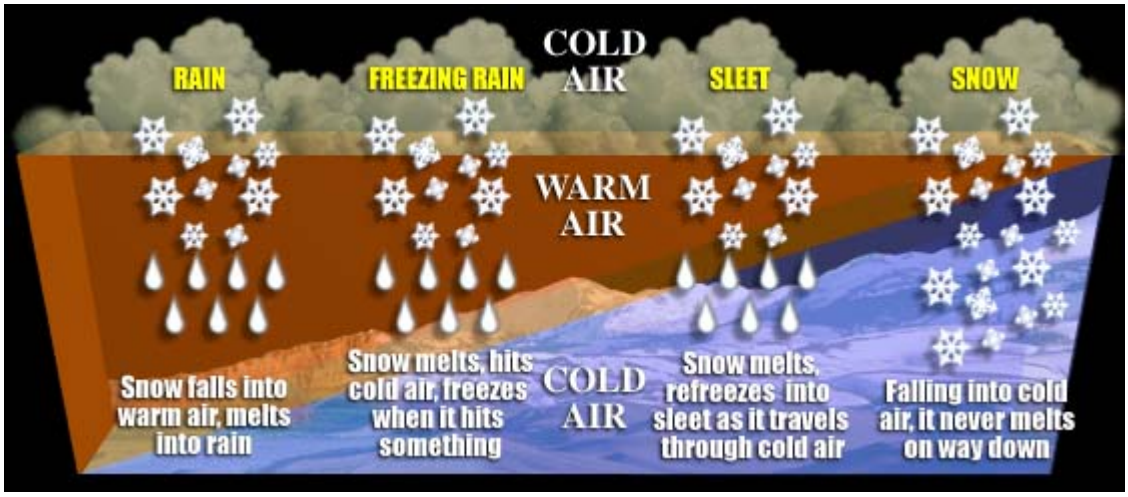
Winter storms can occur as heavy snowfalls, ice storms or extreme cold temperatures. Winter storms can occur as a single event or they can occur in combination which can make an event more severe. For example, a moderate snowfall could create severe conditions if it were followed by freezing rain and subsequent extremely cold temperatures. The aftermath of a winter storm can impact a community or region for weeks, and even months.

Snow: Heavy snowfalls can range from large accumulations of snow over many hours to blizzard conditions with blowing snow that could last several days. The National Weather Service's snow classifications are shown below.

Snow Classifications	
Blizzard	Winds of 35 miles per hour or more with snow and blowing snow reducing visibility to less that ¼ mile for at least 3 hours.
Blowing Snow	Wind-driven snow that reduces visibility. Blowing snow may be falling snow and/or snow on the ground picked up by the wind.
Snow Squalls	Brief, intense snow showers accompanied by strong, gusty winds. Accumulation may be significant.
Snow Showers	Snow falling at varying intensities for brief periods of time. Some accumulation possible.
Snow Flurries	Light snow falling for short duration with little or no accumulation.
Source: National Weather Service	

Ice Storms: An ice storm occurs when freezing rain falls from clouds and freezes immediately upon impact. Freezing rain is found in between sleet and rain. It occurs when the precipitation

falls into a large layer of warm air and does not have time to refreeze in a cold layer (near or below 32°F) before it comes in contact with the surface, which is also near or below 32°F, as illustrated below.



Source: University of Nebraska website, http://hpccsun.unl.edu/nebraska/icestorms.html

Note that ice jam flooding is covered under the flood hazard. It is not related to ice storms, but the break up of frozen rivers in late winter.

Historical Events: The average annual snowfall for Randolph County is 17.5 inches. The largest snowfall over a period of days was recorded on February 3, 1982, with a total of 19 inches. The heaviest 1-day snowfall on record was 13 inches, recorded on March 8, 1978.

Reports on recent winter storms are summarized in Table 2-21. The March 8, 1994 snow event affected nearly all of southern Illinois with 4 to 12 inches of snow. There were numerous car accidents, and damage to aged barn roofs due to the weight of the snow. $500,000 in damage was recorded for this event.

It is likely that damages occurred with each of the listed events, those being car accidents and injuries associated with those accidents.

Table 2-21 Randolph County Recorded Winter Snow Events

Date	Event
March 8, 1994	Heavy Snow
January 8, 1997	Winter Storm
January 12, 1998	Winter Storm
January 22, 1998	Winter Storm
December 21, 1998	Winter Storm
January 1, 1999	Winter Storm
January 13, 1999	Ice Storm
March 13, 1999	Winter Storm
January 28, 2000	Winter Storm
March 11, 2000	Winter Storm
December 13, 2000	Heavy Snow
December 4, 2002	Winter Storm
December 24, 2002	Winter Storm
February 15, 2003	Winter Storm
February 23, 2004	Winter Storm
January 25, 2004	Winter Storm
Source: NCDC	

Vulnerability Assessment – Winter Storms

Frequency: During the 20th century there were at least two severe winter storms in Illinois each year. In an average year, five severe winter storms strike somewhere in the state. Since 1994 when the National Climate Data Center (NCDC) started recording events, Randolph County has been impacted by two to three snow or ice events each winter since 1997. Therefore, the odds of a winter storm hitting Randolph County in any given year are 1:1 or a 100 percent chance.

Safety: Winter storms bring the following two types of safety hazards:

- Weather related hazards, including hazardous driving and walking conditions and heart attacks from 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. The table to the right shows that winter storms have led to more deaths in Illinois than any other natural hazard. Certain populations are especially vulnerable to the cold, including the elderly, the homeless, and lower income families with heating problems.

Winter Storm Deaths
Illinois and United States

	Winter Weather		Cold Related		Total	
	IL	US	IL	US	IL	US
1995		11		22	0	33
1996	1	86	5	62	6	148
1997	10	90	8	51	18	141
1998	2	68		11	2	79
1999	2	41	1	7	3	48
2000	1	33		15	1	48
2001		18		4	0	22
Total	16	347	14	172	30	519

Source: National Weather Service.

Health: About 70 percent of the injuries caused by snow and ice storms result from vehicle accidents and 25 percent occur to people caught out in the storm.

The effect of cold on people is usually made more severe by the impact of wind chill factors. Wind chill is reported as a temperature, but is not the actual temperature. Rather it is how wind and cold feel on exposed skin. As the wind increases, heat is carried away from the body at an accelerated rate, driving down the body temperature.

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.

Injuries Related to Cold

- 50 percent happen to people over 60 years old
- More than 75 percent happen to males
- About 20 percent happen at home

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 mild cases.

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.

Above ground lines are especially susceptible to damage by ice storms. The loss of power has a ripple affect to many other properties.

Source: Matthew Masek, University of Nebraska

Critical Facilities: The major impacts of snow and ice storms on property are to utilities and roads. Power lines and tree limbs are coated with heavy ice resulting in disrupted power and telephone service, often for days. Even small accumulations of ice can be extremely dangerous to motorists and pedestrians. Bridges and over passes are particularly dangerous because they freeze before other surfaces.

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.

Prolonged periods of snow and cold temperatures can be damaging to agriculture. Fruit trees can be damaged by severe cold or ice accumulation, and livestock may freeze or be more susceptible to disease. Rapid melting of heavy snow cover in the spring can flood farmland and delay spring planting.

2.2.4 Tornado

Hazard Assessment

Tornadoes are one of nature's most violent storms. A tornado is a violently rotating column of air extending from a thunderstorm to the ground. The most violent tornadoes are capable of tremendous destruction with wind speeds of 250 mph or more. Damage paths can be in excess of one mile wide and 50 miles long. A majority of tornadoes, however, have wind speeds of 112 mph or less. On page 2-43 is the tornado magnitude scale, the Fujita Tornado Scale, used to categorized tornado events. Often, a tornado isn't classified until the damaged area is inspected to determine the level of damage.

Debris hurled by the wind can hit with enough force to penetrate walls. Tornadoes create localized low-pressure areas that can make a building explode. Windows, chimneys and roofs are the most vulnerable parts of buildings to tornado damage.

Tornadoes can move forward at up to 70 miles per hour, pause, slow down and change directions. Most have a narrow path, less than 100 yards wide and a couple of miles long. However, damage paths can be more than 1 mile wide and 50 miles long.

Fujita Tornado Scale (Magnitude)

F0 Gale tornado 40-72 mph, chimney damage, tree branches broken

F1 Moderate tornado 73-112 mph, mobile homes pushed off foundations or overturned

F2 Significant tornado 113-157 mph, considerable damage, mobile homes demolished, trees uprooted

F3 Severe tornado 158-206 mph, roofs and walls torn down, trains overturned, cars thrown around

F4 Devastating tornado 207-260 mph, well-constructed walls leveled

F5 Incredible tornado 261-318 mph, homes lifted off foundation and carried considerable distances, autos carried as far as 100 meters

Tornadoes are classified as F0 through F5, based on wind speed and damage.

Tornadoes come in all shapes and sizes and can occur anywhere in the U.S. at any time of the year. In the southern states, peak tornado season is March through May, while peak months in the northern states are during the summer months.

In an average year, about 1,000 tornadoes are reported across the United States. Since 1995, deaths due to tornadoes is about 55 per year. Illinois is tied for 7th in the United States with an average of 26 tornadoes per year. A tornado can occur any time of year and at any time of day, though statistics show that over half strike between 3:00 p.m. and 7:00 p.m.

The chart to the right shows the tornado-related fatalities in the United States for the last ten years and where they occurred. The number of people who live in mobile homes is far smaller than the number who live in permanent homes, however they have practically the same number of deaths. The table also shows that the residents in mobile homes are at the greatest risk.

Tornado Fatalities in the United States

Year	Vehicle	Permanent Home	Mobile Home	Other	Total
1995	4	15	8	3	30
1996	2	8	14	1	25
1997	3	38	15	11	67
1998	16	46	64	4	130
1999	6	39	36	13	94
2000	3	6	18	2	29
2002	3	15	17	5	40
2003	-	-	-	-	54
2004	-	-	-	-	34
2005*	-	-	-	-	4
Totals	37	167	172	39	507*

During this period, 15 people were killed in **Illinois**, four in mobile homes and two in vehicles.

* As of March 31, 2005

Source: National Weather Service

Table 2-22 shows the recorded tornado events for Randolph County from 1950 to 2004, as recorded by NOAA's National Climate Data Center. From 1950 to 2004, Randolph County has had four F3 tornadoes; three occurred during the same event in 1957 and the other in 1967. There were no deaths attributed to those F3 events, however there were two injuries. There have been five F2 events. One F1 tornado in 1985 resulted in a death and three injuries in a mobile home part just east Tilden.

Health and safety: Although only one death has been attributed to a tornado in Randolph County (April 5, 1985), the risk of loss of life is still great. The August 1990 twister in Plainfield, Illinois caused 28 deaths. The Utica, Illinois tornado of 2004 killed eight people in one location.

The major health hazard from tornadoes is physical injury from flying debris or being in a collapsed building or mobile home. Based on national statistics for 1970 – 1980, for every person killed by a tornado, 25 people were injured and 1,000 people received some sort of emergency care. The August 1990 twister in Plainfield, Illinois injured 350 people.

Within a building, flying debris or missiles are generally stopped by interior walls. However, if a building has no partitions, any glass, brick or other debris blown into the interior is life threatening. 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.

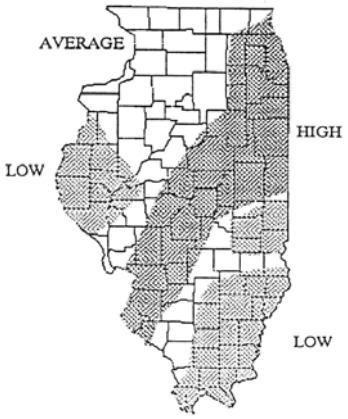
Table 2-22 Tornadoes Recorded in Randolph County
from 1950 to 2004

Date	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
December 2, 1950	F1			$ 25,000	
March 18, 1952	F2			$250,000	
November 15, 1955	F1			0	
December 18, 1957	F3			$ 25,000	
December 18, 1957	F3			$ 250,000	
December 18, 1957	F3			$ 25,000	
April 5, 1958	F0			$ 25,000	
May 3, 1958	F1			$ 25,000	
March 14, 1959	F2		1	$ 25,000	
March 29, 1960	F2			$ 25,000	
April 25, 1960	F1			$ 3,000	
May 16, 1960	F1			$ 25,000	
May 16, 1960	F1			$ 25,000	
March 6, 1961	F2			$ 2,500	
December 21, 1967	F3		2	$ 250,000	
April 5, 1985	F1			$ 2,500	
April 5, 1985	F2	1	3	$ 250,000	
April 28, 1994	F0			$ 500,000	$ 5,000
April 28, 1994	F0			$ 5,000	
April 19, 1996	F0			$ 1,000	$ 5,000
April 19, 1996	F0			$ 5,000	
April 19, 1996	F0			$ 5,000	
April 19, 1996	F0			$ 9,000	
December 23, 1996	F1			---	
October 24, 2001	F1			---	
May 12, 2002	F0			---	
May 6, 2003	F1			---	
May 6, 2003	F0			---	
November 1, 2004	F0			---	
November 1, 2004	F0			---	
	Total:	1	6	$ 6,752,000	$ 10,000

Source: National Oceanic & Atmospheric Administration, National Climate Data Center

Vulnerability Assessment - Tornadoes

Tornado Frequency



Source: Illinois Emergency Management Agency

Frequency: For Randolph County 20 of 30 recorded tornado events, or two-thirds, occurred in March, April and May. The next prominent month is December with four events. No tornadoes were recorded for the summer months. Again, in the southern states, peak tornado season is March through May, while peak months in the northern states are during the summer. Given Randolph County's location in the country, it is still likely that the area expect summer tornadoes. The most recent tornado event in Randolph County was in 2003 when a tornado damaged a home in Chester.

In the 2004 Illinois Natural Hazard Mitigation Plan, Randolph County had 26 of the 1,472 tornadoes recorded in Illinois between 1950 and 1999. This ranks Randolph County 12th in the State for the highest normalized number of tornadoes per 1000 square miles. Randolph County is classified as having a "high" tornado risk based on historic tornado wind speeds and the number of recorded tornadoes per 1,000 square miles.

The map on page 2-46 shows the plotted path of recorded tornadoes in Randolph County from 1950 to 2004. The plot shows tornadoes have struck in almost every community. There also seems to be a particular frequency to tornadoes striking along the path from Chester to Steeleville to Percy.

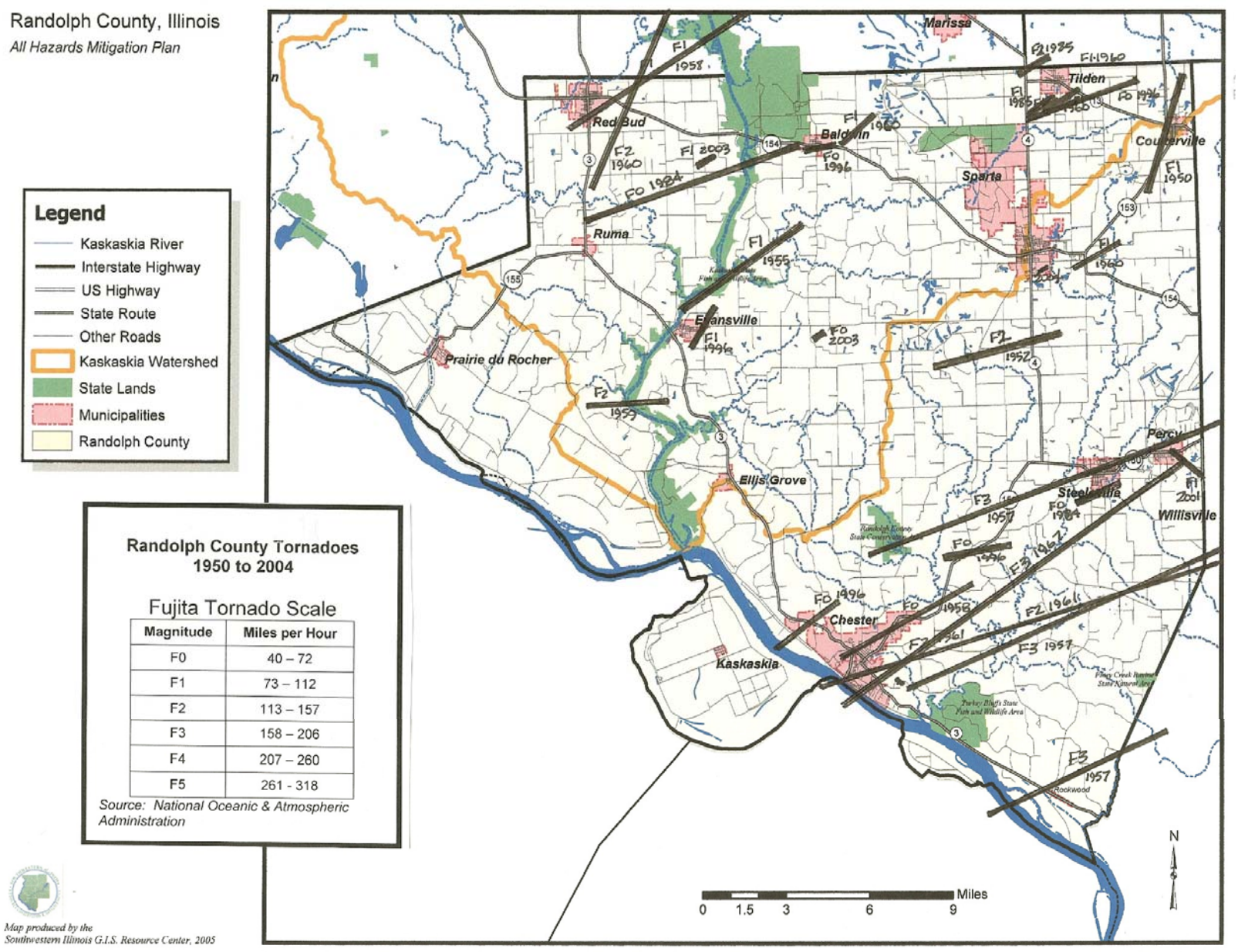
Though there are no official recurrence intervals calculated for tornadoes, with 30 occurrences over 55 years (1950 to 2004), the likelihood of a tornado hitting somewhere in the county is 0.55 (55 percent) in any given year. The width and the length of a tornado's path can vary greatly, but with an assumption that a tornado affects one square mile of land, and there are 595 square miles in Randolph County, the odds of a tornado hitting any particular square mile in the County is 1 in 1,080 each year, or a 0.0009% chance.

Impact on people: Randolph County has lost a life to a tornado and had injuries. Residents living in mobile homes are more vulnerable than people in permanent homes. People can inadvertently put their lives in danger during a tornado, or have little or no warning.

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), and
- 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.


Randolph County, Illinois
All Hazards Mitigation Plan
Legend
Kaskaskia River
Interstate Highway
US Highway
State Route
Other Roads
Kaskaskia Watershed
State Lands
Municipalities
Randolph County
Randolph County Tornadoes
1950 to 2004
Fujita Tornado Scale
Magnitude | Miles per Hour
F0 | 40 – 72
F1 | 73 – 112
F2 | 113 – 157
F3 | 158 – 206
F4 | 207 – 260
F5 | 261 - 318
Source: National Oceanic & Atmospheric Administration
Map produced by the
Southwestern Illinois G.I.S. Resource Center, 2005
Marissa
Tilden
Red Bud
Baldwin
Coulterville
Sparta
Ruma
Evansville
Prairie du Rocher
Ellis Grove
Chester
Kaskaskia
Willisville
Miles
0 1.5 3 6 9
N

In 1999, FEMA conducted an extensive damage survey of residential and non-residential buildings in Oklahoma and Kansas following an outbreak of tornadoes on May 3, 1999, which killed 49 people. The assessment found:

- The failure for many residential structures occurred where the framing wasn't secured to the foundation, or when nails were used as the primary connectors between the roof structure and the walls. A home in Kansas, for example, was lifted from its foundation. The addition of nuts to the foundation anchor bolts (connected to the wood framing) may have been all that was needed to prevent this.
- Roof geometry also played a significant role in a building's performance.
- Failure of garage doors, commercial overhead doors, residential entry doors or large windows caused a significant number of catastrophic building failures.
- Manufactured homes on permanent foundations were found to perform better than those that were not on solid foundation walls.

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

- They have large numbers of people present, either during school or as a storm shelter, and
- 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.

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. At this time, we do not know which critical facilities in Randolph County may have large span structures.

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. Damage to roads and railroads is also localized. If it can't be repaired promptly, alternate transportation routes are usually available. Public expenditures include search and rescue, shelters, 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.

2.2.5 Severe Storms

In this Plan, severe storms are considered to be thunderstorms, microbursts or high wind events, lightning events, and hail storms.

Building damaged by a microburst, July 7, 1994 storm in Aurora

Source: Aurora Emergency Management

Hazard Assessment

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. The biggest threats from thunderstorms are flash flooding and lightning. In most cases, flash flooding occurs in small drainage areas where water quickly accumulates before it drains to the mapped floodplains discussed in section 2.2.1.

Lightning, which occurs during all thunderstorms, can strike anywhere. Generated by the buildup of charged ions in a thundercloud, the discharge of a lightning bolt interacts with the best conducting object or surface on the ground. The air in the channel of a lightning strike reaches temperatures higher than 50,000°F. The rapid heating and cooling of the air near the channel causes a shock wave which produces thunder.

Other threats from thunderstorms include downburst winds, high winds, hail and tornadoes. Downdraft winds occur during the dissipating stage of all thunderstorms. Downburst winds are strong, concentrated, straight-line winds created by falling rain and sinking air that can reach speeds of 125 mph and are often associated with intense thunderstorms. Downbursts may produce damaging winds at the surface.

Microbursts can form from intense thunderstorms. A microburst is a convective downdraft with an affected outflow area of less than 2½ miles wide and peak winds lasting less than 5 minutes. Microbursts may induce dangerous horizontal or vertical wind shears, which can cause property damage (and adversely affect aircraft performance).

Windows and cars are especially vulnerable to hail damage

Source: University of Nebraska website

Hailstones are ice crystals that form within a low-pressure front due to warm air rising rapidly into the upper atmosphere and the subsequent cooling of the air mass. Frozen droplets gradually accumulate on the ice crystals until, having developed sufficient weight, they fall as precipitation. 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.

The National Weather Service classifies a thunderstorm as severe if its winds reach or exceed 58 mph, produces a tornado, or drops surface hail at least 0.75 inch in

diameter. Compared with other atmospheric hazards such as tropical cyclones and winter low pressure systems, individual thunderstorms affect relatively small geographic areas. The average thunderstorm system is approximately 15 miles in diameter (75 square miles) and typically lasts less than 30 minutes at a single location. However, weather monitoring reports indicate that coherent thunderstorm systems can travel intact for distances in excess of 600 miles.

National Weather Service:

Description	Diameter (inches)
Pea	0.25
Marble or Mothball	0.50
Penny or Dime	0.75
Nickel	0.88
Quarter	1.00
Half Dollar	1.25
Walnut or Ping Pong Ball	1.50
Golf Ball	1.75
Hen's Egg	2.00
Tennis Ball	2.50
Baseball	2.75
Tea Cup	3.00
Grapefruit	4.00
Softball	4.50

Safety: The threat to life and the cause of death vary by the type of storm. Between 1995 and 2000, the National Weather Service reported 20 people in Illinois were killed by flash floods, wind, and lightning brought by thunderstorms (see table). Hail rarely causes loss of life. Most deaths can be prevented through safe practices. Much information has come out over the last 20 years about lightning safety, for example, which has reduced the loss of life. Before 1990, an average of 89 people were killed by lightning each year.

Health: No special health problems are attributable to thunderstorms, other than the potential for tetanus and other diseases that arise from injuries and damaged property.

When lightning strikes a human being, death, or at a minimum, serious burns are the common outcomes. For every person killed by lightning, three people are injured. For those who survive, their injuries can lead to permanent disabilities. Seventy percent of the survivors suffer serious, long-term effects, such as memory loss, sleep disorders, depression, and fatigue.

Thunderstorm Deaths, Illinois and United States

	Lightning		Wind		Flash Flood		Total	
	IL	US	IL	US	IL	US	IL	US
1995	1	85	2	38		60	3	183
1996	2	52		23	2	94	4	169
1997	1	42		37		86	1	165
1998		44		41		118	0	203
1999	2	46		29		60	2	135
2000	0	51	1	25	3	29	4	105
2001	5	44	1	17		35	6	96
Total	11	364	4	210	5	482	20	1,056

Deaths from flash floods are also counted in the table on page 2-12.

Source: National Weather Service.

Vulnerability Assessment – Severe Storms

Frequency: The Randolph County area averages 5 thunderstorm events each year with winds in excess of 40 miles per hour. They average an hour in duration. It is estimated that only five storms each year have the hailstorms and high winds to be considered a severe thunderstorm. Assuming the average severe storm affects 100 square miles, the odds of a severe thunderstorm hitting any particular square mile in Randolph County are 1 to 1 or 100 percent.

Flash flood events have occurred in Chester in November 1993 and north of Chester in May 1995, in the southern portion of the County in May 1996, roads near Red Bud in July 2001, and along Route 4 between Tilden and Sparta in June 2003.

Table 2-24 Number of Thunderstorm and High Wind Events in Randolph County
Past 5 Years

Year	Number of Storms	Magnitude	Location
1999	4	52-55 mph	Sparta, Chester, Tilden, Prairie du Rocher
2000	4	51-55 mph	Coulterville, Ruma, Baldwin, Percy
2001	7	40-55 mph	Evansville, Chester, Unicorp. County
2002	6	52-61 mph	Chester, Percy, Ellis Grove, Kaskaskia, Unicorp. County
2003	7	55-65 mph	Prairie du Rocher, Ruma, Baldwin, Percy, Chester. Tilden
2004	4	52 mph	Chester, Red Bud, Sparta

There have been numerous hail events in the County with records dating back to 1961. A plot of hail events is shown on page 2-51. The plot shows that hail events have occurred in all parts of the County. The larger hail events seem to have occurred across the west and northern portions of the County.

Impact on people: Severe summer storms pose a real danger to people's lives. In July 2000, two people were injured near Coulterville due to a lightning storm. While there have only been those two injuries recorded by the NCDC in the years of records for thunderstorms, high winds, lightning and hail, there is still a large risk of injury and death.

Damage to buildings: As with tornadoes, mobile homes are at a high risk for 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.

Table 2-23 Number of Recorded Hail Events in Randolph County
1950 to 2004

	Size of Hail, Inches			
Community	**0.75-0.88**	**1.00-1.5**	**1.75 - 2.75**	**3.00-4.00**
Randolph County	5	2	2	
Baldwin	2	2	2	
Chester	7			1
Coulterville	1		2	
Ellis Grove	1	1		
Evansville	1	3	2	
Kaskaskia				
Percy				
Prairie du Rocher	1	1	2	
Red Bud	1	1	1	
Rockwood				
Ruma	4	2		
Sparta	13	4	3	
Steeleville	2	2		
Tilden	1			
	39	18	14	1

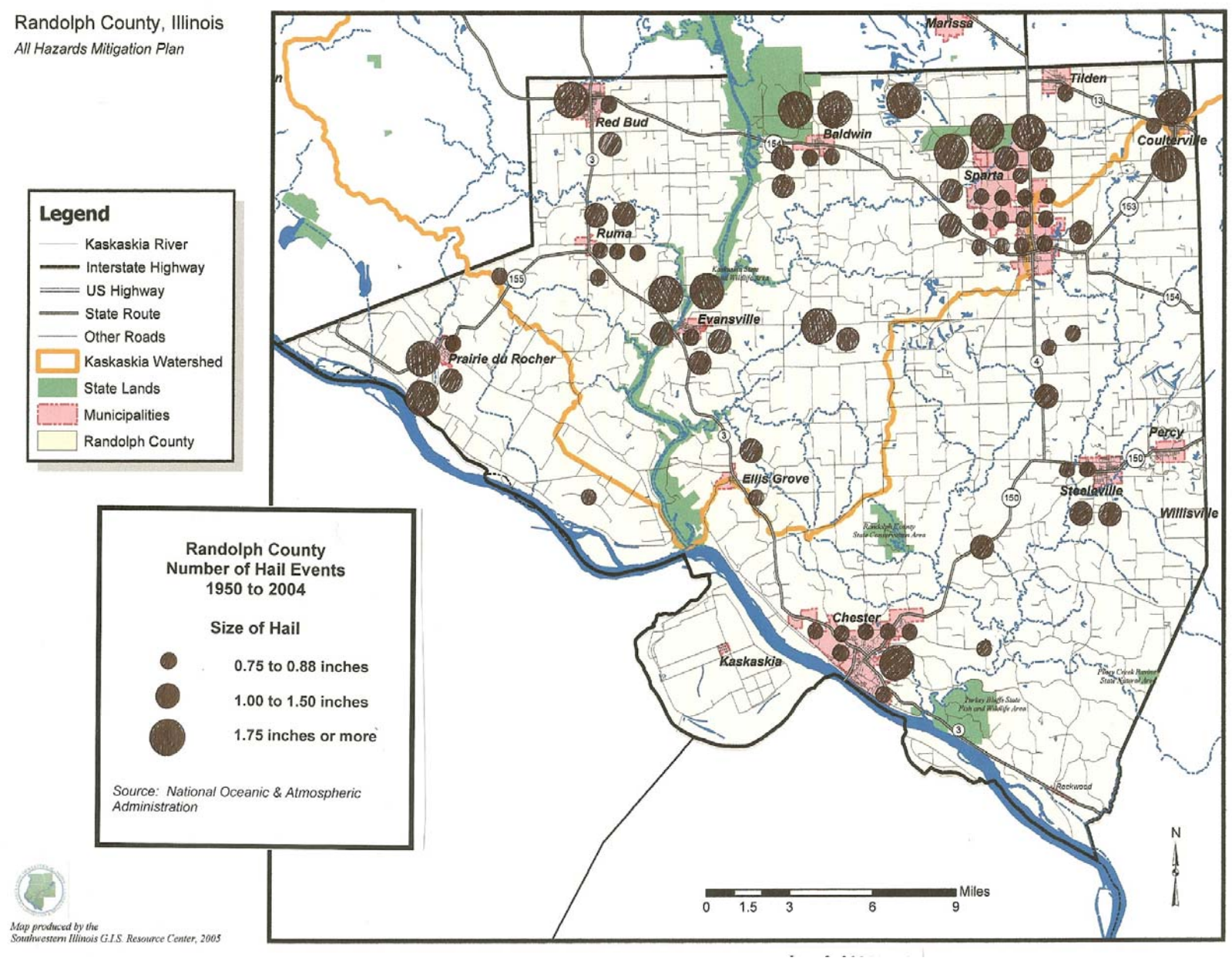
Source: National Oceanic & Atmospheric Administration, National Climate Data Center

Hail can inflict severe damage to roofs, windows and siding, depending on hailstone size and winds. One study of insured losses in St. Louis found that 75 percent of the dollar damage was to roofing, 12 percent to awnings, 6 percent to exterior paint, 4 percent to glass and 3 percent to siding (*Hail Loss Potential in the US*, page 2).

