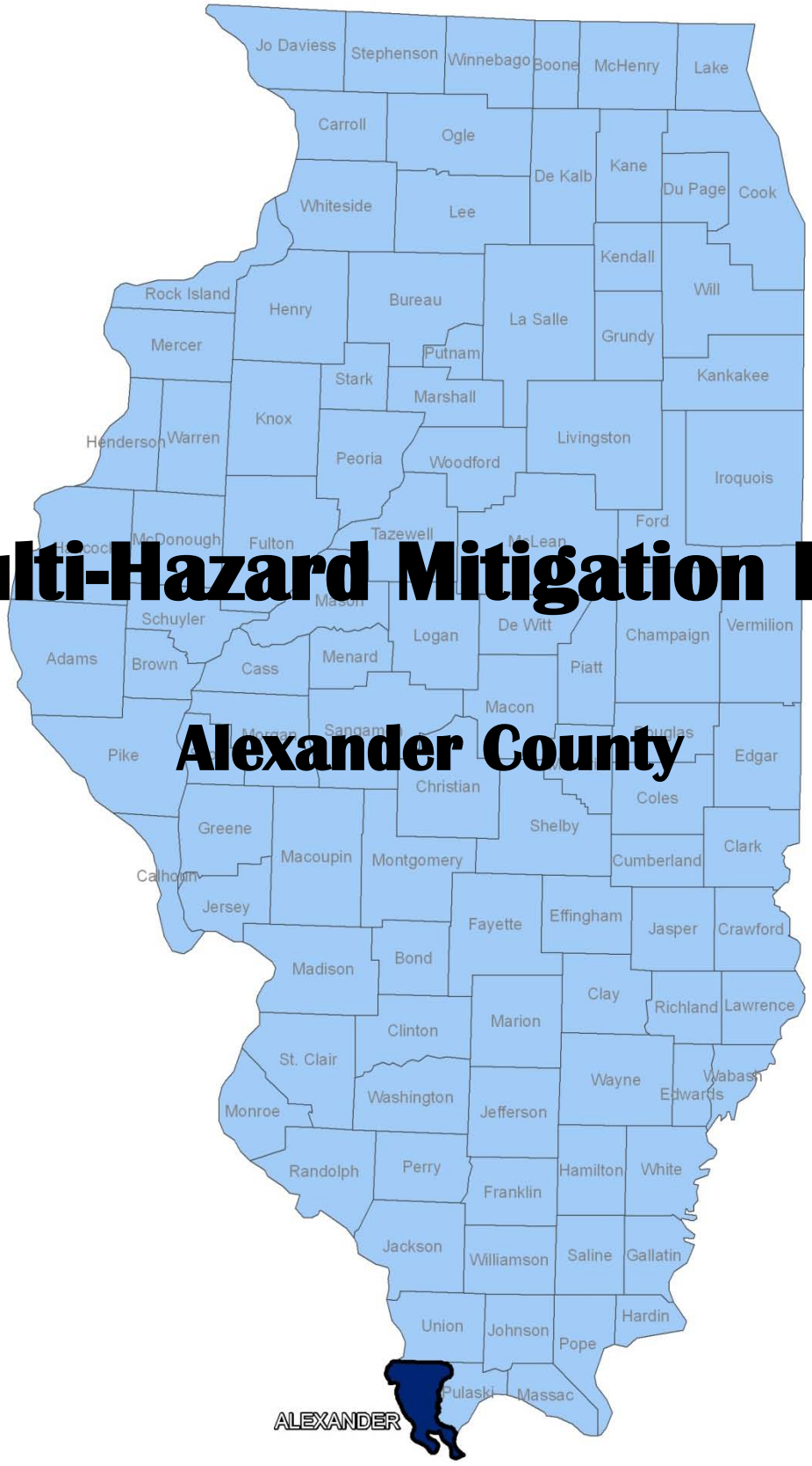
Multi-Hazard Mitigation Plan

Alexander County



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Hazard Mitigation Plan

Alexander County, Illinois

Adoption Date: -- _____ --

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Section 1 - Public Planning Process

1.1 Narrative Description

Hazard Mitigation is defined as any sustained action to reduce or eliminate long-term risk to human life and property from hazards. The Federal Emergency Services Disaster Agency (FEMA) has made reducing hazards one of its primary goals; hazard mitigation planning and the subsequent implementation of resulting projects, measures, and policies is a primary mechanism in achieving FEMA's goal.

The Multi-Hazard Mitigation Plan (MHMP) is a requirement of the Federal Disaster Mitigation Act of 2000 (DMA 2000). The development of a local government plan is a requirement in order to maintain eligibility for certain federal disaster assistance and hazard mitigation funding programs. In order for the National Flood Insurance Program (NFIP) communities to be eligible for future mitigation funds, they must adopt an MHMP.

In recognition of the importance of planning in mitigation activities, FEMA has created HAZUS-MH (**Haz**ards **US**A **M**ulti-**H**azard) a powerful geographic information system (GIS)-based disaster risk assessment tool. This tool enables communities of all sizes to predict the estimated losses from floods, hurricanes, earthquakes, and other related phenomena and to measure the impact of various mitigation practices that might help reduce those losses. The Illinois Emergency Services Disaster Agency (IEMA) has determined that HAZUS-MH should play a critical role in the risk assessments in Illinois. Southern Illinois University at Carbondale (SIUC) and The Polis Center at Indiana University Purdue University Indianapolis (IUPUI) are assisting Alexander County planning staff with performing the hazard risk assessment.

1.2 Planning Team Information

The Alexander County Multi-Hazard Mitigation Planning Team is headed by Martha Nicholson, whom is the primary point of contact. Members of the planning team including jurisdictions within the county and state representatives. Table 1-1 below identifies the planning team individuals and the organizations they represent.

Table 1-1: Multi-Hazard Mitigation Planning Team Members

Name	Title	Organization	Jurisdiction
Jeff Denny	Highway Engineer	Alexander County	Alexander County
Dave Barkett	Sheriff	Sheriff's Office	Alexander County
Martha Nicholson	Director	ESDA/911	Alexander County / Cairo
Twyla Wareing	Floodplain Administrator	Alexander County/Village of Thebes	Alexander County / Thebes
John Meyer	Fire Chief / Building Inspector	Cairo Fire Dept	Cairo
Don McGinness	Board Member	ESDA/911	Cairo
Judson Childs	Mayor	City of Cairo	Cairo
Monica Smith	Project Coordinator	City of Cairo	Cairo
Al Blumenberg	Village President	Village of East Cape Girardeau	East Cape Girardeau
Stan Mouser	Fire Chief	McClure/East Cape Fire Department	McClure and East Cape Girardeau
Brandon Craig	Former Fire Chief	Tamm Fire Department	Tamms
Joseph Dakin	Village Board	Village of Tamms	Tamms
Scott Crist	District Fire Manager	U.S. Forest Service	Federal

The Disaster Mitigation Act (DMA) planning regulations and guidance stress that planning team members must be active participants. The Alexander County MHMP committee members were actively involved on the following components:

- Attending the MHMP meetings
- Providing available Geographic Information System (GIS) data and historical hazard information
- Reviewing and providing comments on the draft plans
- Coordinating and participating in the public input process
- Coordinating the formal adoption of the plan by the county

An MHMP kickoff meeting was held at the Shawnee Illinois Community College in Ullin, IL on April 14th, 2008. Representatives of Alexander County attended the meeting. Lisa Thurston Director of Southern Five Regional Planning District and Development Commission explained the rationale behind the MHMP program and answered questions from the participants. Nicholas Pinter from SIU, provided an introduction to hazards, and John Buechler, from The Polis Center, provided an overview of HAZUS-MH. Nicholas described the timeline and the process of the mitigation planning project and presented Alexander County with a Memorandum of Understanding (MOU) for sharing data and information.

The Alexander County Multi-Hazard Mitigation Planning Team met on October 29, 2008, December 10, 2008, June 30, 2009, September 21, 2009, and March 9, 2010. Meetings 1, 2, 4 and 5 were held at the Cairo City Hall. Meeting 3 was held at the Olive Branch Community Center. Each meeting was approximately two hours in length. The meeting minutes and attendance sheets are included in Appendix A. During these meetings, the planning team successfully identified critical facilities, reviewed hazard data and maps, identified and assessed the effectiveness of existing mitigation measures, established mitigation projects, and assisted with preparation of the public participation information.

1.3 Public Involvement in Planning Process

The planning process commenced on January 29, 2008 when Southern Illinois University-Carbondale held a news conference to advise the general public that FEMA had approved funding of proposed planning activities for natural disaster preparedness. It was explained that the university would collaborate with members of The Polis Center as well as the five regional planning commissions. The news conference was attended by representatives of the local papers, radio, and television.

Alexander County conducted presentations for the public to give an overview of the planning process, inform them of the benefits of completing the plan, and discuss natural hazards affecting the county. The public meeting was held on June 30, 2009. Appendix A contains the minutes from the public meeting. Appendix B contains articles published by the local newspaper throughout the public input process.

1.4 Neighboring Community Involvement

The Alexander County planning team invited participation from various representatives of neighboring counties and local, city, and town governments. The initial planning meeting at SIUC on March 19, 2008 included representatives from the adjacent Southern Five Regional Planning District and Planning Commission counties of Johnson, Massac, Pulaski, and Union. In the meeting, the county board chairmen and their EMA directors discussed creating county planning teams, scheduling meetings throughout the planning process, and ways to ensure public involvement in the plan. The county board chairmen also agreed to allow university research staff to have access to county GIS programs and data from the supervisor of the assessment.

Alexander County is the southernmost county in Illinois and bounded by Union and Pulaski Counties. Alexander County has working relationships and cooperation with these counties through regional partnerships. Details of how neighboring stakeholders were involved are summarized in Table 1-2.

Table 1-2: Neighboring Community Participation

Person Participating	Neighboring Jurisdiction	Organization	Participation Description
Kenneth Korley	Pulaski County	Pulaski County ESDA	Mailed draft copy and asked for suggestions
Dana Pearson	Union County	Union County ESDA	Mailed draft copy and asked for suggestions

1.5 Review of Technical and Fiscal Resources

The MHMP planning team has identified representatives from key agencies to assist in the planning process. Technical data, reports, and studies were obtained from these agencies. The organizations and their contributions are summarized in Table 1-3.

Table 1-3: Key Agency Resources Provided

Agency Name	Resources Provided
Illinois Environmental Protection Agency	Illinois 2008 Section 303(d) Listed Waters and watershed maps
U.S. Census	County Profile Information such as Population and Physical Characteristics
Department of Commerce and Economic Opportunity	Community Profiles
Illinois Department of Employment Security	Industrial Employment by Sector
National Climatic Data Center	Climate Data
USDA/US Forest Service	Physical Characteristics and Wildfire Data
Illinois Emergency Services Disaster Agency	2007 Illinois Natural Hazard Mitigation Plan
United States Geological Survey	Physiographic/Hill Shade Map, Earthquake Information
Illinois State Geological Survey	Geologic, Karst Train, Physiographic Division and Coal Mining Maps

1.6 Review of Existing Plans

Alexander County and its associated local communities utilize a variety of planning documents to direct community development. These documents include land use plans, comprehensive plans, emergency response plans, municipal ordinances, and building codes. The MHMP planning process incorporated the existing natural hazard mitigation elements from these previous planning efforts. Table 1-4 lists the plans, studies, reports, and ordinances used in the development of the plan.

Table 1-4: Planning Documents Used for MHMP Planning Process

Author(s)	Year	Title	Description	Where Used
Illinois Emergency Services Disaster Agency	2007	Illinois Natural Hazard Mitigation Plan	The Illinois Natural Hazard Mitigation Plan (INHMP) establishes a process for identifying and mitigating the effects of natural hazards in the State of Illinois as required under the Disaster Mitigation Act of 2000.	Mitigation Actions/Projects
Southern Five RPC	2007 – 2010	Comprehensive Economic Development Strategy (CEDS)	Lists economic and community projects for local governments. Includes mitigation to prevent developing in floodplain and building safer structures to withstand a potential earthquake.	Background and Mitigation Actions/ Projects

Section 2 - Jurisdiction Participation Information

The jurisdictions included in this multi-jurisdictional plan are listed in Table 2-1.

Table 2-1: Participating Jurisdictions

Jurisdiction Name
Alexander County
City of Cairo
Village of East Cape
Village of McClure
Village of Tamms
Village of Thebes

2.1 Adoption by local governing body

The draft plan was made available to the planning team and other agencies on March 9, 2010, for review and comments. The Alexander County Hazard Mitigation Planning team presented and recommended the plan to the Alexander County Board, the City of Cairo, the Village of East Cape, the Village of McClure, the Village of Tamms, and the Village of Thebes, who adopted the Alexander County Hazard Mitigation Plan on *<date adopted>*. Resolution adoptions are included in Appendix C of this plan.

2.2 Jurisdiction Participation

It is required that each jurisdiction participates in the planning process. Each of the incorporated communities within Alexander County was invited to participate on the planning team. Table 2-2 lists each jurisdiction and describes its participation in the construction of this plan.

Table 2-2: Jurisdiction Participation

Jurisdiction Name	Participating Member	Participation Description
Alexander County	Jeff Denny	Member, MHMP planning committee
Alexander County / Cairo	Martha Nicholson	Member, MHMP planning committee
Alexander County / Thebes	Twyla Wareing	Member, MHMP planning committee
Cairo	John Meyers	Member, MHMP planning committee
Cairo	Don McGinness	Member, MHMP planning committee
Cairo	David Barkett	Member, MHMP planning committee
Cairo	Monica Smith	Member, MHMP planning committee

Jurisdiction Name	Participating Member	Participation Description
Cairo	Judson Childs	Member, MHMP planning committee
East Cape Girardeau	Al Bloomenberg	Member, MHMP planning committee
McClure and East Cape Girardeau	Stan Mouser	Member, MHMP planning committee
Tamms	Joseph Dakin and Brandon Craig	Member, MHMP planning committee

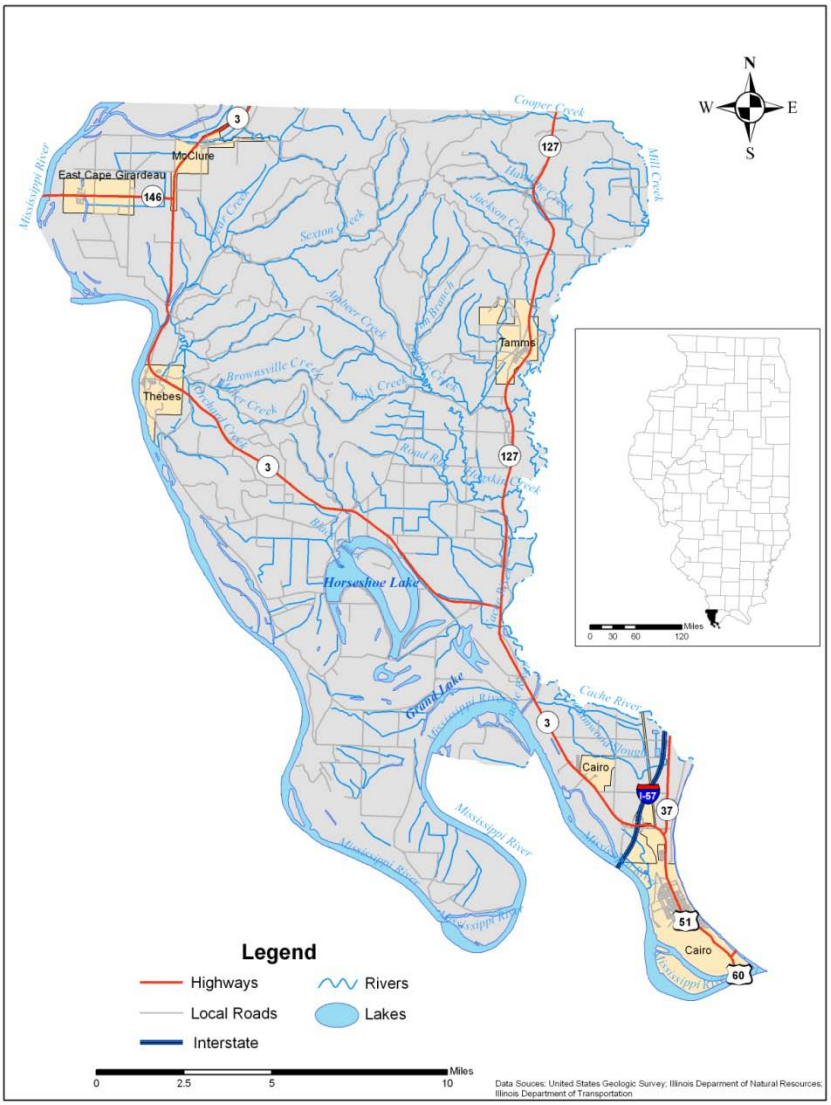
All members of the MHMP planning committee were actively involved in attending the MHMP meetings, providing available Geographic Information System (GIS) data and historical hazard information, reviewing and providing comments on the draft plans, coordinating and participating in the public input process, and coordinating the county's formal adoption of the plan. Each meeting culminated with an open forum to invite questions and input from the council members. Appendix A provides further description of the meetings, including dates.

Section 3 - Jurisdiction Information

Alexander County organized and claimed its boundaries from the division of Union County in 1819. Alexander County was named after William M. Alexander who was an early settler of the County who later became a Senator in the second and third General Assemblies of Illinois. The County Seat is Cairo (1860–Present). Prior County Seats were America (1819–1833), Unity (1833–1845), and Thebes (1845–1860).

Alexander County is located at the southern most tip of Illinois. It is bounded on the north by Union County, on the south by the Mississippi River, on the west by the Mississippi River, and on the east by Pulaski County and the Ohio River. It relates to major urban areas as follows: 120 miles southeast of St. Louis, Missouri; 200 miles south of Springfield, Illinois; 340 miles south-southwest of Chicago, Illinois. Figure 3-1 shows the location of Alexander County.

Figure 3-1: Map of Alexander County



The major sources of economic activity in Alexander County include recreation, tourism, health service, social service, public administration and transportation. Shawnee National Forest, the Mississippi River National Wildlife Refuge, and Horse Shoe Bend Nature Preserve offer opportunities for fishing, camping, and hiking. The towns and villages in Alexander County offer amenities, such as restaurants, entertainment, and shopping on a rural community scale.

Sources: Illinois State Archives Depository, Alexander County Fact Sheet, 4/17/09, http://www.ilsos.net/departments/archives/irad/Alexander.html

State of Illinois, Origin and Evolution of Illinois Counties, 1982

3.1 Physical Setting (Topography)

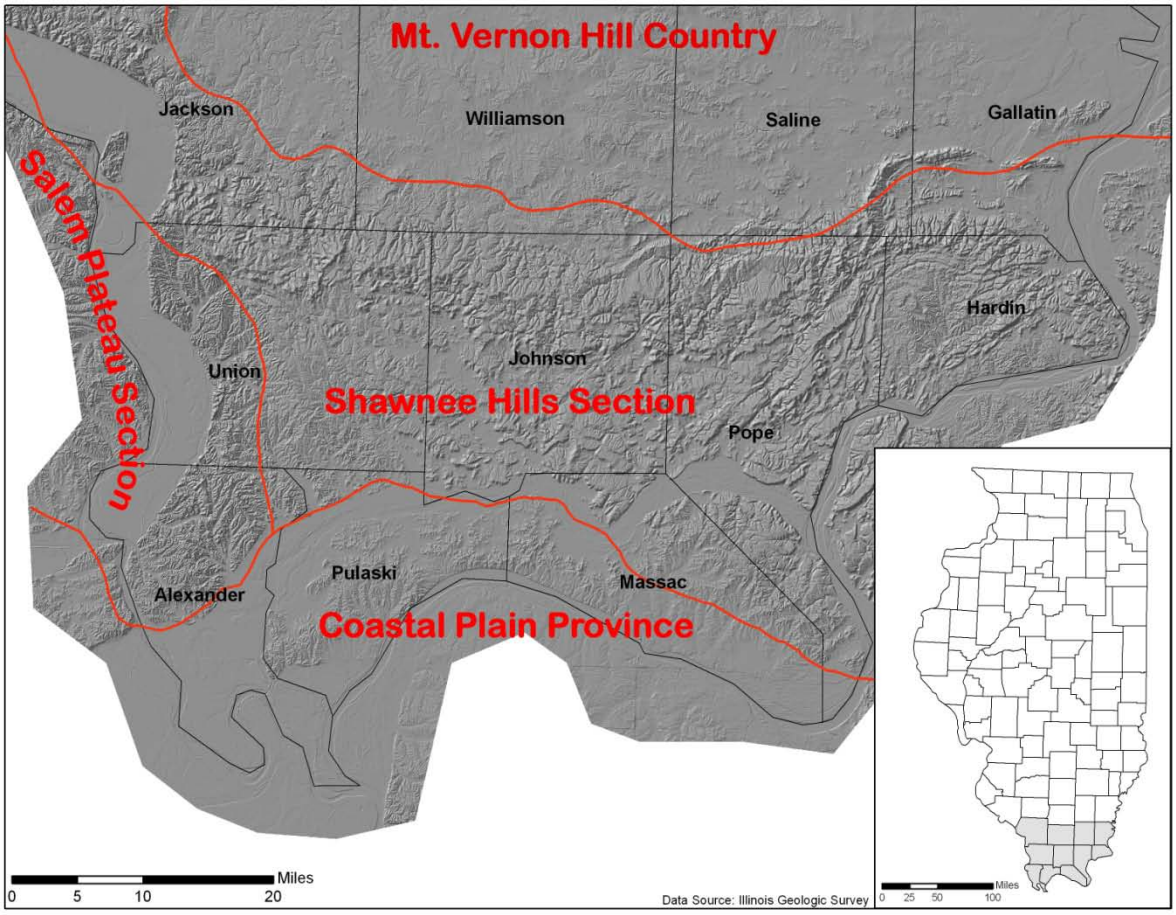
Alexander County is located within three physiographic proveniences, the Ozark Plateau Province located in the northwest portion of the County, the Interior Low Plateaus Province (Shawnee Hills) in the northeast corner of the County, and the Coastal Plain Province which encompasses the southern two-thirds of the County. The Ozark Plateau Province is formed by limestone and dolomites which overlie the Cambrian and Ordovician carbonate rocks with streams dissecting it in varying degrees. Along the drainage divides, the area has been best preserved as a rolling upland surface with a local relief of 100–200 feet. Karst features such as sinkholes, springs, and caves are prominent.

The Low Plateaus Province or Shawnee Hills are underlain by sandstone and limestone bedrock. In areas of sandstone bedrock the topography is characterized by bluffs, steep-sided ridges, and hills with narrow to broad valleys. In areas of limestone bedrock the terrain tends to be similar in character but the slopes tend to be less-step with broader valleys. Because of the limestone bedrock sinkhole and caves are commonly found in these areas.

The Coastal Plain Province is underlain by unconsolidated sediments (Cretaceous, Tertiary and Quaternary in age). The Coastal Plain Province can be dived into to sub-sections, the Cretaceous Hills and Missisippi/Ohio River Bottom Lands. The bottom lands are characterized broad by river valleys with alluvial terrace and recent fluvial landforms related to movement of the Ohio, Mississippi and Cache rivers. The Cretaceous hills are gently rolling hills located between the Cache and Ohio River Floodplains.

The highest elevation(s) (~840 feet above sea level) in Alexander County are found in the north-central portion of the county along Whitney Hollow Road. The lowest elevation(s) (~295 feet above sea level) are found at the confluences of the Ohio and Mississippi Rivers just South of Cairo, IL. Figure 3-2 depicts the physiographic division within Alexander County and it characteristics.

Figure 3-2: Physiographic Divisions of Alexander County



Sources: Illinois Geologic Survey, 1998, The Physiographic divisions of Illinois, including Provinces, Sections, and Divisions. http://www.isgs.illinois.edu/nsdihome/webdocs/st-geolq.html.

Leighton, M.M., Ekblaw, G.E., Horberg, L., 1948, Physiographic Divisions of Illinois. Journal of Geology. v. 56, n. 1, p. 16-33.

3.2 Climate

Alexander County climate is typical of Southern Illinois and generally characterized by hot dry summers and cool wet winters. The variables of temperatures, precipitation, and snowfall can vary greatly from one year to the next. In summer, the average low is 67.6° F and average high is 87.5° F; however, daily maximum temperatures often exceed 103° F for the period of time (several weeks) between June and September.

During the fall and into the spring, freezing temperatures can occur any time between late September and early May. The average low and high temperatures in January are 30.0° F and 45.4° F, respectively. Average annual precipitation is 23.0 inches (IL State Climatologist Data from 1901 to 2008 at Cairo, IL). While the winters are generally cool, i.e. temperatures are above

freezing most days, extended periods (days to a couple of weeks) of sub-freezing temperatures often occur and are sometimes accompanied by significant amounts of ice and snow.

3.3 Demographics

According the U.S. Census of 2007, Alexander County is estimated to have a population of 8,458. The population of Alexander County has decreased by 11.8% between 2000 and 2007. The largest town in Alexander County is Cairo with a population of approximately 3,150. The breakdown of population by incorporated areas is included in Table 3-1.

Table 3-1: Population by Community

Community	2007 Population	% of County
City of Cairo	3,151	37.3%
Village of East Cape Girardeau	377	4.5%
Village of McClure	369	4.4%
Village of Tamms	1,111	13.1%
Village of Thebes	412	4.9%
Rural Population	3,038	35.9%

Source: American FactFinder, 2009 and Illinois MapStats, 2009

3.4 Economy

Illinois MapStats and Illinois Department of Employment Security report for 2007 state that 62.4% of the workforce in Alexander County was employed in the private sector. The breakdown is included in Table 3-2. Public Administration represents the largest sector, employing approximately 39.4% of the workforce and generating approximately 47.1% of the earnings. The US Census 2000 annual per capita income (inflation adjusted) in Alexander County is $ 28,443 compared to an Illinois average of $ 54,141.

Table 3-2: Industrial Employment by Sector

Industrial Sector	% of County Workforce (2007)
Agriculture, Forestry, Fishing, Hunting, and Mining	4.3%
Construction	1.0%
Manufacturing	8.0%
Wholesale Trade	0.0%
Retail Trade	7.1%
Transportation, Warehousing and Utilities	9.0%
Information	1.0%
Finance, Insurance, Real Estate, and Rental/Leasing	2.5%
Professional and Business Services	1.5%
Educational, Health, and Social Services	20.7%
Arts, Entertainment, Recreation, Accommodation and Food Services	4.4%
Other Services (except Public Administration)	1.1%
Public Administration	39.4%

Source: Illinois Department of Employment Security 2008 and Illinois MapStats, 2009

3.5 Industry

Alexander County's major employers and number of employees are listed in Table 3-3. The largest employers in Alexander County are Waterfront Services, American Commercial Lines, the Delta Center, and Community Health & Emergency. Educational, Health, and Social Services are the largest employment sectors in the county.

Table 3-3: Major Employers

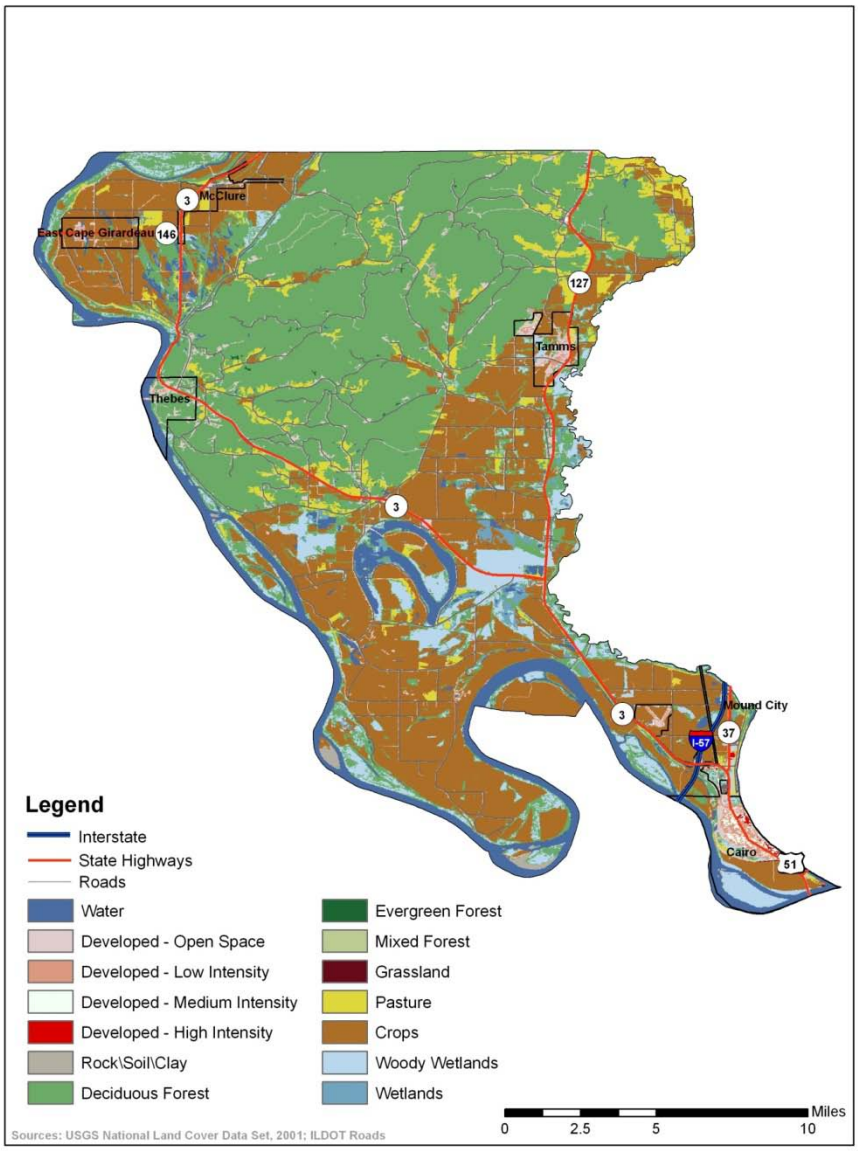
Transportation, Warehousing and Utilities			
Company Name	**Jurisdiction**	**Number of Employees**	**Description**
American Commercial Lines	Cairo	249	River Barge Lines and Terminals
Waterfront	Cairo	100	River Transportation Services
Educational, Health, and Social Services			
Delta Center	Cairo	250	Social Service and Welfare
Community Health & Emergency	Cairo	250	Medical Clinic

Source: Department of Commerce and Economic Opportunity, Community Profiles 2007; and Direct Contact

3.6 Land Uses and Development Trends

Pre-European settlement, Alexander County was a land of dense upland and floodplain forests. Since settlement, agriculture, logging, and urbanization have dramatically altered the county's land cover. Today, agriculture is the predominant land cover in the County. Agriculture in Alexander County is concentrated along and within the floodplains of the Mississippi, Ohio, and Cache Rivers. The uplands in Alexander County remain forested in part because of the Shawnee National Forest and the soils found in these areas are not suited to agriculture. These forest areas are found in the north and central portions of the county Figure 3-3. Currently, in Alexander County, there are no substantial developments taking place and no substantial growth is expected within the next five years.

Figure 3-3: Land Cover of Alexander County



3.7 Major Lakes, Rivers, and Watersheds

Alexander County is located just north of the confluence of the Mississippi and Ohio Rivers. The majority of surface water flows to the south and west emptying into the Mississippi River. There is one significant lake in Alexander County, Horseshoe Lake. Horseshoe Lake was formed when a wide meander in the Mississippi River was cutoff by a change its course (Figure 3-1).

Section 4 - Risk Assessment

The goal of mitigation is to reduce the future impacts of a hazard including loss of life, property damage, disruption to local and regional economies, and the expenditure of public and private funds for recovery. Sound mitigation must be based on sound risk assessment. Risk assessment involves quantifying the potential loss resulting from a disaster by assessing the vulnerability of buildings, infrastructure, and people. This assessment identifies the characteristics and potential consequences of a disaster, how much of the community could be affected by a disaster, and the impact on community assets. A risk assessment consists of three components: hazard identification, vulnerability analysis, and risk analysis.

4.1 Hazard Identification/Profile

4.1.1 Existing Plans

The previous Alexander County Comprehensive Emergency Management Plan (CEMP) did not contain a risk analysis. Additional local planning documents were reviewed to identify historical hazards and help identify risk. To facilitate the planning process, DFIRM maps were used for the flood analysis.

4.1.2 National Hazard Records

4.1.2.1 National Climatic Data Center (NCDC) Records

In addition to these identified hazards, the MHMP planning committee reviewed the list of natural hazards prepared by FEMA. To assist the planning team, historical storm event data was compiled from the National Climatic Data Center (NCDC; http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll). This NCDC data included 284 reported events in Alexander County between April 4, 1957 and April 2, 2008. A summary table of events related to each hazard type is included in the hazard profile sections that follow. A list of the events, including additional sources that identify specific occurrences, are included as Appendix D. In addition to NCDC data, Storm Prediction Center (SPC) data associated with tornadoes, strong winds, and hail were plotted using SPC recorded latitude and longitude. These events are plotted and included as Appendix E. The list of NCDC hazards is included in Table 4-1.

Table 4-1: Climatic Data Center Historical Hazards

Hazard
Tornadoes
Severe Thunderstorms
Drought/Extreme Heat
Winter Storms
Flood/Flash flood

4.1.2.2 FEMA Disaster Information

Since 1965 there have been 50 Federal Disaster Declarations for the state of Illinois. Emergency declarations allow states access to FEMA funds for Public Assistance (PA); disaster declarations allow for even more PA funding including Individual Assistance (IA) and the Hazard Mitigation

Grant Program (HMGP). Alexander County has received Federal aid for 14 declared disasters since 1969. Figure 4-1 depicts the disasters and emergencies that have been declared for Alexander County within the past decade. Table 4-2 lists more specific information for each declaration.

Figure 4-1: FEMA-Declared Emergencies and Disasters in Alexander County (1965-present)

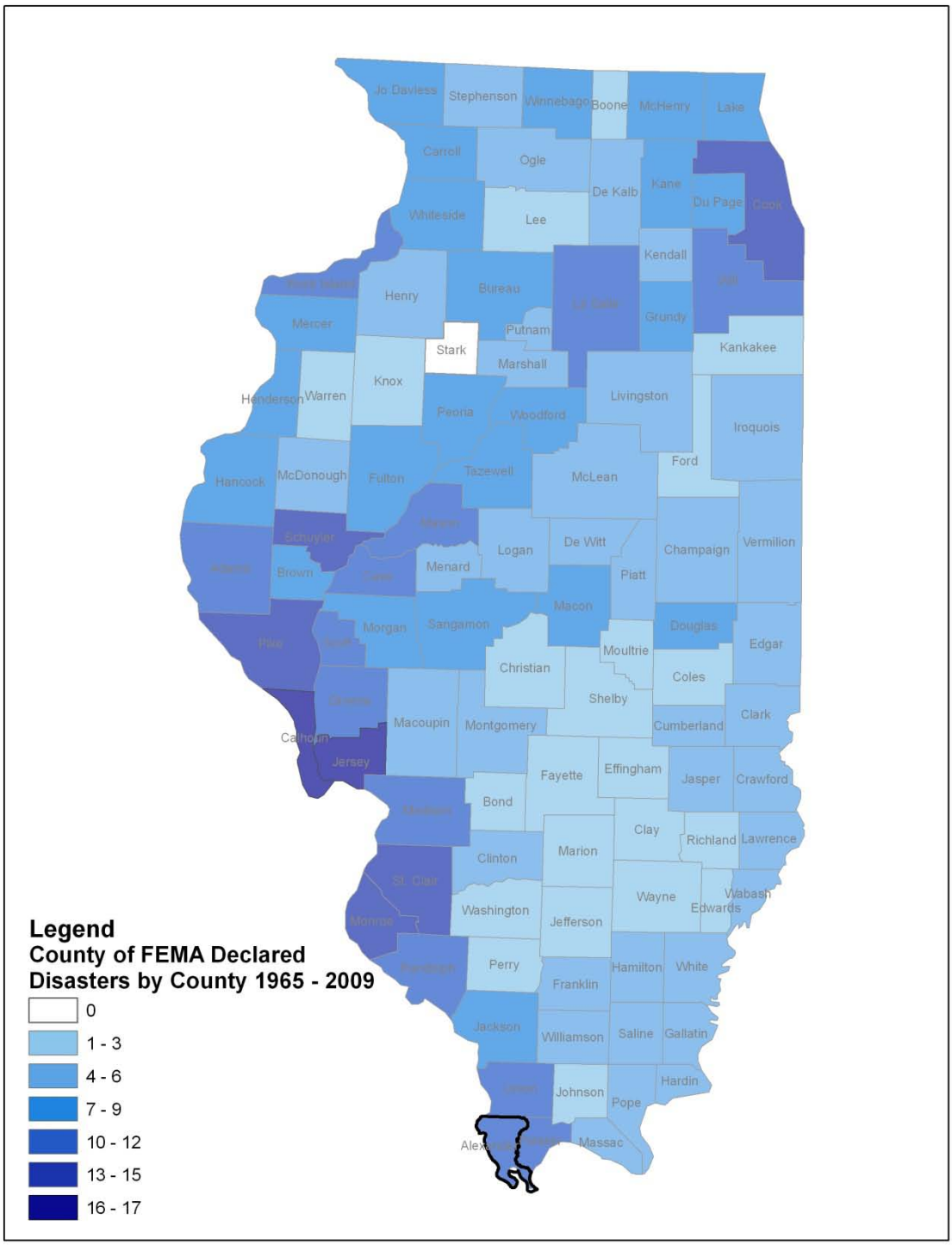


Table 4-2: FEMA-Declared Emergencies in Alexander County (1969-present)

Date of Incident	Declaration Number	Date of Declaration	Disaster Description	Type of Assistance
	276	8/30/1969	Flooding	
	373	4/27/1973	Severe Storms, Flooding	
	438	6/10/1974	Severe Storms, Flooding	
	583	1/16/1979	Severe Storms, Flooding	
12/2/1982	674	12/17/1982	Severe Flooding, Torrential Rains	
4/17/1983	684	5/16/1983	Tornado, Flooding, Unseasonable Freezing Temperatures	
6/7/1993	997	7/7/1993	Continued Riverine and Flash Flooding	
4/11/1994	1025	5/15/1994	Torrential Rain, Thunderstorms	
6/8/1995	1053	6/14/1995	Severe Thunderstorms, High Winds, Torrential Rains, Flash Flooding	
5/6/1996	1112	5/17/1996	Severe Thunderstorms, Torrential Rains, Flooding	
3/1/1997	1170	3/10/1997	Severe Storm System, Torrential Flash Flooding	
5/7/2002	1416	6/6/2002	Flooding	IA and PA
5/4/2003	1469	5/15/2003	Tornadoes, Severe Storms, and Flooding	
1/26/2009	1826	3/2/2009	Severe Winter Storm	

4.1.3 Planning Team

During Meeting #2, which occurred on December 10, 2008, the planning team developed and ranked a list of hazards that affect the county. The team identified 1) river flooding which occurs on an annual basis during the spring, 2) earthquakes, 3) severe thunderstorms with tornadoes, and 4) winter storms. The plan also identified Alexander County's principal technological hazards (in order of likelihood): 1) land transportation accidents with hazardous material release, 2) dam or levee failure, and 3) fire\explosion.

4.1.4 Hazard Ranking Methodology

Based on planning team input, national datasets, and existing plans, Table 4-3 lists the hazards Alexander County will address in this multi-hazard mitigation plan. In addition, these hazards ranked the highest based on the Risk Priority Index discussed in section 4.1.5.

Table 4-3: Planning Team Hazard List

Hazard
Flooding
Earthquake
Tornado
Transportation Hazardous Material Release
Winter Storms
Thunderstorms/ High Winds/Hail/ Lightning
Levee Failure
Fire\Explosion

4.1.5 Calculating the Risk Priority Index

The first step in determining the Risk Priority Index (RPI) was to have the planning team members generate a list of hazards which have befallen or could potentially befall their community. Next, the planning team members were asked to assign a likelihood rating based on the criteria and methods described in the following table. Table 4-4 displays the probability of the future occurrence ranking. This ranking was based upon previous history and the definition of hazard. Using the definitions given, the likelihood of future events is "Quantified" which results in the classification within one of the four "Ranges" of likelihood.

Table 4-4: Future Occurrence Ranking

Probability	Characteristics
4 - *Highly Likely*	Event is probable within the calendar year. Event has up to 1 in 1 year chance of occurring. (1/1=100%) History of events is greater than 33% likely per year.
3 - *Likely*	Event is probable within the next three years. Event has up to 1 in 3 years chance of occurring. (1/3=33%) History of events is greater than 20% but less than or equal to 33% likely per year.
2 - *Possible*	Event is probable within the next five years. Event has up to 1 in 5 years chance of occurring. (1/5=20%) History of events is greater than 10% but less than or equal to 20% likely per year.
1 - *Unlikely*	Event is possible within the next ten years. Event has up to 1 in 10 years chance of occurring. (1/10=10%) History of events is less than or equal to 10% likely per year.

Next, planning team members were asked to consider the potential magnitude/severity of the hazard according to the severity associated with past events of the hazard. Table 4-5 gives four classifications of magnitude/severity.

Table 4-5: Hazard Magnitude

Magnitude/Severity	Characteristics
8 - *Catastrophic*	Multiple deaths. Complete shutdown of facilities for 30 or more days. More than 50% of property is severely damaged.
4 - *Critical*	Injuries and/or illnesses result in permanent disability. Complete shutdown of critical facilities for at least 14 days. More than 25% of property is severely damaged.
2 - *Limited*	Injuries and/or illnesses do not result in permanent disability. Complete shutdown of critical facilities for more than seven days. More than 10% of property is severely damaged.
1 - *Negligible*	Injuries and/or illnesses are treatable with first aid. Minor quality of life lost. Shutdown of critical facilities and services for 24 hours or less. Less than 10% of property is severely damaged.

Finally, the RPI was calculated by multiplying the probability by the magnitude/severity of the hazard. Using these values, the planning team member where then asked to rank the hazards. Table 4-6 identifies the RPI and ranking for each hazard facing Alexander County.

Table 4-6: Alexander County Hazards (RPI)

Hazard	Probability	Magnitude/Severity	Risk Priority Index	Rank
Flooding	4 - Highly Likely	8 - Catastrophic	32	1
Earthquake	2 - Possible	8 - Catastrophic	18	2
Tornado	3 - Likely	2 - Limited	6	3
Transportation of Hazardous Material Release	3 - Likely	2 - Limited	6	4
Winter Storms	3 - Likely	2 - Limited	6	5
Thunderstorms/ High Winds/Hail/ Lightning	4 - Highly Likely	1 - Negligible	4	6
Dam/Levee Failure	2 - Possible	2 - Limited	4	7
Fire/Explosion	2 - Possible	1 - Negligible	2	8

4.1.6 Jurisdictional Hazard Ranking

Because the jurisdictions in Alexander County differ in their susceptibilities to certain hazards—for example, Tamms, located on the edge of the Shawnee National Forest is more likely to experience wildfires than East Cape Girardeau which is surrounded by farm fields—the hazards identified by the planning team were ranked by SIUC for each individual jurisdiction using the methodology outlined in Section 4.1.5. The SIUC rankings were based on input from the planning team members, available historical data, and the hazard modeling results described within this hazard mitigation plan. During the five-year review of the plan this table will be updated by the planning team to ensure these jurisdictional rankings accurately reflect each community's assessment of these hazards. Table 4-7 lists the jurisdictions and their respective hazard rankings (Ranking 1 being the highest concern).

Table 4-7: Hazard Rankings by Jurisdiction

Jurisdiction	Hazard							
	Tornado	HAZMAT	Earthquake	Thunderstorms	Flooding	Winter Storms	Dam or Levee Failure	Fire/Explosion
City of Cairo	4	5	3	7	1	6	2	8
Village of East Cape	4	5	3	7	1	6	2	8
Village of McClure	4	5	3	7	1	6	2	8
Village of Tamms	3	4	2	6	1	5	NA	7
Village of Thebes	3	4	2	6	1	5	NA	7

NA = Not applicable

4.1.7 GIS and HAZUS-MH

The third step in this assessment is the risk analysis, which quantifies the risk to the population, infrastructure, and economy of the community. Where possible, the hazards were quantified using GIS analyses and HAZUS-MH. This process reflects a level two approach to analyzing hazards as defined for HAZUS-MH. The approach includes substitution of selected default data with local data. Level two analysis significantly improves the accuracy of the model predictions.

HAZUS-MH generates a combination of site-specific and aggregated loss estimates depending upon the analysis options that are selected and upon the input that is provided by the user. Aggregate inventory loss estimates, which include building stock analysis, are based upon the assumption that building stock is evenly distributed across census blocks/tracts. Therefore, it is possible that overestimates of damage will occur in some areas while underestimates will occur in other areas. With this in mind, total losses tend to be more reliable over larger geographic areas than for individual census blocks/tracts. It is important to note that HAZUS-MH is not intended to be a substitute for detailed engineering studies. Rather, it is intended to serve as a planning aid for communities interested in assessing their risk to flood-, earthquake-, and hurricane-related hazards. This documentation does not provide full details on the processes and procedures completed in the development of this project. It is only intended to highlight the major steps that were followed during the project.

Site-specific analysis is based upon loss estimations for individual structures. For flooding, analysis of site-specific structures takes into account the depth of water in relation to the structure. HAZUS-MH also takes into account the actual dollar exposure to the structure for the costs of building reconstruction, content, and inventory. However, damages are based upon the assumption that each structure falls into a structural class, and that structures in each class will respond in similar fashion to a specific depth of flooding. Site-specific analysis is also based upon a point location rather than a polygon; therefore the model does not account for the percentage of a building that is inundated. These assumptions suggest that the loss estimates for site-specific structures as well as for aggregate structural losses need to be viewed as approximations of losses that are subject to considerable variability rather than as exact engineering estimates of losses to individual structures.

The following events were analyzed. The parameters for these scenarios were created using GIS, HAZUS-MH, and historical information to predict which communities would be at risk.