Ellis Grove recalls damage to roofs from a 3-inch hail event in April 1996.

From available data, the following property damage has been recorded:

- Flash flooding (since 1993) $510,000.
- Thunderstorms and high winds (since 1974) $169,000.
- Hail (since 1961) $0, though verbal information of sustained roof damage.


Randolph County, Illinois
All Hazards Mitigation Plan
Legend
Kaskaskia River
Interstate Highway
US Highway
State Route
Other Roads
Kaskaskia Watershed
State Lands
Municipalities
Randolph County
Randolph County
Number of Hail Events
1950 to 2004
Size of Hail
0.75 to 0.88 inches
1.00 to 1.50 inches
1.75 inches or more
Source: National Oceanic & Atmospheric Administration
Marissa
Tilden
Red Bud
Baldwin
Coulterville
Sparta
Ruma
Evansville
Prairie du Rocher
Percy
Ellis Grove
Steeleville
Willisville
Chester
Kaskaskia
Rockwood
N
Miles
0 1.5 3 6 9
Map produced by the
Southwestern Illinois G.I.S. Resource Center, 2005

Damage to 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 not record of critical facilities having incurred any damages due to severe storms.

Economic Impact: Thunderstorms, flash flooding, wind and hail can all destroy crops in the field. Long stemmed vegetation, such as corn and wheat, is particularly vulnerable to hail. Winds greater than 39 miles per hour can damage crops during the growing season. Lightning is one of the major causes of forest fires. Fortunately, these impacts are relatively localized.

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.

2.2.6 Extreme Heat

Hazard Assessment

Extreme heat is when temperatures are 10 degrees, or more, above the average high temperature for the region, and last for several weeks. 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.

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.

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

Heat Exhaustion
A mild form of heat stroke, characterized by faintness, dizziness, and heavy sweating.

Heat Index
The Heat Index (HI) or the "Apparent Temperature" is an accurate measure of how hot it really feels when the Relative Humidity (RH) is added to the actual air temperature.

Heat Lightning
Lightning that occurs at a distance such that thunder is no longer audible.

Heat Stroke
A condition resulting from excessive exposure to intense heat, characterized by high fever, collapse, and sometimes convulsions or coma. Also called sun stroke.

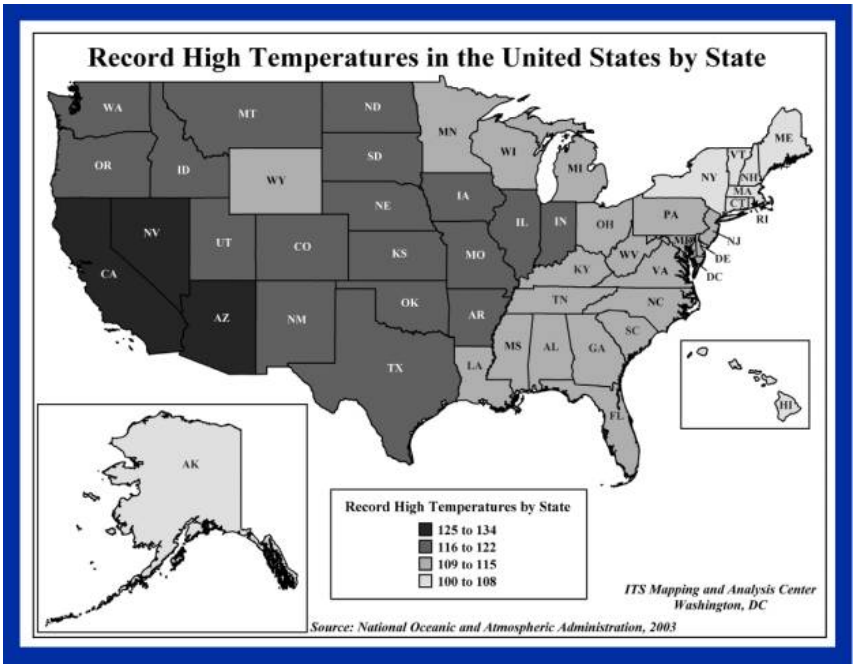
Heat Wave
A period of abnormally and uncomfortably hot and unusually humid weather. Typically a heat wave lasts two or more days.

Source: National Weather Service

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. Livestock can be affected, as well.

Droughts occur when a long period passes without substantial rainfall. A heat wave combined with a drought creates a very dangerous environment. Also, 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.



Vulnerability Assessment

Randolph County, like most areas of the Midwest, is very vulnerable to extreme heat. 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. This effect brings little relief to the area even in the nighttime. With the right precautions, residents of Randolph County should be able to protect themselves against the affects of extreme heat, due to the County being more rural than urban, ,. Table 2-25 shows a trend that Randolph County is subject to at least one heat event each year.

Table 2-25 Randolph County Extreme Heat Events
Last 5 years

Year	Number	Months
1999	1	July
2000	1	July
2001	6	July, August
2002	4	July, August
2003	3	August
2003	1	July

2.2.7 Other Natural Hazards

Other natural hazards that exist in Randolph County are shown in the table on page 2-4, including wildland fire, drought, dam failure, ice jam, landslide due to earthquakes, and sinkholes. As shown in the table (page 2-4), these hazards have a low frequency and a small area of impact. They are, however, hazards that can impact the region. Wildland fire, droughts, and ice jams will not be discussed in detail in this Plan. Available data and resources regarding permitted dams and sinkhole hazards are discussed below for informational purposes. A hazard analysis of these hazards may be performed in future revisions or updates to this Plan.

Sinkholes

The Sinkhole Plain: The Sinkhole Plain is an area of about 1,228 square miles that extends from St. Clair County to Monroe County and to northern Randolph County. The area is roughly bordered by the Kaskaskia and Mississippi Rivers. The Sinkhole Plain is a landscape riddled with underground cracks, crevices, and caves that have formed due to the natural erosion of the geologic limestone formations in the area. The characteristics of the Sinkhole Plain are also called "karst topography." The erosion of the limestone and the formation of cracks is a natural phenomenon that has occurred over thousands of years as water slowly due to trickles through the limestone and dissolves it away. As cracks and crevices are formed, water begins to flow creating springs and underground streams. The water eventually enters the groundwater table.

Soil and other material also enter the cracks, which leads to the development of sinkholes. Illinois Department of Natural Resources (IDNR) reports that "[in] parts of southern St. Clair County and northern Randolph County, sinkholes number 230 per square mile – and estimated 10,000 in all. The larger ones are as much as 25 feet deep."

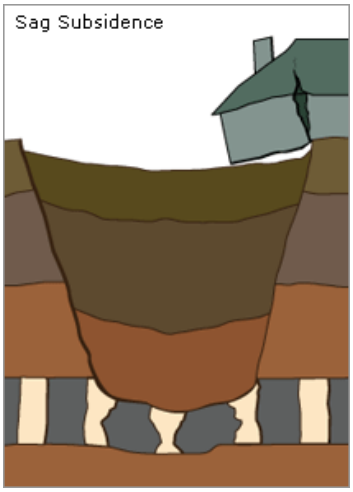
Two hazards associated with the Sinkhole Plain are present for Randolph County. First, new development in the northern portion of the County can be at risk to sinkholes. Second, an IDNR study points out that "the threat of groundwater contamination by pollutants spilled, dumped or stored on the [ground] surface, from septic field discharges, road runoff, and pesticide and fertilizer runoff from farm fields is high."

Mine Subsidence: Coal mining in Randolph County has been extensive with over 10,000 acres of surface mined land and 97 abandoned underground mines. Where mines are, or were, located, subsidence is possible, though statistically it is fairly infrequent.

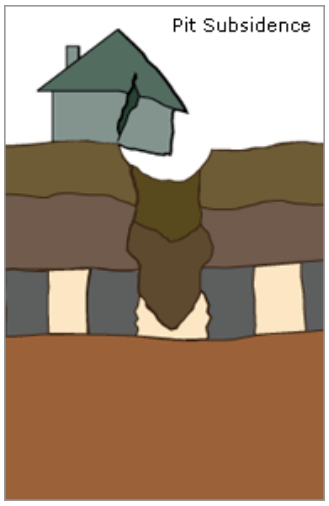
Mine Subsidence Facts

What Is Mine Subsidence?

Mine Subsidence is the sinking or shifting of the ground surface resulting from collapse of an underground mine - most commonly an old coal mine.



Sag subsidence (left), the most common type of mine subsidence, appears as a gentle depression in the ground and can spread over an area as large as several acres. Collapse of pillars supporting the mine roof is a typical cause.



Pit subsidence (right) forms a bell-shaped hole 6-8 feet deep and from 2-40 feet across, and occurs when a shallow mine roof collapses.

Mine subsidence is also affected by three aspects of Illinois geology:

1. 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.
2. 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.
3. 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.

Source: Illinois Mine Subsidence Insurance Fund Website (www.imsif.com)

Dam Failure

Dams are made to hold back large amounts of water. If they fail or are overtopped, they can produce a dangerous flood situation because of the high velocities and large volumes of water released. A break in a dam can occur with little or no warning on clear days when people are not expecting rain, much less a flood. Breaching often occurs within hours after the first visible signs of dam failure, leaving little time for evacuation.

Dam failures are usually caused by either structural problems with the dam or by hydrologic problems. Structural problems include seepage, erosion, cracking, sliding and overturning that are a result of the age of the dam or lack of maintenance. Hydrologic problems typically occur when there is excessive runoff due to heavy precipitation. A dam failure can occur if the dam has to impound (hold back) more water than it was designed to, or if the spillway capacity is inadequate for the amount of water needing to pass downstream.

Table 2-26 IDNR Permitted Dam Classifications in Randolph County

Name:	IDNR Class
Baldwin Plant Cooling Lake Dam	I
Baldwin Plant Cooling Lake Dikes	I
Zeigler-Mine 11-Slurry Pond 3 Dam	I
Randolph County Lake Dam	II
Sparta Old City Reservoir Dam	II
Sparta New City Reservoir Dam	II
Southwestern Community Club Dam	II
Zeigler-Mine 11-Slurry Pond 2 Dam	II
Kaskaskia River Navigation Pool Dam	III
Taphorn Pond Dam	III
Schaffner Lake 1 Dam	III
Shaufler Pond Dam	III
Coulterville City Reservoir Dam	III
Lake Coulterville Dam	III
Birchlers Lake Dam	III
Crescent Club Lake Dam	III
Langford Pond Dam	III
Fort Chartres Sportsman's Club Lake Dam	III
Simpson Pond Dam	III
Zeigler Coal Company Dam	III
Golf Course Lake Dam	III
Site B Dredge Disposal Pond Dam	III
Zeigler-Mine 11-Slurry Pond 1 Dam	III
Behnken Lake Dam	III

Source: Illinois Department of Natural Resources, Office of Water Resources

A dam can suffer a partial failure or a complete failure, but 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.

In Illinois, dams are categorized in one of three classes, according to the degree of threat to life and property in the event of dam failure:

Class I – Dams located where failure has high probability for causing loss of life or substantial economic loss in excess of that which would naturally occur downstream of the dam if the dam had not failed.
Class II – Dams located where failure has moderate probability for causing loss of life or may cause substantial economic loss in excess of that which would naturally occur downstream of the dam if the dam had not failed.
Class III – Dams located where failure has low probability for causing loss of life or minimal economic loss in excess of that which would naturally occur downstream of the dam if the dam had not failed or where there are no permanent structures for human habitation.

The Illinois Department of Natural Resources (IDNR) Dam Safety Section has 24 of Randolph County's dams in its inventory. Other Randolph County dams may not be included in the

inventory primarily because their height was less than 25 feet and less than a 50 acre-foot impounding area.

2.3 Manmade Hazards

As discussed in Section 2.1 of this Chapter, the Planning Committee identified and prioritized manmade hazards that could impact Randolph County. These hazards are discussed briefly in this Plan, and it is the intention of the Committee to include detailed hazard and vulnerability assessments when resources become available.

2.3.1 Utility Disruption

Randolph County, as with every community, relies on the delivery of utilities to residents and businesses. Locations in Randolph County are also providers of utilities to surrounding areas. Utility disruption can occur as a result of a natural hazard, but it can also occur from manmade causes, such as, fires or transportation incidents. The Planning Committee identified utility disruption as a priority manmade hazard with attention given to the following utility sources:

– Electric
– Communications
– Natural Gas

Dynergy Power Plant near Baldwin

Randolph County is home to the Baldwin Energy Complex with is owned by the Dynergy Midwest Generation, Corporation. The Baldwin Plant produces 18 megawatts of electricity per day. The inoperation of the Baldwin Plant would have a significant impact on the region. A natural gas pipeline also travels through Randolph County. The pipeline originates in Texas and continues on to Chicago. Many years ago, a valve along the pipeline failed north of Prairie du Rocher, which created a significant hazard. There are also cellular towers in the County.

2.3.2 Transportation Incident

Transportation incidents are manmade hazards that are difficult to predict. Awareness and preparedness are important for addressing transportation incidents, but there can be certain mitigation opportunities. The Planning Committee separated transportation incidents into the following categories:

- Air
- Rail
- Truck
- Barge

Coal car derailment at Baldwin Plant (derailment and cleanup did not impact residents or businesses), October 2004

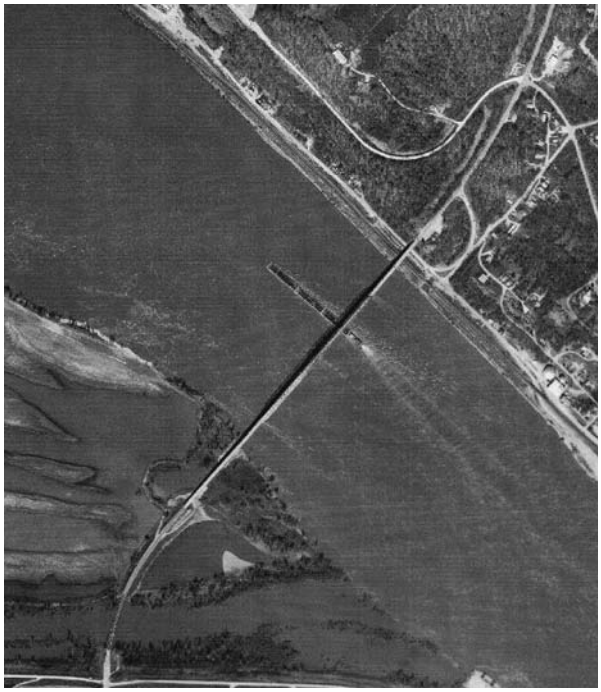
Air transportation incidents are of concern due to the potential for aircraft that could be diverted into Randolph County from the Lambert-St. Louis International Airport. Also, a helicopter crash occurred in northern Randolph County.

There is a significant amount of rail traffic through Randolph County. Much of the rail traffic is in the Mississippi River valley to serve the River's ports. Also, trains are brought in daily, carrying coal, to the Baldwin Plant. In October 2004 coal cars derailed on Dynergy's property. The accident response and cleanup was handled by Dynergy.

Commercial trucks travel through Randolph County. Highways in Randolph County are two lanes, so an accident ona highway could create considerable problems.

A major concern of the Committee's is the Chester Bridge over the Mississippi River. The Chester Bridge is owned by the State of Missouri. Illinois State Route 150 ends at the bridge, and Missouri State Route 51 begins, and includes the bridge. Of concern are the unprotected piers of the bridge. A barge traveling on the Mississippi River could hit the bridge piers and jeopardize the integrity of the bridge. While Randolph County has requested that Missouri address this concern, to date, Missouri has not agreed. Many years ago, after the bridge was reconstructed, it was struck by a tornado and suffered major damage. Therefore, many people in Randolph County question the stability of the structure.

Chester Bridge (Illinois Route 150 and Missouri State Route 51) at the Mississippi River



Chester Bridge – unprotected pier

2.3.3 Radiological Incident

Concern for radiological incidents stems from the transportation of radiological material by rail through Randolph County. Quantities of material and frequency of material being moved through Randolph County is unknown, however the County is aware of the hazards to people and property.

2.4 Summary – Impact of the Hazards

The impacts of the hazards are summarized according to the four major concerns:

- Impact on people (e.g., safety and health),
- Damage to buildings,
- Damage to critical facilities, and
- Economic disruption (damage to businesses and infrastructure).

After the conclusion of the hazard assessments and vulnerability assessments of the priority hazards (listed on page 2-3), the Committee discussed the findings in order to determine the overall impact the hazard has on the County and the communities. The hazards and their impact are shown on page 2-60, "Summary of the Hazards," and they are in order of the overall impact to Randolph County.

The different columns on the table represent the following:

Annual Chance or Frequency: The annual chance column in the table shows the likelihood of occurrence in any given year. These numbers are discussed in the "Frequency" section of each hazard.

Location: The location and area affected by a single occurrence is shown.

Safety: The safety hazard rating for thunderstorms and winter/ice storms is relatively high because each has killed 20 people in Illinois since 1995.

Property damage: The property damage column is a factor of the estimated damage per structure, times the number of structures likely to be damaged by the hazard. A tornado that will destroy 50, $100,000 homes produces $5 million in property damage, the same as a flood that causes $25,000 in damage to 200 homes.

Critical facilities: The types of critical facilities and infrastructure that are affected are listed.

Economic disruption: Typical impacts on businesses and utilities are listed in this column. Overall, we have adequate data on the hazards affecting the County as a whole. However, to measure the impact on individual communities and locations, such as critical facilities, requires additional effort beyond the scope of this county-wide plan. It is recommended that each critical facility be investigated further to determine its vulnerability to damage by the hazards reviewed in this chapter.

Table 2-27 Summary of Randolph County Hazards

Hazard	Annual Chance	Impact Location	Square miles Affected	Safety Hazard	Property Damage	Vulnerable Critical Facilities	Economic Impact
Natural Hazards:							
Floods	1%	Floodplains	(Floodplain)	Medium	Major	Police stations, schools	Businesses, transportation
Earthquakes	< 1%	Countywide	595	Medium	Major	Police and fire stations, schools	Businesses, transportation, safety, utilities
Winter Storms	100%	Countywide	595	Medium	Minor	Power losses, transportation	Health, utilities, livestock
Tornadoes	55%	Countywide	595	High	Major	Schools and buildings with large spaces	Safety, utility lines
	0.0009%	Single Location	1	High	Major	Schools and buildings with large spaces	Safety, utility lines
Severe Storms	100%	Countywide	10	High	Moderate	Power and communication losses	Safety, hail damage to crops, power utilities
Extreme Heat	100%	Countywide	595	High	Minor	Power losses	Health, utilities, livestock
Manmade Hazards:							
Utility Interruption - Electrical	---	Region of County	200	Low	Low	Power stations	Utilities
Utility Interruption - Communications	---	Region of County	200	Low	Low	Communication stations	Utilities
Utility Interruption – Natural Gas	---	Region of County	200	Medium	Low	Pipeline systems	Utilities
Transportation Incident – Air	---	Single Location	1	Medium	Low	Airfields, roads	Transportation
Transportation Incident – Rail	---	Single Location	1	Low	Low	Rails, roads	Transportation
Transportation Incident – Truck	---	Single Location	1	Low	Low	Roads	Transportation
Transportation Incident – Barge	---	Single Location	5	Low	Low	Transportation	Transportation
Radiological Incident	---	Region of County	50	High	Major	Facilities and transportation	Safety, health, livestock, transportation

As a comparison, the State of Illinois Natural Hazards Mitigation Plan, October 2004, summarized Randolph County's hazard risk, as follows:

Illinois Hazard Rating By County
Based on Criteria and Methodology Established at the Illinois Natural Hazard Mitigation Planning Committee Meeting on March 10, 2004

County Name	Population	Severe Storms	Floods	Severe Winter Storms	Drought	Extreme Heat	Earth-quake	Tornado
Randolph	33,893	High	Elevated	High	Guarded	High	High	Elevated

2004 Illinois Natural Hazards Mitigation Plan, October 2004, page 30 and 31.

From a review of Table 2-27 "Summary of the Problem," the assessment of hazards for Randolph County done by the Randolph County Hazard Mitigation Planning Committee is consistent with the assessment shown in the State Plan.

2.5 References

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Chapter 3. Goals

The goals for this planning effort were established by the All Hazards Mitigation Planning Committee over the course of their February and March 2005 meetings. The hazard mitigation goals were developed to reflect on current community priorities, to be consistent with current planning efforts, and in consideration of the impact of each hazard that affects Randolph County. At the February 3, 2005 meeting, the Committee conducted several exercises to outline the goals for this mitigation plan and to develop guidelines for funding and implementation. At the March 3, 2005 meeting, the Committee reviewed the goals and developed guidelines for their implementation. The goals and guidelines presented in this chapter will be the foundation of the Action Plan for this Plan, presented in Chapter 10.

3.1 Community Priorities

The Committee, while working in small groups, was given a handout listing various community priorities listed in alphabetical order. The handout asked: "What are the top five priorities for your community and Randolph County? What do your community leaders hold as most important? Committee members were asked not to answer this from your personal views, but reflect the position of your city council, village board, or County Board."

The exercise was to put people in a frame of mind, thinking about the future of the County, in preparation for the rest of the goal setting exercises. Through discussion and a show of hands, the possible community priorities were ranked as follows:

Priorities given attention by most communities:

- Improve/get more businesses
- Provide a safe place to live and work
- Improve employment opportunities
- Improve/get more housing
- Improve/get more manufacturing facilities
- Improve roads and highways
- Improve/get more recreation facilities

Priorities given attention by more than one community:

- Improve schools and educational programs
- Improve habitat
- Improve water quality
- Preserve farmland

Priorities given attention by at least one community:

- Preserve historic and cultural resources
- Improve air quality
- Improve/get more public transportation opportunities

From the discussion following the exercise, the Committee agreed to give more priority to preserving historic and cultural resources than the voting reflected. Randolph County's historical resources are spread throughout the county, and therefore were not noted as a particular community priority.

3.2 Plan Direction

At the February 2005 meeting, the Committee conducted two more exercises to ask what the plan should focus on, and how mitigation projects should be funded and implemented. The results of these exercises set the direction of the mitigation planning effort.

The first question asked for things that mitigation activities should focus on and why they are important. By a show of hands from all participants, the responses were tallied. The top five activities of what the plan should focus on were clearly:

- Protect people's lives
- Protect public services (fire, police, etc.)
- Protect streets and utilities
- Protect public health
- Protect critical facilities

Additionally, the committee gave importance to:

- Protecting existing buildings
- Protecting future development
- Preserve and protect historic and cultural resources

Next, each group tackled the question, "How should mitigation projects be funded and implemented?" Again, by a show of hands from all participants, the Committee's responses were tallied.

Selected by most communities:

- Make people aware of how they can protect themselves
- Protect life/safety regardless of the cost
- Use county/municipal funds to pay for mitigation activities

Selected by at least three communities:

- Protect critical facilities regardless of the cost
- Make people aware of the hazards they face
- New developments should pay the full cost of protection measures
- Let state/federal agencies take the lead
- Only fund projects where it's proven that benefits exceed the cost

For each of these exercises, the Committee members were given lists of possible responses. The exercises revealed important information to guide the planning effort, both in what was selected

from the list and what was not selected from the list. For example, the plan should focus on life, safety and health issues over the protection of buildings and property.

Also, the cost of mitigation projects that protect critical facilities and life/safety should be borne by the county and municipality, as necessary. However, state and federal agency support is important. The Committee felt that people should be aware of how to help themselves, but the county and municipalities should take an active role in this effort.

3.3 Goals and Guidelines

The exercises from the February 2005 meeting on community priorities and setting directions provided the guidance for establishing goals and guidelines for the planning effort. Goals and guidelines were drafted for the Committee's consideration and discussed at the March 2005 meeting. The Committee reached a consensus that the goals and guidelines for development of the Randolph County All Hazards Mitigation Plan are:

Goal 1. Protect the lives, health, and safety of the citizens of Randolph County from the effects of natural hazards and manmade hazards.

Goal 2. Protect critical facilities and public infrastructure with public funds.

Goal 3. Mitigate to protect against economic and transportation losses due to natural and manmade hazards.

Goal 4. Mitigate potential damage to buildings and structures through efforts that allow property owners to help themselves.

Goal 5. Identify specific projects to mitigate damage where cost-effective and affordable.

Goal 6. Protect historic, cultural, and natural resources from the effects of natural hazards and manmade hazards.

Guideline 1. Focus natural hazards mitigation efforts on floods, earthquakes, winter storms, tornadoes, summer storms, and extreme heat.

Guideline 2. Focus manmade hazard mitigation efforts on utility disruption, transportation related incidents and radiological release incidents.

Guideline 3. Make people aware of the hazards they face and encourage people to assume some responsibility for their own protection.

Guideline 4. New developments should not create new exposures to damage from natural hazards or manmade hazards.

Guideline 5. Local initiatives should focus on protecting citizens and public property.

Guideline 6. Use available local funds, when necessary, in efforts that protect the lives, health, and safety of people from natural and manmade hazards.

Guideline 7. Seek state, and federal support for mitigation initiatives and special projects.

Guideline 8. Strive to improve housing and business opportunities in Randolph County in conjunction with planned mitigation efforts.

A review of the goals and guidelines that emerged are consistent current initiatives. While the County does not have a comprehensive plan, it is the intention of the Committee that the goals and guidelines established in this Plan be considered at such time that the County would develop a comprehensive plan. The goals in this plan are consistent with ordinances, such as floodplain ordinances, adopted by Randolph County and the municipalities.

In summary, the goals of this plan focus on the life, health, and safety issues associated with natural and manmade hazards, and on the importance of people being able to protect themselves and their property from damage.

Chapter 4. Preventive Measures

The objective of preventive mitigation measures is to protect new construction from hazards and see that future development does not increase potential losses for communities. Building, zoning, planning, and/or code enforcement offices usually administer preventive measures. They include the following:

- Building Codes
- Standards for Manufactured Homes
- Planning and Zoning
- Subdivision Regulations
- Open Space Preservation
- Stormwater Management
- Hazard Mapping

4.1 Building Codes

Hazards Addressed	
Y	Flood
Y	Earthquake
Y	Winter storms
Y	Summer Storms
Y	Tornado
	Extreme Heat
	Utility Disruption
	Transportation Incident
	Radiological Incident

Building codes provide one of the best methods of addressing natural hazard mitigation. They are an important measure to protecting new property from damage by earthquakes, tornadoes, high winds, and snow storms. When properly designed and constructed according to code, the average building can withstand the impacts of most of these forces.

Hazard protection standards for all new and improved or repaired buildings can be incorporated into the local building code.
Provisions that should be included are:

- Making sure roofing systems will handle high winds and expected snow loads,
- Providing special standards for tying the roof, walls and foundation together to resist the effects of wind (see illustration),
- Requiring new buildings to have tornado "safe rooms,"
- Including insulation standards that ensure protection from extreme heat and cold as well as energy efficiency,
- Regulating overhanging masonry elements that can fall during an earthquake,
- Ensuring that foundations are strong enough for earth movement and that all

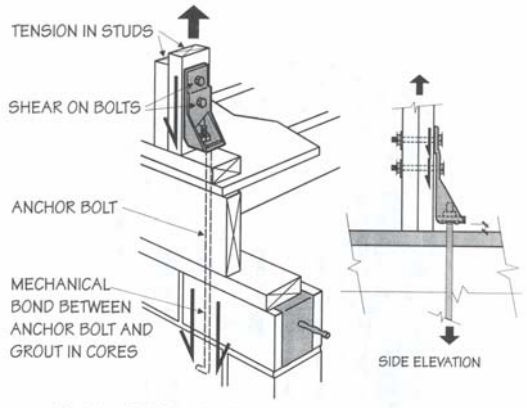


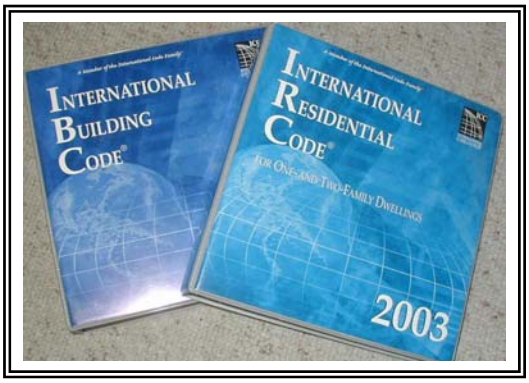
Fig. 14 - TYPICAL TIE-DOWN DETAIL TO FOUNDATION

Both builders and inspectors need to know the details of proper anchoring to protect new buildings from high winds.

Source: *Windstorm Mitigation Manual for Light Frame Construction*, page 95.

structural elements are properly connected to the foundation, and

– Mandating overhead sewers for all new basements to prevent sewer backup.



Model Building Codes: Many communities in Illinois are working with various versions of the National Building Code of the Building Officials and Code Administrators (BOCA) and/or the One and Two Family Dwelling Unit Code published by the Council of American Building Officials (CABO). These standard building codes provide the basis for good building safety programs, especially protection from fire and electrical hazards. However, the BOCA and CABO codes are not "state of the art" when it comes to addressing natural hazards. They are being replaced by the new International Code series.

Tornado standards: After a disaster, FEMA often sends a Building Performance Assistance Team to evaluate how well buildings built to code held up. A recent evaluation of wind and tornado damage concluded that the BOCA and CABO codes should be amended to incorporate wind load standards ASCE 7-95 and 7-98. The new I-codes have already incorporated these standards into their codes.

The Institute for Business and Home Safety (IBHS) has also reviewed the I-Codes with respect to hazards such as hurricanes, floods, hail, and tornadoes. The IBHS recommends that the International Residential Code should be amended to increase design for wind loads to meet hurricane resistant standards, SSTD-10-99.

New construction should also include the construction of an underground shelter or "safe room" at the first floor level to protect the lives of the occupants. A building code could require them in new construction. Tornado safe rooms are discussed further in Section 5.2.3.

Flood standards: The I-Codes have a section on flood protection that communities must adopt separately. These standards are in addition to requirements of the National Flood Insurance Program that are adopted in a community's floodplain ordinance.

Fortified Homes: IBHS has a set of recommendations to strengthen a building to better resist the impacts of natural hazards. The specific requirements for a "Fortified" home are available through the IBHS website at www.ibhs.com. A Fortified Tornado Windstorm Protection Checklist, provided on the website, defines nearly 20 standards, such as the size and depth of anchor bolts and materials of windows and skylights.

IBHS has researched the cost for implementing the Fortified program. The following table shows the increased cost of constructing a "Fortified" home. For less than 10 percent above the cost of the average home, a builder can incorporate all of the recommended criteria for a safer building.

	Standard Home	"Fortified" Home	Incremental Cost
Impact resistant windows and doors	$5,450	$15,500	$10,050
Garage doors	$650	$1,250	$600
Roof decking	$650	$1,750	$1,100
Sealing roof joints	$0	$650	$650
Roof covering	$2,350	$3,350	$1,000
Concrete/steel down pours	$0	$500	$500
Fortified inspection costs	$0	$1,000	$1,000
Total incremental cost			**$14,900**
Percentage of base cost			**9.8%**

Cost of a home meeting the "Fortified" code recommendations

Source: Institute for Business and Home Safety
Note that cost figures are for Florida

Thunderstorm standards: The IBHS also supports stronger codes for roofing standards so they can better resist damage from hail. It recommends that communities adopt the Underwriters Laboratory Standard 2218, to increase the impact resistance of roofing.

Code Administration: Just as important as the code standards is the enforcement of the code. There were many reports of buildings that lost their roofs during Hurricane Andrew because sloppy construction practices did not put enough nails in. Adequate inspections are needed during the course of construction to ensure that the builder understands the requirements and is following them. Making sure a structure is properly anchored requires site inspections at each step.

There is a national program that measures local building code natural hazard protection standards and code administration. The Building Code Effectiveness Grading Schedule (BCEGS) is used by the insurance industry to determine how well new construction is protected from wind, earthquake and other non-flood hazards. It is similar to the 10-year old Community Rating System and the century-old fire insurance rating scheme: building permit programs are reviewed and scored, a class 1 community is the best, and a class 10 community has little or no program.

Code Official Training: A very important part of code enforcement is having code officials who are trained and understand the code requirements. Training of code officials and inspectors is a large part of the BCEGS rating for a community. Courses are offered through the building code associations to help local officials understand standards that apply to seismic, wind and flood hazards.

Local implementation: The table below lists the building codes in use in Randolph County for the communities that have them.

Table 4-1 Building Codes Used in Randolph County

Community	Building Code
Randolph County	---
Baldwin	---
Chester	BOCA
Coulterville	---
Ellis Grove	---
Evansville	BOCA-1993
Kaskaskia	---
Percy	---
Prairie du Rocher	---
Red Bud	---
Rockwood	---
Ruma	---
Sparta	IBC 2003
Steeleville	---
Tilden	---
Schools	BOCA

State property: Construction of state buildings and some other government buildings is exempt from municipal or county regulations. The Illinois Capital Development Board (CDB) is the construction management agency for state projects, such as prisons, college and university classroom buildings, mental health hospitals and state parks.

The CDB recognizes local building codes, but does not require a permit or inspection from the local building department. The agency will soon be adopting the International Codes for its use. The International Code should be applied to the World Shooting Complex planned for Randolph County and being funded by the State.

4.2 Manufactured Homes

Hazards Addressed	
Y	Flood
Y	Earthquake
Y	Winter storms
Y	Summer Storms
Y	Tornado
	Extreme Heat
	Utility Disruption
	Transportation Incident
	Radiological Incident

Manufactured or “mobile” homes are usually not regulated by local building codes. They are built in a factory in another state and are shipped to a site. They do have to meet construction standards set by the US Department of Housing and Urban Development (HUD). All mobile type homes constructed after June 15, 1976 must comply with HUD’s National Manufactured Home Construction and Safety Standards. These standards apply uniformly across the country and it is illegal for a local unit of government to require additional construction requirements. Local jurisdictions may regulate the location to these structures and their on-site installation.

As is well known, the greatest mitigation concern with manufactured housing is protection from damage by wind. The key to local mitigation of wind damage to mobile homes is their installation.

Following tornadoes in Oklahoma and Kansas, FEMA's Building Performance Assistance Team found that newer manufactured housing that had been anchored to permanent foundations performed better. They also found that newer homes are designed to better transmit wind up-lift and overturning forces to the foundation. Unfortunately, they also found that building officials were often unaware of manufacturer's installation guidelines with respect to permanent foundations.

Local implementation: The Illinois Mobile Home Act and Manufactured Home Tiedown Code are enforced by the Illinois Department of Public Health (IDPH). The State code includes equipment and installation standards. Installation must be done in accordance with manufacturers' specifications. There is a voluntary program for installers to be trained and certified.

Following the installation of a manufactured home, installers must send the state a certification that they have complied with the State's tiedown code. Inspections are only done if complaints are made regarding an installation.

Because the state regulates installation of mobile homes and mobile home parks, many local officials believe that they cannot enforce other ordinances. The floodplain ordinances in Randolph County certainly apply to mobile home parks. Also, communities with zoning ordinances in Randolph County have mobile home standards incorporated into them.

In addition to code standards to protect the mobile home from high winds is the need to protect the occupants. There are no state or federal requirements for shelters in mobile home parks.

Mobile school classrooms are structures similar to manufactured homes. They are also regulated by the IDPH, but the school must provide the Bi-County Regional Office of Education with an architect's seal of compliance. Each year, there must be an inspection of the anchoring and a renewed evacuation plan signed by the superintendent of the school district. These provisions provide a higher level of protection than current procedures do for residential mobile homes.

4.3 Planning and Zoning

Building codes provide guidance on how to build in hazardous areas. Planning and zoning activities direct development away from these areas, especially floodplains and wetlands. They do this by designating land uses that are more compatible to the natural conditions of the land, such as open space or recreation. They can also benefit by simply allowing developers more flexibility in arranging improvements on a parcel of land through the planned development approach.

Hazards Addressed	
Y	Flood
Y	Earthquake
Y	Winter storms
Y	Summer Storms
Y	Tornado
	Extreme Heat
	Utility Disruption
	Transportation Incident
	Radiological Incident

Comprehensive Plans: These plans are the primary tools used by communities to address future development. They can reduce future flood related damages by indicating open space or low density development within floodplains and other hazardous areas. Unfortunately, natural hazards are not always emphasized or considered in the specific land use recommendations.

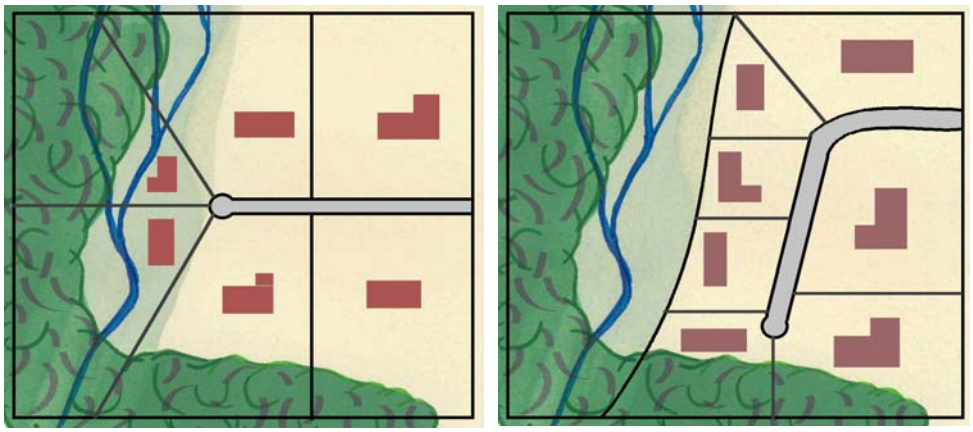
Zoning Regulations: A zoning ordinance regulates development by dividing a community into zones or districts and setting development criteria for each zone or district. Zoning codes are considered the primary tool to implement a comprehensive plan's guidelines for how land should be developed.

A zoning ordinance should designate floodprone lands for agricultural, conservation, or other uses that suffer minimal damage from a flood.

Zoning ordinances usually set minimum lot sizes for each zoning district. Often, developers will produce a standard grid layout, such as that shown in the R-1 district to the right. The ordinance and the community can allow flexibility in lot sizes and location so developers can avoid hazardous areas.

One way to encourage such flexibility is to use the planned unit development (PUD) approach. The PUD approach allows the developer to easily incorporate flood hazard mitigation measures into the project. Open space and/or floodplain preservation can be facilitated and site designs standards and land use densities can be adjusted, as in the example on the next page.

Capital Improvement Plans: A capital improvement plan will guide a community's major public expenditures for the next 5 to 20 years. Capital expenditures may include acquisition of open space within the hazardous areas, extension of public services into hazardous areas, or retrofitting existing public structures to withstand a hazard.



In the standard zoning approach (left), the developer considers six equally-sized lots without regard for the flood hazard. Two properties are subject to flooding and the natural stream is disrupted. An alternative, flexible, approach is shown on the right. The floodplain is dedicated as public open space. There are seven smaller lots, but those abutting the floodplain have the advantage of a larger open area. Four lots have riverfront views instead of two. These amenities compensate for the smaller lot sizes, so the parcels are valued the same.

Local implementation: The table below summarizes the findings of a review of comprehensive and land use plans adopted by the County and the municipalities.

Table 4-2 Randolph County Planning and Land Use Ordinances

Community	Comprehensive Plan	Zoning Ordinance	Subdivision Ordinance
Randolph County	(draft)	Yes/1991	Yes
Baldwin	---	Yes/1978	Yes
Chester	Yes/1965	Yes	Yes
Coulterville	---	---	---
Ellis Grove	---	---	---
Evansville	Riverfront	Yes/1979	Yes
Kaskaskia	---	---	---
Percy	---	--	---
Prairie du Rocher	---	Yes	---
Red Bud	Yes/1992	Yes	Yes
Rockwood	---	---	---
Ruma	---	Yes	---
Sparta	Yes	Yes	Yes
Steeleville	---	Yes	Yes
Tilden	---	County	Yes
Source: Municipal surveys			

4.4 Subdivision Regulations

Hazards Addressed	
Y	Flood
Y	Earthquake
Y	Winter storms
Y	Summer Storms
Y	Tornado
	Extreme Heat
	Utility Disruption
	Transportation Incident
	Radiological Incident

Subdivision regulations govern how land will be subdivided and sets construction standards. These standards generally address roads, sidewalks, utilities, storm sewers and drainageways. They can include the following hazard protection standards:

- Requiring that the final plat show all hazardous areas (as in the example on page 9-4).
- Road standards that allow passage of fire fighting equipment and snow plows
- Requiring power or phone lines to be buried
- Minimum water pressures adequate for fire fighting
- Requiring that each lot be provided with a building site above the flood level
- Requiring that all roadways be no more than one foot below the flood elevation.

Local implementation: The table on the previous page shows the communities in Randolph County that have adopted subdivision regulations.

4.5 Open Space Preservation

Hazards Addressed	
Y	Flood
Y	Earthquake
Y	Winter storms
Y	Summer Storms
Y	Tornado
	Extreme Heat
	Utility Disruption
	Transportation Incident
	Radiological Incident

Keeping the floodplain and other hazardous areas open and free from development is the best approach to preventing damage to new developments. Open space can be maintained in agricultural use or can serve as parks, greenway corridors and golf courses.

Capital improvement plans and comprehensive land use plans can identify areas to be preserved through any or all of the following means:

- Acquisition,
- Dedication by developers,
- Dedicating or purchasing an easement to keep the land open,
- Specifying setbacks or buffer zones where development is not allowed, and
- Subdivision regulations need to ensure that streets and other public facilities can handle emergency vehicles during an emergency.

Kaskaskia River at Evansville – restored open space.

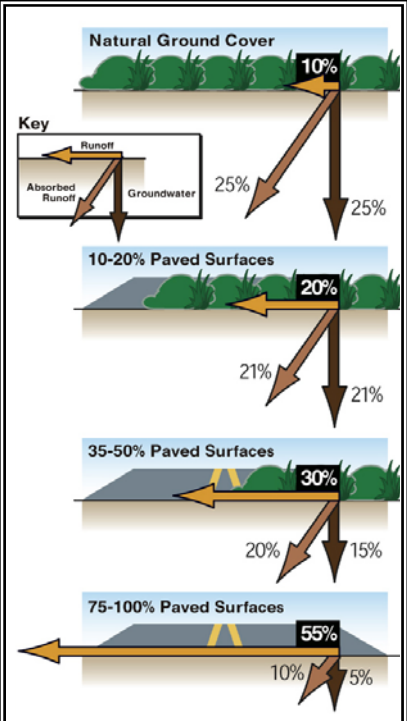
Local implementation: There are two kinds of open space land in Randolph County: lands that are currently open, such as vacant parcels, surface mine areas, and farmland; and lands that are preserved as open space, such as parks and fish and wildlife areas. As further

discussed in Chapter 6, development rights of floodplain portions of farmlands were purchased through IEMA and FEMA grants following the Flood of 1993 in order to maintain them as permanent open space.

4.6 Stormwater Management

Hazards Addressed	
Y	Flood
	Earthquake
Y	Winter storms
Y	Summer Storms
	Tornado
	Extreme Heat
	Utility Disruption
	Transportation Incident
	Radiological Incident

Development in floodplains is development in harm's way. New construction in the floodplain increases the amount of development exposed to damage and can aggravate flooding on neighboring properties.



Increases in impervious surfaces increase watershed runoff. *Source: ASFPM*

Development outside a floodplain can also contribute to flooding problems. Stormwater runoff is increased when natural ground cover is replaced by urban development (see graphic). Development in the watershed that drains to a river can aggravate downstream flooding, overload the community's drainage system, cause erosion, and impair water quality.

Stormwater management encompasses two approaches to protecting new construction from damage by surface water:

- Regulating development in the floodplain to ensure that it will be protected from flooding and that it won't divert floodwaters onto other properties, and
- Regulating all development to ensure that the post-development peak runoff will not be greater than under pre-development conditions.

Most communities participate in the National Flood Insurance Program (NFIP). The NFIP and the Illinois Department of Natural Resources set minimum requirements for regulating development in the floodplain. All new buildings must be protected from the base or 100-year flood and no development can cause an increase in flood heights or velocities.

Stormwater runoff regulations require developers to build retention or detention basins to minimize the increases in the runoff rate caused by impervious surfaces and new drainage systems. Generally, each development must not let stormwater leave at a rate higher than that under pre-development conditions.

Local implementation: The Randolph County and community NFIP ordinances meet or exceed all of the state and NFIP floodplain regulatory requirements.

Having good regulations on the books is one thing, but it is even more important that local officials are properly administering them. Failure to fully enforce the floodplain development regulations is cause for probation or suspension from the NFIP. FEMA and the Illinois Department of Natural Resources (IDNR) periodically visit or contact communities to verify that staff understand and are enforcing the floodplain regulations. According to IDNR, communities were found to be generally okay during recent contacts and visits for administration or enforcement of the floodplain ordinances.

4.7 Hazard Mapping

Hazards Addressed	
Y	Flood
Y	Earthquake
Y	Winter storms
Y	Summer Storms
Y	Tornado
	Extreme Heat
Y	Utility Disruption
	Transportation Incident
Y	Radiological Incident

Mapping of hazards, both the areas impacted and the severity of the hazard, is an important tool and resource for preventing damages from natural and manmade hazards. Communities in the NFIP have the riverine flood hazard mapped on their Flood Insurance Rate Map. However, additional maps of other areas that experience or can potentially flood are very useful.

With the availability of the internet and mapping software tools, both hazards and their potential impact to buildings and infrastructure can be mapped. As communities build GIS mapping capabilities, layers for hazard data can be added as information becomes available.

Local implementation: Currently, Randolph County is developing GIS mapping and hazard layers will be built in the future. For this Plan, Randolph County used the HAZUS program to develop flood maps and critical facility mapping for earthquakes. The Randolph County RC&D has wetland mapping for the County.

4.8 Conclusions

1. Building codes are the prime preventive measure for earthquakes, tornadoes, high winds, and snow storms. The majority of the communities within the County have building codes that will provide some protection of future buildings from these hazards.

2. The County and many communities do not have building codes, or have older building codes, and have not adopted the International Code series, which provides better protection from natural hazards.

3. According to the Institute for Building and Home Safety, the International Residential and Building Codes do not adequately protect new construction from damage by tornadoes and hail.

4. State administration of installation of mobile or manufactured homes does not guarantee that they will be adequately tied down or protected from flooding and other hazards.

5. Comprehensive and land use plans need to address floodplains and the need to preserve these hazardous areas from intensive development.

6. Zoning ordinances should include the identification of natural hazards from available technical information.

7. Zoning ordinances should designate floodprone areas as a special type of land use and reference the community NFIP floodplain ordinance.

8. Standards in subdivision regulations for public facilities should account for the hazards present at the site. New building sites, streets, and water systems should facilitate access and use by fire and emergency equipment.

9. Local permit officials need to be aware of their authorities and current regulatory standards for developments such as the installation of mobile homes.

4.9 Recommendations

1. All communities should adopt the latest International Series of building codes, the new national standard that is being adopted throughout the country, for residential and commercial properties.

2. Communities should be sure that the building codes have adequate natural hazard protection features to strengthen new buildings against damage by earthquakes, high winds, tornadoes and hail.

3. All communities should work to improve code administration and enforcement.

4. Municipal and County code enforcement staff should work to ensure mobile home installation is adequately regulated (so that newly installed mobile homes get the same level of attention as other types of new single-family homes).

5. County and municipal staff should be trained in building code administration and enforcement, and they should be trained on implementing the codes that are applicable to hazard mitigation.

6. On a regional basis, municipal and county staff should develop example subdivision ordinance language that requires new infrastructure to have hazard mitigation provisions, such as:

   a. Streets and water systems that facilitate access and use by fire and emergency equipment.
   b. Buried utility lines.

c. Storm shelters in new mobile home parks.
d. Seismic considerations.

7. Municipal and County comprehensive plans, land use plans and zoning ordinances should incorporate open space provisions that will protect properties from flooding and preserve wetlands and farmland.

8. Offices responsible for design, construction or permitting critical facilities should ensure that the design accounts for natural and manmade hazards and adjacent land uses.

9. The public, developers, builders, and decision makers should be informed about the hazard mitigation benefits of these preventive measures and the procedures that should be followed to ensure that new developments do not create new problems.

10. As part of the County's GIS mapping effort, hazard mapping should be developed on a countywide basis.

4.10 References

1. *Design and Construction Guidance for Community Shelters*, FEMA, 2000.

2. *Guidelines for Installing Manufactured Homes in Illinois*, Illinois Department of Public Health, 2000.

3. *Midwest Tornadoes of 1999, Observations, Recommendations and Technical Guidance*, FEMA, Building Performance Assessment Report, Preliminary Report, July 13, 1999

4. *Multi-Hazard Identification and Risk Assessment*, Federal Emergency Management Agency, 1997.

5. Survey of municipalities and review of ordinances, 2005.

6. *Regulation of Factory Built Structures in Illinois*, Illinois Department of Public Health, 2000.

7. *Subdivision Design in Flood Hazard Areas*, American Planning Association and FEMA, PAS Report 473, 1997.

8. Websites of the Institute for Business and Home Safety (www.ibhs.org) and the Illinois Department of Public Health (www.idph.state.il.us).

9. *Windstorm Mitigation Manual for Light Frame Construction*, Illinois Emergency Management Agency, 1997.

10. Contact with the Illinois Department of Natural Resources, Office of Water Resources in Springfield, Illinois, January through April 2005.

Chapter 5. Property Protection

Property protection mitigation measures are used to modify a building or a property that is subject to a hazard in order to reduce potential damage. Property protection measures fall under three approaches:

- Modify the site to keep the hazard from reaching the building,
- Modify the building so it can withstand the impacts of the hazard, and
- Insure the property to provide financial relief after the damage occurs.

The word "building" can refer to residential, commercial or industrial structures, or it can mean infrastructure facilities (treatment plants, electrical substations, roads) or other public structures.

Property protection measures are normally implemented by the property owner (public or private), although in many cases technical and financial assistance can be provided by a government agency. These are discussed later in this chapter.

5.1 Keeping the Hazard Away

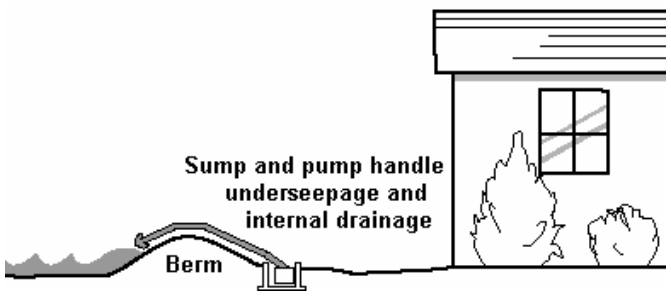
Hazards Addressed	
Y	Flood
	Earthquake
	Winter storms
Y	Summer Storms
	Tornado
	Extreme Heat
	Utility Disruption
	Transportation Incident
	Radiological Incident

For the hazards considered in this plan, flooding is the one hazard that can be kept away from a building. There are four common methods to do this:

- Erect a barrier between the building and the source of flooding,
- Move the building out of the floodprone area
- Elevate the building above the flood level
- Demolish the building.

The advantages and disadvantages to these four methods will be discussed below. Generally, floods do not damage vacant areas. The major impact of hazards is to people and improved property. In some cases, properties can be modified so the hazard does not reach the damage-prone improvements. A fire break is an example of this approach – brush and other fuel are cleared away from the building so a fire may not reach it.

Barriers: A flood protection barrier can be built of dirt or soil ("berm") or concrete or steel ("floodwall"). Berms take up more space that floodwalls,



Small barriers can be effective against shallow flooding.

but floodwalls are more expensive than berms.

Careful design is needed so as not to create flooding or drainage problems on neighboring properties. If the ground is porous and if floodwaters will stay up for more than an hour or two, the design needs to account for leaks, seepage of water underneath, and rainwater that falls inside the perimeter.

Barriers can only be built so high. They can be overtopped by a flood higher than expected. Barriers made of earth are susceptible to erosion from rain and floodwaters if not properly sloped, covered with grass, and maintained. A berm can settle over time, lowering its protection level. A floodwall can crack, weaken, and lose its watertight seal. Therefore, barriers need careful design and maintenance (and insurance on the building, in case of failure).

Relocation: Moving a building to higher ground is the surest and safest way to protect it from flooding. Relocation of a building can be to a new property outside of the floodplain, or, for large lots, to a higher location (outside of the floodplain) on the existing property. While almost any building can be moved, the cost goes up for heavier structures, such as those with exterior brick and stone walls, and for large or irregularly shaped buildings.

Small, wood frame buildings are the easiest to relocate

In areas subject to flash flooding, deep waters, or other high hazard, relocation is often the only safe approach.

Building elevation: Raising a building above the flood level can be almost as effective as moving it out of the floodplain. Water flows under the building, causing little or no damage to the structure or its contents.

Raising a building above the flood level is cheaper than moving it and can be less disruptive to a neighborhood. Elevation has proven to be an acceptable and reasonable means of complying with floodplain regulations that require new, substantially improved, and substantially damaged buildings to be elevated above the base flood elevation.

Home elevated one foot above the base flood elevation.

Elevating a building will change its appearance. If the required amount of elevation is low, the result is similar to putting a building on a 2- or 3-foot-high crawlspace (see example to the left). If the building needs to be raised more than four feet, owners are concerned that it will stick out like a sore thumb, and they may decline to implement an elevation project. Yet, many owners have successfully and attractively (with stairs and landscaping) elevated their homes more than eight feet.

Another problem with this approach is with basements. Only the first floor and higher are elevated. The basement remains as the foundation. All utilities are elevated and the basement is filled in to protect the walls from water pressure. The owner loses the use of the basement, which may deter him or her from trying this approach.

A third problem with elevation is that it may expose the structure to greater impacts from other hazards. If not braced and anchored properly, an elevated building may have less resistance to the shaking of an earthquake and the pressures of high winds. Careful design and construction, however, should prevent these secondary problems.

Demolition: Some buildings, especially heavily damaged or repetitively flooded ones, are not worth the expense to protect them from future damage. It is cheaper to demolish them and either replace them with new, flood protected structures, or relocate the occupants to a safer site. If a home has been heavily damaged and susceptible to future damage, it is safest for owners to relocate. Generally, demolition projects are undertaken by a government agency, so the cost is not borne by the property owner, and the land is converted to public use, such as a park.

Acquisition, followed by demolition, is most appropriate for buildings that are dilapidated and are not worth protecting, but acquisition and demolition should also be considered for structures that would be difficult to move—such as larger, slab foundation, or masonry structures.

One problem that sometimes results from an acquisition and demolition project is a "checkerboard" pattern in which nonadjacent properties are acquired. This can occur when some owners, especially those who have and prefer a waterfront location, are reluctant to leave. Creating such an acquisition pattern in a community adds to the maintenance costs that taxpayers must support.

Evansville acquisition area.

Local implementation: Following the 1993 and the 1995 floods, Evansville with funding from FEMA ($296,000 through the IEMA) acquired 13 properties along the Kaskaskia River and converted them to open space.

Evansville then implemented a redevelopment plan and expanded their municipal boat launch and parking facilities. A map of the redevelopment plan is included on the next page. Acquisitions were also made on Kaskaskia Island following the 1993 flood.

5.2 Retrofitting – Modify the Building

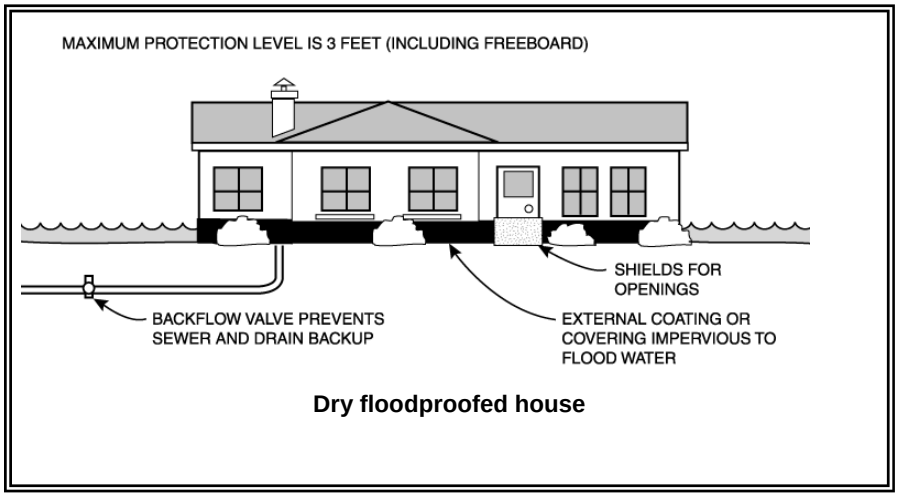
Section 5.1 focused on keeping the hazard from reaching a building or damage-prone part of a property. An alternative is to modify or "retrofit" the site or building to minimize or even prevent damage. There are a variety of techniques to do this. This section looks at the measures that can be implemented to protect existing buildings from damage by floods, sewer backup, earthquakes, tornadoes, summer and winter storms.