Using HAZUS-MH

1. 100-year overbank flooding
2. Earthquake

Using GIS

1. Tornado
2. Hazardous Material Release

4.2 Vulnerability Assessment

4.2.1 Asset Inventory

4.2.1.1 Processes and Sources for Identifying Assets

The HAZUS-MH data is based on best available national data sources. The initial step involved updating the default HAZUS-MH data using State of Illinois data sources. At Meeting #1, the planning team members were provided with a plot and report of all HAZUS-MH critical facilities. The planning team took GIS data provided by SIU-Polis, verified the datasets using local knowledge, and allowed SIU-Polis to use their local GIS data for additional verification. SIU-Polis GIS analysts made these updates and corrections to the HAZUS-MH data tables prior to performing the risk assessment. These changes to the HAZUS-MH inventory allow a level two analysis. This update process improved the accuracy of the model predictions.

The default HAZUS-MH data has been updated as follows:

- The HAZUS-MH defaults, critical facilities, and essential facilities have been updated based on most recent available data sources. Critical and essential point facilities have been reviewed, revised, and approved by local subject matter experts at each county.
- The essential facility updates (schools, medical care facilities, fire stations, police stations, and EOCs) have been applied to the HAZUS-MH model data. HAZUS-MH reports of essential facility losses reflect updated data.
- Parcels with assessment improvements (buildings) values were used to estimate the number of buildings in the flood-prone areas.
- The analysis is restricted to the county boundaries. Events that occur near the county boundary do not contain damage assessments from the adjacent county.

4.2.1.2 Essential Facilities List

Table 4-8 identifies the essential facilities that were added or updated for the analysis. A complete list of the critical facilities is included as Appendix C. A map of all the critical facilities is included as Appendix D.

Table 4-8: Essential Facilities List

Facility	Number of Facilities
Care Facilities	7
Emergency Centers	1
Fire Stations	6
Police Stations	3
Schools	12

4.2.1.3 Facility Replacement Costs

Default HAZUS-MH building stock data were used for the HAZUS-MH analyses. Facility replacement costs and total building exposure are identified in Table 4-9. Table 4-9 also includes the estimated numbers of buildings within each occupancy class.

Table 4-9: Building Exposure (default HAZUS-MH) for Alexander County

General Occupancy	Estimated Total Buildings	Total Building Exposure (X 1000)
Agricultural	9	$2,877
Commercial	159	$68,655
Education	10	$7,145
Government	19	$9,558
Industrial	19	$9,950
Religious/Non-Profit	33	$18,349
Residential	5,044	$398,529
Total	**5,293**	**$515,063**

Alexander County provided parcel boundaries with assessed values. The parcel data was used to estimate the actual number of buildings within the flood-prone areas. The parcel data identified parcels with building improvements, which were then converted into centroid point locations. The parcels with improvements are summarized by occupancy class in Table 4-10.

Table 4-10: Parcels with Improvements by Occupancy Class for Alexander County

Occupancy Class	Count
Residential	5,044
Commercial	159
Industrial	19
Agriculture	9
Exempt	33
Total	**5,264**

4.3 Future Development

Alexander County is subject to a variety of natural disasters. County government, in partnership with State government, must make a commitment to prepare for those types of disasters. Likewise, the Alexander County manufacturing base leaves the county vulnerable to major hazardous materials events and other technological threats. However, as the county-elected and appointed officials become better informed on the subject of community hazards, they will be better able to set and direct policies that will enable emergency management and county response agencies to effectively plan, train, and exercise. The end result will be a stronger community and a better place in which to work, live, and grow.

4.4 Hazard Profiles

4.4.1 Tornado Hazard

Hazard Definition for Tornado Hazard

Tornadoes pose a great risk to the State of Illinois and its citizens. Tornadoes historically have occurred during any month of the year. The unpredictability of tornadoes makes them one of Illinois' most dangerous hazards. Their extreme winds are violently destructive when they touch down in the region's developed and populated areas. Current estimates place the maximum velocity at about 300 mph, but higher and lower values can occur. A wind velocity of 200 mph will result in a wind pressure of 102.4 pounds per square foot of surface area, a load that exceeds the tolerance limits of most buildings. Considering these factors, it is easy to understand why tornadoes can be so devastating for the communities they hit.

Tornadoes are defined as violently-rotating columns of air extending from thunderstorms to the ground. Funnel clouds are rotating columns of air not in contact with the ground. However, the violently-rotating column of air can reach the ground very quickly and become a tornado. If the funnel cloud picks up and blows around debris, it has reached the ground and is a tornado.

Tornadoes are classified according to the Fujita tornado intensity scale. The tornado scale ranges from low intensity F0, with effective wind speeds of 40 to 70 mph, to F5 tornadoes with effective wind speeds of over 260 mph. The Fujita intensity scale is included in Table 4-11.

Table 4-11: Fujita Tornado Rating

Fujita Number	Estimated Wind Speed	Path Width	Path Length	Description of Destruction
0 (Gale)	40–72 mph	6–17 yards	0.3–0.9 miles	Light damage, some damage to chimneys, branches broken, sign boards damaged, shallow-rooted trees blown over.
1 (Moderate)	73–112 mph	18–55 yards	1.0–3.1 miles	Moderate damage, roof surfaces peeled off, mobile homes pushed off foundations, attached garages damaged.
2 (Significant)	113–157 mph	56–175 yards	3.2–9.9 miles	Considerable damage, entire roofs torn from frame houses, mobile homes demolished, boxcars pushed over, large trees snapped or uprooted.
3 (Severe)	158–206 mph	176–566 yards	10–31 miles	Severe damage, walls torn from well-constructed houses, trains overturned, most trees in forests uprooted, heavy cars thrown about.
4 (Devastating)	207–260 mph	0.3–0.9 miles	32–99 miles	Complete damage, well-constructed houses leveled, structures with weak foundations blown off for some distance, large missiles generated.
5 (Incredible)	261–318 mph	1.0–3.1 miles	100–315 miles	Foundations swept clean, automobiles become missiles and thrown for 100 yards or more, steel-reinforced concrete structures badly damaged.

Previous Occurrences for Tornado Hazard

There have been several occurrences of tornadoes within Alexander County during recent decades. The NCDC database reported 12 tornadoes/funnel clouds in Alexander County since 1957. These tornados have been attributed with 12 injuries, and nearly a $1.0 million dollars in property damage within Alexander and adjacent counties. As of January 2008, the most recent tornado touch down occurred on May 6, 2003. This tornado formed northwest of Cairo near the Mississippi River. Three tractor-trailer rigs were overturned on the Interstate 57 bridge over the Mississippi River. The tornado tracked through Cairo, damaging dozens of homes and several businesses. One single-family home was destroyed, injuring a child who was cut by flying debris. Of the damaged homes, about four sustained major damage, and the rest had mainly minor damage.

Alexander County tornadoes recorded in the NCDC database are identified in Table 4-12. Additional details for NCDC events are included in Appendix D.

Table 4-12: Alexander County Tornadoes*

Location or County	Date	Magnitude	Deaths	Injuries	Property Damage
Alexander	4/3/1957	F2	0	5	250K
Alexander	4/17/1960	F1	0	4	25K
Alexander	4/19/1970	F1	0	0	3K
Alexander	7/8/1970	F1	0	1	25K
Alexander	3/15/1971	F1	0	0	0K
Alexander	4/21/1972	F2	0	1	25K
Alexander	1/18/1973	F1	0	0	0K
Alexander	3/19/1984	F0	0	0	0K
Thebes	1/21/1999	F2	0	0	150K
Unity	4/25/2003	F0	0	0	0
Miller City	5/6/2003	F0	0	0	0
Willard	5/6/2003	F2	0	1	300K

Source: NCDC

* NCDC records are estimates of damage compiled by the National Weather Service from various local, state, and federal sources. However, these estimates are often preliminary in nature and may not match the final assessment of economic and property losses related to a given weather event.

Geographic Location for Tornado Hazard

The entire county has the same risk for occurrence of tornadoes. They can occur at any location within the county.

Hazard Extent for Tornado Hazard

The historical tornadoes listed previously generally move from west to east across the county—although many other tracks are possible—from more southerly to northerly. The extent of the hazard varies both in terms of the extent of the path and the wind speed.

Calculated Risk Priority Index for Tornado Hazard

Based on historical information, the probability of future tornadoes in Alexander County is likely. Tornadoes with varying magnitudes are expected to happen. According to the RPI, tornadoes ranked as the number three hazard.

RPI = Probability x Magnitude/Severity.

Probability	x	Magnitude /Severity	=	RPI
3	x	2	=	**6**

Vulnerability Analysis for Tornado Hazard

Tornadoes can occur within any area of the county; therefore, the entire county population and all buildings are vulnerable to tornadoes. To accommodate this risk, this plan will consider all buildings located within the county as vulnerable. The existing buildings and infrastructure in Alexander County are discussed in types and numbers in Table 4-10.

Critical Facilities

All critical facilities are vulnerable to tornadoes. A critical facility will encounter many of the same impacts as any other building within the jurisdiction. These impacts will vary based on the magnitude of the tornado, but can include structural failure, debris (trees or limbs) causing damage, roofs blown off or windows broken by hail or high winds, and loss of facility functionality (e.g. a damaged police station will no longer be able to serve the community). Table 4-9 lists the types and numbers of all of the essential facilities in the area. Critical facility information, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

Building Inventory

A table of the building exposure for the entire county is listed in Table 4-10. The buildings within the county can all expect the same impacts, similar to those discussed for critical facilities. These impacts include structural failure, debris (trees or limbs) causing damage, roofs blown off or windows broken by hail or high winds, and loss of building function (e.g. a damaged home will no longer be habitable causing residents to seek shelter).

Infrastructure

During a tornado the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, and bridges. Since the county's entire infrastructure is equally vulnerable, it is important to emphasize that any number of these items could become damaged during a tornado. The impacts to these items include broken, failed or impassable roadways, broken or failed utility lines (e.g. loss of power or gas to community), and railway failure from broken or impassable railways. Bridges could fail or become impassable causing risk to traffic.

An example scenario is described as follows to illustrate the anticipated impacts of tornadoes in the county in terms of numbers and types of buildings and infrastructure.

Alexander County Tornado Analysis

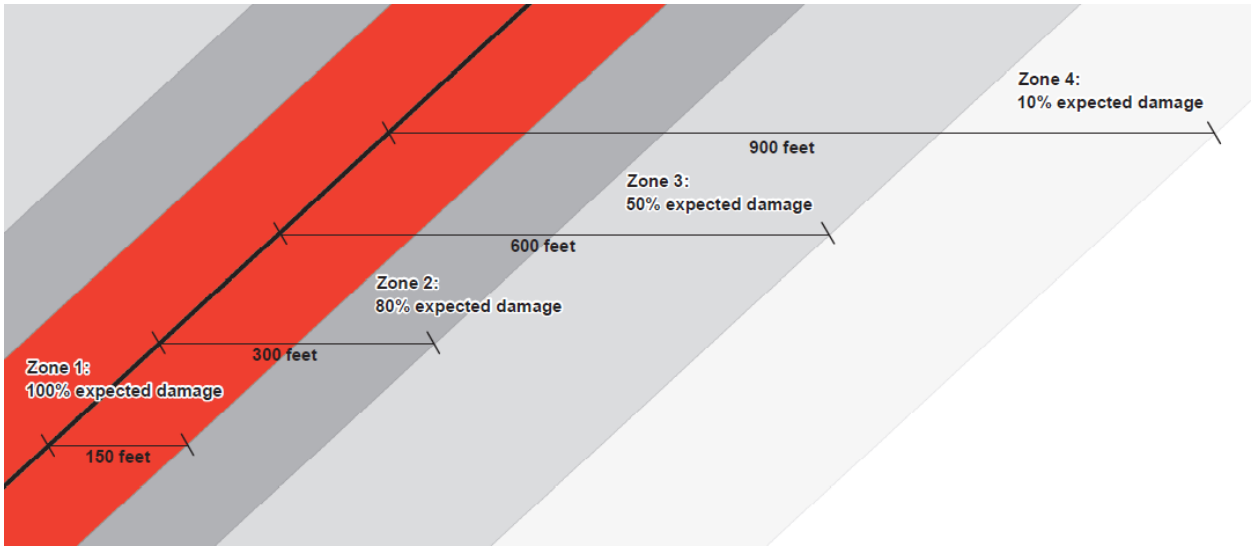
Two GIS overlay models were used to determine the potential impacts of an F4 tornado. The analysis used a hypothetical path based upon an F-4 tornado event that ran 2.3 mile through the community of Cairo and an F4 tornado event that ran for 12 miles across the county and through the communities of Thebes and Tamms. The selected widths were based on a recreation of the Fujita-Scale guidelines based on conceptual wind speeds, path widths, and path lengths. There is no guarantee that every tornado will fit exactly into one of these six categories. The Fujita Scale guidelines are described in Table 4-13.

Table 4-13: Tornado Path Widths and Damage Curves

Fujita Scale	Path Width (feet)	Maximum Expected Damage
F-5	3000	100%
F-4	2400	100%
F-3	1800	80%
F-2	1200	50%
F-1	600	10%
F-0	300	0%

Within any given tornado path there are degrees of damage. The most intense damage occurs within the center of the damage path with a decreasing amount of damage away from the center of the damage path. This natural process was modeled in GIS by adding damage zones around the tornado path. Figure 4-2 and Table 4-14 describe the zone analysis.

Figure 4-2: GIS Analysis Using Tornado Buffers



Once the hypothetical route is digitized on the map, several buffers are created to model the damage functions within each zone.

An F4 tornado has four damage zones. Total devastation is estimated within 150 feet of the tornado path (the darker colored zone 1). The outer buffer is 900 feet from the tornado path (the lightest colored zone 4), within which 10% of the buildings will be damaged.

Table 4-14: Tornado Zones and Damage Curves

Fujita Scale	Zone	Buffer (feet)	Damage Curve
F-4	4	600-900	10%
F-4	3	300-600	50%
F-4	2	150-300	80%
F-4	1	0-150	100%

The selected hypothetical tornado paths are depicted in Figure 4-3 and 4-4, and the damage curve buffers with damaged buildings are shown in Figures 4-5 through 4-7.

Figure 4-3: Hypothetical F-4 Tornado Path in Alexander County (Scenario1, Cario)

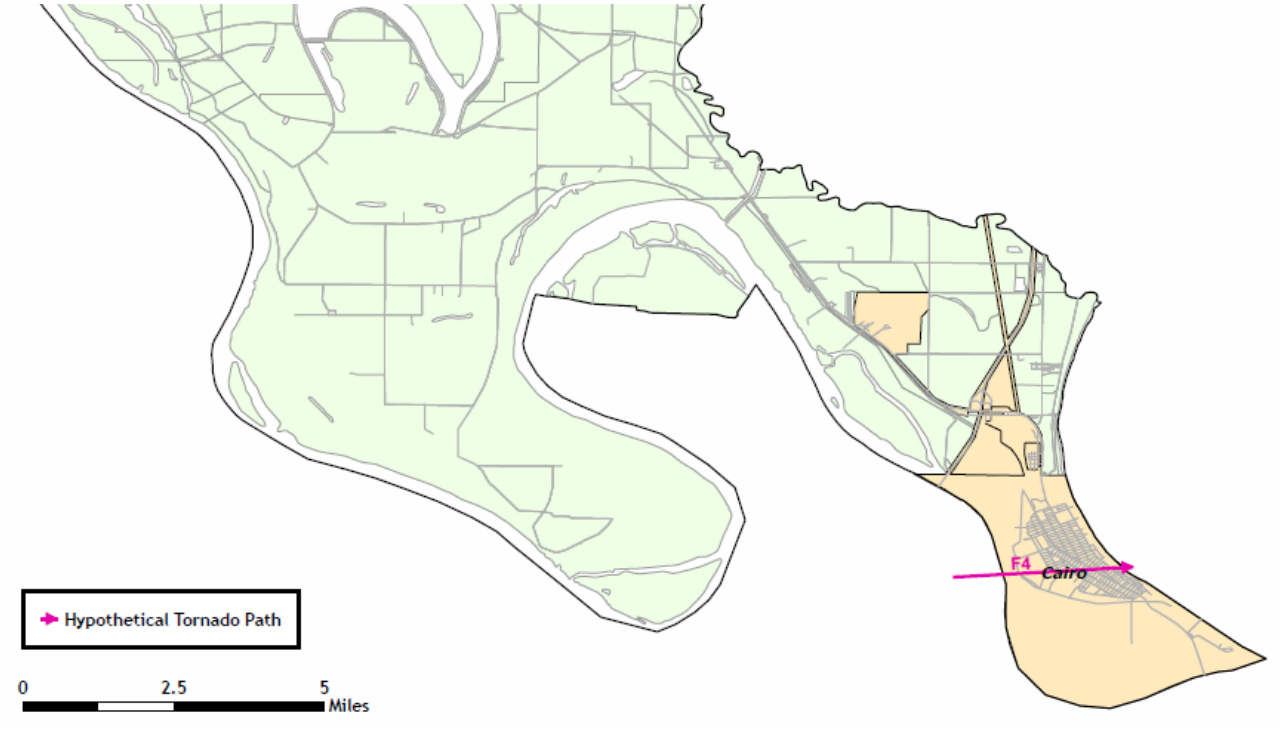


Figure 4-4: Hypothetical F-4 Tornado Path in Alexander County (Scenario 2, Thebes and Tamms)

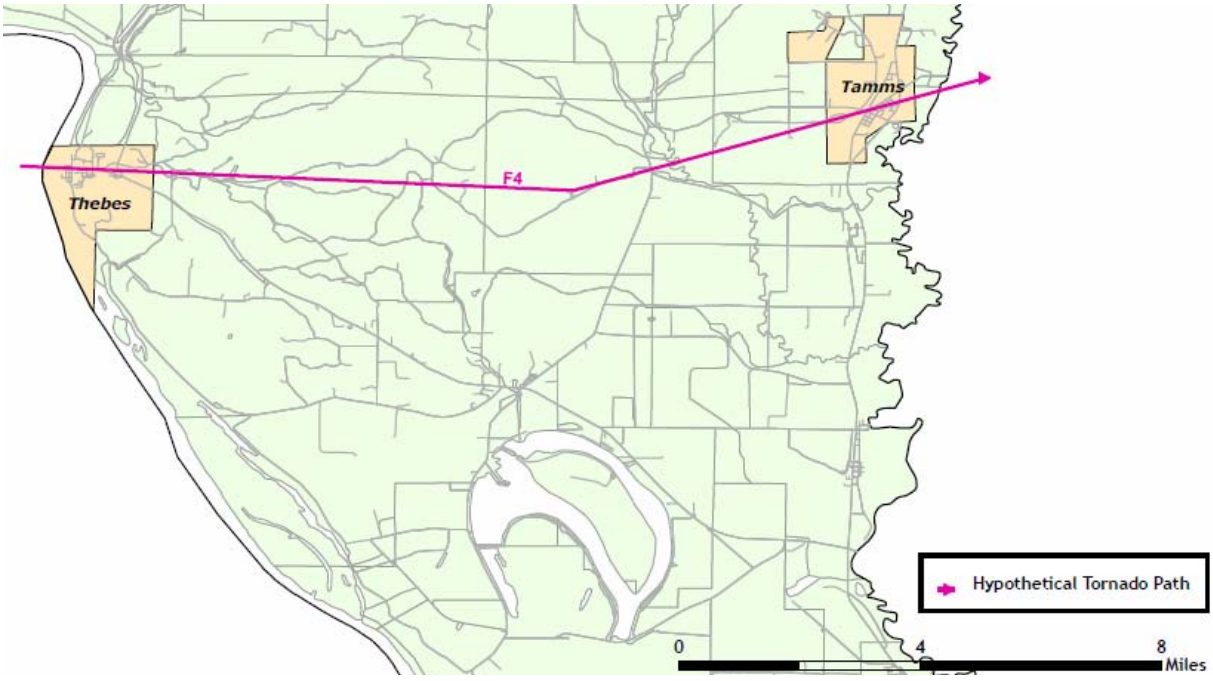


Figure 4-5: Modeled F4 Tornado Damage Buffer for Scenario 1 (Cairo, IL)

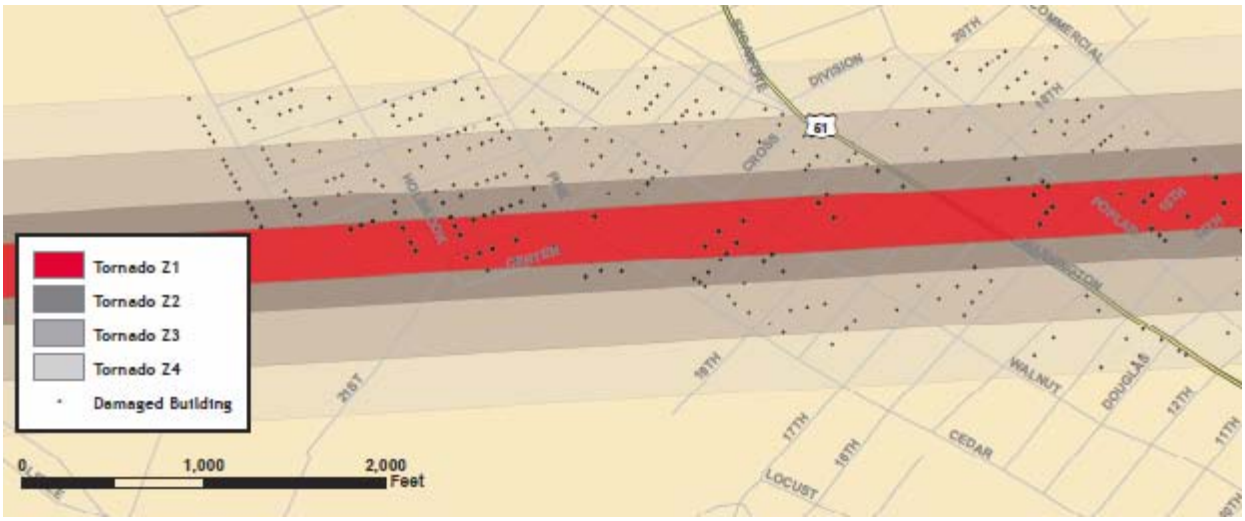


Figure 4-6: Modeled F4 Tornado Damage Buffer for Scenario 2 (Thebes, IL)