5.2.1 Flood Retrofitting - Buildings

Hazards Addressed	
Y	Flood
Y	Earthquake
Y	Winter storms
Y	Summer Storms
Y	Tornado
	Extreme Heat
Y	Utility Disruption
	Transportation Incident
	Radiological Incident

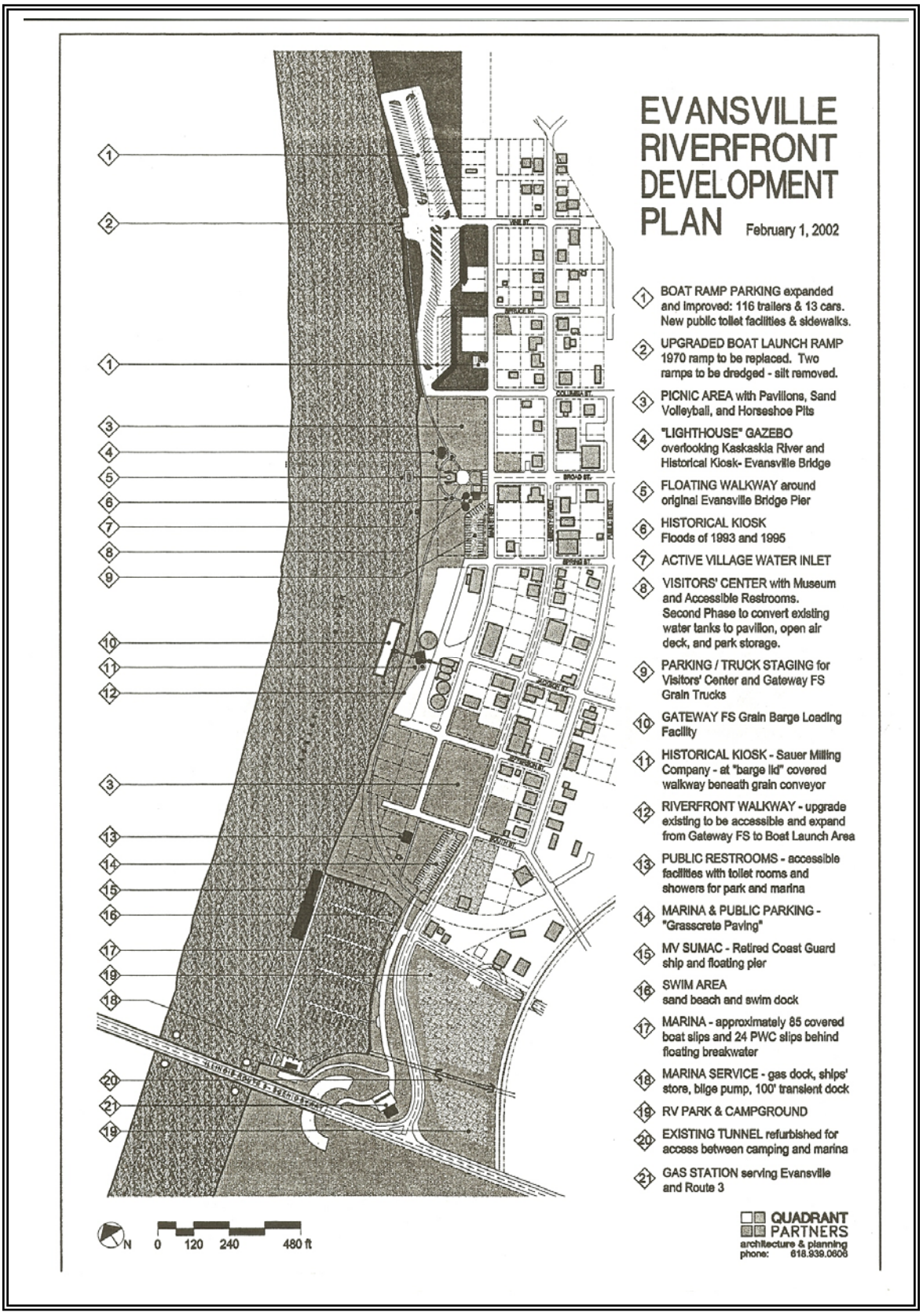
Flood retrofitting measures include **dry floodproofing** where all areas below the flood protection level are made watertight. Walls are coated with waterproofing compounds or plastic sheeting. Openings (doors, windows, and vents) are closed, either permanently, with removable shields, or with sandbags.

Dry floodproofing of new and existing nonresidential buildings in the regulatory floodplain is permitted under State, FEMA and County regulations. Dry floodproofing of existing residential buildings in the floodplain is also permitted as long as the building is not substantially damaged or being substantially improved. Owners of buildings located outside the regulatory floodplain can always use dry floodproofing techniques.

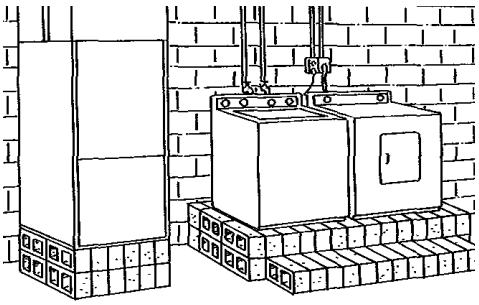


Dry floodproofed house

The alternative to dry floodproofing is **wet floodproofing:** water is let in and everything that could be damaged by a flood is removed or elevated above the flood level. Structural components below the flood level are replaced with materials that are not subject to water damage.


EVANSVILLE
RIVERFRONT
DEVELOPMENT
PLAN
February 1, 2002
1 BOAT RAMP PARKING expanded and improved: 116 trailers & 13 cars. New public toilet facilities & sidewalks.
2 UPGRADED BOAT LAUNCH RAMP 1970 ramp to be replaced. Two ramps to be dredged - silt removed.
3 PICNIC AREA with Pavilions, Sand Volleyball, and Horseshoe Pits
4 "LIGHTHOUSE" GAZEBO overlooking Kaskaskia River and Historical Kiosk- Evansville Bridge
5 FLOATING WALKWAY around original Evansville Bridge Pier
6 HISTORICAL KIOSK Floods of 1993 and 1995
7 ACTIVE VILLAGE WATER INLET
8 VISITORS' CENTER with Museum and Accessible Restrooms. Second Phase to convert existing water tanks to pavilion, open air deck, and park storage.
9 PARKING / TRUCK STAGING for Visitors' Center and Gateway FS Grain Trucks
10 GATEWAY FS Grain Barge Loading Facility
11 HISTORICAL KIOSK - Sauer Milling Company - at "barge lid" covered walkway beneath grain conveyor
12 RIVERFRONT WALKWAY - upgrade existing to be accessible and expand from Gateway FS to Boat Launch Area
13 PUBLIC RESTROOMS - accessible facilities with toilet rooms and showers for park and marina
14 MARINA & PUBLIC PARKING - "Grasscrete Paving"
15 MV SUMAC - Retired Coast Guard ship and floating pier
16 SWIM AREA sand beach and swim dock
17 MARINA - approximately 85 covered boat slips and 24 PWC slips behind floating breakwater
18 MARINA SERVICE - gas dock, ships' store, bilge pump, 100' transient dock
19 RV PARK & CAMPGROUND
20 EXISTING TUNNEL refurbished for access between camping and marina
21 GAS STATION serving Evansville and Route 3
N
0 120 240 480 ft
QUADRANT PARTNERS
architecture & planning
phone: 618.939.0606

For example, concrete block walls are used instead of wooden studs and gypsum wallboard. The furnace, water heater, and laundry facilities are permanently relocated to a higher floor. Where the flooding is not deep, these appliances can be raised on blocks or platforms.



Wet floodproofed basement

Wet floodproofing has one advantage over the other approaches: no matter how little is done, flood damage is reduced. Thousands of dollars in damage can be prevented by simply moving furniture and electrical appliances out of a basement.

A third flood protection modification addresses flooding caused by overloaded sanitary or combined sewers. Four approaches may be used to protect a structure against **sewer backup**: floor drain plugs, floor drain stand-pipes, overhead sewers, and backflow protection valves.

The first two devices keep water from flowing out of the lowest opening in the building, the floor drain. They cost less than $25. However, if water becomes deep enough in the sewer system, it can flow out of the next lowest opening, such as a toilet or tub, or it can overwhelm a drain plug by hydrostatic pressure and flow into the building through the floor drain. The other two measures, overhead sewers and backflow protection valves keep water in the sewer line during a backup. These are more secure, but more expensive ($3,000-$4,000).

For dry floodproofing, wet floodproofing, and sewer backup prevention, it is important to consider what contents of a building are suitable for keeping in basements or crawl spaces. Valuable and invaluable items, such as, photographs, should be kept elsewhere in the event that the seepage or flooding occurs even with the retrofitting measures in place.

Local implementation: Following the 1993 flood, the Gateway Farm Service facility was floodproofed. In Chester, the pump house was elevated to protect it from flood damage.

5.2.2 Flood Retrofitting – Other Assets

Hazardous and Buoyant Materials: Hazardous Materials, such as, petroleum or chemicals, should not be located in the floodplain. If they are in areas where they can't be relocated, then the containers should be properly anchored. This includes homeowner propane tanks. Tanks should be relocated, or elevated, or properly anchored (tied down). Precautions should be taken so that floodwaters will not be contaminated, or so that the contents do not present a fire or explosion hazard.

Local implementation: No retrofitting projects for hazardous materials were reported to the Planning Committee.

Downtown Sparta

5.2.3 Earthquake Retrofitting - Buildings

Earthquakes, or seismic events, present two hazards for buildings and people – a hazard for the structure itself and a hazard for the building's contents (non-structural hazard). Earthquake retrofitting measures for the **structure** include:

- removing masonry overhangs that will fall onto the street during shaking
- bracing the walls of the building provides structural stability
- bolting sill plates to the foundation

Downtown Redbud

These measures can be very expensive and should be considered for buildings on a case by case basis.

Measures that protect against non-structural seismic hazards typically involve small modifications. Retrofitting activities for non-structural hazards include:

- tying down appliances, water heaters, bookcases, and fragile furniture so they won't fall over during a quake
- installing latches on drawers and cabinet doors
- mounting picture frames and mirrors securely
- installing flexible utility connections for water and gas lines
- anchoring and bracing propane tanks and gas cylinders

Downtown Redbud

These approaches can be very cost effective and have little or no impact on the appearance of a building, yet they are important measures for keeping buildings safer and protecting lives during earthquake events.

While these simple and inexpensive measures may be cost effective for a home or business, they may not be sufficient for protection of **critical facilities**. Fire stations need to be sure that they can open their doors and hospitals must be strong enough to continue operating during the shocks and aftershocks. Again, critical facilities should be evaluated on a case by case basis.

Local implementation: No retrofitting projects for earthquakes were reported to the Planning Committee.

5.2.4 Earthquake Retrofitting – Infrastructure and Lifelines

Infrastructure hardening, attention to lifelines and bridge strengthening are important elements of earthquake mitigation. From FEMA Publication Number 271, *Seismic Design Guidelines and Standards for Lifelines* (1996):

> Lifelines are the public works and utility systems that support most human activities: individual, family, economic, political, and cultural. The various lifelines can be classified under the following five systems: electric power, gas and liquid fuels, telecommunications, transportation, and water supply and sewers.

The first step in protecting lifeline systems is the prioritization of critical facilities, utility systems, and other infrastructure. The involvement of state agencies, such as the Illinois Department of Transportation, is important. The involvement of private owners of utility systems is also important. FEMA, through the National Earthquake Hazard Reduction Program (NEHRP) and the Central United States Earthquake Consortium offer technical guidance on retrofitting approaches.

Local implementation: No retrofitting projects for critical facilities or lifelines were reported to the Planning Committee.

5.2.5 Tornado Retrofitting

Tornado retrofitting measures include constructing an underground shelter or "safe room" at the first floor level to protect the lives of the occupants. Their worth has been proven by recent tornadoes in Oklahoma, as shown in the photo to the right. They can be installed for approximately $3,000.

Interior rooms can be reinforced and retrofitted to be tornado "safe rooms"

Safe rooms are built by connecting all parts of the shelter together (walls, roof and foundation) using adequate fasteners or tie downs. These help hold the safe room together when the combination of high wind and pressure differences work to pull the walls and ceiling apart. The walls of the safe room are constructed out of plywood and metal sheeting to protect people from windborne missiles (flying debris) with the strong winds of a tornado. More information on safe rooms can be found in FEMA Publication 320.

Another retrofitting approach for tornadoes and **high winds** is to secure the roof, walls and foundation with adequate fasteners or tie downs. These help hold the building together when the combination of high wind and pressure differences work to pull the building apart. This measure also applies to manufactured homes.

Tornado shelter at Baldwin Power Plant

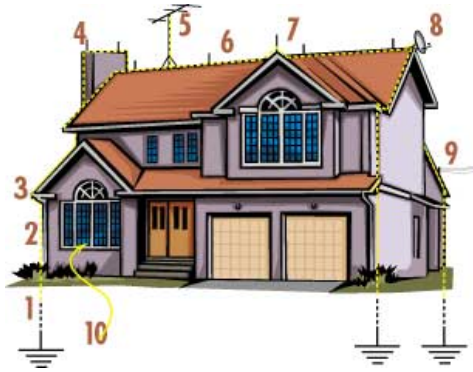
A third tornado and high wind protection modification is to strengthen garage doors, windows and other large openings. If winds break the building's "envelope," the pressures on the structure are greatly increased. Impact-resistant glass is also recommended for high wind or tornado protection.

Local implementation: No safe rooms or other tornado retrofitting projects for summer storms were reported to the Planning Committee. However, at the Baldwin Dynergy Power Plant a safe room was constructed and identified as a tornado shelter.

5.2.6 Summer Storm Retrofitting

Retrofitting approaches to protect private or public buildings from the effects of **thunderstorms** include:

- storm shutters
- lightning rods (illustrated to the right)
- strengthening connections and tie-downs (similar to tornado retrofitting)
- impact-resistant glass in window panes
- surge protectors at electrical outlets



Lightning protection measures
Source: State Farm Insurance

Roofs could be replaced with materials less susceptible to damage by **hail**, such as modified asphalt or formed steel shingles.

Local implementation: No summer storm retrofitting projects were reported to the Planning Committee.

5.2.7 Winter Storm Retrofitting

Winter storm retrofitting measures include improving insulation on older buildings and relocating water lines from outside walls to interior spaces. Windows can be sealed or covered with an extra layer of glass (storm windows) or plastic sheeting. Roofs can be retrofitted to shed heavy loads of snow and prevent ice dams that form when snow melts.

Local implementation: No winter storm retrofitting projects were reported to the Planning Committee.

5.2.8 Utility Interruption Retrofitting

Burying utility lines is a retrofitting measure that addresses the winds from tornadoes and thunderstorms and the ice that accompanies winter storms. Installing or incorporating backup power supplies minimizes the effects of power losses caused by downed lines. "Retrofitting" the trees that hang over power lines is discussed in Chapter 6. Tree pruning near power lines can protect against broken or downed power lines.

Local implementation: No retrofitting projects for county or municipal utilities were reported to the Planning Committee.

5.3 Insurance

Hazards Addressed	
Y	Flood
Y	Earthquake
Y	Winter storms
Y	Summer Storms
Y	Tornado
	Extreme Heat
Y	Utility Disruption
	Transportation Incident
	Radiological Incident

Technically speaking, insurance does not mitigate damage caused by a natural hazard. However, it does help the owner repair, rebuild and (hopefully) afford to incorporate some of the other mitigation measures in the process.

Insurance has the advantage that, as long as the policy is in force, the property is protected and no human intervention is needed for the measure to work. A standard **homeowner's insurance** policy will cover a property for the hazards of tornado, wind, hail, and winter storms. Separate endorsements are usually needed for earth movement (e.g., earthquake) coverage.

Although most homeowner's insurance policies do not cover a property for flood damage, an owner can insure a building for damage by surface flooding through the National Flood Insurance Program. **Flood insurance** coverage is provided for buildings and their contents damaged by a "general condition of surface flooding" in the area.

Some people have purchased flood insurance because it was required by the bank when they got a mortgage or home improvement loan. Usually these policies just cover the building's structure and not the contents. Renters can buy contents coverage, even if the owner does not buy structural coverage on the building. There is limited coverage for basements and the below grade floors of bi-levels and tri-levels.

Several insurance companies have **sump pump failure** or **sewer backup coverage** that can be added to a homeowner's insurance policy. Each company has different amounts of coverage, exclusions, deductibles, and arrangements. Most are riders that cost extra. Most exclude damage from surface flooding that would be covered by a National Flood Insurance policy.

Larger local governments can self-insure and absorb the cost of damage to one facility, but if many properties are exposed to damage, self-insurance can be a major drain on the

treasury. Communities cannot expect Federal disaster assistance to make up the difference. Under Section 406(d) of the Stafford Act.

> If an eligible insurable facility damaged by flooding is located in a [mapped floodplain] … and the facility is not covered (or is underinsured) by flood insurance on the date of such flooding, FEMA is required to reduce Federal disaster assistance by the *maximum* amount of insurance proceeds that would have been received had the buildings and contents been fully covered under a National Flood Insurance Program (NFIP) standard flood insurance policy. [Generally, the maximum amount of proceeds for a non-residential property is $500,000.]
>
> [Communities] Need to:
>
> - Identify all insurable facilities, and the type and amount of coverage (including deductibles and policy limits) for each. The anticipated insurance proceeds will be deducted from the total eligible damages to the facilities.
> - Identify all facilities that have previously received Federal disaster assistance for which insurance was required. Determine if insurance has been maintained. *A failure to maintain the required insurance for the hazard that caused the disaster will render the facility ineligible for Public Assistance funding….*
> - [Communities] *must* obtain and maintain insurance to cover [their] facility - buildings, equipment, contents, and vehicles - for the hazard that caused the damage in order to receive Public Assistance funding. Such coverage must, at a minimum, be in the amount of the eligible project costs. FEMA will not provide assistance for that facility in future disasters if the requirement to purchase insurance is not met. – FEMA Response and Recovery Directorate Policy No. 9580.3, August 23, 2000

In other words, the law expects public agencies to be fully insured as a condition of receiving Federal disaster assistance.

Earthquake Insurance: Earthquakes are not covered under standard homeowners or business insurance policies, but coverage is usually available for earthquake damage in the form of an endorsement to a home or business insurance policy. Cars and other vehicles are covered for earthquake damage under the comprehensive part of the auto insurance policy. In Randolph County, earthquake insurance is relatively inexpensive and property owners should be sure that it is included on their policy.

Earthquake insurance provides coverage for your dwelling, for your personal property, and for any additional living expense (ALE). ALE coverage can include costs for the following:

- Temporary rental home, apartment, or hotel room
- Restaurant meals
- Telephone or utility installation in a temporary residence
- Relocation and storage
- Furniture Rental
- Laundry

Mine Subsidence Insurance: Usually, mine subsidence is covered under a separate endorsement or rider on a homeowner or business insurance policy. This extends the

The Village of South Holland (in South Cook County) received national recognition for its rebate program to help property owners fund retrofitting projects to protect against surface and subsurface flooding. If a project is approved, installed, and inspected, the Village will reimburse the owner 25 percent of the cost up to $2,500. Over 450 floodproofing and sewer backup protection projects have been completed under this program. Perhaps not surprisingly, contractors have become some of the best agents to publicize this program.

policy to cover mine subsidence losses. Insurance companies are required to place this coverage on your policy if you live within 34 counties that have been determined to have a significant mine subsidence exposure. This area includes Randolph County. Property owners may contact the insurance company to remove the coverage, but the owner must sign a waiver of the coverage. The cost of insurance depends on the value of the home but as a guideline; a home having a value of up to $120,000 will pay an annual premium of $50.

Local implementation: Data on private insurance policies are not available. Flood insurance has been available in Randolph County communities since the 1970's. Current flood insurance coverage is 125 policies for $11,900,200 in coverage.

Property owners throughout the County are well insured for earthquake and mine subsidence. Premiums for both of these are very low, but deductibles, especially for earthquake, are very high.

Most communities in Randolph County are enrolled in either the Illinois Municipal League Risk Management Association (IML). IML provides risk management advice and coverage for all of the hazards covered in this plan, including flood and earthquake. Randolph County has an insurance policy through the ICI.

5.4 The Government's Role

Property protection measures are usually considered the responsibility of the property owner. However, local governments should be involved in all strategies that can reduce flood losses, especially acquisition and conversion of a site to public open space. There are various roles the County or a municipality can play in encouraging and supporting implementation of these measures.

Hazards Addressed	
Y	Flood
Y	Earthquake
Y	Winter storms
Y	Summer Storms
Y	Tornado
Y	Extreme Heat
Y	Utility Disruption
Y	Transportation Incident
Y	Radiological Incident

Government facilities: One of the first duties of a local government is to protect its own facilities. Fire stations, water treatment plants and other critical facilities should be a high priority for retrofitting projects and insurance coverage.

Often public agencies discover after the disaster that their "all-hazard" insurance policies do not cover the property for the type of damage incurred. Flood insurance is even more important as a mitigation measure because of the Stafford Act provisions discussed above.

Public Information: Providing basic information to property owners is the first step in supporting property protection measures. Owners need general information on what can be done. They need to see examples, preferably from nearby. Public information activities that can promote and support property protection are covered in Chapter 9.

Financial Assistance: Communities can help owners by helping to pay for a retrofitting project. Financial assistance can range from full funding of a project to helping residents find money from other programs. Some communities assume responsibility for sewer backups, street flooding, and other problems that arise from an inadequate public sewer or public drainage system.

Less expensive community programs include low interest loans, forgivable low interest loans and rebates. A forgivable loan is one that does not need to be repaid if the owner does not sell the house for a specified period, such as five years. These approaches don't fully fund the project but they cost the community treasury less and they increase the owner's commitment to the flood protection project. Often, small amounts of money act as a catalyst to pique the owner's interest to get a self-protection project moving.

The City of Guthrie, Oklahoma has a rebate program for installation of tornado shelters and safe rooms. The City provides up to $1,500 per house, which can cover the majority of the cost.

The more common outside funding sources are listed below. Unfortunately, the last three are only available after a disaster, not before, when damage could be prevented. Following past disaster declarations, FEMA, the Illinois Emergency Management Agency (IEMA) and the Illinois Department of Natural Resources have provided advice on how to qualify and apply for these funds.

Pre-disaster funding sources

- FEMA's Pre-Disaster Mitigation (PDM) grants (administered by IEMA)
- FEMA's Flood Mitigation Assistance (FMA) grants (administered by IEMA)
- Community Development Block Grant (administered by the Department of Commerce and Economic Opportunity
- Illinois Department of Natural Resources
- Conservation organizations, such as the Conservation Foundation and CorLands, although generally these organizations prefer to purchase vacant land in natural areas, not properties with buildings on them.

Post-disaster funding sources

- Insurance claims
- The National Flood Insurance Program's Increased Cost of Compliance provision (which increases the claim payment to cover a flood protection project required by code as a condition to rebuild the flooded building)

Post-disaster funding sources, Federal disaster declaration needed

- FEMA's disaster assistance (for public properties, however, after a flood, the amount of assistance will be reduced by the amount of flood insurance that the public agency should be carrying on the property) (administered by IEMA)
- Small Business Administration disaster loans (for non-governmental properties)
- FEMA's Hazard Mitigation Grant Program (administered by IEMA)

Acquisition agent: The community can be the focal point in an acquisition project. Most funding programs require a local public agency to sponsor the project. The County or a municipality could process the funding application, work with the owners, and provide some, or all, of the local share.

Mandates: Mandates are considered a last resort if information and incentives aren't enough to convince a property owner to take protective actions. An example of a retrofitting mandate is the requirement that many communities have that downspouts be disconnected from the sanitary sewer line.

There is a mandate for improvements or repairs made to a building in the mapped floodplain. If the project equals or exceeds 50 percent of the value of the original building it is considered a "substantial improvement." The building must then be elevated or otherwise brought up to current flood protection codes.

Another possible mandate is to require less expensive hazard protection steps as a condition of a building permit. For example, many communities require upgraded electrical service as a condition of a home improvement project. If a person were to apply for a permit for electrical work, the community could require that the service box be moved above the base flood elevation or the installation of separate ground fault interrupter circuits in the basement.

Local implementation: As discussed in Chapter 1 and Appendix D, there are 185 identified critical facilities. Most of these have no special measures to protect them from flooding, tornadoes, and other natural hazards. One exception is Evansville's water treatment plant that was relocated following the 1993 flood.

5.5 Repetitive Flood Loss Properties

Hazards Addressed	
Y	Flood
	Earthquake
	Winter storms
Y	Summer Storms
	Tornado
	Extreme Heat
	Utility Disruption
	Transportation Incident
	Radiological Incident

Chapter 2 explains the criteria for designation of the County's repetitive loss properties – two claims of at least $1,000 since 1978. This is the FEMA Community Rating System definition. FEMA's minimum criteria are two claims of at least $1,000 in any ten year period. According to FEMA there are eleven repetitive loss properties in Randolph County. These properties deserve special

attention because they are more prone to damage by natural hazards than any other properties in the County. Further, protecting repetitive loss buildings is a priority with FEMA and IEMA mitigation funding programs.

The 11 repetitive loss properties have not been thoroughly reviewed since the completion of mitigation projects from the Flood of 1993. When they are reviewed, the key factors listed below should be used to determine appropriate property protection measures. The criteria used are based on several studies that have identified appropriate measures based on flood and building conditions. While a cost/benefit study was not conducted on each property, these guidelines show which measures are cost-effective.

- "High hazard areas" are areas in the floodway or where the 100-year flood is two or more feet over the first floor.
- Buildings in high hazard areas or in less than good condition should be acquired and demolished.
- Buildings with basements and split level foundations in high hazard areas should be acquired and demolished. They are too difficult to elevate and the hydrostatic pressures on the walls from deeper flooding make them too risky to protect in place.
- Buildings subject to shallow flooding from local drainage should be protected through area-wide flood control or sewer improvement projects.
- Buildings in good condition on crawlspaces should be elevated or relocated.
- Buildings in good condition on slab, basement or split level foundations subject to shallow flooding (less than 2 feet) can be protected by barriers and dry floodproofing.
- Recent flood claims. Some properties have not had a flood insurance claim for 20 years, indicating that some measure has probably been put in place to protect the property from repetitive flooding.

These criteria are general, and recommendations for individual structures should be made only after a site inspection. Other extenuating circumstances may also alter the recommendations.

5.6 Conclusions

1. Property protection measures for natural hazards are important for Randolph County given the number of hazards for which the County is at risk. The advantages and disadvantages of each should be examined for each situation.

2. Acquisition projects following the floods of 1993 and 1995 reduced Randolph County's exposure to flood damage, but additional floodplain property protection work is needed.

3. Very little has been done in Randolph County to protect buildings from earthquake damage. Critical facilities and historic downtown areas are of particular concern.

4. Property owners can implement some property protection measures at little cost, especially for sites in areas of low hazards (e.g., shallow flooding, sewer backup, earthquakes, thunderstorms and winter storms).

5. For other property protection measures, such as relocation, elevation and safe rooms, the owners may need financial assistance.

6. Local government agencies can promote and support property protection measures through several activities, ranging from public information to financial incentives to full funding.

7. It is unlikely that most government properties, including critical facilities, have any special measures to protect them from flooding, tornadoes, and other natural hazards. Sparta Hospital is the exception to this.

8. While Randolph County has a sense of the overall earthquake hazard, the impact on individual critical facilities is not known.

9. 125 of the buildings within Randolph County are covered by flood insurance. Eleven properties in Randolph County are listed by FEMA as a repetitive loss property.

10. The majority of property owners seem to have insurance policies that include earthquake and mine subsidence coverage.

5.7 Recommendations

1. Public education materials should be developed to explain property protection measures that can help owners reduce their exposure to damage by natural hazards and the various types of insurance coverage that are available.

2. Effort should be made to provide information and advice to floodplain property owners. Special attention should be given to repetitive loss and high hazard areas.

3. Most property protection projects should be voluntary, but in some circumstances, projects should be required.

4. The number of structures within the 100-year floodplains should be determined and mitigation opportunities for those structures should be identified.

5. Efforts should be made to include the 100-year floodplain on recorded plats throughout the County.

6. All critical facilities in the floodplain should be mitigated.

7. Repetitive flood loss areas should be investigated and mitigated.

8. Private property owners should be encouraged to tie down or elevated propane tanks that are located within the 100-year floodplain.

9. Each public entity should protect its own publicly-owned facilities with appropriate mitigation measure(s).

10. A standard checklist should be developed to evaluate a property's exposure to damage from the hazards most prevalent in Randolph County. The checklist should be provided to each agency participating in this planning process and made available to the general public. For earthquakes the ACT 21 forms should be utilized.

11. Each public entity should evaluate its own properties using the standard checklist. A priority should be placed on determining critical facilities' vulnerability to damage and whether public properties are adequately insured.

12. Historic areas of Randolph County, such as, downtown Red Bud and Sparta Brick Town, should be assessed to determine if seismic protection measures are feasible.

13. Other than State and Federally-mandated regulations, local incentives for doing property protection should be positive.

14. All property owners should be encouraged to determine if they are adequately insured for natural hazards.

15. Randolph County should seek property protection financial assistance for all mitigation projects. Randolph County should also pursue grants for detail hazard area assessment and project plans.

5.8 References

1. *Disaster Mitigation Guide for Business and Industry*, Federal Emergency Management Agency, FEMA-190, 1990

2. *Engineering Principles and Practices for Retrofitting Flood Prone Residential Buildings,* Federal Emergency Management Agency, FEMA-259, 1995.

3. *Flood Insurance Agent's Manual*, FEMA, 2000

4. *Flood Proofing Techniques, Programs and References,* U.S. Army Corps of Engineers National Flood Proofing Committee, 1991.

5. Mitigation Ideas: Possible Mitigation Measures by Hazard Type, FEMA Region 5, 2002.

6. *Floodproofed Sites in Illinois,* French & Associates, 1992.

7. *Guide to Flood Protection in Northeastern Illinois*, Illinois Association for Floodplain and Stormwater Management, 1997.

8. *The Homeowners Guide to Earthquake Safety*, California Seismic Safety Commission, 2000

9. *Homeowner's Guide to Retrofitting: Six Ways to Protect Your House from Flooding*. Federal Emergency Management Agency, FEMA-312, 1998.

10. *Ice Storm Mitigation*, FEMA –860-DR-Illinois, Illinois Emergency Management Agency, 1990.

11. *Local Flood Proofing Programs*, U.S. Army Corps of Engineers, 1994.

12. Materials supplied by County offices and municipalities, 2004 and 2005.

13. State Farm Insurance website, www.statefarm.com/consumer/lightng.htm

14. *Taking Shelter from the Storm: Building a Safe Room Inside Your House*, Federal Emergency Management Agency, FEMA-320, 1998.

15. Windshield surveys of repetitive loss areas conducted by French & Associates, Ltd., 2003.

16. *Windstorm Mitigation Manual for Light Frame Construction*, Illinois Emergency Management Agency, 1997.

17. Insurance Information Institute website: www.iii.org.

18. Illinois Mine Subsidence Insurance Fund website: www.imsif.com.

Chapter 6. Resource Protection

Resource protection activities are generally aimed at preserving, or in some cases restoring, natural areas. For this Plan, resource protection also means protecting historical assets and natural areas of Randolph County.

Resource protection activities enable the naturally beneficial functions of the land, such as, fields, floodplains or wetlands, to be better realized. Natural and beneficial functions of watersheds, floodplains and wetlands include the following:

- Reduction in runoff from rainwater and snow melt in pervious areas
- Infiltration that absorbs overland flood flow
- Removal and filtering of excess nutrients, pollutants, and sediments
- Storage of floodwaters
- Absorption of flood energy and reduction in flood scour
- Water quality improvement
- Groundwater recharge
- Habitat for flora and fauna
- Recreational and aesthetic opportunities

As development occurs, many of the above benefits can be achieved though regulatory steps for protecting natural areas or natural functions. The regulatory programs are discussed in Chapter 4. Preventive Measures.