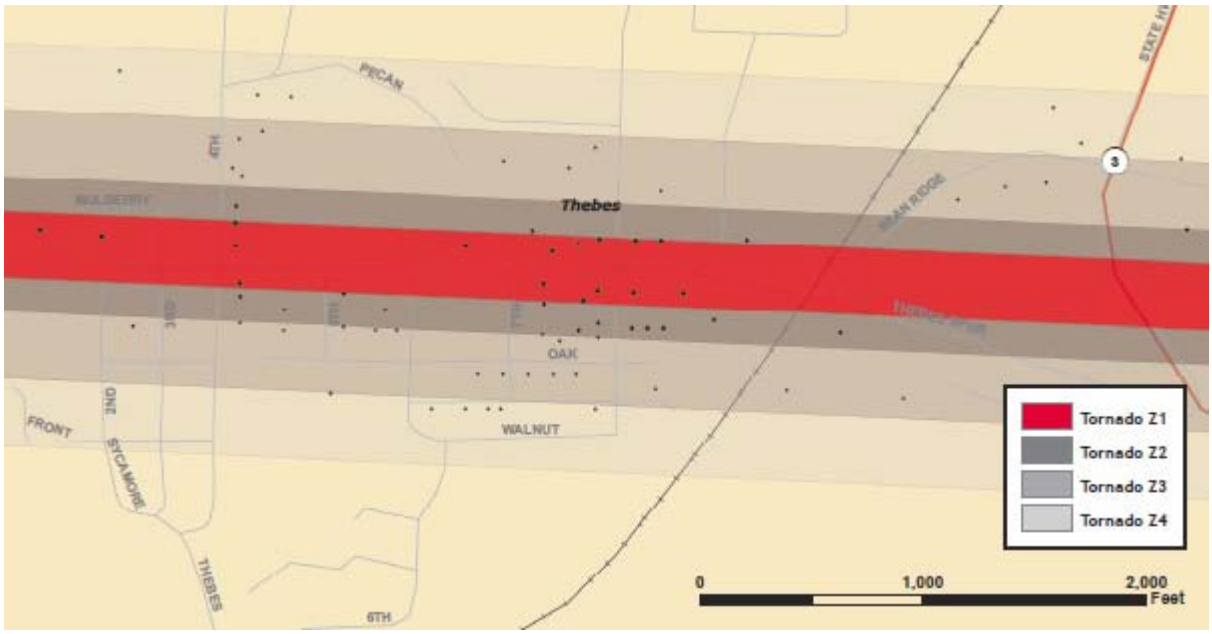
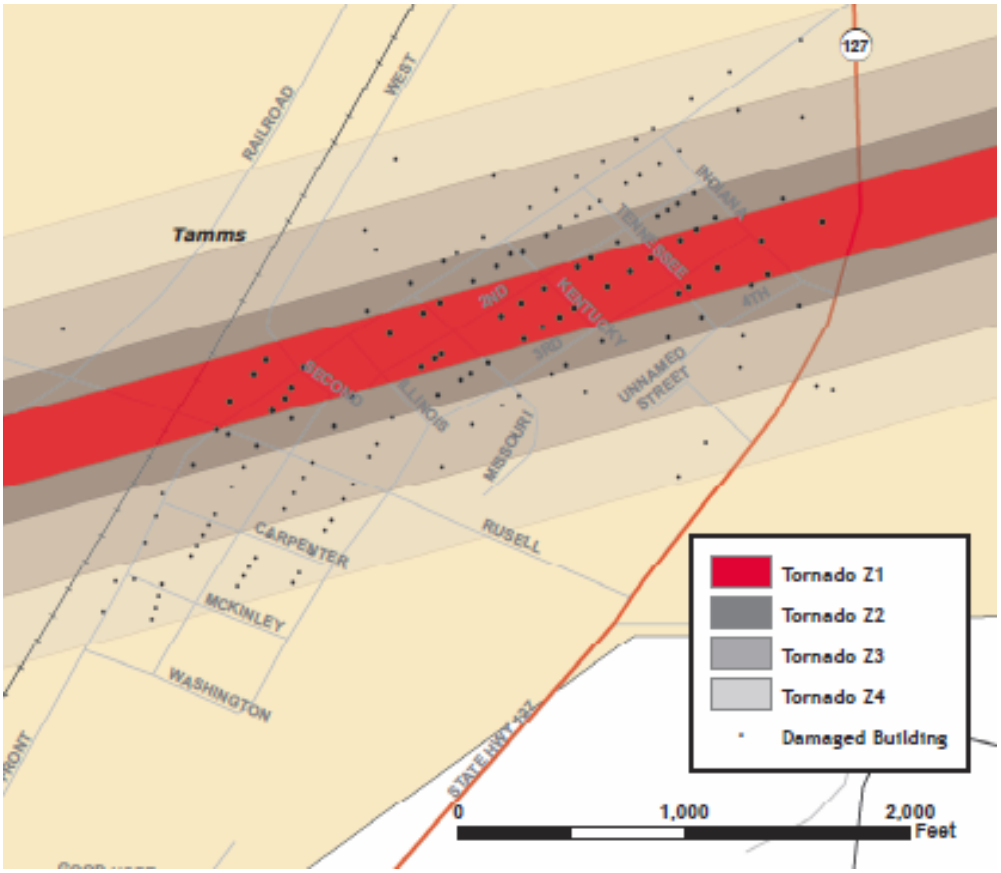


Figure 4-7: Modeled F4 Tornado Damage Buffer for Scenario 2 (Tamms, IL)



The modeling results for scenario 1 (an F-4 Tornado trough Cairo) are depicted in Tables 4-15 and 4-16, and the results for scenario 2 (an F-4 tornado through Thebes and Tamms) are shown in Tables 4-17 and 4-18. The GIS analysis for scenario one estimates that 330 buildings will be damaged. The estimated building losses were $1.92 million. The building losses are an estimate of building replacement costs multiplied by the percentages of damage. The overlay was performed against parcels provided by Alexander County that were joined with Assessor records showing property improvement.

The Assessor records often do not distinguish parcels by occupancy class if the parcels are not taxable. For purposes of analysis, the total number of buildings and the assessed values for government, religious/non-profit, and education should be lumped together as exempt.

Table 4-15: Estimated Numbers of Buildings Damaged by Occupancy Type (Scenario 1)

Occupancy	Zone 1	Zone 2	Zone 3	Zone 4
Residential	34	41	112	94
Commercial	6	2	17	16
Industrial	0	0	0	0
Agriculture	0	0	0	0
Exempt	1	0	6	0
Total	**41**	**43**	**136**	**110**

Table 4-16: Estimated Building Losses by Occupancy Type (Scenario 1)

Occupancy	Zone 1	Zone 2	Zone 3	Zone 4
Residential	$361,365	$244,632	$445,260	$77,351
Commercial	$413,925	$5,892	$345,248	$27,132
Industrial	$0	$0	$0	$0
Agriculture	$0	$0	$0	$0
Exempt	$0	$0	$3,750	$0
Total	**$775,290**	**$250,524**	**$794,258**	**$104,483**

The results for scenario 2 are depicted in Tables 4-17 and 4-18. The GIS analysis estimates that 233 buildings will be damaged. The estimated building losses were $4.16 million. The building losses are an estimate of building replacement costs multiplied by the percentages of damage. The overlay was performed against parcels provided by Alexander County that were joined with Assessor records showing property improvement.

Table 4-17: Estimated Numbers of Buildings Damaged by Occupancy Type (Scenario 2)

Occupancy	Zone 1	Zone 2	Zone 3	Zone 4
Residential	32	41	76	42
Commercial	6	8	7	1
Industrial	0	1	0	0
Agriculture	5	3	6	5
Exempt	1	0	0	0
Total	**43**	**53**	**89**	**48**

Table 4-18: Estimated Building Losses by Occupancy Type (Scenario 2)

Occupancy	Zone 1	Zone 2	Zone 3	Zone 4
Residential	$573,330	$613,608	$853,118	$108,933
Commercial	$230,985	$371,472	$177,480	$2,100
Industrial	$0	$222,324	$0	$0
Agriculture	$109,740	$73,104	$64,193	$29,162
Exempt	$1,250,000	$0	$0	$0
Total	**$1,648,055**	**$1,280,508**	**$1,094,790**	**$140,195**

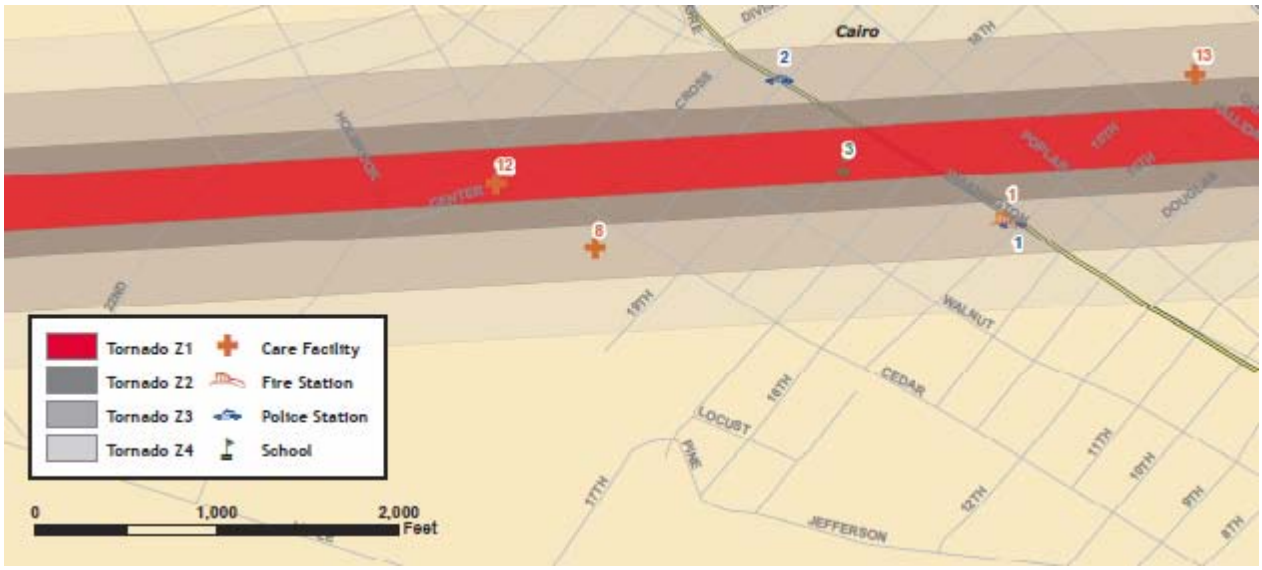
Essential Facilities Damage

In scenario 1 there are 7 essential facilities located within 900 feet of the hypothetical tornado path. The model predicts that 3 medical care facilities 1 fire department, 2 police departments and 1 school would experience damage. The affected facilities are identified in Table 4-19, and their geographic locations are shown in Figure 4-8.

Table 4-19: Estimated Essential Facilities Affected (Scenario 1)

Name
Daystar Care Center
Delta House
Stinger Building
Cairo Fire Department
Cairo Police Records Station
Alexander County Sheriff's Office
Bennett Elementary School

Figure 4-8: Essential Facilities within Tornado Path (Scenario 1)

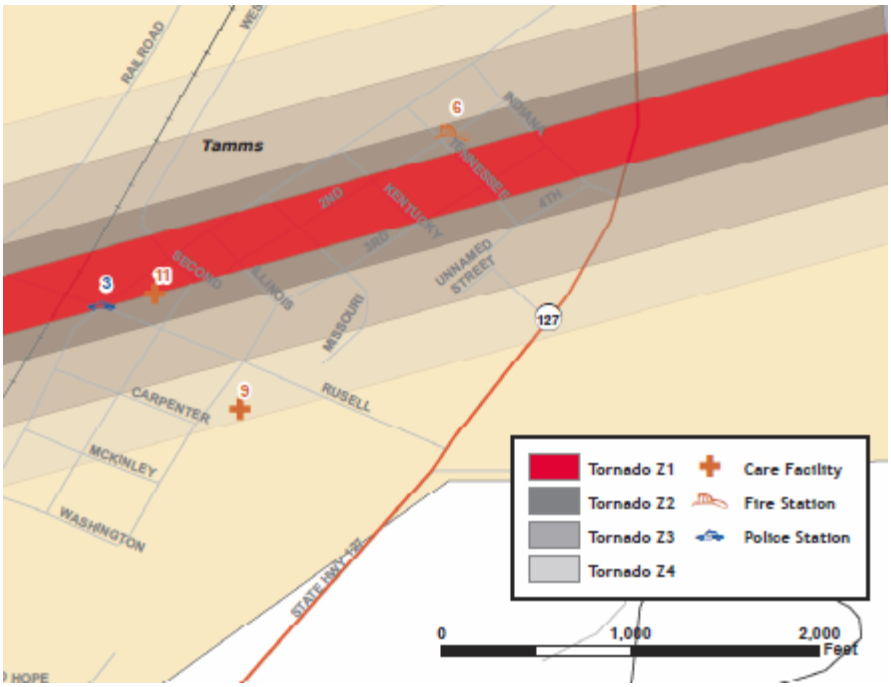


For Scenario 2 there are 5 essential facilities located within 900 feet of the hypothetical tornado path. The model predicts that 2 medical care facilities 1 fire department and 1 police department in Tamms would experience damage. 1 fire department in Thebes would experience damage. The affected facilities are identified in Table 4-20, and the geographic locations for the Tamms facilities are shown in Figure 4-9.

Table 4-20: Estimated Essential Facilities Affected (Scenario 2)

Name
H & S Care Center
Tamms Health Center
Thebes Fire Department
Tamms Fire Department
Tamms Police Department

Figure 4-9: Essential Facilities within Tornado Path (Thebes; Scenario 2)



Vulnerability to Future Assets/Infrastructure for Tornado Hazard

The entire population and buildings have been identified as at risk because tornadoes can occur anywhere within the State of Illinois, at any time of the day, and during any month of the year. Furthermore, any future development in terms of new construction within the county will be at risk. The building exposure for Alexander County is included in Table 4-9.

All critical facilities in the county and its communities are at risk. Critical facility information, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

Analysis of Community Development Trends

Preparing for severe storms will be enhanced if officials sponsor a wide range of programs and initiatives to address the overall safety of county residents. New structures should be built with sturdier construction, and existing structures should be hardened to lessen the potential impacts of severe weather. Community sirens to warn of approaching storms are also vital to ensuring the safety of Alexander County residents.

4.4.2 Flood Hazard

Hazard Definition for Flooding

Flooding is a significant natural hazard throughout the United States. The type, magnitude, and severity of flooding are functions of the amount and distribution of precipitation over a given area, the rate at which precipitation infiltrates into the ground, the geometry and hydrology of the catchment, and flow dynamics and conditions in and along the river channel. Floods can be classified as one of two types: upstream floods or downstream floods. Both types of floods are common in Illinois. Upstream floods, also called flash floods, occur in the upper parts of drainage basins and are generally characterized by periods of intense rainfall over a short duration. These floods arise with very little warning and often result in locally intense damage, and sometimes loss of life, due to the high energy of the flowing water. Flood waters can snap trees, topple buildings, and easily move large boulders or other structures. Six inches of rushing water can upend a person; another eighteen inches might carry off a car. Generally, upstream floods cause damage over relatively localized areas, but they can be quite severe in the local areas where they occur. Urban flooding is a type of upstream flood. Urban flooding involves the overflow of storm drain systems and can be the result of inadequate drainage combined with heavy rainfall or rapid snowmelt. Upstream or flash floods can occur at anytime of the year in Illinois, but they are most common in the spring and summer months.

Downstream floods, sometimes called riverine floods, refer to floods on large rivers at locations with large upstream catchments. Downstream floods are typically associated with precipitation events that are of relatively long duration and occur over large areas. Flooding on small tributary streams may be limited, but the contribution of increased runoff may result in a large flood downstream. The lag time between precipitation and time of the flood peak is much longer for downstream floods than for upstream floods, generally providing ample warning for people to move to safe locations and, to some extent, secure some property against damage. Riverine flooding on the large rivers of Illinois generally occurs during either the spring or summer.

Hazard Definition for Dam and Levee Failure

Dams are structures that retain or detain water behind a large barrier. When full or partially full, the difference in elevation between the water above the dam and below creates large amounts of potential energy, creating the potential for failure. The same potential exists for levees when they

serve their purpose, which is to confine flood waters within the channel area of a river and exclude that water from land or communities land-ward of the levee. Dams and levees can fail due to either: 1) water heights or flows above the capacity for which the structure was designed; or 2) deficiencies in the structure such that it cannot hold back the potential energy of the water. If a dam or levee fails, issues of primary concern include loss of human life/injury, downstream property damage, lifeline disruption (of concern would be transportation routes and utility lines required to maintain or protect life), and environmental damage.

Many communities view both dams and levees as permanent and infinitely safe structures. This sense of security may well be false, leading to significantly increased risks. Both downstream of dams and on floodplains protected by levees, security leads to new construction, added infrastructure, and increased population over time. Levees in particular are built to hold back flood waters only up to some maximum level, often the 100-year (1% annual probability) flood event. When that maximum is exceeded by more than the design safety margin, then the levee will be overtopped or otherwise fail, inundating communities in the land previously protected by that levee. It has been suggested that climate change, land-use shifts, and some forms of river engineering may be increasing the magnitude of large floods and the frequency of levee-failure situations.

In addition to failure that results from extreme floods above the design capacity, levees and dams can fail due to structural deficiencies. Both dams and levees require constant monitoring and regular maintenance to assure their integrity. Many structures across the U.S. have been under-funded or otherwise neglected, leading to an eventual day of reckoning in the form either of realization that the structure is unsafe or, sometimes, an actual failure. The threat of dam or levee failure may require substantial commitment of time, personnel, and resources. Since dams and levees deteriorate with age, minor issues become larger compounding problems, and the risk of failure increases.

Previous Occurrences for Riverine and Flash Flooding

The NCDC database reported 85 flood events in Alexander County since 1995. These flood events have been attributed with one injury and nearly $8.2 million in property damage. A recent example of flooding in Alexander County occurred on February 18, 2008. The Ohio River crested at 43.17 feet on the Cairo gage on the 21st. Flood stage is 40 feet. Minor flooding of low-lying bottomlands and fields occurred. Numerous thunderstorms on the February 5th accompanied a strong storm system that tracked northeast across southeast Missouri and southern Illinois. Heavy rainfall on ground that was already moist from January storms caused flooding of the Ohio River.

Significant Alexander County floods recorded by the NCDC are shown in Table 4-21. A complete list of flood events and additional information about the significant flood events are included in Appendix D. Historical flood crests and discharges at hydrologic monitoring stations are summarized in Appendix H.

Table 4-21: Alexander County Previous Occurrences of Flooding*

Location or County	Date	Type	Deaths	Injuries	Property Damage
Extreme South II	4/9/1995	Flash Flood	0	0	50K
Cairo	3/1/1997	Flash Flood	0	0	400K
Alexander	1/21/1999	Flash Flood	0	0	30K
Alexander	1/22/1999	Flash Flood	0	0	0
Olive Branch	7/19/2001	Flash Flood	0	0	0
Alexander	5/13/2002	Flash Flood	0	0	300K
Alexander	5/17/2002	Flash Flood	0	0	0
Tamms	4/25/2003	Flash Flood	0	0	2K
Alexander	5/4/2003	Flash Flood	0	0	0
Cairo	11/1/2004	Flash Flood	0	0	0
Cairo	8/27/2006	Flash Flood	0	0	0
Alexander	2/1/1996	Flood	0	0	0
Alexander	4/26/1996	Flood	0	0	0
Alexander	5/1/1996	Flood	0	0	50K
Alexander	5/1/1996	Flood	0	0	80K
Alexander	6/1/1996	Flood	0	0	0
Alexander	6/1/1996	Flood	0	0	0
Alexander	12/4/1996	Flood	0	0	0
Alexander	12/19/1996	Flood	0	0	0
Alexander	1/30/1997	Flood	0	0	0
Alexander	2/1/1997	Flood	0	0	0
Alexander	2/26/1997	Flood	0	0	0
Alexander	3/1/1997	Flood	0	0	2.5M
Alexander	3/1/1997	Flood	0	0	20K
Alexander	6/1/1997	Flood	0	0	0
Alexander	1/11/1998	Flood	0	0	0
Alexander	3/21/1998	Flood	0	0	0
Alexander	3/22/1998	Flood	0	0	0
Alexander	4/1/1998	Flood	0	0	0
Alexander	4/4/1998	Flood	0	0	0
Alexander	5/1/1998	Flood	0	0	0
Alexander	5/1/1998	Flood	0	0	0
Alexander	6/15/1998	Flood	0	0	0
Alexander	6/21/1998	Flood	0	0	0
Alexander	7/1/1998	Flood	0	0	0
Alexander	7/4/1998	Flood	0	0	0
Alexander	1/22/1999	Flood	0	0	0
Alexander	2/1/1999	Flood	0	0	30K
Alexander	3/9/1999	Flood	0	0	0
Alexander	4/20/1999	Flood	0	0	0
Alexander	5/1/1999	Flood	0	0	12K

Location or County	Date	Type	Deaths	Injuries	Property Damage
Alexander	5/8/1999	Flood	0	0	0
Alexander	6/1/1999	Flood	0	0	0
Alexander	2/19/2001	Flood	0	0	0
Alexander	3/1/2001	Flood	0	0	0
Alexander	3/1/2001	Flood	0	0	0
Alexander	5/21/2001	Flood	0	0	0
Alexander	6/10/2001	Flood	0	0	0
Alexander	12/17/2001	Flood	0	0	8K
Alexander	12/18/2001	Flood	0	0	0
Alexander	1/23/2002	Flood	0	0	30K
Alexander	1/26/2002	Flood	0	0	0
Alexander	2/1/2002	Flood	0	0	0
Alexander	3/20/2002	Flood	0	0	3K
Alexander	4/1/2002	Flood	0	0	0
Alexander	4/24/2002	Flood	0	0	0
Alexander	5/1/2002	Flood	0	0	762K
Alexander	5/8/2002	Flood	0	0	1.5M
Alexander	6/1/2002	Flood	0	0	0
Alexander	2/18/2003	Flood	0	0	0
Alexander	3/1/2003	Flood	0	0	0
Alexander	5/7/2003	Flood	0	0	0
Alexander	5/13/2003	Flood	0	0	0
Alexander	1/5/2004	Flood	0	0	0
Alexander	2/8/2004	Flood	0	0	0
Alexander	3/9/2004	Flood	0	0	0
Alexander	5/28/2004	Flood	0	0	0
Alexander	5/31/2004	Flood	0	0	0
Alexander	6/1/2004	Flood	0	0	0
Alexander	6/1/2004	Flood	0	0	0
Alexander	12/3/2004	Flood	0	0	0
Alexander	1/5/2005	Flood	0	0	700K
Alexander	1/7/2005	Flood	0	0	0
Alexander	2/1/2005	Flood	0	0	0
Alexander	2/18/2005	Flood	0	0	0
Alexander	4/1/2005	Flood	0	0	0
Cairo	1/15/2007	Flood	0	0	0
Tamms	1/8/2008	Flood	0	0	0
Cairo	2/10/2008	Flood	0	0	0
Alexander	5/15/1995	River Flood	0	1	0
Alexander	6/1/1995	River Flood	0	0	0
Alexander	6/1/1995	River Flood	0	0	1.9M
East Cape Girardeau	12/18/2002	Urban/sml Stream Fld	0	0	0

Source: NCDC

* NCDC records are estimates of damage compiled by the National Weather Service from various local, state, and federal sources. However, these estimates are often preliminary in nature and may not match the final assessment of economic and property losses related to a given weather event.

Previous Occurrences for Levee Failure

Prior to the 1950s, large flood events along the Mississippi and Ohio Rivers within Alexander County often overwhelmed local/private levees inundating the floodplain and its communities. Since the completion of the larger levees constructed by the Federal Government in the 1950s, Only one levee failure has been documented along the Mississippi or Ohio Rivers within Alexander County. On July 15, 1993 the Len Small deflection levee was breached south of Miller City. The purpose of this deflection levee is to help prevent channel evulsions along this sinuous reach of the Mississippi River, not flood control (Chrzastowski et al., 1994). Along the other streams and rivers in Alexander County there are no records or local knowledge of any dam or any other certified levee failure in the county.

Repetitive Loss Properties

FEMA defines a repetitive loss structure as a structure covered by a contract of flood insurance issued under the National Flood Insurance Program (NFIP), which has suffered flood loss damage on two or more occasions during a 10-year period that ends on the date of the second loss, in which the cost to repair the flood damage is 25% of the market value of the structure at the time of each flood loss.

Illinois Emergency Management was contacted to determine the location of repetitive loss structures. Alexander County has 27 repetitive loss structures within the county. As of December 2008, the total amount paid for building replacement and building contents for damages to these repetitive loss structures is $372,961.85. Table 4-22 describes the loss structures in terms of occupancy and jurisdiction.

Table 4-22 Alexander County Repetitive Loss Structures

Jurisdiction	Occupancy Type	Number of Structures	Number of Losses	Total Paid
Alexander County	Single-Family	8	20	$80,001.02
Cairo	Single-Family	1	2	$12,193.26
Thebes	Nonresidential	5	16	$86,054.20
Thebes	Single-Family	13	39	$194,713.37
Totals		**27**	**77**	**$372,961.85**

Geographic Location for Flooding

Most riverine floods in Illinois occur during either the spring or summer and are the result of excessive rainfall and/or the combination of rainfall and snowmelt. Flash flooding in Illinois can occur during anytime of the year, but tends to be less frequent and more localized between mid-summer and early winter.

The primary sources of river flooding in Alexander County are the Mississippi, Ohio, and Cache Rivers. Flooding along Mississippi River can impact Cairo, East Cape Girardeau, McClure and Thebes. Flooding along the Ohio River and the Cache River and its tributaries can impact Cairo and Tamms. Flooding along the Mississippi, Ohio, or Cache Rivers can impact major transportation routes such as State Routes 3, 127, and 137.

Flash flooding in Alexander County typically occurs or is best documented in urban/developed areas. For example on November 11, 2004 flash flooding was reported in Cairo after a broad area of heavy rain produced average rainfall from three quarters to one inch an hour. An underpass was flooded and water was over a few side streets.

The State of Illinois has recently completed the modernization of the Flood Insurance Rate Maps (FIRMs) for Alexander County. These digital files (DFIRMs) were used to identify specific stream reaches for analysis. The areas of riverine flooding are shown on the map in Appendix E.

In Meeting #4, held on September 22, 2009, the planning team members listed a voluntary buyout option as a mitigation strategy for areas not protected by federally constructed flood control levees to alleviate damage to structures within the county's flood plain. They identified potential hazard areas in which this program may prove valuable. The results are listed in Table 4-23.

Table 4-23: A list of the general location and potential number of structures for voluntary buyouts

Jurisdiction	Location	Approximate Number of Structures
City of Cairo	Areas of poor drainage behind the levee	30
Alexander County	Mill Creek Floodplain	2
Alexander County	Cooper Creek Floodplain	2
Alexander County	Hartline Creek Floodplain	20
Alexander County	Jackson Creek Floodplain	10
Alexander County	Wolf Creek Floodplain	3
Alexander County	Sandy Creek Floodplain	10
Alexander County	Cache Creek Floodplain	35
Alexander County	Lake Creek Floodplain	30
Alexander County	Miller Creek Floodplain	5
Alexander County	Sexton Creek Floodplain	5
Alexander County	Clear Creek Floodplain	10
Alexander County	Mississippi River Floodplain	55
Village of Tamms	Mill Creek Floodplain	25
Village of Thebes	Mississippi River Floodplain	4

Geographic Location for Dam and Levee Failure

The National Inventory of Dams identified two dams in Alexander County. The map in Appendix G illustrates the location of Alexander County dams. Table 4-24 summarizes the National Inventory of Dams information.

Table 4-24: National Inventory of Dams

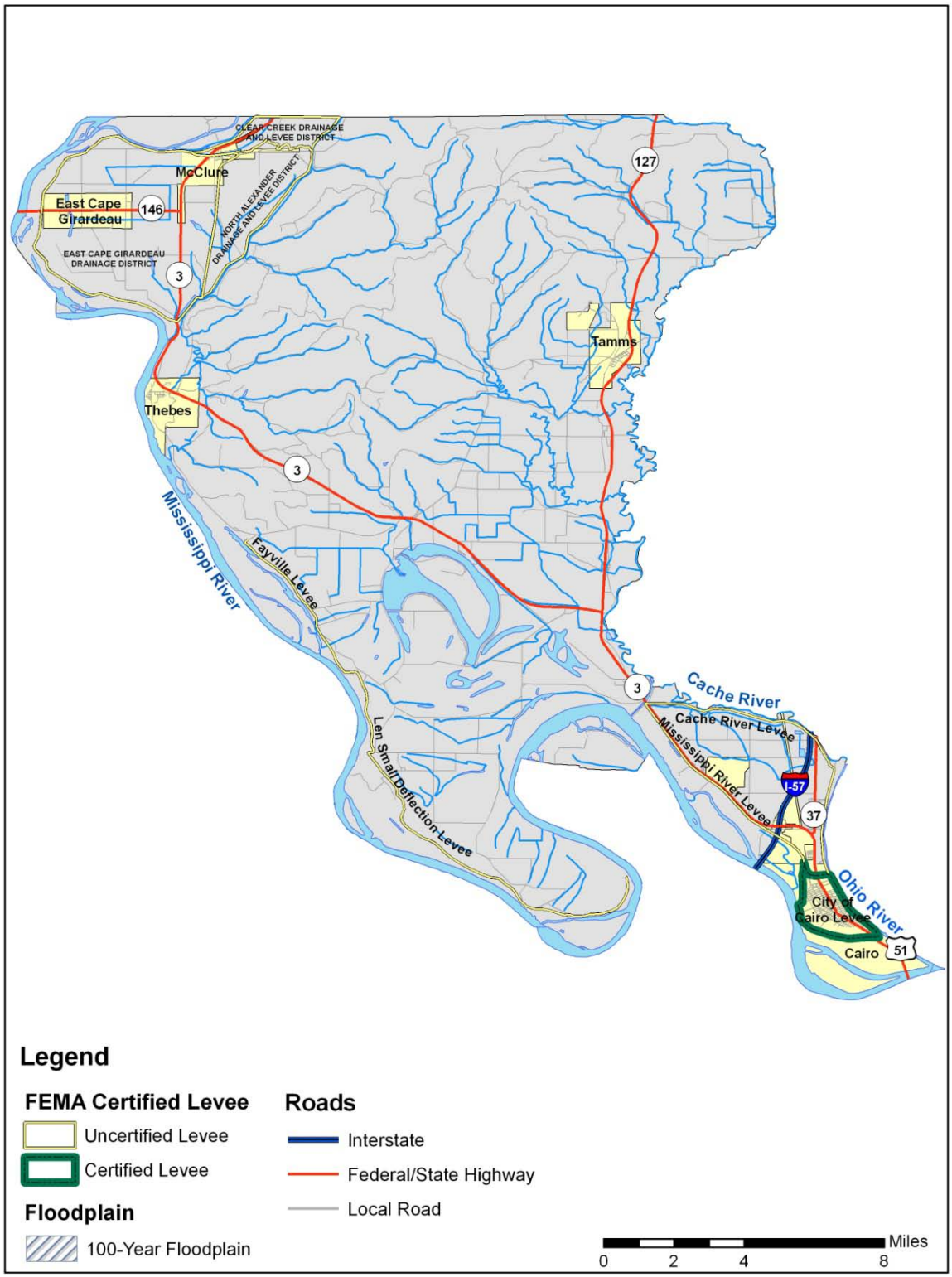
Name	River	Hazard	EAP
Horseshoe Lake Dam	Lake Creek	L	Y
Central Alexander County Sewer Dam	Tributary to Pigeon Roost Creek	L	N

A review of the United States Army Corps of Engineers and IDNR records revealed seven levees and four levee districts within Alexander County. These levees are listed in Table 4-25 and their approximate location shown on Figure 4-10.

Table 4-25 Inventory of Levees

Name	Levee District	River/Stream	Length (mi)	Protection Level	FEMA Certification
Clear Creek Levee	Clear Creek Drainage District and Levee District	Mississippi River and Clear Creek	28.1	~50 - year event	No
North Alexander Levee	North Alexander Drainage and Levee District	Clear Creek	11.9	~50 - year event	No
East Cape Girardeau Levee	East Cape Girardeau Drainage District	Mississippi River	16.4	~ 50 - year event	No
Cairo Levee	City of Cairo and Cairo Drainage District	Mississippi and Ohio Rivers	6.7	100 - year event	Yes
Fayville Levee	Fayville Levee District	Mississippi River	6.0	Unknown	No
Len Small Levee	Len Small Levee District	Mississippi River	10.6	Unknown	No
Cache Levee	Cairo Drainage District	Ohio and Cache Rivers	8.1	Unknown	No
Mississippi River Levee	Cairo Drainage District	Mississippi River		Unknown	NO

Figure 4-10: Alexander County Levees Map



Hazard Extent for Flooding

The HAZUS-MH flood model is designed to use a flood depth grid and flood boundary polygon from the DFIRM data. HAZUS-MH was used to model the Base Flood Elevation (BFE). The BFE is defined as the area that has a 1% chance of flooding in any given year. Planning team input and a review of historical information provided additional information on specific flood events.

Hazard Extent for Dam and Levee Failure

Dams assigned the low (L) hazard potential classification are those where failure or mis-operation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property. Dams assigned the significant (S) hazard classification are those dams where failure or mis-operation results in no probable loss of human life but can cause economic loss, environment damage, disruption of lifeline facilities, or impact other concerns. Dams classified as significant hazard potential dams are often located in predominantly rural or agricultural areas, but could be located in populated areas with a significant amount of infrastructure. Dams assigned the high (H) hazard potential classification are those dams where failure or mis-operation has the highest risk to cause loss of human life and significant damage to buildings and infrastructure.

According to the IDNR and the National Inventory of Dams, none of the dams in Alexander County are classified as a high hazard dams. These dams do not have an Emergency Action Plan (EAP). An EAP is not required by the State of Illinois but is recommended by the Illinois Department of Natural Resources.

Accurate mapping of the risks of flooding behind levees depends on knowing the condition and level of protection the levees actually provide. FEMA and the U.S. Army Corps of Engineers are working together to make sure that flood hazard maps better reflect the flood protection capabilities of levees and that the maps accurately represent the flood risks posed to areas situated behind them. Levee owners—usually states, communities, or private individuals or organizations such as local levee districts—are responsible for ensuring that the levees they own are maintained to their original design level and condition. In order to be considered creditable flood protection structures on FEMA's flood maps, levee owners must provide documentation to prove that the levee meets design, operation, and maintenance standards for protection against the 1% annual probability (100-year) flood.

Calculated Risk Priority Index for Flooding

Based on historical information and the HAZUS-MH flooding analysis results, the probability of flooding in Alexander County is likely. According to the Risk Priority Index (RPI), flooding ranked as the number four hazard.

RPI = Probability x Magnitude/Severity.

Probability	x	Magnitude /Severity	=	RPI
4	x	**8**	=	**32**

Calculated Risk Priority Index for Dam and Levee Failure

Based on operation and maintenance requirements and local knowledge of the dams in Alexander County, the probability of failure is possible. However, if a high hazard dam were to fail, the magnitude and severity of the damage could be great. The warning time and duration of the dam failure event would be very short. According to the RPI, dam and levee failure ranked as the number seven hazard.

RPI = Probability x Magnitude/Severity.

Probability	x	Magnitude /Severity	=	RPI
2	x	**2**	=	**4**

HAZUS-MH Analysis Using 100-Year Flood Boundary and County Parcels

HAZUS-MH generated the flood depth grid for a 100-year return period and made calculations by clipping the USGS 1/3-Arc-Second DEM (~10 m) to the flood boundary. Next, HAZUS-MH utilized a user-defined analysis of Alexander County with site-specific parcel data provided by the county.

HAZUS-MH estimates the 100-year flood would damage 1,692 buildings at an estimated value of $41.9 million. The total estimated numbers of damaged buildings are given in Table 4-26. Figure 4-11 depicts the Alexander County parcel points that fall within the 100-year floodplain. Figures 4-12 and 4-13 highlight damaged buildings within the floodplain areas in Cairo and East Cape Girardeau. The Assessor records often do not distinguish parcels by occupancy class if the parcels are not taxable. For purposes of analysis, the total number of buildings and the assessed values for government, religious/non-profit, and education should be lumped together as exempt.

Table 4-26: Alexander County HAZUS-MH Estimated Building Damage

General Occupancy	Number of Buildings Damaged	Total Building Damage
Residential	1,392	$28,980,174
Commercial	116	$4,686,693
Industrial	9	$3,360,303
Agricultural	172	$4,903,890
Exempt	3	$4,200
Total	**1,692**	**$41,935,260**

Figure 4-11: Alexander County Buildings in Floodplain (100-Year Flood)

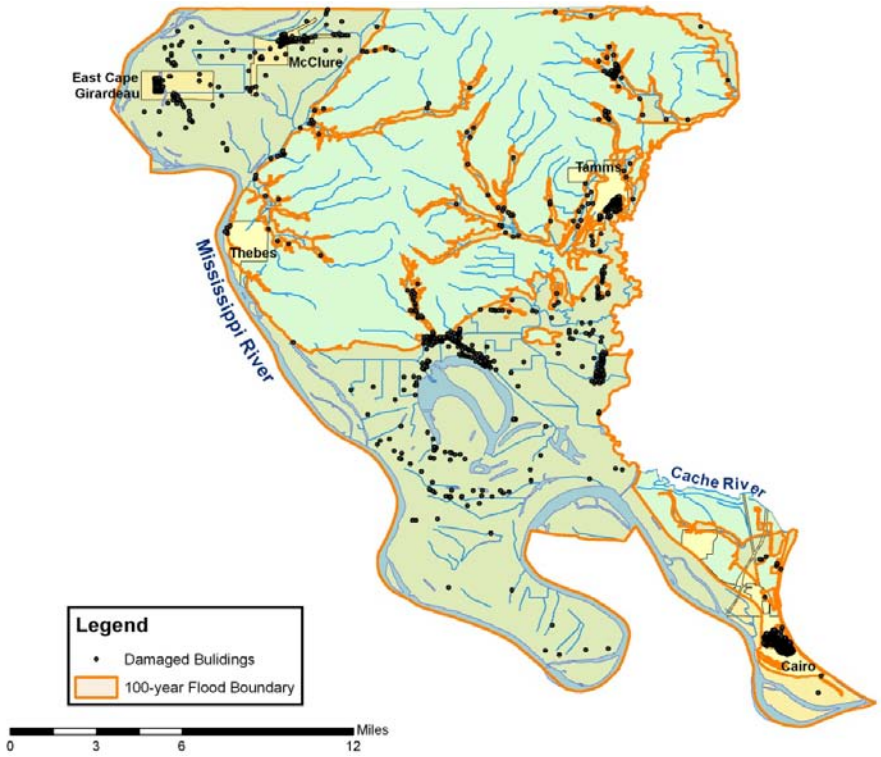
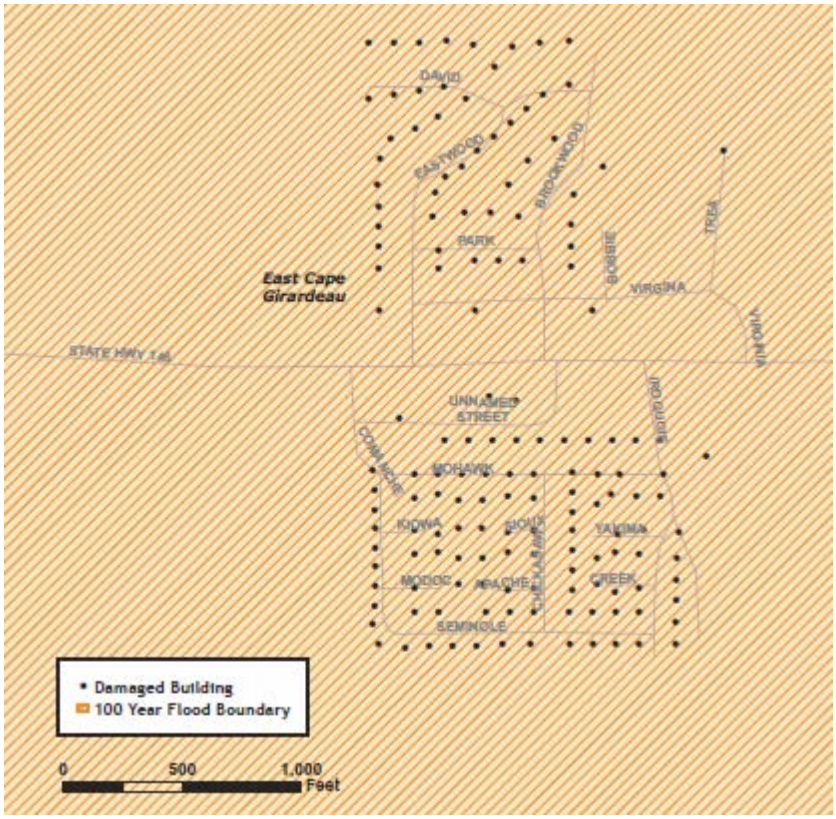


Figure 4-12: Alexander County Urban Areas (Cairo) Flood-Prone Areas (100-Year Flood)

Figure 4-13: Alexander County Urban Areas (East Cape Girardeau) Flood-Prone Areas (100-Year Flood)



Essential Facilities

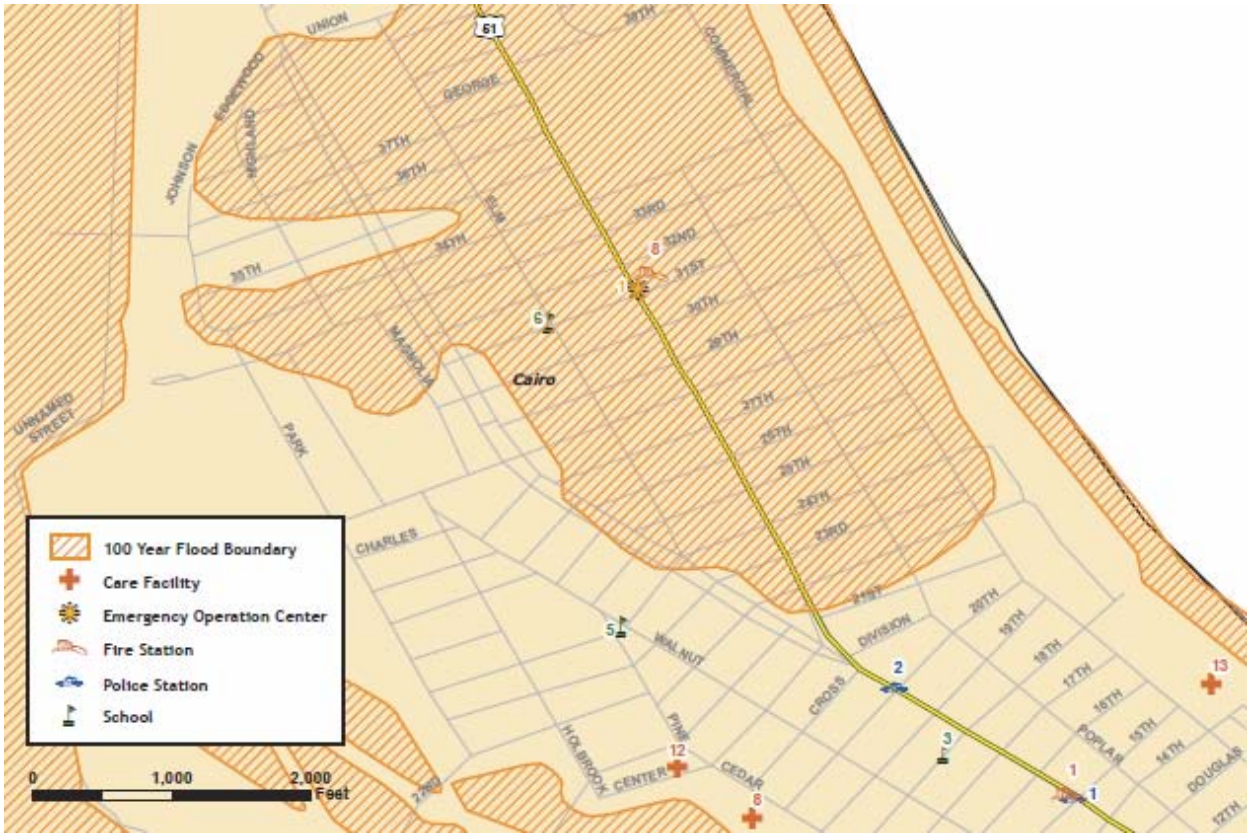
An essential facility will encounter many of the same impacts as other buildings within the flood boundary. These impacts can include structural failure, extensive water damage to the facility and loss of facility functionality (e.g. a damaged police station will no longer be able to serve the community). A complete list of all the critical facilities, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

The HAZUS-MH analysis identified 1 emergency operations center, 1 care center, 2 fire departments, and 7 schools that may be subject to flooding. A list of the essential facilities within Alexander County is given in Table 4-27. A map of essential facilities potentially at risk to flooding is shown in Figure 4-14.

Table 4-27: Alexander County Damaged Essential Facilities

Facility Name
Day Star Care Center
McClure East Cape Fire Department
Tamms Fire Department
Emerson Elementary School
Egyptian High School
Egyptian Middle School
Egyptian Elementary School
Egyptian Pre-Kindergarten
Shawnee Elementary-School
McClure Pre-School
Cairo Auxiliary Fire Station
Cairo Emergency Operations Center

Figure 4-14: Boundary of 100-Year Flood Overlaid with Essential Facilities



Infrastructure

The types of infrastructure that could be impacted by a flood include roadways, utility lines/pipes, railroads, and bridges. Since an extensive inventory of the infrastructure is not available for this plan, it is important to emphasize that any number of these items could become damaged in the event of a flood. The impacts to these items include broken, failed, or impassable roadways; broken or failed utility lines (e.g. loss of power or gas to community); or railway failure from broken or impassable railways. Bridges could fail or become impassable, causing a traffic risk.

Vulnerability Analysis for Flash Flooding

Flash flooding could affect any low lying location within this jurisdiction; therefore, a significant portion of the county's population and buildings are vulnerable to a flash flood. These structures can expect the same impacts as discussed in a riverine flood.

Critical facility information, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

Vulnerability Analysis for Dam and Levee Failure

An EAP is required to assess the effect of dam failure on these communities. In order to be considered creditable flood protection structures on FEMA's flood maps, levee owners must provide documentation to prove the levee meets design, operation and maintenance standards for protection against the 1% annual probability flood.

Vulnerability to Future Assets/Infrastructure for Flooding

Flash flooding may affect nearly any low lying location within the county; therefore all buildings and infrastructure are vulnerable to flash flooding. Currently, the municipality zoning boards review new development for compliance with local zoning ordinances. The Alexander County Emergency Services Disaster Agency administers the floodplain for the county. At this time no construction is planned within the area of the 100-year floodplain. Therefore, there is no new construction, which will be vulnerable to a 100-year flood.

Vulnerability to Future Assets/Infrastructure for Dam and Levee Failure

Municipal Planning Commissions reviews new development for compliance with local zoning ordinances.