This chapter covers the resource protection programs and standards that can help mitigate the impact of natural hazards, while they improve the overall environment and quality of the County. Areas reviewed:

- Wetland protection
- Erosion and sedimentation control
- River restoration
- Best management practices
- Dumping regulations
- Urban forestry
- Farmland protection
- Mined areas
- Historic and natural area protection

Hazards Addressed	
Y	Flood
	Earthquake
	Winter storms
Y	Summer Storms
	Tornado
	Extreme Heat
	Utility Disruption
	Transportation Incident
	Radiological Incident

6.1 Wetland Protection

Wetlands are often found in floodplains and depressional areas of a watershed. Many wetlands receive and store floodwaters, thus slowing and reducing downstream flows. They also serve as a natural filter, which helps to improve water quality, and provide habitat for many species of fish, wildlife, and plants. A 1993 study

by the Illinois State Water Survey concluded that for every one percent increase in protected wetlands along a stream corridor, peak stream flows decreased by 3.7 percent.

Wetlands that are determined to be part of the waters of the United States are regulated by the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency (US EPA) under Section 404 of the Clean Water Act. Before a "404" permit is issued, the plans are reviewed by several agencies, including the Corps and the U.S. Fish and Wildlife Service. Each of these agencies must sign off on individual permits.

There are also nationwide permits that allow small projects that meet certain criteria to proceed without individual permits. Wetlands not included in the Corps' jurisdiction or that are addressed by a nationwide permit may be regulated against by local authorities.

If a permit is issued by the Corps the impact of the development is typically required to be mitigated. Wetland mitigation can include creation, restoration, enhancement or preservation of wetlands elsewhere. Wetland mitigation is often accomplished within the development site, however, mitigation is allowed off-site and sometimes in another watershed. The appropriate type of mitigation is addressed in each permit.

Baldwin Lake

Some developers and government agencies have accomplished the required mitigation by buying into a wetland bank. Wetland banks are large wetlands created for the purpose of mitigation. The banks accept money to reimburse the owner for setting the land aside from development.

When a wetland is mitigated at another site there are drawbacks to consider. First, it takes many years for a new wetland to approach the same quality as an existing one. Second, a new wetland in a different location (especially if it's in a different watershed) will not have the same flood damage reduction benefits as the original one did.

An example of one public information effort is on the next page, showing one of the benefits of protecting and restoring wetlands – protecting against another natural hazard, West Nile Virus.

Local implementation: Wetlands in Randolph County are subject to the Section 404 regulations, which are implemented by the Corps of Engineers, where applicable. Wetlands within agricultural land that have farm subsidies are under the responsibility of the Natural Resources Conservation Service.

West Nile Virus and Wetlands
Wetland predators lower mosquito populations, WNV risk

West Nile is a mosquito-borne virus first detected in the United States in 1999 and in Illinois in 2001. Female mosquitoes transmit the virus mainly to birds, but also to other animals and occasionally to people. The threat to human health raises concerns about mosquito populations and the sites that breed them. **Some citizens are concerned that wetlands are part of the problem, but in fact, wetlands can be part of the cure.**

Healthy wetlands are home to fish, insects and birds that eat mosquitoes and keep their populations low. Furthermore, the species of mosquitoes responsible for transmitting West Nile Virus don't prefer wetlands but breed prolifically in stagnant water in discarded tires, birdbaths, and roof gutters. Such artificial containers lack the predators found in wetlands, and are located in or near urban areas, providing infected mosquitoes with easy access to human or animal hosts.

The presence of West Nile Virus in Illinois makes it more important than ever to protect and restore wetlands. Healthy wetlands can control mosquito numbers in addition to providing wildlife habitat, preventing flooding and purifying water.

Read on to learn more about mosquitoes and wetlands and what you can do around your home and community to decrease the risk of WNV.

Source: Fox River Ecosystem Partnership, Wisconsin DNR

6.2 Erosion and Sediment Control

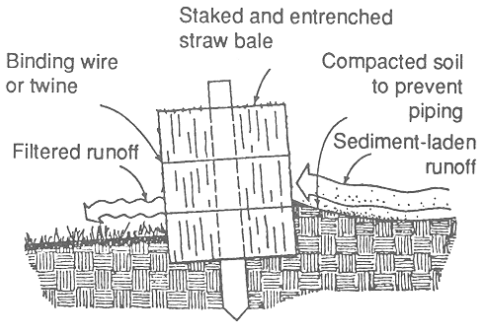
Hazards Addressed	
Y	Flood
	Earthquake
Y	Winter storms
Y	Summer Storms
	Tornado
	Extreme Heat
	Utility Disruption
	Transportation Incident
	Radiological Incident

Farmlands and construction sites typically contain large areas of bare exposed soil. Surface water runoff can erode soil from these sites, sending sediment into downstream waterways. Erosion also occurs along streambanks and shorelines as the volume and velocity of flow or wave action destabilize and wash away the soil.

Sediment suspended in the water tends to settle out where flowing water slows down. It can clog storm sewers, drain tiles, culverts and ditches and reduce the water transport and storage capacity of river and stream channels, lakes and wetlands. When channels are constricted and flooding cannot deposit sediment in the bottomlands, even more is left in the channels. The result is either clogged streams or increased dredging costs.

Not only are the drainage channels less able to do their job, but the sediment in the water reduces light, oxygen, and water quality and often brings chemicals, heavy metals and other pollutants. Sediment has been identified by the US EPA as the nation's number one nonpoint source pollutant for aquatic life.

There are two principal strategies to address these problems: minimize erosion and control sedimentation. Techniques to minimize erosion include phased construction, minimal land clearing, and stabilizing bare ground as soon as possible with vegetation and other soil-stabilizing practices.



Straw bales catch sediment

If erosion occoccurs, other measures are used to capture sediment before it leaves the site. Silt fences, sediment traps and vegetated filter strips are commonly used to control sediment transport. Runoff from the site can be slowed down by terraces, contour strip farming, no-till farm practices, hay or straw bales, constructed wetlands, and impoundments (e.g., sediment basins and farm ponds). Slowing surface water runoff on the way to a drainage channel increases infiltration into the soil and reduces the volume of topsoil eroded from the site.

Erosion and sedimentation control regulations mandate that these types of practices be incorporated into construction plans. They are usually oriented toward construction sites rather than farms. The most common approach is to require applicants for permits to submit an erosion and sediment control plan for the construction project. This allows the applicant to determine the best practices for the site.

Local implementation: The effects of erosion and sediment are apparent in the Kaskaskia and Mississippi, as sediment is transported from upstream areas of both rivers to Randolph County. The Corps of Engineers is responsible for maintenance dredging, when schedule and federal budgeting permit, in order to maintain a navigation channel for the waterways.

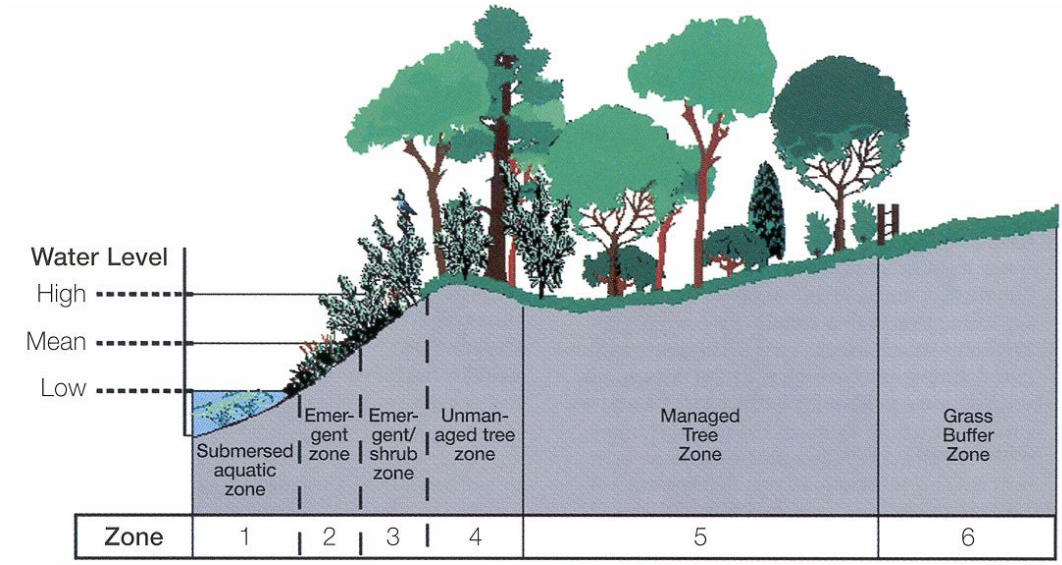
With the acquisition of properties along the Kaskaskia River in Evansville, following the 1993and 1995 floods, Evansville planted grass to prevent erosion. Through its local ordinances, Sparta implements erosion and sediment control requirements based on IEPA statutes.

6.3 River Restoration

Hazards Addressed	
Y	Flood
	Earthquake
	Winter storms
Y	Summer Storms
	Tornado
	Extreme Heat
	Utility Disruption
	Transportation Incident
	Radiological Incident

There is a growing movement that has several names, such as “stream conservation,” “bioengineering” or “riparian corridor restoration.” The objective of these approaches is to return streams, streambanks and adjacent land to a more natural condition, including the natural meanders. Another term is “ecological restoration” which restores native indigenous plants and animals to an area.

A key component of these efforts is to use appropriate native plantings along the banks that resist erosion. This may involve retrofitting the shoreline with willow cuttings, wetland plants, and/or rolls of landscape material covered with a natural fabric that decomposes after the banks are stabilized with plant roots.



Aquatic and riparian buffer plant zones

Different types of plants are used in different buffer zones along a channel. Zone 1 plants are normally submerged while zone 2 plants are inundated during much of the growing season. Zone 3 plants are water tolerant, but are flooded only during high water. By using the proper plants in each zone, they stabilize streambanks, filter polluted runoff, and provide habitat. *Source: Banks and Buffers – A Guide to Selecting Native Plants for Streambanks and Shorelines*, Tennessee Valley Authority

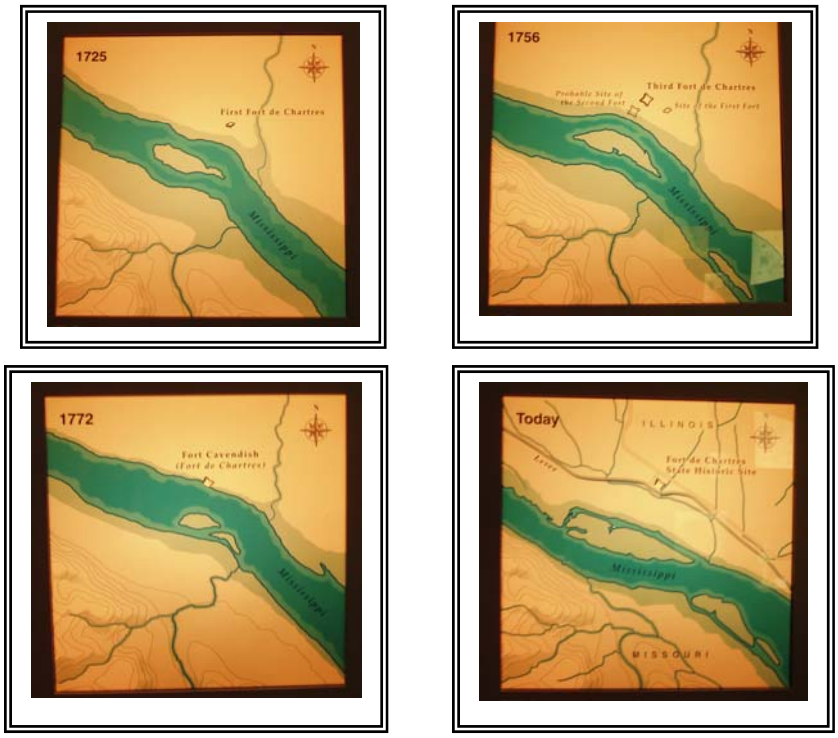
In all, restoring the right vegetation to a stream has the following advantages:

- Reduces the amount of sediment and pollutants entering the water
- Enhances aquatic habitat by cooling water temperature
- Provides food and shelter for both aquatic and terrestrial wildlife
- Can reduce flood damage by slowing the velocity of water
- Increases the beauty of the land and property value
- Prevents property loss due to erosion
- Provides recreational opportunities, such as hunting, fishing, and bird watching
- Reduces long term maintenance costs

The last bullet deserves special attention. Studies have shown that after establishing the right vegetation, long term maintenance costs are lower than if the banks were concrete. The Natural Resources Conservation Service estimates that over a ten year period, the combined costs of installation and maintenance of a natural landscape may be one-fifth of the cost for conventional landscape maintenance, e.g., mowing turf grass.

It is worth noting that rivers will take the most efficient or shortest path as the waters flows downstream. Because of debris, scour and other factors, a stream might meander

through an area. During a flood, though, the stream will attempt to straighten itself or adjust its course. This is a natural occurrence, but manmade influences on this cycle should be minimized. Below is an example from a display at Fort de Chartres which shows that natural change of course for the Mississippi River from the 1700 to 1800s.



6.4 Best Management Practices

Hazards Addressed	
Y	Flood
	Earthquake
Y	Winter storms
Y	Summer Storms
	Tornado
	Extreme Heat
	Utility Disruption
	Transportation Incident
	Radiological Incident

Point source pollutants come from pipes such as the outfall of a municipal wastewater treatment plant. They are regulated by the U.S. and Illinois Environmental Protection Agencies. *Nonpoint source* pollutants come from non-specific locations and are harder to regulate.

Examples of nonpoint source pollutants are lawn fertilizers, pesticides, and other farm chemicals, animal wastes, oils from street surfaces and industrial areas and sediment from agriculture, construction, mining and forestry. These pollutants are washed off the ground's surface by stormwater and flushed into receiving storm sewers, ditches and streams.

The term "best management practices" (BMPs) refers to design, construction and maintenance practices and criteria that minimize the impact of stormwater runoff rates and volumes, prevent erosion, protect natural resources and capture nonpoint source pollutants (including sediment). They can prevent increases in downstream flooding by attenuating runoff and enhancing infiltration of stormwater. They also minimize water

quality degradation, preserve beneficial natural features onsite, maintain natural base flows, minimize habitat loss, and provide multiple use of drainage and storage facilities.

Local implementation: Best management practices are encouraged to meet the requirements of the Clean Water Act and the NPDES Phase II (National Pollutant Discharge Elimination System) requirements. Communities submit annual water quality reports to the Illinois EPA by July of each year. In Sparta, BMP provisions are required with engineering submittals, per their local ordinance and IEPA standards.

6.5 Dumping Regulations

BMPs usually address pollutants that are liquids or suspended in water that are washed into a lake or stream. Dumping regulations address solid matter, such as shopping carts, appliances and landscape waste that can be accidentally or intentionally thrown into channels or wetlands. Such materials may not pollute the water, but they can obstruct even low flows and reduce the channels' and wetlands' ability to convey or clean stormwater.

Many cities have nuisance ordinances that prohibit dumping garbage or other "objectionable waste" on public or private property. Waterway dumping regulations need to also apply to "nonobjectionable" materials, such as grass clippings or tree branches which can kill ground cover or cause obstructions in channels. Regular inspections to catch violations should be scheduled.

Many people do not realize the consequences of their actions. They may, for example, fill in the ditch in their front yard not realizing that it is needed to drain street runoff. They may not understand how regrading their yard, filling a wetland, or discarding leaves or branches in a watercourse can cause a problem to themselves and others. Therefore, a dumping enforcement program should include public information materials that explain the reasons for the rules as well as the penalties.

Local implementation: Some communities, including Baldwin, Chester, Evansville, Prairie du Rocher, and Red Bud have ordinances that prohibit the dumping of debris in or obstructing waterways.

6.6 Forestry

Hazards Addressed	
Y	Flood
Y	Earthquake
Y	Winter storms
Y	Summer Storms
Y	Tornado
	Extreme Heat
Y	Utility Disruption
	Transportation Incident
	Radiological Incident

The majority damage caused by wind, ice and snow storms is to trees. Downed trees and branches break utility lines and damage buildings, parked vehicles and anything else that was under them. A forestry program (urban or rural) can reduce the damage potential of trees. The cities in central Illinois are most prone to ice storms and have initiated programs that select species that are resistant to ice and storm damage.

Trees are the first victims of ice storms.

Urban foresters or arborists can select hardier trees which can better withstand high wind and ice accumulation. Only trees that attain a height less than the utility lines should be allowed along the power and telephone line rights-of-way. Just as important as planting the right trees is correct pruning after a storm. If not done right, the damaged tree will not heal properly, decay over the next few years, and cause a hazard in the future. A trained person should review every damaged tree to determine if it should be pruned or removed.

By having stronger trees, programs of proper pruning, and on-going evaluation of the trees, communities can prevent serious damage to their tree population. A properly written and enforced urban forestry plan can reduce liability, alleviate the extent of fallen trees and limbs caused by wind and ice build-up, and provide guidance on repairs and pruning after a storm. Such a plan helps a community qualify to be a Tree City USA.

6.7 Farmland Protection

Hazards Addressed	
Y	Flood
Y	Earthquake
Y	Winter storms
Y	Summer Storms
Y	Tornado
Y	Extreme Heat
Y	Utility Disruption
	Transportation Incident
	Radiological Incident

Farmland protection is quickly becoming an important piece of comprehensive planning and zoning throughout the United States. The purpose of farmland protection is to provide mechanisms for prime, unique, or important agricultural land to remain as such, and to be protected from conversion to nonagricultural uses.

Frequently, farm owners sell their land to residential or commercial developers and the property is converted to non-agricultural land uses. With development comes more buildings, roads and other infrastructure. Urban sprawl occurs, which can create additional stormwater runoff and emergency management difficulties.

Farms on the edge of cities are often appraised based on the price they could be sold for to urban developers. This may drive farmers to sell to developers because their marginal farm operations cannot afford to be taxed as urban land.

The Farmland Protection Program in the United States Department of Agriculture's 2002 Farm Bill (Part 519) allows for funds to go to state, tribal, local governments and to nonprofit organizations to help purchase easements on agricultural land to protect against the development of the land. Eligible land includes cropland, rangeland, grassland, pastureland, and forest land that is part of an agricultural operation. Certain lands with historical or archaeological resources are also included.

The hazard mitigation benefits of farmland protection are similar to those of open space preservation, discussed in Chapter 4. Preventive Measures:

Preserving floodplain farmland prevents damage to buildings.

- Farmland is preserved for future generations,
- Farmland in the floodplain keeps damageable structures out of harm's way,
- Farmland keeps more stormwater on site and lets less runoff downstream,
- Rural economic stability and development is sustained,
- Ecosystems are maintained, restored and/or enhanced, and
- The rural character and scenic beauty of the area is kept.

Local implementation: Following the Flood of 1993, IEMA through funding from FEMA initiated the acquisition of development rights for the floodplain portions of farmlands. The purchase of floodplain development was an effort to relocate homes and farm buildings out of the floodplain, prohibit the construction of new buildings in the floodplain, and to preserve farmland. These efforts also lead to the protection of those farmlands.

6.8 Mined Areas

Surface mined areas are restored according to the Illinois Department of Natural Resources, Office of Mines and Mineral's regulations. Mining takes place in the northeastern portion of Randolph County. Communities participating in this Plan do not have concerns with the mine reclamation efforts at this time.

6.9 Historic and Natural Area Protection

Hazards Addressed	
Y	Flood
	Earthquake
	Winter storms
Y	Summer Storms
	Tornado
	Extreme Heat
	Utility Disruption
	Transportation Incident
	Radiological Incident

Randolph County is rich in historic resources and natural resources. Many of the natural resource areas are protected through the State of Illinois as State Fish and Wildlife Areas.

Table 6-1 provides a list of most of Randolph County's historic and natural sites. Most of these natural sites are open space areas and little hazard mitigation is necessary. However, the Committee agreed that it is important for the sites to be identified and considered as valuable assets of the County.

The historic sites are vulnerable to hazards. It is difficult to protect the structures from hazards due to their historic nature. Therefore, the Committee again agreed that showing them as assets will help ensure that they are considered should any mitigation opportunities be presented.

Table 6-1 Randolph County Historic and Natural Sites

Kaskaskia Watershed Area
Baldwin State Fish and Wildlife Area
Kaskaskia State Fish and Wildlife Area
Piney Creek Ravine State Natural Area
Randolph County State Fish and Wildlife Area
Turkey Bluffs State Fish and Wildlife Area
Fort de Chartres Historic Site
Little Mary's River Covered Bridge
Downtown Red Bud Historic District
Sparta Brick Town Historic District
Dry Lake
Fort Kaskaskia
Perrie Menard Home
Charter Oaks School
Liberty Bell State Memorial
Governor Bond Memorial
Old Randolph County Courthouse
Prairie du Rocher Natural Area Bluffs
Modoc Rock Shelter
Kratz Nature Trail Road
Sparta Depot
Shiloh College
Creole House
French Colonial Historic District
Castle Rock Creek and Devil's Hole

Old Randolph County Courthouse, Chester

Mary's River Covered Bridge

6.10 Conclusions

1. A hazard mitigation program can utilize resource protection programs to support protecting areas and natural features that can mitigate the impacts of natural hazards.

2. Community forestry programs can be effective against damage and power losses from wind and ice storms.

3. Preserving farmland in the floodplain and other hazardous areas will prevent damage to homes, businesses and other development.

4. Mined areas in the County have been adequately restored according to State regulations.

5. Randolph County has a natural karst topography, or sinkhole plain, that property owners should be aware of.

6. Randolph County is rich in historic and natural areas, which are important for the growth of tourism.

6.11 Recommendations

1. Communities should enforce any adopted ordinances for the wetland protection, erosion and sediment control and best management practices.

2. The public and decision makers should be informed about the hazard mitigation benefits of restoring rivers, wetlands and other natural areas. Myths about mosquitoes should be dispelled and restoration and protection techniques should be explained.

3. Each community should ensure that it has enforceable stream and wetland dumping regulations.

4. The public should be informed about the need to protect streams and wetlands from dumping and inappropriate development and the relevant codes and regulations.

5. Communities should implement a forestry program. Forestry efforts should be coordinated with groups like the Randolph County RC&D.

6. Municipal comprehensive plans, land use plans and zoning ordinances should incorporate open space provisions that will protect properties from flooding and preserve wetlands and farmland.

7. Randolph County should continue to preserve historic areas of the County and protect them from natural hazards.

8. Randolph County should continue to preserve and protect natural areas of the County.

6.12 References

1. *Banks and Buffers – A Guide to Selecting Native Plants for Streambanks and Shorelines*, Tennessee Valley Authority, 1997

2. *Best Management Practices Guidebook for Urban Development*, Northeastern Illinois Planning Commission, 1992.

3. *Environmental Consideration in Comprehensive Planning*, Northeastern Illinois Planning Commission, 1994.

4. *Illinois Hazard Mitigation Plan,* Illinois Emergency Management Agency, 2000.

5. *Living With Wetlands, A Handbook for Homeowners in Northeastern Illinois*, The Wetlands Initiative, 1998

6. *Making our Urban Forests Safer,* Alabama Cooperative Extension Service, 2001.

7. *Protecting Nature in Your Community*, Chicago Wilderness and Northeastern Illinois Planning Commission, 2000.

8. *Reducing the Impacts of Urban Runoff – The Advantages of Alternative Site Design Approaches,* Northeastern Illinois Planning Commission, 1997.

9. *Stormwater management – The Benefits of Alternative Approaches*, South Suburban Mayors and Managers Association, 2000.

10. *Stream and Wetland Protection: A Natural Resource Management Priority in Northeastern Illinois,* Northeastern Illinois Planning Commission, 1991.

11. *Stream Corridor Restoration Principles, Processes and Practices,* Federal Interagency Stream Restoration Working Group, 1998. Copies available through the USDA Natural Resource Conservation Service.

12. Survey of municipalities, January, 2005.

Chapter 7. Emergency Services

Emergency services measures protect life and property in four phases; mitigation, preparedness, response and recovery. A good emergency management program addresses all hazards, and it involves all municipal and/or county departments.

At the state level, programs are coordinated by the Illinois Emergency Management Agency (IEMA). Randolph County emergency services are coordinated through the Randolph County Office of Emergency Services and Disaster Assistance (ESDA) at the Courthouse in Chester. All Randolph County municipalities are operating under the County Emergency Operations Plan, and implementation of that Plan is coordinated with the mayors or village presidents, and the fire, police and public works departments of the communities. Randolph County is in the process of updating County Plan, tailoring community-specific plans, and undergoing NIMS compliance for Emergency Operations Plan and training.

This chapter reviews emergency services measures, following their chronological order of responding to an emergency, being with identifying an oncoming problem (threat recognition) through post-disaster activities.

7.1 Threat Recognition

Hazards Addressed	
Y	Flood
Y	Earthquake
Y	Winter storms
Y	Summer Storms
Y	Tornado
Y	Extreme Heat
	Utility Disruption
	Transportation Incident
	Radiological Incident

Threat recognition is the key. This is easier with natural hazards than with manmade hazards. The first step in responding to a flood, tornado, storm or other natural hazard is knowing when weather conditions are such that an event could occur. With a proper and timely threat recognition system, adequate warnings can be disseminated.

Floods: A flood threat recognition system predicts the time and height of the flood crest. This can be done by measuring rainfall, soil moisture, and stream flows upstream of the community and calculating the subsequent flood levels.

On larger rivers, including the Mississippi and Kaskaskia Rivers, the measuring and calculating is done by the National Weather Service which is in the U.S. Department of Commerce's National Oceanic and Atmospheric Administration (NOAA). Support in NOAA's efforts is provided by cooperating partners from state and local agencies. On the Kaskaskia River the US Army Corp of Engineers and the Illinois Department of Natural Resources has control of the Lock and Dam located at the mouth of the Mississippi River and the Dam in the northern part at Carlyle, IL.

Forecasts of expected river stages are made through the Advanced Hydrologic Prediction Service (AHPS) of the National Weather Service. Flood threat predictions are disseminated on the NOAA Weather Wire or NOAA Weather Radio. NOAA Weather Radio is considered by the federal government to be the official source for weather information.

On smaller rivers, locally established rainfall and river gages are needed to establish a flood threat recognition system. The National Weather Service may issue a "flash flood watch." This means the amount of rain expected will cause ponding and other flooding on small streams and depressions. These events are so localized and so rapid that a "flash flood warning" may not be issued, especially if no remote threat recognition equipment is available.

In the absence of a gauging system on small streams, the best threat recognition system is to have local personnel monitor rainfall and stream conditions. While specific flood crests and times will not be predicted, this approach will provide advance notice of potential local or flash flooding.

Tornadoes and Thunderstorms: The National Weather Service is the prime agency for detecting meteorological threats, such as tornadoes and thunderstorms. Severe weather warnings are transmitted through the Illinois State Police's Law Enforcement Agencies Data System (LEADS) and through the NOAA Weather Radio System. Randolph County Weather Center located in Sparta, IL monitors the weather and notifies weather spotters in the county. As with floods, the Federal agency can only look at the large scale, e.g., whether conditions are appropriate for formation of a tornado. For tornadoes and thunderstorms, local emergency managers can provide more site-specific and timely recognition by sending out National Weather Service trained spotters to watch the skies when the Weather Service issues a watch or warning.

Winter Storms: The National Weather Service is again the prime agency for predicting winter storms. Severe snow storms can often be forecasted days in advance of the expected event, which allows time for warning and preparation. Though more difficult, the National Weather Service can also forecast ice storms.

Local implementation:

Floods: Real-time stream gage readings for sites on the Mississippi River and Kaskaskia River can be accessed on the internet at the USGS website for current stream conditions. The US Army Corp of Engineers monitor the gage sites on the Mississippi River at Chester, and on the Kaskaskia River at Carlyle, Crooked Creek, Shoal Creek, Venedy Station, Fayetteville, Richland Creek, Red Bud,

Stream Gages

USGS Site:

http://waterdata.usgs.gov/il/nwis/uv?07020500
for Chester Gage

US Army Corp of Engineer Site:

http://mvs-wc.mvs.usace.army.mil

National Weather Service:

http://www.crh.noaa.gov

upper Roots, and lower Roots Site.

The Army Corp of Engineer sites are valuable tools for response to floods in Randolph County with the vast number of Corp levee systems on the Mississippi and Kaskaskia River and lock and dam facilities in the County.

The National Weather Service is able to issue a specific *prediction* of when and how high the Mississippi River will crest. The prediction can be accessed at http://www.crh.noaa.gov/lot/. NWS can also issue more general flood statements on rivers, such as the Kaskaskia River, and smaller streams throughout the County.

Other Weather Hazards: Randolph County dispatch centers receive other severe weather alerts from the LEADS system. These alerts are issued by the Illinois State Police who monitor the NOAA Weather Wire, or through their monitoring of NOAA weather radios. Police and fire stations, schools, county and municipal buildings, and some private facilities have been issued Weather Radios, or they are notified over the EAS from Randolph County Weather Center.

Hazardous weather and damage is reported to 911 Dispatch or Randolph County Weather Center.

7.2 Warning

Hazards Addressed	
Y	Flood
	Earthquake
Y	Winter storms
Y	Summer Storms
Y	Tornado
Y	Extreme Heat
	Utility Disruption
	Transportation Incident
	Radiological Incident

After the threat recognition system tells the ESDA and municipalities that a flood, tornado, thunderstorm, winter storm or other hazard is coming, the next step is to notify the public and staff of other agencies and critical facilities. The earlier and the more specific the warning, the greater the number of people who can implement protection measures.

The National Weather Service issues notices to the public using two levels of notification:

Watch: conditions are right for flooding, thunderstorms, tornadoes or winter storms.