Analysis of Community Development Trends

Areas with recent development within the county may be more vulnerable to drainage issues. Storm drains and sewer systems are usually most susceptible, which can cause the back-up of water, sewage, and debris into homes and basements, causing structural and mechanical damage as well as creating public health hazards and unsanitary conditions. Controlling floodplain development is the key to reducing flood-related damages.

4.4.3 Earthquake Hazard

Hazard Definition for Earthquake Hazard

An earthquake is a sudden, rapid shaking of the Earth caused by the breaking and shifting of rock beneath the Earth's surface. For hundreds of millions of years, plate tectonics has shaped the Earth as the huge plates that form the Earth's surface move slowly over, under, and past each other. At their boundaries, the plates typically are locked together and unable to release the accumulating energy. When this energy grows strong enough, the plate boundary breaks free and causes the ground to shake. Most earthquakes occur at the boundaries where the plates meet; however, some earthquakes occur in the middle of plates, as is the case for seismic zones in the Midwestern United States. The most seismically active area in the Midwest U.S. is the New Madrid Seismic Zone. Scientists have 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 manifests evidence of large earthquakes in its geologic history, and there may be other, as yet unidentified, faults that could produce strong earthquakes.

Ground shaking from strong earthquakes can collapse buildings and bridges; disrupt gas, electric, and phone service; and sometimes trigger landslides, avalanches, flash floods, fires, and destructive ocean waves (tsunamis). Buildings with foundations resting on unconsolidated materials and other unstable soil, and trailers and homes not tied to their foundations are at risk because they can be shaken off their mountings during an earthquake. When an earthquake occurs in a populated area, it may cause deaths, injuries, and extensive property damage. Magnitude measures the energy released at the source of the earthquake. Magnitude is determined from measurements on seismographs, and a single earthquake will have a single magnitude to quantify its strength. Earthquake intensity measures the strength of shaking produced by the earthquake at a certain location. Intensity is determined from effects on people, human structures, and the natural environment, and a single earthquake will have a wide range of intensity values at different locations around the epicenter. Table 4-28 is a description of earthquake intensity using an abbreviated Modified Mercalli Intensity scale, and Table 4-29 lists earthquake magnitudes and their corresponding intensities.
(Source: *http://earthquake.usgs.gov/learning/topics/mag_vs_int.php*)

Table 4-28: Abbreviated Modified Mercalli Intensity Scale

Mercalli Intensity	Description
I	Not felt except by a very few under especially favorable conditions.
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.
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.
VI	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.

Mercalli Intensity	Description
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.
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.
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.

Table 4-29: Earthquake Magnitude vs. Modified Mercalli Intensity Scale

Earthquake Magnitude	Typical Maximum Modified Mercalli Intensity
1.0 - 3.0	I
3.0 - 3.9	II - III
4.0 - 4.9	IV - V
5.0 - 5.9	VI - VII
6.0 - 6.9	VII - IX
7.0 and higher	VIII or higher

Historical Earthquakes that have Affected Alexander County

Numerous instrumentally measured earthquakes have occurred in Illinois. In the past few decades, with many precise seismographs positioned across Illinois, measured earthquakes have varied in magnitude from very low microseismic events of M=1-3 to larger events up to M=5.4. Microseismic events are usually only detectable by seismographs and rarely felt by anyone. The most recent earthquake in Southern Illinois—as of the date of this report—occurred on September 6, 2009 at 2:46:20 local time about 10 km (6 miles) west-northwest of Mount Carmel, IL and measured 2.4 in magnitude.

The consensus of opinion among seismologists working in the Midwest is that a magnitude 5.0 to 5.5 event could occur virtually anywhere at any time throughout the region. Earthquakes occur in Illinois all the time, although damaging quakes are very infrequent. Illinois earthquakes causing minor damage occur on average every 20 years, although the actual timing is extremely variable. Most recently, a magnitude 5.2 earthquake shook southeastern Illinois on April 18, 2008, causing minor damage in the Mt Carmel, IL area. Earthquakes resulting in more serious damage have occurred about every 70 to 90 years.

First on the list of historical earthquakes that have affected Illinois and first on the list on continuing earthquake threats at present and into the future is seismic activity on the New Madrid Seismic Zone of southeastern Missouri. On December 16, 1811 and January 23 and February 7 of 1812, three earthquakes struck the central U.S. with magnitudes estimated to be 7.5-8.0. These earthquakes caused violent ground cracking and volcano-like eruptions of sediment *(sand blows)* over an area of >10,500 km^2, and uplift of a 50 km by 23 km zone (the Lake County uplift). The shaking rang church bells in Boston, collapsed scaffolding on the Capitol in Washington, D.C., and was felt over a total area of over 10 million km^2 (the largest

felt area of any historical earthquake). Of all the historical earthquakes that have struck the U.S., an 1811-style event would do the most damage if it recurred today.

The New Madrid earthquakes are especially noteworthy because the seismic zone is in the center of the North American Plate. Such intraplate earthquakes are felt, and do damage, over much broader areas than comparable earthquakes at plate boundaries. The precise driving force responsible for activity on the New Madrid seismic zone is not known, but most scientists infer that it is compression transmitted across the North American Plate. That compression is focused on New Madrid because it is the site of a Paleozoic structure—the Reelfoot Rift—which is a zone of weakness in the crust.

The United States Geological Survey (USGS) and the Center for Earthquake Research and Information (CERI) at the University of Memphis estimate the probability of a repeat of the 1811–1812 type earthquakes (magnitude 7.5–8.0) is 7%–10% over the next 50 years (*USGS Fact Sheet 2006-3125*.) Frequent large earthquakes on the New Madrid seismic zone are geologically puzzling because the region shows relatively little deformation. Three explanations have been proposed: 1) recent seismological and geodetic activity is still a short-term response to the 1811–12 earthquakes; 2) activity is irregular or cyclic; or 3) activity began only in the recent geologic past. There is some dispute over how often earthquakes like the 1811–12 sequence occur. Many researchers estimate a recurrence interval of between 550 and 1100 years; other researchers suggest that either the magnitude of the 1811–12 earthquakes have been over-stated, or else the actual frequency of these events is less. It is fair to say, however, that even if the 1811–12 shocks were just magnitude ~7 events, they nonetheless caused widespread damage and would do the same if another such earthquake or earthquake sequence were to strike today.

[Above: New Madrid earthquakes and seismic zone modified from N. Pinter, 1993, Exercises in Active Tectonic history adapted from *Earthquake Information Bulletin*, 4(3), May-June 1972. *http://earthquake.usgs.gov/regional/states/illinois/history.php*]

The earliest reported earthquake in Illinois was in **1795**. This event was felt at Kaskaskia, IL for a minute and a half and was also felt in Kentucky. At Kaskaskia, subterranean noises were heard. Due to the sparse frontier population, an accurate location is not possible, and the shock may have actually originated outside the state.

An intensity VI-VII earthquake occurred on **April 12, 1883**, awakening several people in Cairo, IL. One old frame house was significantly damaged, resulting in minor injuries to the inhabitants. This is the only record of injury in the state due to earthquakes.

On **October 31, 1895** a large M6.8 occurred at Charleston, Missouri, just south of Cairo. Strong shaking caused eruptions of sand and water at many places along a line roughly 30 km (20 mi) long. Damage occurred in six states, but most severely at Charleston, with cracked walls, windows shattered, broken plaster, and chimneys fallen. Shaking was felt in 23 states from Washington, D.C. to Kansas and from southernmost Canada to New Orleans, LA.

A Missouri earthquake on **November 4, 1905**, cracked walls in Cairo. Aftershocks were felt over an area of 100,000 square miles in nine states. In Illinois, it cracked the wall of the new education building in Cairo and a wall at Carbondale, IL.

Among the largest earthquakes occurring in Illinois was the **May 26, 1909** shock, which knocked over many chimneys at Aurora. It was felt over 500,000 square miles and strongly felt in Iowa and Wisconsin. Buildings swayed in Chicago where there was fear that the walls would collapse. Just under two months later, a second Intensity VII earthquake occurred on **July 18, 1909**, damaged chimneys in Petersburg, IL, Hannibal, MO, and Davenport, IA. Over twenty windows were broken, bricks loosened and plaster cracked in the Petersburg area. This event was felt over 40,000 square miles.

On **November 7, 1958**, a shock along the Indiana border resulted in damage at Bartelso, Dale and Maunie, IL. Plaster cracked and fell, and a basement wall and floor were cracked.

On **August 14, 1965**, a sharp but local shock occurred at Tamms, IL, a town of about 600 people. The magnitude 5 quake damaged chimneys, cracked walls, knocked groceries from the shelves, and muddied the water supply. Thunderous earth noises were heard. This earthquake was only felt within a 10 mile radius of Tamms, in communities such as Elco, Unity, Olive Branch, and Olmstead, IL. Six aftershocks were felt.

An earthquake of Intensity VII occurred on **November 9, 1968**. This magnitude 5.3 shock was felt over an area of 580,000 square miles in 23 states. There were reports of people in tall buildings in Ontario and Boston feeling the shock. Damage consisted of bricks being knocked from chimneys, broken windows, toppled television antenna, and cracked plaster. There were scattered reports of cracked foundations, fallen parapets, and overturned tombstones. Chimney damage was limited to buildings 30 to 50 years old. Many people were frightened. Church bells rang at Broughton and several other towns. Loud rumbling earthquake noise was reported in many communities.

Dozens of other shocks originating in Missouri, Arkansas, Kansas, Nebraska, Tennessee, Indiana, Ohio, Michigan, Kentucky, and Canada have been felt in Illinois without causing damage. There have been three earthquakes slightly greater than magnitude 5.0 and Intensity level VII which occurred in 1968, 1987 and 2008 and that were widely felt throughout southern Illinois and the midcontinent.

Above text adapted from *http://earthquake.usgs.gov/regional/states/illinois/history.php* and from *Seismicity of the United States, 1568-1989 (Revised), C.W. Stover and J.L. Coffman, U.S. Geological Survey Professional Paper 1527, United States Government Printing Office, Washington: 1993.*

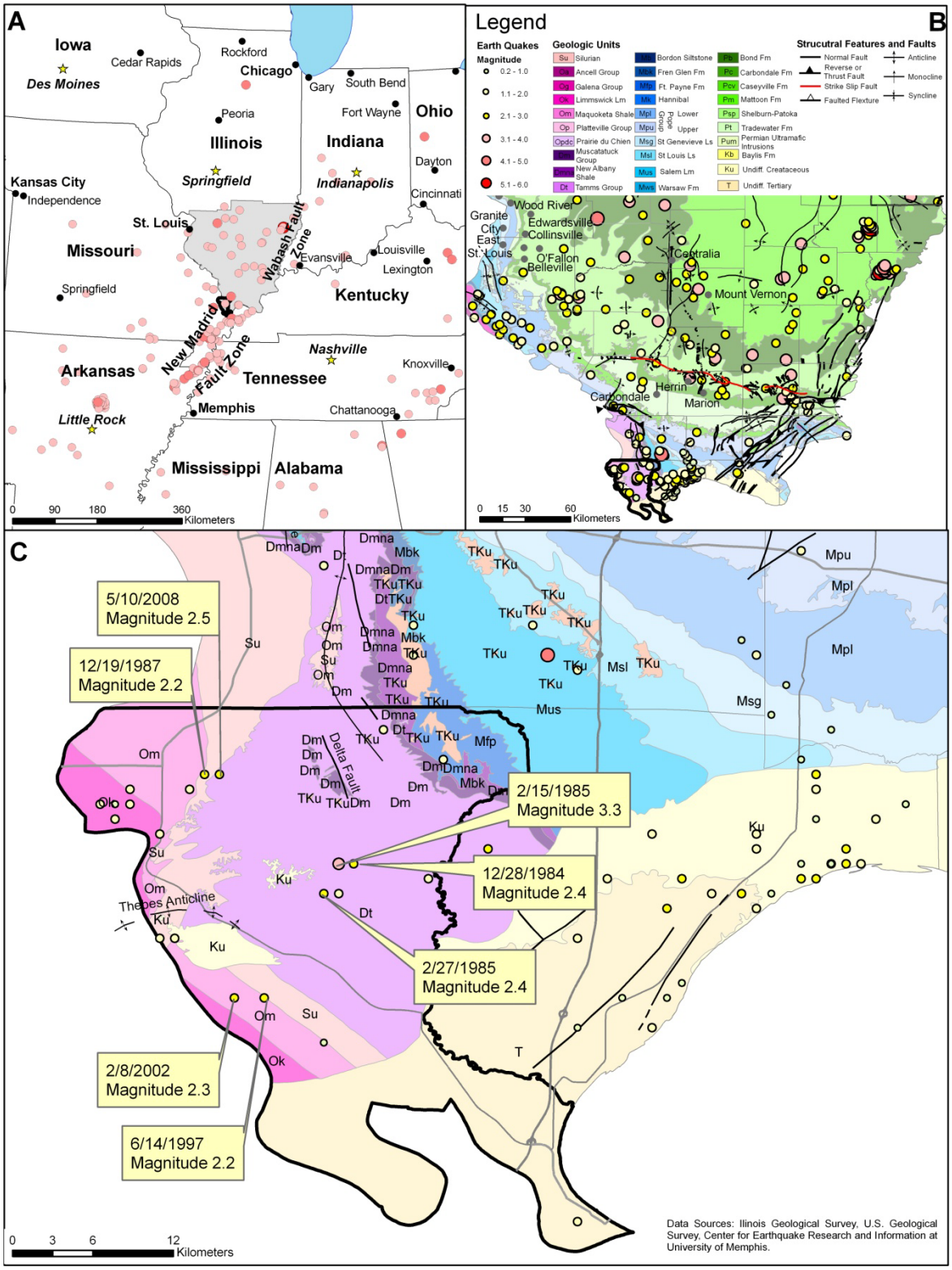
Geographic Location for Earthquake Hazard

Alexander County occupies a region susceptible to earthquakes. Regionally, the two most significant zones of seismic activity are the New Madrid Seismic Zone and the Wabash Valley Fault System. The epicenters of 20 small earthquakes (M1.0–3.3) have been recorded in Alexander County (Figure 4-15). The geologic mechanism related to the minor earthquakes is poorly understood. Return periods for large earthquakes within the New Madrid System are

estimated to be ~500–1000 years; moderate quakes between magnitude 5.5 and 6.0 can recur within approximately 150 years or less. The Wabash Valley Fault System extends nearly the entire length of southern Illinois and has the potential to generate an earthquake of sufficient strength to cause damage between St. Louis, MO and Indianapolis, IN. The USGS and the Center for Earthquake Research and Information estimate the probability of a repeat of the 1811–1812 type earthquakes (magnitude 7.5–8.0) at 7%–10% and the probability of a magnitude 6.0 or larger at 25%–40% within the next 50 years.

Figure 4-15 depicts the following: a) Location of notable earthquakes in the Illinois region with inset of Alexander County; b) Generalized geologic bedrock map with earthquake epicenters, geologic structures, and inset of Alexander County; c) Geologic and earthquake epicenter map of Alexander County.

Figure 4-15 a, b, c: Alexander County Earthquakes



Hazard Extent for Earthquake Hazard

The extent of the earthquake is countywide.

Calculated Risk Priority Index for Earthquake Hazard

Based on historical information as well as current USGS and SIU research and studies, future earthquakes in Alexander County are possible. According to the RPI, earthquake is ranked as the number two hazard.

RPI = Probability x Magnitude/Severity.

Probability	x	Magnitude /Severity	=	RPI
2	x	8	=	16

Vulnerability Analysis for Earthquake Hazard

This hazard could impact the entire jurisdiction equally; therefore, the entire county's population and all buildings are vulnerable to an earthquake and can expect the same impacts within the affected area. To accommodate this risk this plan will consider all buildings located within the county as vulnerable.

Critical Facilities

All critical facilities are vulnerable to earthquakes. A critical facility would encounter many of the same impacts as any other building within the county. These impacts include structural failure and loss of facility functionality (e.g. damaged police station will no longer be able to serve the community). A complete list of all of the critical facilities, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

Building Inventory

94-8 shows building exposure for the entire county. The buildings within the county can all expect the same impacts, similar to those discussed for critical facilities. These impacts include structural failure and loss of building function, which could result in indirect impacts (e.g. damaged homes will no longer be habitable, causing residence to seek shelter).

Infrastructure

During an earthquake, the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, and bridges. Since a full inventory of infrastructure is not available for this plan, it is important to emphasize that any number of these items could become damaged in the event of an earthquake. The impacts to these items include broken, failed, or impassable roadways, broken or failed utility lines (e.g. loss of power or gas to community), and railway failure from broken or impassable railways. Bridges could fail or become impassable causing

risk to traffic. Typical scenarios are described to gauge the anticipated impacts of earthquakes in the county in terms of number and types of buildings and infrastructure.

The SIU-Polis team reviewed existing geological information and recommendations for earthquake scenarios. Three earthquake scenarios—two based on USGS modeled scenarios and one based on deterministic scenarios were developed to provide a reasonable basis for earthquake planning in Alexander County. The two USGS analyses were a M7.7 event on the New Madrid fault zone and M7.1 earthquake on the Wabash Valley Seismic Zone. Shake maps provided by FEMA were used in HAZUS-MH to estimate losses for Alexander County based on these events. The final scenario was a Moment Magnitude of 5.5 with the epicenter located in Alexander County. Note that a deterministic scenario, in this context, refers to hazard or risk models based on specific scenarios without explicit consideration of the probability of their occurrences. This scenario was selected based upon a rupture of a local unnamed fault just northeast of Cairo, IL that presents a realistic earthquake scenario for planning purposes.

Modeling a deterministic scenario requires user input for a variety of parameters. One of the most critical sources of information that is required for accurate assessment of earthquake risk is soils data. Illinois Geologic Survey provided a NEHRP (National Earthquake Hazards Reduction Program) soil classification map for Illinois (Bauer and Su, 2007). NEHRP soil classifications portray the degree of shear-wave amplification that can occur during ground shaking.

Earthquake hypocenter depths in southern Illinois range from less than 1.0 up to ~25.0 km. The average hypocenter depth, ~10.0 km, was used for the deterministic earthquake scenario. For this scenario type HAZUS-MH also requires the user to define an attenuation function. To maintain consistency with the USGS's (2006) modeling of strong ground motion in the central United States the Toro et al. (1997) attenuation function was used for the deterministic earthquake scenario.

The building losses are subdivided into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake

Results for 7.7 Magnitude Earthquake New Madrid Scenario

The results of the 7.7 New Madrid earthquake are depicted in Table 4-30, 4-31, and Figure 4-16. HAZUS estimates that approximately 3,333 buildings will be at least moderately damaged. This is more than 80% of the total number of buildings in the region. It is estimated that 817 buildings will be damaged beyond repair.

The total building-related losses totaled $303.4 million; 11% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies, which comprised more than 60% of the total loss.

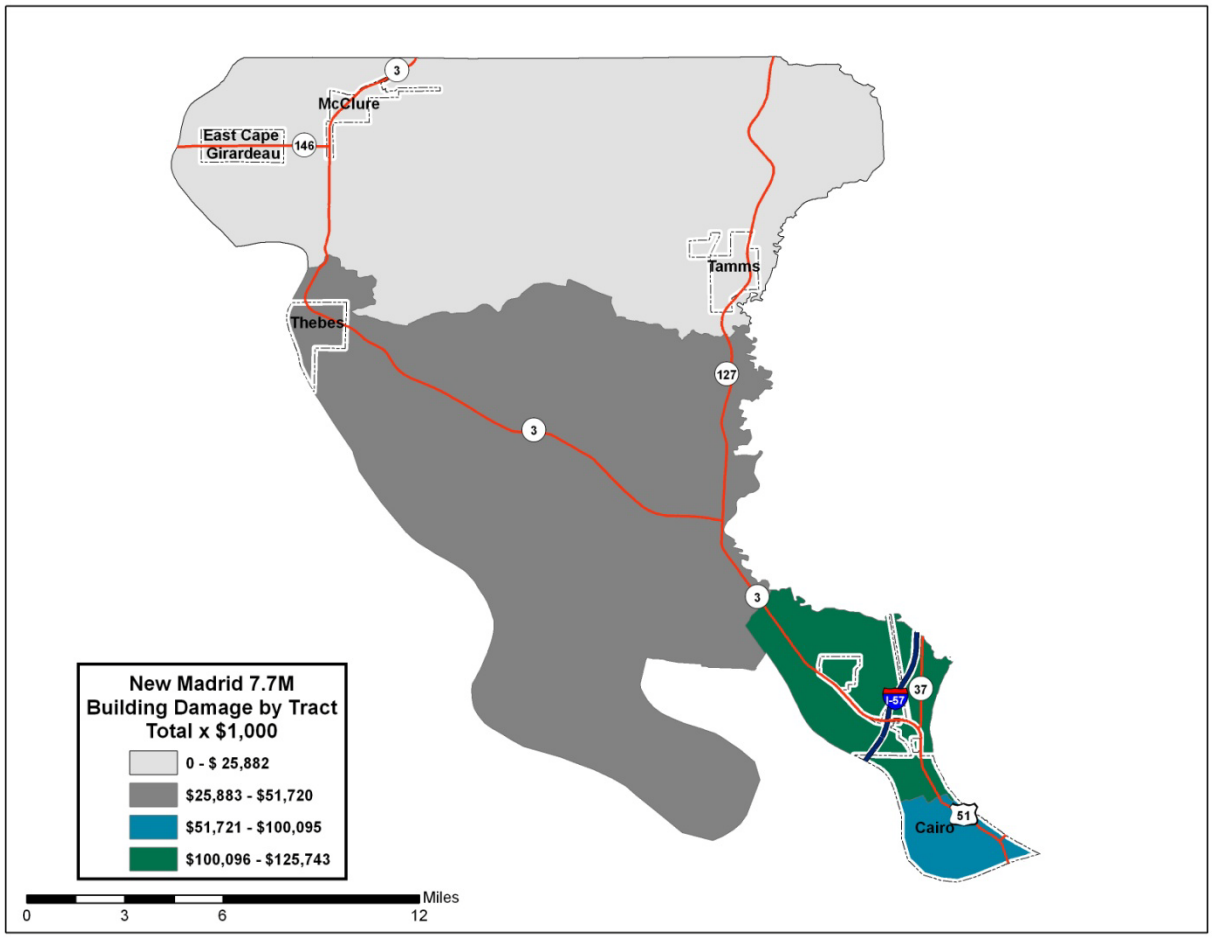
Table 4-30: New Madrid Scenario-Damages Counts by Building Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.07	0	0.04	1	0.04	1	0.08	1	0.16
Commercial	1	0.87	3	0.50	8	0.48	12	1.33	33	4.02
Education	0	0.07	0	0.04	1	0.04	1	0.12	3	0.36
Government	1	0.57	2	0.25	3	0.18	2	0.26	3	0.40
Industrial	0	0.21	1	0.11	2	0.11	2	0.23	4	0.50
Other Residential	8	5.52	71	10.47	279	16.98	269	30.87	263	32.20
Religion	0	0.07	0	0.07	2	0.12	2	0.18	5	0.60
Single Family	135	92.61	604	88.51	1,350	82.05	583	66.94	505	61.77
Total	**146**		**682**		**1,645**		**871**		**817**	

Table 4-31: New Madrid Scenario-Building Economic losses in Millions of Dollars

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Loses							
	Wage	0.00	1.89	8.44	0.13	1.10	11.55
	Capital-Related	0.00	0.79	6.76	0.09	0.25	7.89
	Rental	4.53	4.24	4.21	0.03	0.59	13.60
	Relocation	0.53	0.14	0.23	0.00	0.17	1.07
	Subtotal	**5.06**	**7.06**	**19.63**	**0.25**	**2.11**	**34.11**
Capital Stock Loses							
	Structural	19.81	8.31	10.47	0.69	4.54	43.83
	Non_Structural	73.47	39.77	36.68	3.09	15.79	168.80
	Content	19.83	9.07	16.90	2.04	7.77	55.61
	Inventory	0.00	0.00	0.56	0.44	0.09	1.09
	Subtotal	**113.12**	**57.15**	**64.62**	**6.26**	**28.18**	**269.33**
	Total	**118.18**	**64.21**	**84.25**	**6.51**	**30.29**	**303.44**

Figure 4-16: New Madrid Scenario-Building Economic Losses in Thousands of Dollars



Results for 7.1 Magnitude Earthquake Wabash Valley Scenario

The results of the 7.1 Wabash Valley earthquake are depicted in Table 4-32, Table 4-33, and Figure 4-17. HAZUS estimates that approximately 31 buildings will be at least moderately damaged. This is more than 1% of the total number of buildings in the region. It is estimated that no buildings will be damaged beyond repair.

The total building related losses totaled $13.5 million; 1% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies, which made up more than 62% of the total loss.

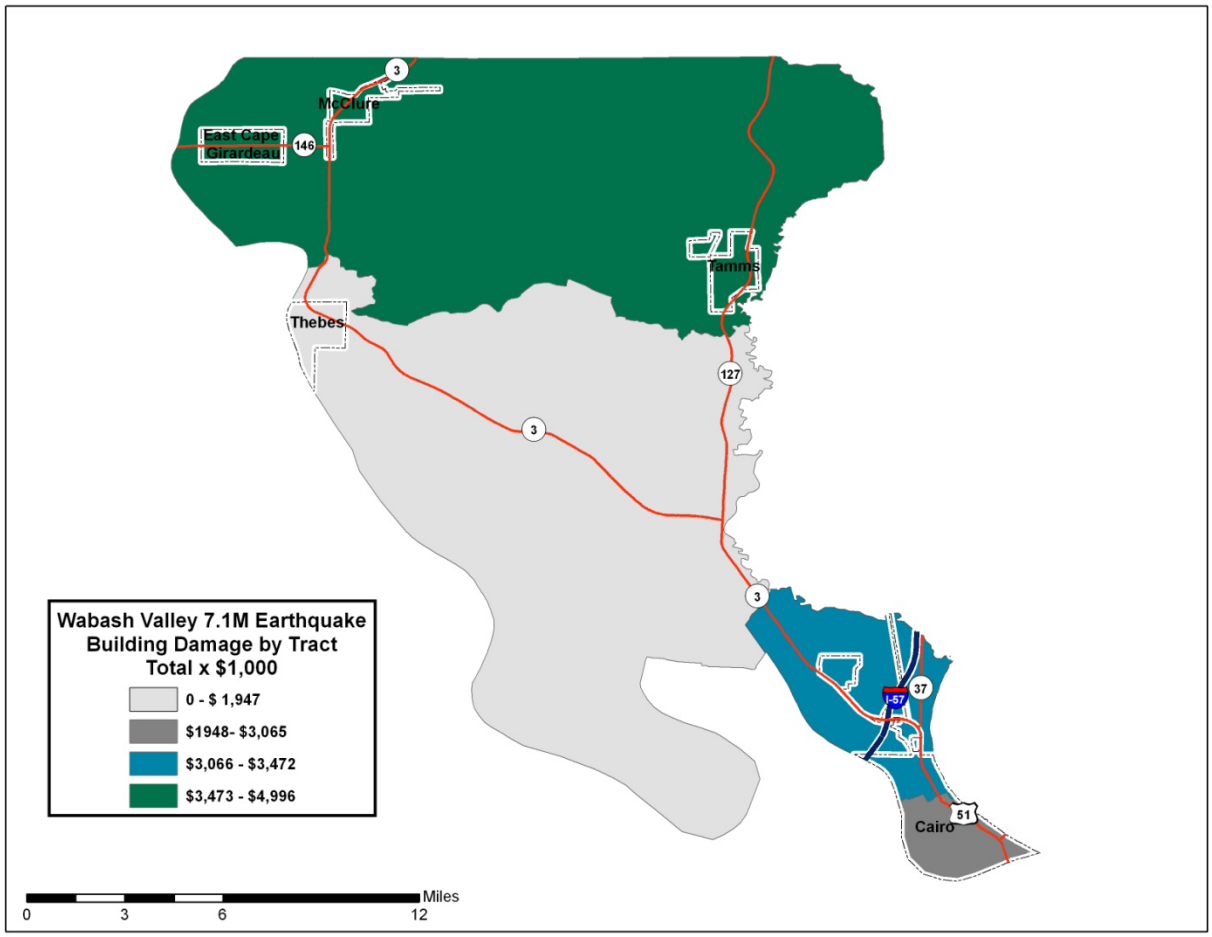
Table 4-32: Wabash Valley Scenario-Damage Counts by Building Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	3	0.07	0	0.08	0	0.12	0	0.22	0	0.14
Commercial	55	1.40	2	0.88	0	1.17	0	2.19	0	1.50
Education	5	0.12	0	0.09	0	0.12	0	0.21	0	0.25
Government	10	0.26	1	0.38	0	0.49	0	0.86	0	1.00
Industrial	8	0.22	0	0.22	0	0.34	0	0.62	0	0.22
Other Residential	784	19.97	89	43.31	19	56.66	0	19.12	0	0.99
Religion	9	0.22	0	0.10	0	0.12	0	0.23	0	0.21
Single Family	3,051	77.74	112	54.94	13	40.99	0	76.55	0	95.69
Total	3,924		204		33		1		0	

Table 4-33: Wabash Valley Scenario-Building Economic losses in Millions of Dollars

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Loses							
	Wage	0.00	0.00	0.02	0.00	0.01	0.03
	Capital-Related	0.00	0.00	0.02	0.00	0.00	0.02
	Rental	0.01	0.01	0.01	0.00	0.00	0.04
	Relocation	0.00	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.02**	**0.01**	**0.05**	**0.00**	**0.02**	**0.09**
Capital Stock Loses							
	Structural	0.08	0.05	0.01	0.01	0.02	0.17
	Non_Structural	3.09	1.81	1.40	0.35	0.79	7.45
	Content	2.40	0.92	1.27	0.30	0.78	5.68
	Inventory	0.00	0.00	0.04	0.05	0.01	0.10
	Subtotal	**5.58**	**2.78**	**2.72**	**0.72**	**1.60**	**13.39**
	Total	**5.59**	**2.79**	**2.77**	**0.72**	**1.62**	**13.48**

Figure 4-17: Wabash Valley Scenario-Building Economic Losses in Thousands of Dollars



Results for 5.5 Magnitude Earthquake in Alexander County

The results of the initial analysis, the 5.5 magnitude earthquake with an epicenter two miles north west of Cairo in south eastern Alexander County, are depicted in Table 4-34 and 4-35 and Figure 4-18. HAZUS estimates that approximately 454 buildings will be at least moderately damaged. This is more than 11% of the total number of buildings in the region. It is estimated that 17 buildings will be damaged beyond repair.

The total building related losses totaled $31.7 million; 9% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies, which comprised more than 63% of the total loss.

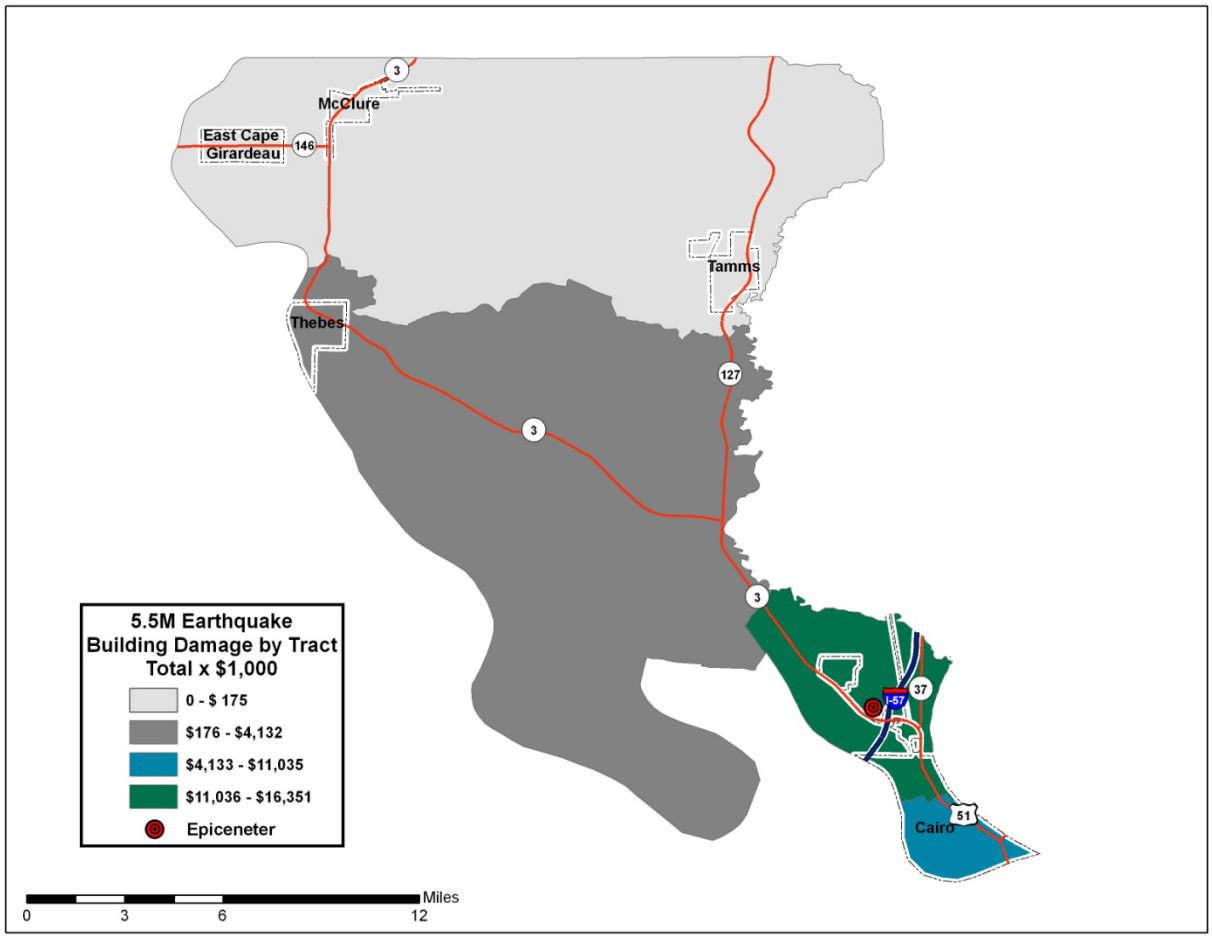
Table 4-34: Alexander County 5.5M Scenario-Damage Counts by Building Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	2	0.07	0	0.05	0	0.09	0	0.15	0	0.12
Commercial	35	1.20	11	1.35	8	2.23	3	3.67	1	3.02
Education	3	0.11	1	0.11	1	0.19	0	0.32	0	0.34
Government	9	0.31	1	0.13	1	0.19	0	0.26	0	0.24
Industrial	6	0.22	1	0.16	1	0.27	0	0.43	0	0.29
Other Residential	654	22.37	130	16.67	89	24.35	16	22.13	1	8.09
Religion	5	0.17	2	0.26	1	0.39	0	0.64	0	0.64
Single Family	2,209	75.55	636	81.27	265	72.29	52	72.39	15	87.26
Total	**2,924**		**783**		**367**		**71**		**17**	

Table 4-35: Alexander County 5.5M Scenario-Building Economic Losses in Millions of Dollars

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Loses							
	Wage	0.00	0.14	0.71	0.01	0.09	0.94
	Capital-Related	0.00	0.06	0.56	0.01	0.02	0.64
	Rental	0.39	0.38	0.48	0.00	0.04	1.30
	Relocation	0.05	0.01	0.03	0.00	0.01	0.10
	Subtotal	**0.44**	**0.59**	**1.77**	**0.02**	**0.17**	**2.98**
Capital Stock Loses							
	Structural	1.68	0.58	0.81	0.04	0.33	3.44
	Non_Structural	7.61	4.15	3.35	0.23	1.42	16.75
	Content	3.41	1.46	2.34	0.17	1.01	8.38
	Inventory	0.00	0.00	0.08	0.05	0.01	0.13
	Subtotal	**12.69**	**6.19**	**6.57**	**0.49**	**2.76**	**28.71**
	Total	**13.13**	**6.78**	**8.35**	**0.51**	**2.93**	**31.69**

Figure 4-18: Alexander County 5.5M Scenario-Building Economic Losses in Thousands of Dollars



Analysis of Community Development Trends

Community development will occur outside of the low-lying areas in floodplains with a water table within five feet of grade which are susceptible to liquefaction. Furthermore, Alexander County will continue to provide training to county officials, implement public education, and institute leaders who are proactive in mapping and studying the risks of earthquakes in the county.

4.4.4 Thunderstorm Hazard

Hazard Definition for Thunderstorm Hazard

Severe thunderstorms are defined as thunderstorms with one or more of the following characteristics: strong winds, large damaging hail, and frequent lightning. Severe thunderstorms most frequently occur in Illinois in the spring and summer months and in the late afternoon or evening, but can occur any month of the year at any time of day. A severe thunderstorm's impacts can be localized or can be widespread in nature. A thunderstorm is classified as severe when it meets one of more of the following criteria:

- Hail of diameter 0.75 inches or higher
- Frequent and dangerous lightning
- Wind speeds equal to or greater than 58 mph

Hail

Hail can be a product of a strong thunderstorm. Hail usually falls near the center of a storm; however strong winds occurring at high altitudes in the thunderstorm can blow the hailstones away from the storm center, resulting in a broader distribution. Hailstones range from pea-sized to baseball-sized, but hailstones larger than softballs have been reported on rare occasions.

Lightning

Lightning is a discharge of electricity from a thunderstorm. Lightning is often perceived as a minor hazard, but in reality lightning causes damage to many structures and kills or severely injures numerous people in the United States each year.

Severe Winds (Straight-Line Winds)

Straight-line winds from thunderstorms are a fairly common occurrence across Illinois. Straight-line winds can cause damage to homes, businesses, power lines, and agricultural areas and may require temporary sheltering of individuals who are without power for extended periods of time.

Previous Occurrences for Thunderstorm Hazard

The NCDC database reported hailstorms in Alexander County since 1966. Hailstorms occur nearly every year in the late spring and early summer months. The most recent significant occurrence was in February 2007 when 1.75-inch hail fell in the region. A swath of golf-ball size hail crossed central Alexander County. A cold front pressed southeast across the region during the afternoon as a wave of low pressure shifted east along the front into the Ozarks of northern Arkansas. Southerly flow ahead of the low brought warm moist air northward as temperatures reached the 60s. The atmosphere destabilized enough by late afternoon to allow for the development of thunderstorms over southeast Missouri. These storms were prolific hail producers as they crossed into southern Illinois.

Alexander County hailstorms are listed in Table 4-36; additional details for NCDC events are included in Appendix D.

Table 4-36: Alexander County Hailstorms*

Location or County	Date	Type	Magnitude	Deaths	Injuries	Property Damage
Alexander	6/7/1966	Hail	1.75 in.	0	0	0
Alexander	6/7/1966	Hail	1.75 in.	0	0	0
Alexander	4/3/1989	Hail	1.75 in.	0	0	0
Alexander	5/5/1989	Hail	1.00 in.	0	0	0
Alexander	11/15/1989	Hail	0.75 in.	0	0	0
Alexander	7/20/1990	Hail	1.75 in.	0	0	0
Alexander	7/4/1992	Hail	1.75 in.	0	0	0
Tamms	4/12/1993	Hail	1.00 in.	0	0	0
Dixon Springs	4/20/1995	Hail	1.50 in.	0	0	0
Cairo	5/13/1995	Hail	0.75 in.	0	0	0
Olive Branch	5/16/1995	Hail	0.75 in.	0	0	0
Cairo	5/16/1995	Hail	0.75 in.	0	0	0
Cairo Arpt	2/28/1997	Hail	1.75 in.	0	0	0
Cairo	7/14/1997	Hail	0.75 in.	0	0	0
Urbandale	4/13/1998	Hail	0.88 in.	0	0	0
Cairo	4/16/2000	Hail	1.75 in.	0	0	0
Urbandale	4/16/2000	Hail	1.75 in.	0	0	0
Mc Clure	4/27/2000	Hail	0.75 in.	0	0	0
Tamms	9/22/2000	Hail	1.75 in.	0	0	0
Tamms	5/20/2001	Hail	0.75 in.	0	0	0
Cairo	5/2/2002	Hail	1.00 in.	0	0	0
East Cape Girardeau	4/25/2003	Hail	1.25 in.	0	0	0
Olive Branch	5/4/2003	Hail	1.75 in.	0	0	0
Olive Branch	5/6/2003	Hail	0.75 in.	0	0	0
Elco	7/28/2003	Hail	0.75 in.	0	0	0
East Cape Girardeau	3/30/2005	Hail	2.50 in.	0	0	0
Olive Branch	3/30/2005	Hail	0.88 in.	0	0	0
East Cape Girardeau	5/13/2005	Hail	0.75 in.	0	0	0
Cairo	5/13/2005	Hail	0.75 in.	0	0	0
Thebes	3/12/2006	Hail	0.75 in.	0	0	0
Mc Clure	4/2/2006	Hail	0.75 in.	0	0	0
Cairo	4/2/2006	Hail	1.75 in.	0	0	0
Mc Clure	5/25/2006	Hail	1.75 in.	0	0	0
Cairo	5/25/2006	Hail	0.75 in.	0	0	0
Tamms	6/9/2006	Hail	1.00 in.	0	0	0
Thebes	2/20/2007	Hail	1.75 in.	0	0	0
Tamms	1/29/2008	Hail	0.88 in.	0	0	0

Source: NCDC

* NCDC records are estimates of damage compiled by the National Weather Service from various local, state, and federal sources. However, these estimates are often preliminary in nature and may not match the final assessment of economic and property losses related to a given weather event.

The NCDC database identified 62 wind storms reported since 1965. On multiple occasions in the past 50 years trees have been uprooted by severe winds in Alexander County. These storms have been attributed with one injury and $1.1 million in property damage in Alexander and adjacent counties.

As shown in Table 4-37, wind storms have historically occurred year-round with the greatest frequency and damage in April through August.

Table 4-37: Alexander County Wind Storms*

Location or County	Date	Type	Magnitude	Deaths	Injuries	Property Damage
Alexander	4/30/1997	High Wind	52 kts.	0	0	20K
Alexander	1/29/2008	High Wind	61 kts.	0	0	100K
Alexander	11/11/1995	High Winds	Not Measured	0	0	0
Alexander	1/8/2006	Strong Wind	Not Measured	0	0	19K
Alexander	1/19/2006	Strong Wind	Not Measured	0	0	19K
Alexander	2/16/2006	Strong Wind	Not Measured	0	0	14K
Alexander	12/1/2006	Strong Wind	Not Measured	0	0	1K
Alexander	12/22/2007	Strong Wind	Not Measured	0	0	1K
Alexander	2/7/1999	Strong Winds	Not Measured	0	0	23K
Thebes	8/3/2007	Thunderstorm Wind	Not Measured	0	0	0
Cairo	10/18/2007	Thunderstorm Wind	Not Measured	0	0	0K
Olive Branch	1/29/2008	Thunderstorm Wind	Not Measured	0	0	20K
Alexander	11/14/1993	Thunderstorm Winds	Not Measured	0	0	5K
Alexander	5/17/1995	Thunderstorm Winds	Not Measured	0	0	0
Alexander	5/18/1995	Thunderstorm Winds	Not Measured	0	0	10K
Alexander	6/8/1995	Thunderstorm Winds	Not Measured	0	0	75K
Olive Branch	6/20/1995	Thunderstorm Winds	Not Measured	0	0	0
Alexander	6/2/1965	Thunderstorm Winds	Not Measured	0	0	0
Alexander	12/10/1971	Thunderstorm Winds	Not Measured	0	0	0
Alexander	9/28/1974	Thunderstorm Winds	Not Measured	0	0	0
Alexander	11/3/1974	Thunderstorm Winds	Not Measured	0	0	0
Alexander	7/19/1981	Thunderstorm Winds	Not Measured	0	0	0
Alexander	7/3/1991	Thunderstorm Winds	Not Measured	0	0	0

Location or County	Date	Type	Magnitude	Deaths	Injuries	Property Damage
Tatumville	1/18/1996	Thunderstorm Winds	Not Measured	0	0	0
Cache	5/5/1996	Thunderstorm Winds	50 kts.	0	0	0
Cairo	7/8/1996	Thunderstorm Winds	52 kts.	0	0	0
Cairo	10/22/1996	Thunderstorm Winds	50 kts.	0	0	0
Sandusky	4/20/1997	Thunderstorm Winds	53 kts.	0	0	0
Olive Branch	6/13/1997	Thunderstorm Winds	50 kts.	0	0	0
Mc Clure	7/4/1997	Thunderstorm Winds	52 kts.	0	0	0
Cairo	7/14/1997	Thunderstorm Winds	50 kts.	0	0	5K
Urbandale	6/12/1998	Thunderstorm Winds	52 kts.	0	0	5K
Miller City	1/17/1999	Thunderstorm Winds	Not Measured	0	0	50K
Willard	5/17/1999	Thunderstorm Winds	70 kts.	0	1	75K
Cairo	2/18/2000	Thunderstorm Winds	100 kts.	0	0	500K
Alexander	2/24/2001	Thunderstorm Winds	Not Measured	0	0	4K
Cairo	7/18/2001	Thunderstorm Winds	50 kts.	0	0	0
Tamms	10/24/2001	Thunderstorm Winds	52 kts.	0	0	25K
Olive Branch	7/2/2002	Thunderstorm Winds	50 kts.	0	0	5K
Olive Branch	11/10/2002	Thunderstorm Winds	50 kts.	0	0	2K
Cairo	5/1/2003	Thunderstorm Winds	50 kts.	0	0	0
Olive Branch	5/4/2003	Thunderstorm Winds	52 kts.	0	0	0
Cairo	5/6/2003	Thunderstorm Winds	55 kts.	0	0	0
Olive Branch	7/18/2003	Thunderstorm Winds	50 kts.	0	0	0
Cairo	8/27/2003	Thunderstorm Winds	50 kts.	0	0	0
Alexander	5/30/2004	Thunderstorm Winds	55 kts.	0	0	10K
Cairo	6/9/2004	Thunderstorm Winds	50 kts.	0	0	5K
Cairo	1/13/2005	Thunderstorm Winds	50 kts.	0	0	0
Olive Branch	3/9/2006	Thunderstorm Winds	74 kts.	0	0	100K
Cairo	3/9/2006	Thunderstorm Winds	50 kts.	0	0	0
Thebes	3/12/2006	Thunderstorm Winds	52 kts.	0	0	8K
Olive Branch	7/21/2006	Thunderstorm Winds	50 kts.	0	0	0
Alexander	8/10/2006	Thunderstorm Winds	50 kts.	0	0	8K
Cairo	9/22/2006	Thunderstorm Winds	50 kts.	0	0	0
Alexander	3/9/2002	Wind	Not Measured	0	0	3K

Source: NCDC

* NCDC records are estimates of damage compiled by the National Weather Service from various local, state, and federal sources. However, these estimates are often preliminary in nature and may not match the final assessment of economic and property losses related to a given weather event.