Warning: a flood, tornado, etc. has started or has been observed.

A more specific warning may be disseminated by the community in a variety of ways. The following are the more common methods:

- Outdoor warning sirens
- Sirens on public safety vehicles
- Commercial or public radio or TV stations
- The Weather Channel
- Cable TV emergency news inserts
- Telephone trees/mass telephone notification

- NOAA Weather Radio
- Tone activated receivers in key facilities
- Door-to-door contact
- Mobile public address systems
- E-mail notifications

Multiple or redundant systems are most effective – if people do not hear one warning, they may still get the message from another part of the system. Each has advantages and disadvantages:

- Radio and television provide a lot of information, but people have to know when to turn them on.
- NOAA Weather Radio can provide short messages of any impending weather hazard or emergency and advise people to turn on their radios or televisions, but not everyone has a Weather Radio.
- Outdoor warning sirens can reach many people quickly as long as they are outdoors. They do not reach people in tightly-insulated buildings or those around loud noise, such as in a factory, during a thunderstorm, or in air conditioned homes. They do not explain what hazard is coming, but people should know to turn on a radio or television.
- Automated telephone notification services are also fast, but can be expensive and do not work when phones lines are down. Nor do they work for unlisted numbers and calling screener services, although individuals can sign up for notifications.
- Where a threat has a longer lead time (e.g., flooding along the Mississippi River), going door-to-door and manual telephone trees can be effective.

Just as important as issuing a warning is telling people what to do. A warning program should have a public information aspect. People need to know the difference between a tornado warning (when they should seek shelter in a basement) and a flood warning (when they should stay out of basements).

StormReady: The National Weather Service established the StormReady program to help local governments improve the timeliness and effectiveness of hazardous weather-related warnings for the public. To be officially StormReady, a community must:

- Establish a 24-hour warning point and emergency operations center
- Have more than one way to receive severe weather warnings and forecasts and to alert the public
- Create a system that monitors weather conditions locally
- Promote the importance of public readiness through community seminars

- Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises.

Being designated as a StormReady community by the Weather Service is a good measure of a community's emergency warning program for weather hazards.

Local implementation: The Randolph County ESDA and municipal emergency services are responsible for disseminating warning information to the public and notifying response personnel during an emergency. Once a threat is perceived, the County's 911 dispatch center then transmits the warnings to all first responders, and, in conjunction with the Randolph County Weather Center, the warnings are transmitted to schools, hospitals, government offices, business, and the general public through the following systems:

- The Emergency Alert Radio System (EARS) is a tone alert system designed to provide weather watch and warning information to schools, hospitals, government offices, business, and the general public.
- The Emergency Alert System (EAS) is a national warning system that utilizes broadcast radio, television stations, and local cable television systems. In Randolph County, activation of the EAS will only be initiated by the CEO of the County, ESDA coordinator or Sheriff. The EAS works closely with radio stations WHCO Radio 1230 AM.
- The Emergency Alert System Emergency Management Network (EM*net*). This is a satellite based digital state-wide messaging system that allows users to send secure messages to all six municipal Public Safety Answering Points, hospitals, and the County Health Department. It is scheduled to be installed at Randolph County Sheriff Dispatch office in October, 2005.

Incorporated areas: Municipalities are responsible for notification to their citizens and activation of their warning systems. Fire chiefs, police chiefs, and mayors may be authorized to activate the warning system according to their emergency plans.

Rural areas: In the rural area, the population is urged to have weather alert radios and a battery operated AM/FM radio.

Special Needs Populations: The hospitals, nursing homes, special needs homes in the county have weather radios to monitor weather conditions.

Hazards Addressed	
Y	Flood
Y	Earthquake
Y	Winter storms
Y	Summer Storms
Y	Tornado
Y	Extreme Heat
Y	Utility Disruption
Y	Transportation Incident
Y	Radiological Incident

7.3 Response

The protection of life and property is the foremost important task of emergency responders. Concurrent with threat recognition and issuing warnings, a community should respond with actions that can prevent or reduce damage and injuries. Typical actions and responding parties include the following:

- Activating the emergency operations center (emergency management)
- Closing streets or bridges (police or public works)
- Shutting off power to threatened areas (utility company)
- Passing out sand and sandbags (see photo) (public works)
- Ordering an evacuation (chief elected official)
- Holding children at school/releasing children from school (school district)
- Opening evacuation shelters (Red Cross)
- Monitoring water levels (engineering)
- Security and other protection measures (police)

Emergency response planning will make flood response activities more efficient.

An emergency action plan ensures that all bases are covered and that the response activities are appropriate for the expected threat. These plans are developed in coordination with the county agencies, offices and municipal first responders and give SOG's for response.

Planning is best done with adequate data. One of the best tools is a flood stage forecast map (see page 2-8). Emergency management staff can identify the number of properties flooded, which roads will be under water, which critical facilities will be affected, etc.. With this information, an advance plan can be prepared that shows problem sites and determines what resources will be needed to respond to the predicted flood level.

Emergency response plans should be updated annually to keep contact names and telephone numbers current and to make sure that supplies and equipment that will be needed are still available. They should be critiqued and revised after disasters and exercises to take advantage of the lessons learned and changing conditions. The end result is a coordinated effort implemented by people who have experience working together so that available resources will be used in the most efficient manner.

Local implementation: Randolph County: The Randolph County Emergency Services Disaster Agency (ESDA) is responsible for the Emergency Operations Plan for the County and municipalities. The chief elected official, County office holders, first responders in Randolph County (law enforcement, fire departments, EMS), and local hospitals are included in the emergency planning process. The Randolph County Local Emergency Planning Committee (LEPC), which plans for hazardous chemical incidents, has re-formed and has started updating the HazMat Plan for the County**.**

Municipalities: Municipalities are responsible for their incorporated areas until all of their resources are exhausted. If the severity or extent of an emergency were to exceed

any municipality's capability, the County ESDA will be able to provide additional resources and assistance.

7.4 Critical Facilities Protection

Hazards Addressed	
Y	Flood
Y	Earthquake
Y	Winter storms
Y	Summer Storms
Y	Tornado
Y	Extreme Heat
Y	Utility Disruption
Y	Transportation Incident
Y	Radiological Incident

Critical facilities are discussed in Chapter 1. Protecting critical facilities during a disaster is the responsibility of the facility owner or operator. However, if they are not prepared for an emergency, the rest of the community could be impacted. If a critical facility is damaged, workers and resources may be unnecessarily drawn away from other disaster response efforts. If such a facility is adequately prepared by the owner or operator, it will be better able to support the community's emergency response efforts.

Most critical facilities have full-time professional managers or staff who are responsible for the facility during a disaster. Some have their own emergency response plans. Illinois state law requires hospitals, nursing homes, and other public health facilities to develop such plans. Many facilities would benefit from early warning, response planning, and coordination with community response efforts.

Local implementation: This Plan identifies all county-owned, municipal-owned buildings, schools, hospitals, nursing homes, and other public and private health facilities.

7.5 Post-Disaster Recovery and Mitigation

Hazards Addressed	
Y	Flood
Y	Earthquake
Y	Winter storms
Y	Summer Storms
Y	Tornado
Y	Extreme Heat
Y	Utility Disruption
Y	Transportation Incident
Y	Radiological Incident

After a disaster, communities should undertake activities to protect public health and safety, facilitate recovery and help prepare people and property for the next disaster. Throughout the recovery phase, everyone wants to get "back to normal." The problem is, "normal" means the way they were before the disaster, exposed to repeated damage from future disasters.

Appropriate measures include the following:

Recovery actions

- Patrolling evacuated areas to prevent looting
- Providing safe drinking water
- Monitoring for diseases
- Vaccinating residents for tetanus
- Clearing streets
- Cleaning up debris and garbage
- Regulating reconstruction to ensure that it meets all code requirements

Mitigation actions

- Conducting a public information effort to advise residents about mitigation measures they can incorporate into their reconstruction work
- Evaluating damaged public facilities to identify mitigation measures that can be included during repairs
- Acquiring substantially or repeatedly damaged properties from willing sellers
- Planning for long term mitigation activities
- Applying for post-disaster mitigation funds

Regulating reconstruction: Requiring permits for building repairs and conducting inspections are vital activities to ensure that damaged structures are safe for people to re-enter and repair.

There is a special requirement to do this in floodplains, regardless of the type of disaster or cause of damage. The National Flood Insurance Program (and the County's stormwater ordinance) requires that local officials enforce the substantial damage regulations. These rules require that if the cost to repair a building in the mapped floodplain equals or exceeds 50% of the building's market value, the building must be retrofitted to meet the standards of a new building in the floodplain. In most cases, this means that a substantially damaged building must be elevated above the base flood elevation.

This requirement can be very difficult for understaffed and overworked offices after a disaster. If these activities are not carried out properly, not only does the community miss a tremendous opportunity to redevelop or clear out a hazardous area, it may be violating its obligations under the NFIP.

Local implementation: Randolph County Zoning office tracks the floodplain regulations for the county. All parcels in the floodplain should be identified on the GIS mapping for future use.

7.6 Conclusions

1. The flood threat recognition system is best on the Mississippi River. For other streams, (e.g. Kaskaskia and Mary's River) the flood threat recognition system is insufficient. Local officials have to augment the National Weather Service's general statements of possible flooding.

2. The rain gage network in the County is very limited.

3. The threat recognition system for severe weather hazards (tornadoes, thunderstorms, and winter storms) for the County is inadequate.

4. The warning system for the County is also inadequate. Warning systems do not exist for parts of the County. Mobile home parks are without warning systems.

5. Schools, hospitals, nursing homes, government buildings and some factories do have weather radios.

6. The procedures and media that the County and municipalities use to disseminate warnings are lacking. Warnings from radio sources can be unreliable. Most citizens of Randolph County rely on Randolph County Weather Center and St. Louis television station reports for good information.

7. The County has a network of storm watchers.

8. The *Emergency Operations Plan* are currently being revised in the County. The plans have overall guidance on responding to many different kinds of hazards.

9. Some emergency response plans do not cover critical facilities that will be affected by various types of hazards.

10. There are no specific plans or guidance documents on post-disaster inspections and capitalizing on post-disaster mitigation opportunities.

7.7 Recommendations

1. Update Emergency Operations Plans for the County and municipalities before August, 2006.

2. Work with LEPC for updating the County's Chemical Plan.

3. Work with the NIMS compliance for the County and all municipalities.

4. Conduct annual emergency response training exercises.

5. Provide training on NIMS and ICS for all first responders and other identified personnel for compliance.

6. Research funding for emergency warning and response equipment, including outdoor weather warning sirens, generators for critical facilities, and warning systems.

7. Research funding for additional river gauges.

8. All parcels in the floodplain should be identified using the County's GIS mapping for planning, warning and response purposes.

9. All identified critical facilities in the County (listed in Appendix D) should be mapped using the County's GIS mapping for planning, warning and response purposes.

7.8 References

1. *CRS Coordinator's Manual*, Community Rating System, FEMA, 2002
2. *CRS Credit for Flood Warning Programs*, FEMA, 1999
3. *Flood Fighting*, Illinois Department of Transportation, Division of Water Resources, 1985.
4. *Guidelines on Community Local Flood Warning and Response Systems*, Federal Interagency Advisory Committee on Water Data, 1985
5. Information on StormReady communities can be found on the National Weather Service website, www.nws.noaa.gov/stormready/
6. *Post-Flood Mitigation Procedures,* Village of South Holland, Illinois, 1997.
7. Illinois Emergency Management Agency
8. FEMA

Chapter 8. Structural Projects

Structural projects are projects that are constructed to protect people and infrastructure from damage due to natural hazards. Often, they are referred to as regional projects or alternative, because they typically protect a number of buildings or properties. Structural projects are usually funded by public agencies. Preventing damage due to flooding is the primary focus of structural projects, but structural projects can also address manmade hazards, such as, hazardous material containment or the protection of infrastructure.

Structural projects have traditionally been used by communities to control or manage floodwaters. Structural projects keep flood waters away from an area by constructing barriers, by storing floodwater elsewhere, or by redirecting flood flows. Larger structural flood control projects have regional or watershed-wide implications and can be very expensive. Because of this, they are often planned, funded and implemented at a regional level by agencies, such as the Illinois Department of Natural Resources, Office of Water Resources, the U.S. Army Corps of Engineers, and the USDA Natural Resources Conservation Service.

Flood Gate at Prairie du Rocher Levee

Six approaches are reviewed in this chapter:

- Levees and barriers
- Channel improvements
- Reservoirs and detention
- Crossings and roadways
- Drainage and storm sewer improvements
- Drainage system maintenance

Structural projects offer advantages not provided by other measures, as shown in the table on the next page, but they also have shortcomings. The appropriateness of using structural flood control depends on individual project area circumstances.

Since structural flood control is generally the most expensive type of mitigation measure in terms of installation costs, maintenance requirements and environmental impacts, a thorough alternative assessment should be conducted before choosing a structural project. In some circumstances smaller flood control measures may be included in a package of several recommended measures for a project area where non-structural measures would not be practical or effective.

Pros and Cons of Structural Flood Control Projects

Advantages	Shortcomings
May provide the greatest amount of protection for land area used.	They disturb the land and disrupt natural water flows, often destroying wildlife habitat.
Because of land limitations, may be the only practical solution in some circumstances.	They require regular maintenance, which if neglected, can have disastrous consequences.
Can incorporate other benefits into structural project design such as water supply and recreational uses.	They are built to a certain flood protection level that can be exceeded by larger floods, causing extensive damage.
Regional detention may be more cost-efficient and effective than requiring numerous small detention basins.	They can create a false sense of security as people protected by a project often believe that no flood can ever reach them.
	Although it may be unintended, in many circumstances they promote more intensive land use and development in the floodplain.

The following flood control studies or reports on flooding have been published for Randolph County communities:

Plan for Major Drainage: The Lower Kaskaskia River Planning Basin, Southwestern Illinois Metropolitan and Regional Planning Commission, 1977.

Plan for Major Drainage: The Mary's River Planning Basin, 1979, Southwestern Illinois Metropolitan and Regional Planning Commission.

Strategic Planning Study for Flood Control: Edgar Lakes Drainage and Levee District, Illinois Department of Transportation, Division of Water Resources, 1984.

Inventory and Analysis of Urban Water Damage Problems: Village of Ruma, U.S. Army Corps of Engineers, 1989.

Inventory and Analysis of Urban Water Damage Problems: Village of Steeleville, U.S. Army Corps of Engineers, 1980.

The Great Flood of 1993 Post-Flood Report: Upper Mississippi River Basin, U.S. Army Corps of Engineers, 1994.

Along with the survey of Randolph County communities, these reports form the basis of this chapter.

8.1 Levees and Barriers

Hazards Addressed	
Y	Flood
	Earthquake
	Winter storms
Y	Summer Storms
	Tornado
	Extreme Heat
	Utility Disruption
Y	Transportation Incident
	Radiological Incident

8.1.1 Levees and Floodwalls for Flood Control

Probably the best known flood control measure is a barrier of earth (levee) or concrete (floodwall) erected between the watercourse and the property to be protected. Levees and floodwalls confine water to the stream channel by raising its banks. They must be well designed to account for large floods, underground seepage, pumping of internal drainage, and erosion and scour.

Key considerations when evaluating use of a levee include:

- Removal of fill to compensate for the floodwater storage that will be displaced by the levee
- Internal drainage of surface flow from the area inside the levee.
- Cost of construction
- Cost of maintenance
- River access and views
- Creating a false sense of security (while levees may reduce flood damage for smaller more frequent rain events, they may also overtop or breach in extreme flood events and subsequently create more flood damage than would have occurred without the levee).

Kaskaskia Island Levee

Levees placed along the river or stream edge degrade the aquatic habitat and water quality of the stream. They also are more likely to push floodwater onto other properties upstream or downstream. To reduce environmental impacts and provide multiple use benefits a setback levee (set back from the floodway) is the best project design. The area inside a setback levee can provide open space for recreational purposes and provide access sites to the river or stream.

Floodwalls perform like levees except they are vertical-sided structures that require less surface area for construction. Floodwalls are constructed of reinforced concrete, which makes the expense of installation cost prohibitive in many circumstances. Floodwalls also degrade adjacent habitat and can displace erosive energy to unprotected areas of shoreline downstream.

Local implementation: Randolph County has several levees that protect communities and agricultural land from Mississippi River and Kaskaskia River flooding. The Prairie du Rocher, Kaskaskia Island and Stringtown levees are discussed in Chapter 2. The Prairie du Rocher and Kaskaskia Island levees where repaired following the Mississippi River flood of 1993. There are no current proposals for other levee improvements in the County.

Bulkheads protect the piers of the State Route 154 Bridge at the Kaskaskia River.

8.1.2 Berms and Barriers for Potential Manmade Hazards

Earthen berms, concrete walls, and other barriers have been effectively used for the containment of hazardous materials, and for the protection of critical facilities.

Bridge piers can be protected with bulkheads being placed in front of the piers. The Chester Bridge at the Mississippi River (owned and maintained by Missouri) is unprotected from transportation incidents, such as, a barge striking one of the bridge's piers.

8.2 Reservoirs and Detention

Hazards Addressed	
Y	Flood
	Earthquake
	Winter storms
Y	Summer Storms
	Tornado
	Extreme Heat
	Utility Disruption
	Transportation Incident
	Radiological Incident

Reservoirs reduce flooding by temporarily storing flood waters behind dams or in storage or detention basins. Reservoirs lower the flood height by holding back, or detaining, runoff before it can flow downstream. Flood waters are detained until the flooding has subsided, then the water in the reservoir or detention basin is released or pumped out slowly at a rate that the river can accommodate downstream.

Reservoirs can be dry and remain idle until a large rain event occurs. Or they may be designed so that a lake or pond is created. The lake may provide recreational benefits or water supply (which could help mitigate a drought).

Reservoirs are most commonly built for one of two purposes. Large reservoirs are constructed to protect property from existing flood problems. Smaller reservoirs or detention basins are built to protect property from the impacts of new development (i.e., more runoff).

Regardless of size, reservoirs protect the development that is downstream from the reservoir site. Unlike levees and channel modifications, they do not have be built close to or disrupt the area to be protected. Reservoirs are most efficient in deeper valleys where there is more room to store water, or on smaller rivers where there is less water to store.

There are several considerations when evaluating use of reservoirs and detention:

- There is the threat of flooding the protected area should the reservoir's dam fail.
- There is a constant expense for management and maintenance of the facility.
- They may fail to prevent floods that exceed their design levels.
- Sediment deposition may occur and reduce the storage capacity over time.
- They can impact water quality as they are known to affect temperature, dissolved oxygen and nitrogen, and nutrients.
- If not designed correctly, they may cause backwater flooding problems upstream.

Local implementation: Detention or retention of floodwaters in Randolph County primarily occurs within the floodplains or backwater areas of the river system. This happens within the County and at Lake Carlyle in Clinton County. The Carlyle Dam is operated to retain flood flows for the upstream area of the Kaskaskia River watershed. This protects counties that are downstream of the Dam, including Randolph County (Village of Evansville) from flood damage, until flood flows need to be released in an effort to balance potential flood damage upstream and downstream of the Dam.

At one time, detention was considered for the Edgar Lakes Drainage and Levee District, which was impacted by the higher pool elevations when the Kaskaskia River Navigation Project was constructed. The approach was to have runoff (along with Kaskaskia River backwater) detained within a 14 acre area during Kaskaskia River flood events and then let much of the collected flow drain by gravity when the flood event passed. This alternative was not feasible, however, due to the cost of land acquisition. Instead, the current pump station was constructed and the gates that allow Kaskaskia River backwater to flow into Edgar Lakes are closed at a certain elevation, and flood water is pumped out of the drainage district, as necessary.

Evansville has considered additional detention in Evansville Lake to protect properties along Church Street.

8.3 Channel Improvements

Hazards Addressed	
Y	Flood
	Earthquake
	Winter storms
Y	Summer Storms
	Tornado
	Extreme Heat
	Utility Disruption
	Transportation Incident
	Radiological Incident

By improving channel's conveyance, more water is carried away at a faster rate. Three types of channel improvements are reviewed here: dredging the channel bottom; projects that make the channel wider, straighter or smoother; and diversion of high flows to another channel or body of water.

Dredging for the purpose of floodwater management is often viewed as a form of conveyance improvement. However, it has the following problems:

- Given the large volume of water that comes downstream during a flood, removing a foot or two from the bottom of the channel will have little effect on flood heights.
- Dredging is often cost prohibitive because the dredged material must be disposed of somewhere.
- Unless instream and/or tributary erosion are corrected upstream, the dredged areas usually fill back in within a few years, and the process and expense have to be repeated.
- If the channel has not been disturbed for many years, dredging will destroy the habitat that has developed.
- To protect the natural values of the stream, federal law requires a Corps of Engineers permit before dredging can proceed. This can be a lengthy process that requires much advance planning and many safeguards to protect habitat.

Dredging

Straightening, deepening and/or widening a stream or river channel, commonly referred to as "**channelization**" has traditionally been the common remedy for local drainage or flooding problems. Here are the concerns with this approach that need to be kept in mind:

- Channelized streams can create or worsen flooding problems downstream as larger volumes of water are transported at a faster rate.
- Channelized streams rise and fall faster. During dry periods the water level in the channel is lower than it should be, which creates water quality problems and degrades habitat.
- Channelized waterways tend to be unstable and experience more streambank erosion. The need for periodic reconstruction and silt removal becomes cyclic, making channel maintenance very expensive.

On the other hand, properly sloped and planted channel banks are more aesthetically and environmentally appealing, and can prove cheaper to maintain than concrete ditches. See the example on page 8-8.

A **diversion** is a new channel that sends floodwaters to a different location, thereby reducing flooding along an existing watercourse. Diversions can be surface channels, overflow weirs, or tunnels. During normal flows, the water stays in the old channel. During flood flows, the floodwaters spill over to the diversion channel or tunnel, which carries the excess water to a receiving lake or river. Diversions are limited by topography; they will not work in some areas. Unless the receiving water body is relatively close to the floodprone stream and the land in between is low and vacant, the cost of creating a diversion can be prohibitive.

Local implementation: Channel improvements in Sparta, near Spartan Light Metals, were constructed by the U.S. Army Corps of Engineers in 2003 to provide better storm drainage.

Evansville has a need for limited channel improvements from Evansville Lake to the Kaskaskia River. Evansville has also proposed better use of Evansville Lake for the detention of flood flows that impact properties along Church Street.

Periodic dredging of the Mississippi River and Kaskaskia River has become necessary for navigation purposes.

8.4 Crossings and Roadways

Hazards Addressed	
Y	Flood
	Earthquake
	Winter storms
Y	Summer Storms
	Tornado
	Extreme Heat
	Utility Disruption
	Transportation Incident
	Radiological Incident

In some cases buildings may be elevated above floodwaters but access to the building is lost when floodwaters overtop local roadways, driveways, and culverts or ditches. Depending on the recurrence interval between floods, the availability of alternative access, and the level of need for access, it may be economically justifiable to elevate some roadways and improve crossing points.

For example, if there is sufficient downstream channel capacity, a small culvert that constricts flow and causes localized backwater flooding may be replaced with a larger culvert to eliminate flooding at the waterway crossing point. The potential for worsening adjacent or downstream flooding needs to be considered before implementing any crossing or roadway drainage improvements.

Local implementation: The FEMA Flood Insurance Studies in Randolph County do not contain enough detail to determine in which flood events that roadways or bridges would be overtopped. The best source of information is the observations of local officials. The following bridges or culverts are of concern and should be evaluated for improvements:

Chester – The pump house is not accessible during certain flood events due to not being able to cross the railroad tracks.

Evansville – Maple Street and Church Street.

Prairie du Rocher – State Route 155.

Red Bud – Theodore Drive and County Club Lane.

While the Chester Bridge, which crosses the Mississippi River in not subject to flooding, Missouri State Route 51 does get overtopped by floodwater. The most recent occurrence of this was the 1993 flood. As mentioned earlier in this chapter, Randolph County has a concern that the Chester Bridge is vulnerable to severe damage in the event of a barge accident. The piers of the bridge are unprotected and at risk if struck by a barge.

8.5 Drainage and Storm Sewer Improvements

Hazards Addressed	
Y	Flood
	Earthquake
	Winter storms
Y	Summer Storms
	Tornado
	Extreme Heat
	Utility Disruption
	Transportation Incident
	Radiological Incident

Manmade ditches and storm sewers help drain areas where the surface drainage system is inadequate, or where underground drainageways may be safer or more practical. Storm sewer improvements include installing new sewers, enlarging small pipes, and preventing back flows. Particularly appropriate for depressions and low spots that will not drain naturally, drainage and storm sewer improvements usually are designed to carry the runoff from smaller, more frequent storms.

Because drainage ditches and storm sewers convey water faster to other locations, improvements are only recommended for small local problems where the receiving stream or river has sufficient capacity to handle the additional volume and flow of water. To reduce the cumulative downstream flood impacts of numerous small drainage projects, additional detention or run-off reduction practices should be provided in conjunction with the drainage system improvements.

A combination of restored wetland detention, vegetated swales, infiltration trenches and other best management practices that increase infiltration (reducing runoff), and improve water quality can be implemented in conjunction with stormwater system improvements.

Local implementation: No drainage or sewer improvement projects were reported to the Planning Committee, other than the improvement made near Spartan Light Metals in Chester, discussed above.

8.6 Drainage System Maintenance

Hazards Addressed	
Y	Flood
	Earthquake
	Winter storms
Y	Summer Storms
	Tornado
	Extreme Heat
	Utility Disruption
	Transportation Incident
	Radiological Incident

The drainage system may include detention ponds, stream channels, swales, ditches and culverts. Drainage system maintenance is an ongoing program to clean out blockages caused by an accumulation of sediment or overgrowth of weedy, non-native vegetation or debris, and remediation of streambank erosion sites.

Periodic inspections and debris removal are needed to prevent dams in streams

"Debris" refers to a wide range of blockage materials that may include tree limbs and branches that accumulate naturally, or large items of trash or lawn waste accidentally or intentionally dumped into channels, drainage swales or detention basins. Maintenance of detention ponds may also require revegetation or repairs of the restrictor pipe, berm or overflow structure.

Maintenance activities normally do not alter the shape of the channel or pond, but they do affect how well the

drainage system can do its job. Sometimes it is a very fine line that separates debris that should be removed from natural material that helps form habitat. Therefore, written procedures that are consistent with state laws and environmental concerns are usually needed.

A regular inspection and maintenance program can remove debris before it becomes an obstruction to stream flows.

Government agencies usually accept responsibility for maintaining facilities on public property. However, in Illinois, the responsibility for drainageway maintenance on private property, when no easements have been granted, is with the individual private property owner. This often results in very little maintenance being accomplished.

Local implementation: No drainage system maintenance programs were reported to the Planning Committee.

8.7 Conclusions

1. Structural projects, such as the Kaskaskia River Lock and Dam, have been used effectively to reduce flooding in Randolph County.

2. Some levees in Randolph County have preformed better than others since their construction.

3. Structural measures could be used further to address additional floodwater management areas of concern. However, it should be understood that they can have adverse impacts on downstream properties and on the environment. They can also be very expensive.

4. Structural projects can be effective in protecting critical facilities and infrastructure, such as, the Roots Bridge, from natural and manmade hazards.

5. There are a number of locations where bridge or culvert replacement or enlargement should be considered. However, as with structural projects, such work could increase flood problems elsewhere.

6. The Chester Bridge at the Mississippi River is unprotected from incidents, such as barge accidents.

7. Local drainage and stormwater flooding (both in and outside the floodplain) would benefit from drainage system improvements.

8. Drainage maintenance programs in communities are important.

8.8 Recommendations

1. Structural flood control projects, including farm drainage and bridge and culvert improvements, should be pursued, provided they meet the following criteria:

a. Each project should be coordinated with the Soil and Water Conservation District
b. Each project's study looks beyond the immediate project site to ensure that no other properties will be adversely impacted.
c. Each project's study considers protecting the natural functions of the stream and floodplain, in addition to flood protection.
d. Each project's study considers alternative non-structural approaches to protect the affected properties from flood damage.
e. The design and construction is certified by a licensed professional engineer.
f. Opportunities for stream and natural areas restoration are incorporated wherever feasible.
g. Communities and property owners that may be affected by the project are notified.
h. All relevant federal, state and local permits are obtained, including Corps of Engineer's 404 permits and IDNR floodway permits.

2. Each municipality and the County will consider establishing a formal and regular drainage system maintenance program.

3. Recurring flooding problems in the County should be examined, such as:

- Nine Mile Creek, north of Ellis Grove
- Along State Route 4, south of Sparta
- Ponding in the downtown area of Steeleville

8.9 References

1. Studies listed on page 8-2 of this chapter.
2. *CRS Coordinator's Manual*, Community Rating System, FEMA, 2002.
3. *CRS Credit for Drainage System Maintenance*, FEMA, 2002.
4. *Flood Insurance Study, Randolph County, Illinois*, FEMA, 1986.
5. Survey of municipalities and County offices, 2004 and 2005.

Chapter 9. Public Information

Hazard mitigation public information activities advise property owners, renters, businesses, and local officials about hazards and ways to protect people and property from these hazards. These activities can motivate people to take the steps necessary to protect themselves and others. A successful hazard mitigation program involves a public information strategy and involves both the public and private sectors.

This chapter discusses activities that reach out to people and tells them to be advised of the hazard, and discusses elements of a public information outreach strategy.

9.1 Outreach Projects

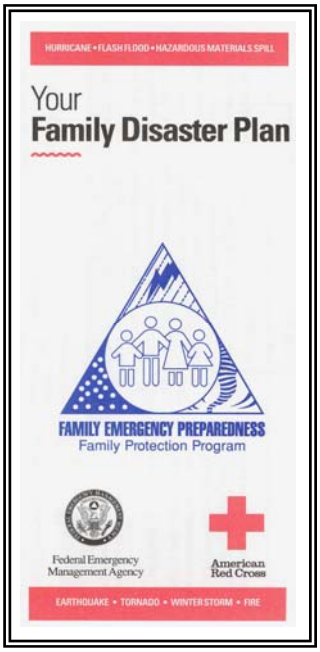
Hazards Addressed	
Y	Flood
Y	Earthquake
Y	Winter storms
Y	Summer Storms
Y	Tornado
Y	Extreme Heat
Y	Utility Disruption
	Transportation Incident
	Radiological Incident

Numerous government agencies and non-profit organizations publish public information and guidance regarding hazards and hazard mitigation. Communities often provide technical assistance and library resources. None of these efforts are effective, however, if no one knows they exist.

An outreach project can remedy this. Outreach projects are the first step in the process of orienting property owners to property protection and assisting them in designing and implementing a project. They are designed to encourage people to seek out more information in order to take steps to protect themselves and their properties. Sending notices to property owners can help introduce the idea of property protection and identify sources of assistance.

Community newsletters/direct mailings: The most effective types of outreach projects are mailed or distributed to everyone in the community or, in the case of floods, to floodplain property owners.

Research has proven that outreach projects work. However, awareness of the hazard is not enough; people need to be told what they can do about the hazard, so projects should include information on safety, health and property protection measures. Research has also shown that a properly run local information program is more effective than national advertising or publicity campaigns. Therefore, outreach projects should be locally designed and tailored to meet local conditions.



News media: Local newspapers can be strong allies in efforts to inform the public. Press releases and story ideas may be all that's needed to whet their interest. After a tornado in another community, people and the media become interested in their tornado hazard and how to protect themselves and their property. Local radio stations and cable TV channels can also

help. These media offer interview formats and cable may be willing to broadcast videos on the hazards.

Other approaches: Examples of other outreach project approaches include:

- School programs,
- Presentations at meetings of neighborhood, civic or business groups,
- Displays in public buildings or shopping malls,
- Signs in parks, along trails and on waterfronts that explain the natural features (such as the river) and their relation to hazards (such as floods),
- Brochures available in municipal buildings and libraries, and
- Special meetings such as floodproofing open houses.

Local implementation: Table 9-1 shows which Randolph County communities provide residents with a newsletter, offer a website, and/or provide technical assistance for floodplain management issues or addressing wind or snow hazards.

Table 9-1 Randolph County Community Public Information Efforts

Municipality	Community newsletter	Website	Technical assistance
Randolph County	No	*www.randolphco.org*	Yes
Baldwin	No	--	No
Chester	No	*www.chesterill.com*	No
Coulterville		--	--
Ellis Grove	No	--	No
Evansville	With Water Bill	--	Yes
Kaskaskia	--	--	--
Percy	--	--	--
Prairie du Rocher	No	--	Yes
Red Bud	No	*www.cityofredbud.org*	No
Rockwood	--	--	--
Ruma	--	--	--
Sparta	No	www.egyptian.net/~spartacc/	Yes
Steeleville	--	--	--
Tilden	--	--	--

The American Red Cross has a variety of brochures and publications on safety measures to take for fires, floods, winter storms, heat, etc. Their publications are tailored for

different age groups. The Red Cross also conducts specialized programs on topics such as "home alone safety," first aid and CPR, and what to do during a disaster.

American Red Cross brochures can be ordered through the Little Egypt Network of the American Red Cross in Herrin, Illinois (618/988-1147).

Randolph County schools, including the Sparta public schools, provide students with a program for tornado safety and other hazards.

9.2 Real Estate Disclosure

Hazards Addressed	
Y	Flood
	Earthquake
	Winter storms
	Summer Storms
	Tornado
	Extreme Heat
	Utility Disruption
	Transportation Incident
	Radiological Incident

Many times after a flood or other natural disaster, people say they would have taken steps to protect themselves if only they had known they had purchased a property exposed to a hazard. Three regulations, one federal and two state, require that a potential buyer of a parcel be told of their exposure to a hazard.

Federal law: Federally regulated lending institutions must advise applicants for a mortgage, or other loan that is to be secured by an insurable building, that the property is in a floodplain as shown on the Flood Insurance Rate Map.

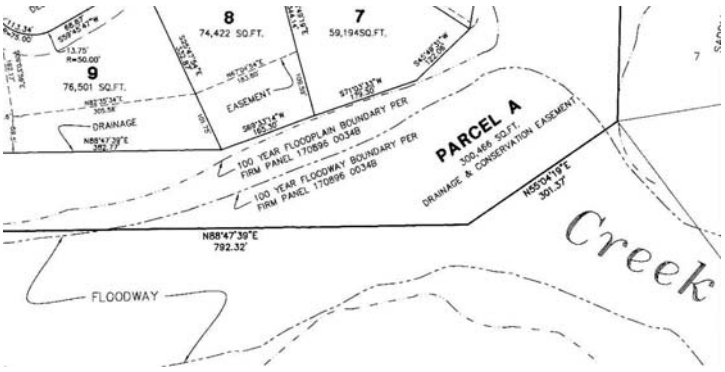
Flood insurance is required for buildings located within the base floodplain if the mortgage or loan is federally insured. However, because this requirement has to be met only 10 days before closing, often the applicant is already committed to purchasing the property when he or she first learns of the flood hazard.

Illinois Residential Real Property Disclosure Act: This law requires a seller to tell a potential buyer:

- If the seller is aware of any flooding or basement leakage problem
- If the property is located in a floodplain or if the seller has flood insurance
- If the seller is aware of a radon problem
- If the seller is aware of any mine subsidence or earth stability defects on the premises
- If the seller is aware of any structural defects

This State law is not wholly reliable because the seller must be aware of a problem and willing to state it on the disclosure form. Due to the sporadic occurrence of flood events, a property owner may legitimately not be aware of potential flooding problems with a property being sold or purchased. Practices by local real estate boards can overcome the deficiencies of these laws and advise newcomers about the hazard earlier. They may also encourage disclosure of past flooding or sewer problems, regardless of whether the property is in a mapped floodplain.

The shortcoming of this approach is that it is dependent on the seller, not on an independent check of the flood map. Multiple Listing Service (MLS) entries read "Flood insurance may be required." This does not provide any help in disclosing the flood hazard.



Subdivision plat with flood hazard disclosure

Illinois Compiled Statutes: Chapter 55, Section 5/3-5029 requires that all subdivision plats must show whether any part of the subdivision is located in the 100-year floodplain (see example).

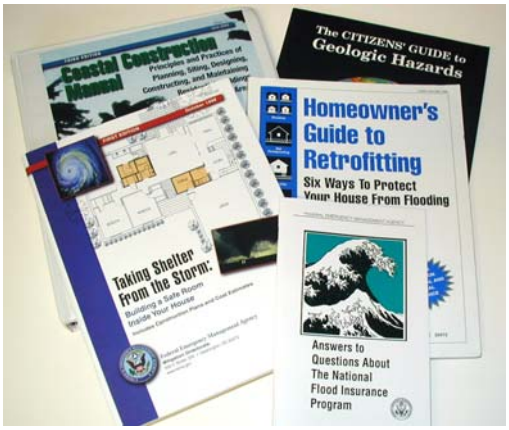
9.3 Library and Web Sites

Hazards Addressed	
Y	Flood
Y	Earthquake
Y	Winter storms
Y	Summer Storms
Y	Tornado
Y	Extreme Heat
Y	Utility Disruption
	Transportation Incident
	Radiological Incident

The community library and local web sites are obvious places for residents to seek information on hazards, hazard protection, and protecting natural resources. Books and pamphlets on hazard mitigation can be given to libraries, many of them obtained free from state and federal agencies. Libraries also have their own public information campaigns with displays, lectures, and other projects, which can augment the activities of the local government.

Today, web sites are becoming more popular as research tools. They provide quick access to a wealth of public and private sites and sources of information. Through links to other web sites, there is almost no limit to the amount of up-to-date information that can be accessed by the user.

In addition to on-line floodplain maps, websites can link to information for homeowners on how to retrofit for tornadoes, earthquakes and floods and a "FEMA for Kids" site. This website teaches children how to protect their home and what to have in a family disaster kit.



There are many hazard protection references that can be put in libraries

Local implementation: Communities with websites are listed in Table 9-1. At this time, none of the websites direct users to hazard information, although the County website under ESDA does contain links to IEMA and FEMA. Randolph County libraries are listed in Table 9-2. Potentially, the community libraries have a variety of references on natural hazards. Evansville has hazard mitigation information available at the City Hall.

Table 9-2 Randolph County Public Libraries*

- Chester Public Library 733 State Street
- Coulterville Public Library 103 South Fourth Street
- Evansville Public Library 602 Public Street
- Steeleville Public Library District - Percy Reading Center, 306 West Pine Street
- Red Bud Public Library 925 South Main Street
- Sparta Public Library 211 West Broadway
- Steeleville Area Public Library District 107 West Broadway Avenue
- Tilden Public Library 540 Pine Street

- Chester High School Library, 1901 Swanwick Street
- Red Bud High School Library, 815 Locust Street
- Southwestern Illinois College Red Bud Campus Library, 500 West South Fourth Street
- Sparta High School Library, 205 West Hood

*Elementary School libraries not included.

9.4 Technical Assistance

Hazards Addressed	
Y	Flood
	Earthquake
Y	Winter storms
	Summer Storms
Y	Tornado
	Extreme Heat
	Utility Disruption
	Transportation Incident
	Radiological Incident

Hazard information: Many benefits stem from providing map information to inquirers. Residents and business owners that are aware of the potential hazards can take steps to avoid problems and/or reduce their exposure to flooding. Real estate agents and house hunters can find out if a property is floodprone and whether flood insurance may be required.

Communities can easily provide map information from FEMA's Flood Insurance Rate Maps (FIRMs) and Flood Insurance Studies. They may also assist residents in submitting requests for map amendments and revisions when they are needed to show that a building is outside the mapped floodplain.

Communities often supplement what is shown on the FIRM with maps that complement and clarify the FIRM and information on additional hazards, flooding outside mapped areas and zoning. When the map information is provided, community staff can explain insurance, property protection measures and mitigation options that are available to property owners. They should also remind inquirers that being outside the mapped floodplain is no guarantee that a property will never get wet.

Property protection assistance: While general information provided by outreach projects or the library helps, most property owners do not feel ready to retrofit their buildings without more specific guidance. Local building department staffs are experts in construction. They can provide free advice, not necessarily to design a protection measure, but to steer the owner onto the right track.

Building or public works department staff can provide the following types of assistance:

- Visit properties and offer protection suggestions
- Recommend or identify qualified or licensed contractors
- Inspect homes for anchoring of roofing and the home to the foundation
- Provide advice on protecting windows and garage doors from high winds
- Explain when building permits are needed for home improvements

Local implementation: The Randolph County Zoning office provides advice and technical assistance to property owners and local government units for floodplain management. [The Randolph County Health Department provides technical guidance related to septic system failure and well contamination.]

Prairie du Rocher, Evansville, Sparta provide technical assistance for floodplain management issues. Prairie du Rocher and Sparta officials will visit properties to provide advice. Sparta also give technical assistance for addressing wind and snow hazards for buildings.

9.5 Public Information Program Strategy

Hazards Addressed	
Y	Flood
Y	Earthquake
Y	Winter storms
Y	Summer Storms
Y	Tornado
Y	Extreme Heat
Y	Utility Disruption
	Transportation Incident
	Radiological Incident

The development of a public information program strategy a way to be sure that a community's public information efforts are effective. A public information program strategy involves the review of local conditions, local public information needs, and a recommended action plan of activities. A strategy should consist of the following parts, which are incorporated into this plan.

- The local hazards – discussed in Chapter 2 of the *Plan*.
- The property protection measures appropriate for a specific hazard – discussed in Chapters 2 and 5.
- Hazard safety measures appropriate for the local situation. Examples for earthquakc hazards are shown on page 9-8.
- Flood safety measures appropriate for the local situation – discussed in the box on page 9-10.
- The public information activities currently being implemented within the communities, including those by non-government agencies – discussed in sections 9.1 through 9-4.
- Goals for the community public information programs are covered in Chapter 3.

- The outreach projects that will be done each year to reach the goals are section 9-7's recommendations and Chapter 10's Action Plan.
- The process that will be followed to monitor and evaluate the projects is in Chapter 10's Action Plan

Much of the above items are taken from FEMA's Community Rating System for the National Flood Insurance Program, but the strategy is useful and applicable for any hazard or mitigation outreach effort.

Public information topics: The Planning Committee worked through a list of potential public information topics and selected ten topics to focus initial efforts on. These selected topics are shown in the recommendations section of this chapter (9.7). Of note is the recommendation for more information on mosquito protection and eradication. This is due to the concern for the West Nile Virus. Safety is another important topic selected by the Committee, along with more information on earthquakes. The Committee agreed that while the area is aware of the earthquake hazard, little information has been provided to residents on earthquake safety or preparedness.

As examples, the following three pages depict some of the available public information on earthquake preparedness and flood safety.

Ways to disseminate public information: The Committee also evaluated ways or methods of distributing the public information messages and materials. The top ten approaches are also presented in the recommendations section of this chapter (9.7).

9.6 Conclusions

1. There are many ways that public information programs can be used so that people and businesses will be more aware of the hazards they face and how they can protect themselves.

2. Public information efforts have been implemented by the County, municipalities, and Red Cross, but primarily during and after disasters.

3. A community's staff can implement some of the public information activities.

4. Outreach projects, libraries and websites can reach a lot of people, but most communities are not including much hazard or mitigation information in any current activities.

Duck, Cover and Hold

Whether you are in your home, a school classroom, a high-rise or other type of building, it is important to know how to protect yourself during an earthquake. Practice what to do during an earthquake with your family members so you can react automatically when the shaking starts. If you are outdoors when the shaking starts, get into an open area away from trees, buildings, walls and power lines. If you are indoors follow these steps.

Duck

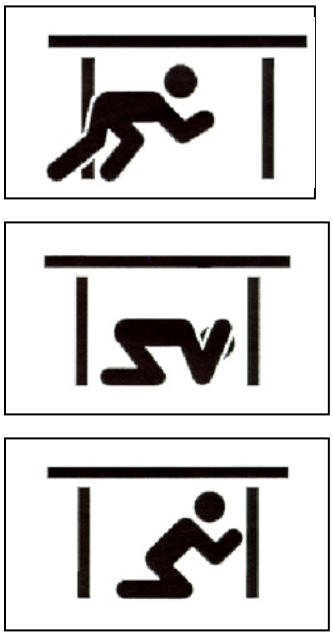
Duck or drop down to the floor.

Cover

Take cover under a sturdy desk, table or other furniture. If that is not possible, seek cover against an interior wall and protect your head and neck with your arms. Avoid danger spots near windows, hanging objects, mirrors or tall furniture.

Hold

If you take cover under a sturdy piece of furniture, hold on to it and be prepared to move with it. HOLD the position until the ground stops shaking and it is safe to move.



Earthquake Preparedness Before, During and After

There are many things you can do to help yourself in the event of an earthquake. Generally, an earthquake is divided into three stages: before, during and after. Know what to do in each stage.

Before

- Develop a family earthquake plan. Prepare yourself and your home by completing the activities on this checklist.
- Decide how and where your family will reunite if separated.
- Choose an out-of-area friend or relative who separated family members can call after the quake to report their whereabouts and condition.
- Know the safe spots in each room: under sturdy tables, desks, or against inside walls.
- Know the danger spots: windows, mirrors, hanging objects, fireplaces and tall, unsecured furniture.
- Conduct practice drills. Physically place yourself in safe locations.
- Learn first aid and CPR (cardiopulmonary resuscitation) from your local American Red Cross chapter or other community organization.
- Keep a list of emergency phone numbers.
- Learn how to shut off gas, water and electricity in case the lines are damaged. (Safety note: Do not attempt to relight a gas pilot).
- Secure water heaters and appliances that could move enough to rupture lines.
- Secure heavy furniture, hanging plants, heavy pictures or mirrors.
- Keep flammable or hazardous liquids in cabinets or on lower shelves.
- Maintain emergency food, water and other supplies, including a flashlight, a portable battery-operated radio, extra batteries, medicines, first aid kit and clothing.

Earthquake Preparedness
Before, During and After - continued

During

- If indoors, stay there and take cover under a table, desk, or other sturdy furniture.
- Face away from windows and glass doors.
- A doorway without a door is an acceptable location in which to stand.
- Lie, kneel or sit near a structurally sound interior wall or corner away from windows, brick fireplaces, glass walls, etc.
- Protect your head and body from falling or flying objects.
- Remain where you are until shaking stops. Think out your plan of action first, then move.
- Know exit routes if in a commercial building. Take cover and don't move until the shaking stops.
- If outside, get into an open area away from trees, buildings, walls and power lines.
- Lie down or crouch low to maintain balance.
- Get to the best available shelter if there is no open area available.
- If driving, stop safely as soon as possible. Stay inside your vehicle until the shaking stops.
- Do not stop your vehicle under overpasses or bridges.
- Stay below window level in your vehicle.
- Turn off the engine and turn on the radio. Follow emergency instructions.
- Stay in the vehicle if downed power lines have fallen across it. Do not touch metal. Wait for help. You might be able to back away from lines.
- If you have to leave your vehicle, move to an open area quickly.

After

- Check for injuries. Render first aid. Do not move seriously injured victims unless they are in immediate danger. Do not use the telephone immediately unless there is a serious injury, fire or other emergency. Hunt for hazards.
- Check for other hazards and control them (fire, chemical spills, toxic fumes and possible collapse).
- Check utilities (water, gas, electric). If there is damage, turn the utility off at the source.
- Check for other hazards and control them (fire, chemical spills, toxic fumes and possible collapse).
- Check building for cracks and damage, including roof, chimneys, and foundation.
- Check food and water supplies.
- Emergency water can be obtained from water heaters, melted ice cubes, canned vegetables, and toilet tanks.
- Never use matches, lighters or candles inside.
- Turn on the radio and listen for emergency broadcasts/announcements, news reports, and instructions. Cooperate with public safety officials.
- Do not use your vehicle unless there is an emergency. Keep the streets clear for emergency vehicles.
- If buildings are suspect, set up your shelter area away from damage.
- Work with your neighbors for a quicker recovery. Stay calm and lend a hand to others.
- Be prepared for aftershocks.
- Plan for evacuation in case events make this necessary. Leave written messages for other family members or searchers.
- Use gloves, wear heavy shoes, and have adequate and appropriate clothing available.

Source: Illinois Emergency Management Agency
www.state.il.us/Prep/earthquake.htm

Flood Safety

- Do not walk through flowing water. Drowning is the number one cause of flood deaths. Currents can be deceptive; six inches of moving water can knock you off your feet. Use a pole or stick to ensure that the ground is still there before you go through an area where the water is not flowing.
- Do not drive through a flooded area. More people drown in their cars than anywhere else. Don't drive around road barriers; the road or bridge may be washed out.
- Stay away from power lines and electrical wires. The number two flood killer after drowning is electrocution. Electrical current can travel through water. Report downed power lines to the Police or Sheriff by calling 911.
- Look out for animals that have been flooded out of their homes and who may seek shelter in yours. Use a pole or stick to poke and turn things over and scare away small animals.
- Look before you step. After a flood, the ground and floors are covered with debris including broken bottles and nails. Floors and stairs that have been covered with mud can be very slippery.
- Be alert for gas leaks. Use a flashlight to inspect for damage. Don't smoke or use candles, lanterns, or open flames unless you know the gas has been turned off and the area has been ventilated.
- Carbon monoxide exhaust kills. Use a generator or other gasoline-powered machine outdoors. The same goes for camping stoves. Charcoal fumes are especially deadly -- cook with charcoal outdoors.
- Clean everything that got wet. Flood waters have picked up sewage and chemicals from roads, farms, factories, and storage buildings. Spoiled food, flooded cosmetics, and medicine can be health hazards. When in doubt, throw them out.
- Take good care of yourself. Recovering from a flood is a big job. It is tough on both the body and the spirit and the effects a disaster has on you and your family may last a long time.

9.7 Recommendations

1. The County and municipalities should develop a public information strategy with focus on floods, earthquakes, tornadoes, severe summer and winter storm hazards.

2. The following topics should be covered in public information activities.

- Mosquito protection/eradication
- Thunderstorm/lightning safety precautions
- Earthquake safety precautions
- Emergency protection measures
- Sources of assistance for property owners
- What the municipalities and county agencies are doing
- Safety in building during emergencies
- Protecting water quality (streams and stormwater)
- Health hazards
- Reporting dumping violations

3. Sample articles, with illustrations, on these topics should be prepared and distributed to all interested parties, such as public information offices, webmasters, permit offices, reception desks, and neighborhood organizations.

4. The following media should be used to convey these messages:

- Newspaper articles and supplements
- Educational programs in schools
- Handouts and flyers at public places
- Cable TV notices
- Presentations at neighborhood meetings
- Special events (e.g., “flood week”)
- Utility bill or insurance bill “stuffers”
- Web site with links to other sources
- Newsletters

6. Each County office and municipality should review their current public information activities and incorporate the messages in them, where appropriate, or develop public information activities.

7. Local libraries should be provided with an order form for people to order free state and federal hazard mitigation publications.

8. Community websites should include information and links to other sites to cover as many mitigation topics as possible.

9. Communities in the Flood Insurance Program should provide floodplain information for property owners.

9.8 References

1. Community surveys, January 2005.

2. *Are You Ready? A guide to Citizen Preparedness,* FEMA, 2002.

3. *CRS Credit for Outreach Projects,* Federal Emergency Management Agency, 2002.

4. *Floodproof Retrofitting: Homeowner Self-Protective Behavior*, Shirley Bradway Laska, University of Colorado, 1991.

5. Municipal websites and questionnaires, Spring 2003.

6. *Protecting Nature in Your Community*, Chicago Wilderness and Northeastern Illinois Planning Commission, 2000.

7. *Stormwater Management Public Information Resource Guide,* South Suburban Mayors and Managers Association, 1999

Chapter 10. Action Plan

10.1 Action Plan Overview

The findings, conclusions and recommendations of Chapters 1 through 9 of the Randolph County *All Hazards Mitigation Plan* have been aggregated into this Action Plan. The Action Plan established the general direction of the Randolph County mitigation program. Specific mitigation activities pursuant to the general direction are detailed in Section 10.2. A table summarizing all of the action items is provided in Section 10.3. Section 10.4 addresses plan maintenance.

The overall direction of this *Plan* can be summarized under the six goals established in Chapter 3:

Goal 1. Protect the lives, health, and safety of the citizens of Randolph County from the effects of natural hazards and manmade hazards.

Goal 2. Protect critical facilities and public infrastructure with public funds.

Goal 3 Mitigate to protect against economic and transportation losses due to natural and manmade hazards.

Goal 4. Mitigate potential damage to buildings and structures through efforts that allow property owners to help themselves.

Goal 5. Identify specific projects to mitigate damage where cost-effective and affordable.

Goal 6. Protect historic, cultural, and natural resources from the effects of natural hazards and manmade hazards.

The eight guidelines from Chapter 3 set the direction or the strategy for the mitigation activities developed or recommended in Chapters 4 through 9. The guidelines also set the direction for the action items in this Chapter.

Guideline 1. Focus natural hazards mitigation efforts on floods, earthquakes, winter storms, tornadoes, summer storms, and extreme heat.
Guideline 2. Focus manmade hazard mitigation efforts on utility disruption, transportation related incidents and radiological release incidents.
Guideline 3. Make people aware of the hazards they face and encourage people to assume some responsibility for their own protection.
Guideline 4. New developments should not create new exposures to damage from natural hazards or manmade hazards.
Guideline 5. Local initiatives should focus on protecting citizens and public property.
Guideline 6. Use available local funds, when necessary, in efforts that protect the lives, health, and safety of people from natural and manmade hazards.
Guideline 7. Seek state, and federal support for mitigation initiatives and special projects.
Guideline 8. Strive to improve housing and business opportunities in Randolph County in conjunction with planned mitigation efforts.

Recommendations for this *Randolph County All Hazard Mitigation Plan* appear at the end of Chapters 4 – 9 for each of the six mitigation strategies (preventive, property protections, resource protection, emergency services, structural measures, and public information). This chapter converts those recommendations to specific action items, generally following the same order of mitigation strategy as Chapters 4 – 9. Action items have been developed for recommendations that are both a priority and feasible in the next few years. Feasibility has to due with current County resources and the likelihood of grant funding from state and federal agencies. Recommendations not included in the Action Plan are no less important. Some recommendations act as "building blocks" to other recommendations. Some recommendations may not be fundable until mitigation funds are made available following a disaster declaration.

The action items in Section 10.2 assign recommended projects and deadlines to the appropriate agencies. Each action item starts with a short description. The next four subheadings list the responsible agency, the deadline for accomplishing the action item, the costs and the benefits. The action items are summarized in Table 10-1 (page 10-12). All of the action items can be tied to the above listed goals and guidelines and the recommendations in Chapters 4 – 9. The relationship between the goals and guidelines are shown in Table 10-2 (page 10-13). The recommendations and the discussions in earlier chapters provide more background and direction on these action items.

Action items are grouped into program activities, public information items and administrative items.

10.2 Mitigation Action Items

Mitigation Program Action Items

Action 1: Building Code Improvements

Adopt the latest International series of codes, the new national standard that is being adopted throughout the country. Code revisions should be pursued to strengthen new buildings against damage by high winds, tornadoes, hail, and earthquakes. Requiring tornado "safe rooms" in certain structures should be considered. Any code revisions should be consistent with the efforts undertaken by multi-community organizations of building department staff.

Responsible agency: Randolph County and building departments for those municipalities that have not adopted the I-Codes.

Deadline: Adoption of the I-Codes: 18 months

Cost: Staff time.

Benefits: This will improve the hazard protection standards for new construction and will ensure a consistent set of building standards across the County. Countywide adoption of the IBC will protect against damages that are likely to occur during natural hazards.

Action 2 - Code Administration and Enforcement Training

Develop and conduct training for building department staff on building code administration, enforcement, and the natural hazards aspects of the International Codes, regulation of mobile home installation, floodplain ordinances, and provisions applicable to hazard mitigation

Responsible agency: Randolph County and building departments.

Deadline: 24 months.

Cost: Staff time.

Benefits: Building codes cannot be effective unless they are administered and enforced properly. Training will ensure that county and municipal staff understand the codes and procedures. This is a benefit that property owners will also benefit from as they understand the importance of the building standards for new construction. It also allows them to protect their investment in the property.

Action 3 – Critical Facilities Design with All Hazards Protection

Offices responsible for design, construction or permitting critical facilities, including federal, state, county and municipal agencies, should ensure that the design or modification of critical facilities accounts for natural and manmade hazards and adjacent land uses.

Responsible agency: County, municipal, federal and state agencies responsible for critical facilities.

Deadline: Ongoing.

Cost: Staff time.

Benefits: This *Plan* expanded the list of critical facilities to include school, places of assembly, and other assets that are significant in the county during times of natural or manmade disasters. These may be shelters, or places of concentrated populations. If these facilities are better protected, then the risk for life, health and safety is reduced.

Action 4 - Mapping of Hazards

Natural and manmade hazard mapping should be developed on a countywide basis, as part of the County's GIS mapping effort. Mapping should include critical facilities listed in Appendix D.

Responsible agency: Randolph County ESDA and GIS.

Deadline: 12 months.

Cost: Staff time.

Benefits: The County's GIS is under development, and map layers that pertain to hazard mitigation will be developed. The mapping will benefit several groups, including, the Mitigation Committee as they implement this Action Plan, emergency officials as they

prepare or respond to disasters or incidents, permit and building officials as property develops, and property owners interested in mitigating against hazards.

Action 5 - Structural Evaluation of Buildings for Earthquake Hazards

Critical facilities, historic areas and cultural assets of the County should be evaluated for potential earthquake damages. Mitigation or retrofitting opportunities for structures should also be assessed. A standard checklist should be developed to evaluate a property's exposure to earthquake damage. Historic areas of Randolph County, such as, downtown Red Bud and Sparta Brick Town, should also be assessed to determine if seismic protection measures are feasible.

Responsible agency: Randolph County ESDA

Deadline: 36 months.

Cost: Staff time, plus $100,000 for consultants.

Benefits: A priority should be placed on determining critical facilities' vulnerability to earthquake damage. Other than the HAZUS results provided in the *Plan*, vulnerability of structures is unknown. Public and private entities will be able touse the standard checklist to evaluate their properties if they are not included in the scope of this project.

Action 6 –Retrofitting of Buildings for Earthquake Hazards

Should retrofitting be needed to protect critical facilities from earthquake hazards, and it can be shown that the project would be cost-effective, funding assistance should be applied for from FEMA or IEMA. The County should also effectively utilize any post-disaster mitigation funds towards earthquake retrofitting of critical facilities.

Responsible agency: Randolph County ESDA.

Deadline: 48 months.

Cost: Staff time.

Benefits: Any protection of critical facilities and assets from earthquake damage reduce injury and loss of life, and will benefit the entire County if critical facilities can remain operational following a disaster.

Action 7 - Mitigation for Floodplain Properties and Critical Facilities

Repetitive flood loss areas with in the mapped 100-year floodplain should be investigated and mitigated, along with any critical facilities in the floodplain. Since the 1993 and 1995 floods, it is unclear how many properties remain on the countywide list of repetitive loss properties.

The number of structures within the 100-year floodplains should be determined in more detail than what has been provided by the HAZUS software, and mitigation opportunities for those structures should be identified. Include a review of insurance coverage and identify where more information can be found on the property protection measures.

Should major work be needed to protect a facility, and it can be shown that the project would be cost-effective, funding assistance could be applied for from FEMA or IEMA. Also, the County should make use of available post-disaster mitigation dollars to provide floodplain property protection.

All communities currently in the NFIP should remain in full compliance.

Responsible agency: Randolph County Zoning and ESDA.

Deadline: 24 months.

Cost: Staff time, plus $50,000 for consultant and interns.

Benefits: Much as been done in Randolph County for flood mitigation and for addressing repetitive loss. Much of this work, however, occurred when the opportunity presented itself. This comprehensive effort through participation in the NFIP and examining all floodprone properties and facilities will allow Randolph County to implement additional mitigation measures before the next major flood.

Action 8 – Include the All Hazards Mitigation Plan into Other Plans

As the county and municipalities develop or revise comprehensive or land use plans, emergency operations plans, and ordinances, the goals and guidelines of this *Plan* should be incorporated into those efforts.

Randolph County Zoning Department is currently drafting a comprehensive plan. The Randolph County ESDA and communities are currently working to update emergency operation plans. Therefore, the goals and guidelines of this *Plan* can be emphasized as those plans are written and revised.

Responsible agency: Randolph County and municipalities

Deadline: Ongoing.

Cost: Staff time.

Benefits: This will ensure that Randolph County takes a consistent approach to hazard mitigation, and develops other plans with the protection of life, health, safety, business and property in mind.

Action 9 – Grant Funding for Safe Rooms

Pursue grant funding for the construction of safe rooms, in homes, businesses, at critical facilities, health care facilities, and schools. The first priority for any available funding should be schools.

Responsible agency: Randolph County and municipalities

Deadline: 36 months

Cost: Staff time (plus grant cost-share)

Benefits: Randolph County is vulnerable to tornado events. With the construction of safe rooms, life and safety can be protected.

Action 10 – NOAA Weather Radios for Critical Facilities, Homes, and Businesses

Provide all critical facilities (as defined by this *Plan*) in the County and municipalities with the latest NOAA weather radios that include additional media alerts.

Responsible agency: County and Municipal ESDAs.

Deadline: 24 months.

Cost: Unknown

Benefits: At the current time, NOAA weather radios are the primary warning mechanism for Randolph County. Many critical facilities already have weather radios. By ensuring that everyone does, then life, health and safety can be protected.

Action 11 – Improved Hazard Warning and Response Capabilities of Emergency Vehicles

Pursue assistance from state and federal agencies, such as, IEMA and FEMA, to provide County and municipal squad cars with disaster response kits that include medical kits and portable stop signs.

Responsible agency: Randolph County ESDA.

Deadline: 36 months.

Cost: Unknown.

Benefits: Randolph County is primarily rural. The lives, health and safety of people would be better protected if emergency vehicles (e.g., squad cars) had equipment to warn and assist people during hazard events.

Action 12 - Improved Threat Recognition

Randolph County and the municipalities should seek funding for improved outdoor warning sirens.

Responsible agency: Randolph County ESDA.

Deadline: 18 months.

Cost: Unknown.

Benefits: With the exception of radios and other police and fire communication networks, Randolph County has limited warning systems. Outdoor warning systems are inadequate for the County. The lives, health and safety of people would be better protected with effective outdoor warning systems.

Action 13 - Improved Emergency Response

Working through the Local Emergency Planning Committee (LEPC), Randolph County and the municipalities should update all state and federal required emergency response plans for natural and manmade hazards.

Responsible agency: Randolph County ESDA and municipal ESDAs.

Deadline: 18 months.

Cost: Staff time.

Benefits: Updating and enhancing the County and municipal emergency response plans will enhance the effectiveness of the County's mitigation program. Improved emergency response will also protect the lives, health and safety of the people in Randolph County.

Public Information Action Items

Action 14 - Information for Floodplain Property Owners

Due to their particular vulnerability to damage, properties in floodplains should be provided with information and advice on property protection measures. Special attention should be given to repetitive loss and high hazard areas.

Responsible agency: Randolph County ESDA and Zoning.

Deadline: 18 months.

Cost: Staff time.

Benefits: It is beneficial for people to be aware of hazards that may impact them.

Action 15 – Educate Property Owners on Safe Rooms

Use available brochures and other information to educate residents, businesses, and other property owners about safe rooms for tornadoes. Encourage retrofitting of existing buildings to include safe rooms, and the construction of safe rooms in new building designs.

Responsible agency: Randolph County and municipalities

Deadline: 24 months

Cost: Staff time

Benefits: Randolph County is vulnerable to tornado events and safe rooms used in other parts of the country have proven effective. Encouraging property owners to include safe rooms in their buildings will protect lives.

Action 16 – Educate Property Owners on Earthquake Retrofitting

Use available brochures and other information to educate residents, businesses, and other property owners about retrofitting building for earthquake hazards. Encourage structural

(anchoring foundations, strengthening walls) and non-structural (anchoring shelves and hot water heaters) retrofitting of existing buildings.

Responsible agency: Randolph County and municipalities

Deadline: 24 months

Cost: Staff time

Benefits: Randolph County is vulnerable to earthquakes. Encouraging property owners to implement earthquake retrofitting measures will reduce property damage and injuries.

Action 17 - Public Information Hazard Mitigation Materials

Prepare background information, articles, and other explanations of hazard mitigation topics, including:

Safety in buildings during emergencies
Emergency protection measures
Thunderstorm/lightning safety precautions
Earthquake safety precautions
What the municipalities and county agencies are doing
Sources of assistance for property owners
Health hazards associated with disasters
Benefits of preventive measures
Protecting water quality (streams and stormwater)
Mosquito protection/eradication

These materials are to be provided to County, municipal, school, and private offices for use in presentations, newsletter articles, webpages, brochures and other outreach projects.

Responsible agency: Randolph County ESDA. The American Red Cross could provide technical advice.

Deadline: 6 months.

Cost: Staff time

Benefits: By preparing a master set of locally pertinent articles and materials, each interested office only has to select the most appropriate media and distribute the messages. By simply inserting an article in a newsletter or putting it on the website, the local level of effort is greatly reduced, which increases the likelihood that the messages will get out. The messages will also be technically correct and consistent throughout the County.

Action Item 18 - Public Information Outreach Projects

Prepare and disseminate outreach projects based on the materials provided under action item 17. Such projects should include articles in newsletters, news releases, directed mailings, handouts, websites, and displays. Different media should be used for the following audiences:

The general public
Floodplain residents
Developers and builders
Decision makers
Schools and teachers

Responsible agency: Randolph County ESDA. The American Red Cross should also participate.

Deadline: 12 months.

Cost: Most projects will only cost staff time, such as newsletter articles and websites. Others, such as directed mailings and brochures, will have printing and/or postage expenses.

Benefits: There are many benefits to having a well-informed public. For example, deaths from lightning have steadily decreased over the years because people are more aware of what they should and should not do. More self-help and self-protection measures will be implemented if people know about them and are motivated to pursue them.

Action 19 - Property Protection References

Provide building departments, libraries and other interested offices with a list of references on property protection that can be ordered for free from state and federal offices. Include a request that they make the references available for public use. A special effort should be made to identify references on insurance, emergency preparedness and property protection.

Also, identify websites that provide property protection information and provide their addresses to the County and municipal webmasters.

Responsible agency: Randolph County to collect publications, then municipal offices to place in libraries and offices. The American Red Cross should provide technical advice.

Deadline: 12 months.

Cost: Staff time.

Benefits: As with the other public information activities, this action item helps inform the public. It provides the greatest assistance to those people who want to learn more about property protection and take the right steps to reduce their exposure to damage by natural hazards.

Administrative Action Items

Action Item 20 - *Plan* Adoption

Adopt this *Randolph County All Hazards Mitigation Plan* by passing the resolution provided in the Chapter, as appropriate. The County's resolution should create the All Hazards Mitigation Planning Committee which is described in the next action item. The municipal resolutions should adopt each action item that is pertinent to the community and assigns a person responsible for it.

Responsible agency: County Board, Village Boards and City Councils

Deadline: December 30, 2005 (2 months)

Cost: Staff time

Benefits: Formal adoption of the *Plan* ensures that County and municipal staffs are authorized and instructed to implement the action items. Adoption is also a requirement for recognition of the *Plan* by mitigation funding programs and the Community Rating System.

Action Item 21 - Mitigation Planning Committee

The All Hazards Mitigation Planning Committee would be converted to a permanent advisory body in the County's resolution to adopt this *Plan*. It would:

Act as a forum for hazard mitigation issues,
Disseminate hazard mitigation ideas and activities to all participants,
Allow for continued public participation in the implementation and future revisions,
Ensure incorporation of this *Plan*'s goals and guidelines into other planning documents,
Monitor implementation of this Action Plan, and
Report on progress and recommended changes to the County Board and each municipality.

Responsible agency: The Randolph County ESDA.

Deadline: Ongoing.

Cost: Staff time.

Benefits: The benefit is better implementation of this *Plan*, plus a more comprehensive mitigation program in Randolph County. This approach also provides a mechanism for continued public involvement (e.g., Committee activities posted on County website).

Action Item 22 - Plan Monitoring and Maintenance

A Mitigation Planning Committee meeting will be held *at least* once a year to evaluate and monitor progress on implementation. This meeting will be publicized in local newspapers and on the County and community websites (the public will be welcome to attend and/or comment). An annual evaluation report will be submitted to the County

Board by the Randolph County ESDA director or the current chair of the Mitigation Planning Committee.

At the annual meeting, along with an assessment of the implementation efforts, the Committee will determine if other mitigation issues or efforts, based on any natural or manmade hazard occurrences or input from communities or the public, should be added to the *Plan*. Any substantive revisions to the *Plan*, in particular, to the Action Plan, must be adopted by the County Board and the participating communities.

The Mitigation Planning Committee will update the *Plan* every five years.

Deadline: Evaluation reports are due on the anniversary of the date the *Plan* is adopted by the County Board. A five year update is required for FEMA's mitigation funding programs.

Cost: Staff time.

Benefits: A monitoring system helps ensure that responsible agencies don't forget their assignments or fall behind in working on them. The *Plan* should be evaluated in light of progress, changed conditions, and new opportunities.

10.3 Summary of Action Plan Items

Table 10-1 summarizes the 22 action items, the responsible agencies and the deadlines for implementing them. Again, the action items are categorized as mitigation program items, public information items, and Planning Committee items. Planning Committee items include additional tasks needed to administer and support plan implementation.

The relationship between the goals and guidelines (from Chapter 3) are shown in Table 10-2.

10.4 Plan Implementation and Maintenance

The continuation of the Mitigation Planning Committee is necessary to ensure that the Action Plan is carried out. Accordingly, the creation of a permanent Mitigation Planning Committee is proposed to monitor the implementation of the *Plan*, report to the County Board and municipalities on its progress, and recommend revisions to this *Plan* as needed. This is explained in Action Items 21 and 22.

Maintenance and monitoring of the *Randolph County All Hazards Mitigation Plan* are addressed in Action Item 22. This Action Item explains how and when this *Plan* will be reviewed, revised, and updated. While Action Item 22 calls for the Mitigation Planning Committee to meet at least once a year, it is fully anticipated that they will meet quarterly or semi-annually as Randolph County proceeds with the development of GIS and updates emergency operation plans. These efforts were intentionally incorporated into Action Items 4 and 13 to be sure that all efforts are coordinated.

Table 10-1 Action Items, Responsible Agencies and Deadlines

	Mitigation Program													Public Information						Administrative		
Responsible Agency	1. Building Code Improvements	2. Code Administration and Enforcement Training	3. Critical Facility Design with All Hazards Protection	4. Mapping of Hazards	5. Structural Evaluation of Buildings for Earthquake Hazards	6. Retrofitting of Buildings for Earthquake Hazards	7. Mitigation for Floodplain Properties and Critical Facilities	8. Include the All Hazards Plan into Other Plans	9. Grant Funding for Safe Rooms	10. NOAA Weather Radios	11. Improved Hazard Warning and Resp. Capab.of Emerg. Vehicles	12. Improved Threat Recognition	13. Improved Emergency Response	14. Information for Floodplain Property Owners	15. Educate Property Owners on Safe Rooms	16. Educate Property Owners on Earthquake Retrofitting	17. Public Information - Hazard Mitigation Materials	18. Public Information - Outreach Projects	19. Property Protection References	20. Plan Adoption	21. Hazard Mitigation Planning Committee	22. Plan Maintenance and Monitoring
Randolph County																						
County Board	X							X												X		X
ESDA				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Zoning	X	X	X				X	X						X								
Economic Development								X														
911 Office								X														
Transportation								X														
Other Designated Departments	X	X	X					X									X	X	X			
Municipalities																						
City Council/Village Board	X							X												X	X	X
ESDA Office								X	X	X	X	X	X	X	X	X	X	X	X		X	X
Designated department(s)	X	X	X					X						X			X	X	X			
Regional Office of Education			X															X				
Bi-County Health Department			X															X				
Road Districts			X																			
Planning Agencies				X													X	X				
Drainage Districts			X																			
Illinois Agencies			X																			
American Red Cross																	X	X	X			
Deadline for first product (months)	18	24	--	12	36	48	24	--	36	24	36	18	18	18	24	24	6	12	12	2	--	--

Table 10-2 Action Items, Goals and Guidelines

	Mitigation Program													Public Information						Administrative		
	1. Building Code Improvements	2. Code Administration and Enforcement Training	3. Critical Facility Design	4. Mapping of Hazards	5. Structural Evaluation of Buildings for Earthquake Hazards	6. Retrofitting of Buildings for Earthquake Hazards	7. Mitigation for Floodplain Properties and Critical Facilities	8. Include the All Hazards Plan into Other Plans	9. Grant Funding for Safe Rooms	10. NOAA Weather Radios	11. Improved Warning and Resp. Capab. of Emerg. Vehicles	12. Improved Threat Recognition	13. Improved Emergency Response	14. Information for Floodplain Property Owners	15. Educate Property Owners on Safe Rooms	16. Educate Property Owners on Earthquake Retrofitting	17. Public Information - Hazard Mitigation Materials	18. Public Information - Outreach Projects	19. Property Protection References	20. Plan Adoption	21. Hazard Mitigation Planning Committee	22. Plan Maintenance and Monitoring
Goals																						
Protect the lives, health, and safety.	X	X	X		X	X	X		X	X	X	X	X	X	X	X	X	X	X			
Protect critical facilities and infrastructure.			X	X	X	X	X	X														
Mitigate to protect against economic and transportation losses.	X		X	X	X	X	X				X	X		X	X	X	X	X	X	X	X	X
Mitigate potential damage to buildings and structures.	X				X	X	X		X		X	X	X	X						X	X	X
Identify specific projects to mitigate damage.					X	X	X		X					X								
Protect historic, cultural, and natural resources.	X			X								X					X	X	X			
Guidelines																						
Focus on floods, earthquake, winter storms, tornadoes, summer storms, and extreme heat.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Focus on utility disruption, transportation related incidents and radiological release incidents.	X	X	X					X		X	X	X	X					X	X	X	X	X
Make people aware of the hazards they face.															X	X	X	X	X	X	X	X
New developments should not create new exposures to damage.	X		X	X																X	X	X
Local initiatives should focus on protecting citizens and public property.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Seek state, and federal support for projects.					X	X	X		X	X	X									X	X	X
Strive to improve housing and business opportunities.	X	X	X					X												X	X	X

Table 10-3 Action Items and Recommendations

	Mitigation Program													Public Information						Administrative		
	1. Building Code Improvements	2. Code Administration and Enforcement Training	3. Critical Facility Design	4. Mapping of Hazards	5. Structural Evaluation of Buildings for Earthquake Hazards	6. Retrofitting of Buildings for Earthquake Hazards	7. Mitigation for Floodplain Properties and Critical Facilities	8. Include the All Hazards Plan into Other Plans	9. Grant Funding for Safe Rooms	10. NOAA Weather Radios	11. Improved Warning and Resp. Capab. of Emerg. Vehicles	12. Improved Threat Recognition	13. Improved Emergency Response	14. Information for Floodplain Property Owners	15. Educate Property Owners on Safe Rooms	16. Educate Property Owners on Earthquake Retrofitting	17. Public Information - Hazard Mitigation Materials	18. Public Information - Outreach Projects	19. Property Protection References	20. Plan Adoption	21. Hazard Mitigation Planning Committee	22. Plan Maintenance and Monitoring
Recommendations																						
Ch. 4. Preventive Measures	X	X		X				X								X	X	X	X	X	X	X
Ch. 5. Property Protection			X	X	X	X	X			X				X	X	X	X	X	X	X	X	X
Ch. 6. Resource Protection				X												X	X	X	X	X	X	X
Ch. 7. Emergency Services					X	X		X			X	X	X			X	X	X	X	X	X	X
Ch. 8. Structural Projects													X						X	X	X	X
Ch. 9. Public Information				X										X	X	X	X	X	X	X	X	X

Appendices

Appendix A – Committee Participants
Appendix B – Public Involvement Activities
Appendix C – HAZUS (Not printed with this copy of the *Plan*)
Appendix D – Critical Facilities (Not printed with this copy of the *Plan*)

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Appendix A

Randolph County All Hazards Mitigation Plan
Planning Committee Meeting Participants
December 2004 to November 2005

Agency	Representative Name	Title	Address	City
Randolph County Offices				
ESDA	Nancy J. Schilling	Coordinator	#1 Taylor Street, R100	Chester
Zoning	Diane Mudd	Administrator	#1 Taylor Street, Room 200	Chester
Progress Committee	Edward R. Crow	Director	#1 Taylor Street, P.O. Box 332	Chester
911 Office	Sherry Craig	911	#1 Taylor Street	Chester
Municipalities				
Village of Baldwin	Michael Turnure	Trustee	113 E. Olive Street	Baldwin
Chester ESDA	Daniel R. Hecht	Coordinator	1422 Oak Street	Chester
Chester ESDA	Timothy P. Crow	ESDA	1330 Swanwick	Chester
Chester ESDA	Terry Knop	ESDA	1330 Swanwick	Chester
Coulterville ESDA	Brian Fox	ESDA	114 North Fourth St., P.O. Box 489	Coulterville
Coulterville ESDA	Louie Spinnie	ESDA	925 Nashville Rd	Coulterville
Ellis Grove ESDA	Charles M. Hanton	ESDA	501 Eggemeyer Plaza, P.O. Box 9	Ellis Grove
Village of Evansville	Erwin C. Becker	President	403 Spring Street, P.O. Box 257	Evansville
Evansville Police Dept	Glen Simpson	Chief	403 Spring Street, P.O. Box 257	Evansville
Evansville Fire Dept	Edward Braun	Chief	1402 Pine Street	Evansville
Village of Pr du Rocher	Ernie Doiran	Trustee	207 Bluff View	Prairie du Rocher
Village of Pr Du Rocher	James Sirtak	Trustee	415 Market	Prairie du Rocher
City of Red Bud	Pam Kempfer	Adm Assistant	200 E Market	Red Bud
Red Bud Police Dept	Reginald Hammonds	Chief	200 E. Market	Red Bud
City of Red Bud	John Brittingham	Detective	836 Illinois Avenue	Red Bud
Village of Rockwood	Sherry Johnson		922 County Road 5	Rockwood
Sparta Police Dept	Tom Ashley	Chief	112 W Jackson	Sparta
Sparta Fire Dept	Rob Soderlund	Chief	107 E. Jackson	Sparta
City of Steeleville	Lyn Thies	Asst. Chief	504 S Garfield	Steeleville
Tilden	Earl Dorf	Trustee	330 May	Tilden
Stakeholders – Public				
Road District # 3	Larry Meyerhoff			
MedStar Ambulance	Charles R Kelley	Operations Manager	P.O. Box 296	Sparta
MedStar Ambulance	Lee Davis			

Agency	Representative Name	Title	Address	City
Regional Office of Education	Marc Kiehna	Superintendent	#1 Taylor Street, Room 101	Chester
Stringown Levee District	Lee Prange	Chairman	100 S. Main St.	Waterloo
Coordinating Agencies				
Illinois Emergency Management Agency	Gary Poshard	Regional Coordinator	2309 W. Main St., Suite 110	Marion
Illinois Emergency Management Agency	Chris Pulley		2309 W. Main St., Suite 110	Marion
Southwestern Illinois Metropolitan Planning Commission	Linda Tragesser	Community Planner	203 W. Main Street	Collinsville
Southwestern Illinois RC&D, Inc.	Ed Weilbacher	Coordinator	406 E. Main Street	Mascoutah
Monroe-Randolph Bi-County Health Department	Krista Mulholland	Planner	2515 State Street	Chester
Little Egypt Network - American Red Cross	Patrick Creek	Homeland Security-Vista	112 E. Walnut Street	Herrin
Little Egypt Network - American Red Cross	Sandy Webster		112 E. Walnut Street	Herrin
Consultants				
O'Toole & Associates, Ltd.	Molly O`Toole	President	450 S. Stewart Ave	Lombard
Media				
Sparta News-Plaindealer	Scott Keifer			
North County News	Jane Lucht			
County Journal	Jeff Blair			

Appendix B
Public Involvement Activities

Shown below are samples of public information efforts associated with the development of the Randolph County All Hazards Mitigation Plan:

A. Press Releases

Initial Press Release
November 2004

For Immediate Release

Randolph County is subject to natural hazards that threaten life and health and have caused extensive property damage in the past. Floods struck the County in 1993 and 1995, and tornados in 2002. Randolph County is also subject to earthquake damage. While these hazards are acts of nature, the impacts on residents, public facilities, businesses, and private property can be diminished through hazard mitigation.

The Randolph County is undertaking an All Hazards Mitigation Plan for the County. This Plan will identify activities that can be undertaken by both the government and the private sector to reduce the safety hazards, health hazards, and property damage caused by floods, tornados, earthquakes, thunderstorms and winter/ice storms, and the plan will also examine manmade hazards that can impact the County.

The work is being coordinated by the All Hazards Mitigation Planning Committee, which was created by the County Board on September 3, 2004. The Committee's members include representatives of County offices, interested municipalities, property owner associations, and public organizations.

"Hazard mitigation" means doing everything that can be done to reduce the impact of the natural hazards on people and property. It does not necessarily mean controlling floodwaters or stopping tornadoes. These hazards are natural phenomena and, in many cases, mitigation means adjusting what people do in the face of this natural activity.

There are a variety of mitigation measures. They are organized under six general strategies:

Structural flood control projects - e.g., levees, reservoirs, channel improvements
Property protection- e.g., relocation out of harm's way, retrofitting buildings, insurance Preventive - e.g., zoning, building codes, and other development regulations
Emergency services - e.g., warning, sandbagging, evacuation
Natural resource protection - e.g., wetlands protection, urban forestry programs
Public information - e.g., outreach projects, technical assistance to property owners

The meetings are open to the public. The public is invited to comment on the plan and the planning effort. Beginning on Thursday, December 2, 2004, the Mitigation Planning Committee will generally meet on the first Thursday of each month at Reid's Harvest House in Chester, at 10:30 a.m. The meetings are open to the public. For more information, contact the Nancy Schilling, Randolph County ESDA Coordinator at 618/826-5000, ext. 227.

Ongoing Press Releases

DRAFT – Press Release for February 3, 2005 Meeting
For Immediate Release

The second meeting of the Randolph County Hazard Mitigation Planning Committee was held on February 3, 2005 at Reid's Harvest House in Chester. The Mitigation Planning Committee has been established to develop the County's All Hazards Mitigation. Randolph County staff, representatives of participating municipalities, and interested agencies makes up the Committee.

The Committee worked through several exercises to examine the potential natural and manmade hazards that face Randolph County, and to developed hazard mitigation goals for the County. The Plan will identify activities that can be undertaken by both the government and the private sector to reduce the safety hazards, health hazards, and property damage caused by floods, tornados, earthquakes, thunderstorms and winter/ice storms. This will be done based on the goals developed at Thursday's meeting.

The Randolph County is subject to natural hazards that threaten life and health and have caused extensive property damage in the past. Floods affect the County frequently and as recently as 2003. Tornados caused damage in 2002 and 2003. Randolph County is also subject to earthquake damage and manmade hazards. Hazards are usually acts of nature, but the impacts on residents, public facilities, businesses, and private property can be diminished through hazard mitigation.

"Hazard mitigation" means doing everything that can be done to reduce the impact of the natural hazards on people and property. It does not necessarily mean controlling floodwaters or stopping tornadoes. These hazards are natural phenomena and, in many cases, mitigation means adjusting what people do in the face of this natural activity.

The public is invited to comment on the plan and the planning effort. The Mitigation Planning Committee will generally meet on the first Thursday of each month at Reid's Harvest House in Chester, at 10:30 a.m. The meetings are open to the public. For more information, contact the Nancy Schilling, Randolph County ESDA Coordinator at 618/826-5000, ext. 227.

North County Journal, Red Bud, IL October 27, 2005

COUNTY JOURNAL SECTION TWO

ory Included he Outdoors

Public Meeting Set To Discuss Hazard Plan

The Randolph County Hazard Mitigation Planning Committee has completed a draft of the All Hazards Mitigation Plan.

On November 3 at 11 a.m., the Hazard Mitigation Planning Committee will hold a public meeting to discuss the draft plan. The meeting will be held at the Randolph County Courthouse third floor lounge.

Following the public meeting, the committee will recommend that the plan be adopted by the Randolph County Board of Commissioners and the participating municipalities.

Hazard Mitigation Planning Committee was established by the county board and the Randolph County ESDA office. Randolph County staff, representatives of participating municipalities, and interested agencies make up the committee.

The committee has been meeting once a month since December, 2004 to examine the potential natural and man-made hazards that face Randolph County and to develop hazard mitigation goals for the county.

The plan identifies activities that can be undertaken by both the government and the private sector to reduce the safety hazards, health hazards and property damage caused by floods, tornadoes, earthquakes, thunderstorms and winter/ice storms.

Randolph County is subject to natural hazards that threaten life and have caused extensive property damage in the past.

Hazard mitigation means doing everything that can be done to reduce the impact of the natural hazards on people and property. It does not necessarily mean controlling floodwaters or stopping tornadoes. These hazards are natural phenomena and, in many cases, mitigation means adjusting what people do in the face of this natural activity, according to ESDA Coordinator Nancy Schilling.

The public is invited to the public meeting and to comment on the plan and the planning effort. For more information, contact Schilling at 826-5000, ext. 227.

North County News
THE GREATER KASKASKIA VALLEY — PUBLISHING AND PRINTING SINC
E 47 - NUMBER 40 — TWENTY-TWO PAGES — RED BUD, ILLINOIS 62278 — THURSDAY, OCTO

Hazard Mitigation Planning Committee to discuss draft plan in public meeting

The Randolph County Hazard Mitigation Planning Committee has completed a draft of the Randolph County All Hazards Mitigation Plan. On November 3, 2005 the Hazard Mitigation Planning Committee will hold a public meeting to discuss the draft plan. The public meeting will be held on Thursday, November 3, at 11 a.m. at Randolph County Courthouse 3rd Floor Lounge, #1 Taylor Street in Chester. Following the public meeting the Committee will recommend that All Hazards Mitigation Plan be adopted by the Randolph County Board of Commissions and the participating municipalities.

The Hazard Mitigation Planning Committee was established by the County Board and the Randolph County ESDA Office. Randolph County staff, representatives of participating municipalities, and interested agencies makes up the Committee. The Committee has been meeting once a month since December 2004 to examine the potential natural and manmade hazards that face Randolph County, and to develop hazard mitigation goals for the County. The Plan identifies activities that can be undertaken by both the government and the private sector to reduce the safety hazards, health hazards, and property damage caused by floods, tornadoes, earthquakes, thunderstorms, and winter/ice storms.

Randolph County is subject to natural hazards that threaten life and health and have caused extensive property damage in the past. Floods affect the County frequently and as recently as 2003. Tornadoes caused damage in 2002 and 2003. Randolph County is also subject to earthquake damage and manmade hazards. Hazards are usually acts of nature, but the impacts on residents, public facilities, businesses, and private

>see Hazard continued on page 3A

AZARD

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"Hazard mitigation" means g everything that can be to reduce the impact of the ral hazards on people and property. It does not necessarily mean controlling floodwaters or stopping tornadoes. These hazards are natural phenomena and, in many cases, mitigation means adjusting what people do in the face of this natural activity.

The public is invited to the public meeting and to comment on the plan and the planning effort. For more information, contact Nancy Schilling, Randolph County ESDA Coordinator at 618/826-5000, ext. 227.

B. Websites

Meetings were posted on the Randolph County website (www.randolphco.org/gov/):

C. Public Meeting

A public meeting was held on November 3, 2005 to receive comments on the draft Plan and to take questions from the public.

Randolph County Mitigation Plan
Public Meeting
November 3, 2005, 11:00 am
Randolph County
Courthouse

Name:	Representing:	Phone:
PATRICK A. CREEK	Little Egypt Network / American Red Cross / Homeland Security	618 988-1147
SCOTT KIEFER	Sparta News-Plaindealer	443-2145
Jane Lucht	North County News	282-3803
DAN HECHT	City of Chester Fire/ESDA	826-1514
Jeff Blair	County Journal	497-8272
Tom Ashley	Sparta Police Dept	443-4331
LYN TILLES	Steeleville Police Dept	965-3135
ROD SODERLUND	SPARTA FIRE + ESDA	443-2917
DIANE MUDD	RANDOLPH COUNTY ZONING	826-5000 x 139
ERNIE DOIRON	PRODUCER	284-7723
* MARC KIEHNA	REGIONAL OFFICE OF EDUCATION	826-5471
* LARRY MEYERHOFF	Randolph Co. Road Dist #2	826-4208
Krista Mulholland	Monroe-Randolph Bi-Co. Health Dept	826-5007 x 103
Edward R. Crow	Randolph County Dept. of Economic Development	826-5000 x 22/136
CHARLES M. HANTON	ELLIS GROVE ESDA + FIRE	859-3473
Chris Pally	FEMA	497-5847
KARL DORF	Village of Tilden	587-4102
Edward Braun	Village of Evansville Fire	853-9980
GLENN SIMPSON	VILLAGE OF EVANSVILLE POLICE	853-2621
ERWIN "BEL" BROEKER	VILLAGE OF EVANSVILLE MAYOR	853-9663

Name:	Representing	Phone:
PAMELA K KEMPFER	CITY OF RED BUD	282-2315
DAN Brotz	City of Red Bud	282 6118
MARTY BERT	City of CHESTER	826 5714

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Appendix C

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HAZUS-MH Loss Estimation Software

Results for:

- 100-year Flood
- 8.0 Magnitude Earthquake

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Appendix D

Critical Facilities

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