Geographic Location for Thunderstorm Hazard

The entire county has the same risk for occurrence of thunderstorms. They can occur at any location within the county.

Hazard Extent for Thunderstorm Hazard

The extent of the historical thunderstorms listed previously varies in terms of the extent of the storm, the wind speed, and the size of hailstones. Thunderstorms can occur at any location within the county.

Calculated Risk Priority Index for Thunderstorm Hazard

Based on historical information, the probability of future high wind damage is highly likely. High winds with widely varying magnitudes are expected to happen. According to the RPI, thunderstorms and high wind damage ranked as the number six hazard.

RPI = Probability x Magnitude/Severity.

Probability	x	Magnitude /Severity	=	RPI
4	x	1	=	4

Vulnerability Analysis for Thunderstorm Hazard

Severe thunderstorms are an evenly distributed threat across the entire jurisdiction; therefore, the entire county's population and all buildings are susceptible to severe thunderstorms and can expect the same impacts. This plan will therefore consider all buildings located within the county as vulnerable. The existing buildings and infrastructure in Alexander County are discussed in types and numbers in Table 4-10.

Critical Facilities

All critical facilities are vulnerable to severe thunderstorms. A critical facility will encounter many of the same impacts as any other building within the jurisdiction. These impacts include structural failure, debris (trees or limbs) causing damage, roofs blown off or windows broken by hail or high winds, fires caused by lightning, and loss of function of the facility (e.g. a damaged police station will no longer be able to serve the community). Table 4-8 lists the types and numbers of all essential facilities in the area. Critical facility information, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

Building Inventory

A table of the building exposure in terms of types and numbers of buildings for the entire county is provided in Table 4-10. The buildings within the county can all expect the same impacts, similar to those discussed for critical facilities. These impacts include structural failure, debris (trees or limbs) causing damage, roofs blown off or windows broken by hail or high winds, fires caused by lightning, and loss of building functionality (e.g. a damaged home will no longer be habitable causing residence to seek shelter).

Infrastructure

During a severe thunderstorm, the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, and bridges. Since the county's entire infrastructure is equally vulnerable, it is important to emphasize that any number of these items could become damaged during a severe thunderstorm. The impacts to these items include broken, failed or impassable roadways; broken or failed utility lines (e.g. loss of power or gas to community); or railway failure from broken or impassable railways. Bridges could fail or become impassable causing risk to traffic.

Vulnerability to Future Assets/Infrastructure for Thunderstorm Hazard

All future development within the county and all communities will remain vulnerable to these events.

Analysis of Community Development Trends

Preparing for severe storms will be enhanced if officials sponsor a wide range of programs and initiatives to address the overall safety of county residents. New structures need to be built with more sturdy construction, and those structures already in place need to be hardened to lessen the potential impacts of severe weather. Community warning sirens to provide warning of approaching storms are also vital to preventing the loss of property and ensuring the safety of Alexander County residents.

4.4.5 Winter Storm Hazard

Hazard Definition for Winter Storm Hazard

Severe winter weather consists of various forms of precipitation and strong weather conditions. This may include one or more of the following conditions: freezing rain, sleet, heavy snow, blizzards, icy roadways, extreme low temperatures, and strong winds. These conditions can cause human health risks such as frostbite, hypothermia, and death.

Ice (glazing) and Sleet Storms

Ice or sleet, even in small quantities, can result in hazardous driving conditions and can cause property damage. Sleet involves frozen raindrops that bounce when they hit the ground or other objects. Sleet does not stick to trees and wires. Ice storms, on the other hand, involve liquid rain

that falls through subfreezing air and/or onto sub-freezing surfaces, freezing on contact with those surfaces. The ice coats trees, buildings, overhead wires, and roadways, sometimes causing extensive damage.

The most damaging winter storms in southern Illinois have been ice storms. Ice storms occur when moisture-laden gulf air converges with the northern jet stream causing strong winds and heavy precipitation. This precipitation takes the form of freezing rain coating power and communication lines and trees with heavy ice. The winds will then cause the overburdened limbs and cables to snap; leaving large sectors of the population without power, heat, or communication. In the past few decades, including the winter of 2007–08, numerous ice storm events have occurred in southern Illinois.

Snow Storms

Significant snow storms are characterized by the rapid accumulation of snow, often accompanied by high winds, cold temperatures, and low visibility. A blizzard is categorized as a snow storm with winds of 35 miles per hour or greater and/or visibility of less than ¼ mile for three or more hours. Blizzards are the most dramatic and perilous of all winter storm events. Most snow within a blizzard is in the form of fine, powdery particles, which are wind-blown in such great quantities that visibility is reduced to only a few feet. Blizzards have the potential to result in property damage.

Illinois has repeatedly been struck by blizzards, although they are less common in the southern part of the state. Blizzard conditions can cause power outages, loss of communication, and make transportation impossible. The blowing of snow can reduce visibility to less than ¼ mile, resulting in disorientation that can make even travel by foot dangerous.

Severe Cold

Severe cold is characterized by the ambient air temperature that may drop to 0°F or below. These extreme temperatures can increase the likelihood of frostbite and hyperthermia. High winds during severe cold events can enhance the air temperature's effects. Fast winds during cold weather events can lower the Wind Chill Factor (how cold the air feels on your skin), which can lower the time it takes for frostbite and hypothermia to affect a person's body.

Previous Occurrences for Winter Storm Hazard

The NCDC database identified 44 winter storm and extreme cold events for Alexander County since 1994. These storms have been attributed with three deaths, one injury, and $1.75 million in property damage in Alexander and surrounding counties. A recent example a severe winter storm occurred in February 2008, low pressure developed over the southern Plains, spreading widespread heavy precipitation across southern Illinois. At the same time, high pressure over the upper Ohio Valley produced a cold easterly wind flow. The result was a crippling ice storm.

Approximately one inch of ice caused extensive damage across far southern Illinois, along and south of a line from Carbondale and Marion to Harrisburg and Carmi. Many of those same areas received three to six inches of sleet and snow. The most destructive icing occurred in an east to

west band across Union, Johnson, Massac, and Pope Counties. The state designated most counties in southern Illinois as a disaster area. Numerous trees and power lines were brought down, knocking out power to many thousands of homes. Power outages lasted up to a week.

The NCDC winter storms for Alexander County are listed in Table 4-38. Additional details for NCDC events are included in Appendix D.

Table 4-38: Winter Storm Events*

Location or County	Date	Type	Deaths	Injuries	Property Damage
Southern Illinois	3/8/1994	Heavy Snow	0	0	500K
Alexander	9/24/1995	Frost	0	0	0
Alexander	12/8/1995	Snow	0	0	0
Alexander	12/9/1995	Cold Wave	0	0	0
Alexander	1/2/1996	Winter Storm	0	0	0
Alexander	1/6/1996	Winter Storm	0	0	0
Alexander	2/2/1996	Extreme Cold	0	0	0
Alexander	2/5/1996	Ice Jam	0	0	0
Alexander	1/8/1997	Winter Storm	0	0	0
Alexander	1/10/1997	Extreme Windchill	1	0	0
Alexander	1/15/1997	Ice Storm	0	0	0
Alexander	4/18/1997	Frost	0	0	0
Alexander	1/17/1998	Freezing Drizzle	0	0	0
Alexander	12/21/1998	Freezing Rain	0	0	0
Alexander	12/23/1998	Snow	0	0	0
Alexander	1/1/1999	Ice Storm	0	0	150K
Alexander	1/8/1999	Ice Storm	0	0	0
Alexander	3/14/1999	Heavy Snow	0	0	0
Alexander	1/22/2000	Snow	0	0	0
Alexander	4/9/2000	Frost	0	0	0
Alexander	10/9/2000	Frost	0	0	0
Alexander	12/12/2000	Extreme Cold	0	0	0
Alexander	12/13/2000	Winter Storm	0	0	0
Alexander	1/1/2001	Extreme Cold	0	0	0
Alexander	1/26/2001	Freezing Rain	0	0	0
Alexander	2/21/2001	Winter Storm	0	0	0
Alexander	4/18/2001	Frost	0	0	0
Alexander	1/19/2002	Heavy Snow	0	0	0

Location or County	Date	Type	Deaths	Injuries	Property Damage
Alexander	12/4/2002	Winter Storm	0	0	0
Alexander	1/16/2003	Winter Storm	0	0	0
Alexander	1/22/2003	Winter Weather/mix	0	0	0
Alexander	1/23/2003	Extreme Cold/wind Chill	0	0	0
Alexander	2/6/2003	Heavy Snow	0	0	0
Alexander	2/16/2003	Winter Storm	0	0	0
Alexander	1/25/2004	Ice Storm	0	0	0
Miller City	10/26/2004	Funnel Cloud	0	0	0
Alexander	12/22/2004	Winter Storm	1	1	100K
Alexander	12/23/2004	Extreme Cold/wind Chill	1	0	0
Alexander	10/28/2005	Frost/freeze	0	0	0
Alexander	12/8/2005	Winter Weather/mix	0	0	0
Alexander	2/18/2006	Winter Weather/mix	0	0	0
Alexander	2/19/2006	Winter Weather/mix	0	0	0
Alexander	2/3/2007	Winter Weather	0	0	0
Alexander	2/11/2008	Winter Storm	0	0	1M

Source: NCDC

* NCDC records are estimates of damage compiled by the National Weather Service from various local, state, and federal sources. However, these estimates are often preliminary in nature and may not match the final assessment of economic and property losses related to a given weather event.

Geographic Location for Winter Storm Hazard

Severe winter storms are regional in nature. Most of the NCDC data is calculated regionally or in some cases statewide.

Hazard Extent for Winter Storm Hazard

The extent of the historical winter storms listed previously varies in terms of storm extent, temperature, and ice or snowfall. Severe winter storms affect the entire jurisdiction equally.

Calculated Risk Priority Index for Winter Storm Hazard

Based on historical information, the probability of future winter storms is likely. Winter storms of varying magnitudes are expected to happen. According to the RPI, winter storms ranked as the number fifth highest hazard.

RPI = Probability x Magnitude/Severity.

Probability	x	Magnitude /Severity	=	RPI
3	x	2	=	6

Vulnerability Analysis for Winter Storm Hazard

Winter storm impacts are evenly distributed across the jurisdiction; therefore the entire county is vulnerable to winter storms and can expect the same impacts within the affected area. The building exposure for Alexander County, as determined from the building inventory, is included in Table 4-10.

Critical Facilities

All critical facilities are vulnerable to a winter storm. A critical facility will encounter many of the same impacts as any other buildings within the jurisdiction. These impacts include loss of gas or electricity from broken or damaged utility lines, roads and railways damaged or impassable, broken water pipes, and roof collapse from heavy snow. Table 4-9 lists the types and numbers of the essential facilities in the area. Critical facility information, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

Building Inventory

Table 4-10 lists the building exposure in terms of types and numbers of buildings for the entire county. The impacts to the building stock within the county are similar to the damages expected to the critical facilities, including loss of gas of electricity from broken or damaged utility lines, roads and railways damaged or impassable, broken water pipes, and roof collapse from heavy snow.

Infrastructure

During a winter storm, the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads and bridges. Since the county's entire infrastructure is equally vulnerable, it is important to emphasize that any number of these items could become damaged during a winter storm. Potential impacts include broken gas and/or electricity lines, or damaged utility lines, damaged or impassable roads and railways, and broken water pipes.

Vulnerability to Future Assets/Infrastructure for Winter Storm Hazard

Any new development within the county will remain vulnerable to these events.

Analysis of Community Development Trends

Because the winter storm events are regional in nature, future development will be impacted across the county. Rural areas in Alexander County are particularly vulnerable due to the likely hood of long term power outages. Human service agencies, volunteer organizations, the

Alexander County Health Department, medical and health care facilities, and schools have definite roles to play in public education, planning, and response to extreme winter conditions.

4.4.7 Hazardous Materials Storage and Transport Hazard

Hazard Definition for Hazardous Materials Storage and Transport Hazard

Explosions result from the ignition of volatile materials such as petroleum products, natural gas and other flammable gases, hazardous materials/chemicals and dust, and explosive devices. An explosion can potentially cause death, injury, and property damage. In addition, a fire routinely follows an explosion, which may cause further damage and inhibit emergency response. Emergency response may require fire, safety/law enforcement, search and rescue, and hazardous materials units.

Previous Occurrences for Hazardous Materials Storage and Transport Hazard

Alexander County has not experienced a significant or large-scale hazardous material incident at a fixed site or transportation route that has resulted in multiple deaths or serious injuries.

Geographic Location for Hazardous Materials Storage and Transport Hazard

The hazardous material hazards are countywide and are primarily associated with the transport of materials via highway or rail.

Hazard Extent for Hazardous Materials Storage and Transport Hazard

The extent of the hazardous material hazard varies both in terms of the quantity of material being transported as well as the specific content of the container.

Calculated Risk Priority Index for Hazardous Materials Storage and Transport Hazard

The possibility of a hazardous materials accident is likely, based on input from the planning team. According to the RPI, Hazardous Materials Storage and Transport ranked as the forth greatest hazard.

RPI = Probability x Magnitude/Severity.

Probability	x	Magnitude /Severity	=	RPI
3	x	2	=	6

Vulnerability Analysis for Hazardous Materials Storage and Transport Hazard

Hazardous material impacts are evenly distributed across the jurisdiction; therefore the entire county is vulnerable to a release associated with hazardous materials storage or transport and can expect the same impacts within the affected area. The building exposure for Alexander County,

as determined from building inventory, is included in Table 4-9. This plan will therefore consider all buildings located within the county as vulnerable.

Critical Facilities

All critical facilities and communities within the county are at risk. A critical facility, if vulnerable, will encounter many of the same impacts as other buildings within the jurisdiction. These impacts include structural failure due to fire or explosion and loss of function of the facility (e.g. a damaged police station will no longer be able to serve the community). Table 4-9 lists the types and numbers of all essential facilities in the area. Critical facility information, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

Building Inventory

Table 4-10 lists the building exposure in terms of type and number of buildings for the entire county. The buildings within the county can all expect the same impacts, similar to those discussed for critical facilities. These impacts include structural failure due to fire or explosion or debris and loss of function of the building (e.g. a damaged home will no longer be habitable causing residence to seek shelter).

Infrastructure

During a hazardous materials release, the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, and bridges. Since a full inventory of infrastructure is not available for this plan, it is important to emphasize that any number of these items could become damaged in the event of a hazardous material release. The impacts to these items include broken, failed, or impassable roadways; broken or failed utility lines (e.g. loss of power or gas to community); and railway failure from broken or impassable railways. Bridges could fail or become impassable causing risk to traffic.

The U.S. EPA's ALOHA (Areal Locations of Hazardous Atmospheres) model was utilized to assess the area of impact for a Vinyl Chloride release along the Canadian Northern railroad track west of US Highway 51 on the north side of Cairo, Illinois.

Vinyl Chloride is a colorless gas with a sweet odor this is used to make plastics, adhesives and other chemicals. It is a suspected carcinogen that is easily ignited and is usually shipped as a liquefied gas under its own vapor pressure. Any leaks may be liquid or vapor. Contact with the unconfined liquid may cause frostbite by evaporative cooling. Vapors are heavier than air, and may asphyxiate by the displacement of air. Under prolonged exposure to fire or intense heat the containers may rupture violently and rocket.

Source: http://cameochemicals.noaa.gov/chemical/1692

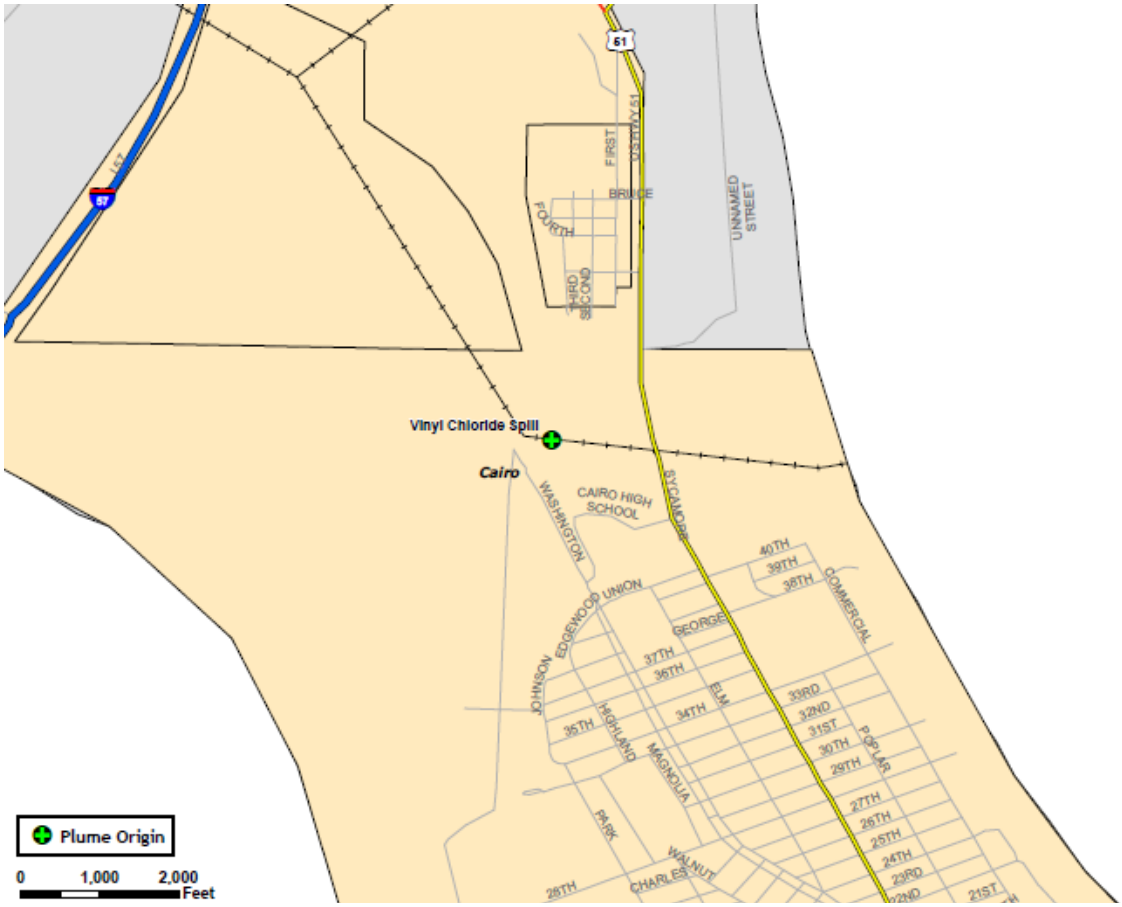
ALOHA is a computer program designed especially for use by people responding to chemical accidents, as well as for emergency planning and training. Vinyl Chloride is a common chemical

used in industrial operations and can be found in either liquid or gas form. Rail and truck tankers commonly haul Vinyl Chloride to and from facilities.

For this scenario, moderate atmospheric and climatic conditions with a slight breeze from the North-North-West were assumed. The target area was chosen due to the large volume of rail shipments containing various chemicals in the area and the proximity to residential and commercial interests.

The geographic area covered in this analysis is depicted in Figure 4-19.

Figure 4-19: Location of Chemical Release



Analysis

The ALOHA atmospheric modeling parameters, depicted in Figure 4-20, were based upon a North North Westerly wind speed of 5 mph. The temperature was 68°F with 75% humidity and partly cloudy skies.

The source of the chemical spill is a horizontal, cylindrical-shaped tank. The diameter of the tank was set to 12 feet and the length set to 40 feet 33,500 gallons). At the time of its release, it was estimated that the tank was 99% full. The vinyl chloride in this tank is in its liquid state.

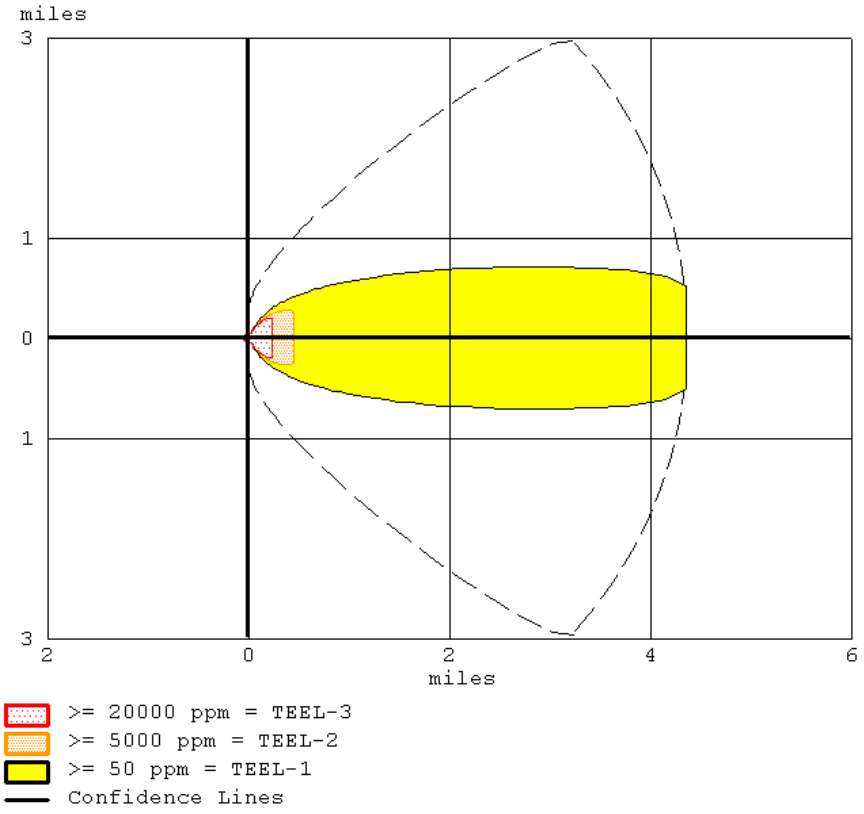
This release was based on a leak from a 2.5-inch-diameter hole, 12 inches above the bottom of the tank.

Figure 4-20: ALOHA Plume Modeling Parameters

```
SITE DATA:
  Location: CAIRO, IL, ILLINOIS
  Building Air Exchanges Per Hour: 0.21 (sheltered single storied)
  Time: March 11, 2009  0132 hours CDT (user specified)

CHEMICAL DATA:
  Chemical Name: VINYL CHLORIDE          Molecular Weight: 62.50 g/mol
  TEEL-1: 50 ppm     TEEL-2: 5000 ppm    TEEL-3: 20000 ppm
  LEL: 36000 ppm     UEL: 330000 ppm
  Ambient Boiling Point: 6.1° F
  Vapor Pressure at Ambient Temperature: greater than 1 atm
  Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)
  Wind: 5 miles/hour from NNW at 10 meters
  Ground Roughness: open country         Cloud Cover: 5 tenths
  Air Temperature: 68° F                 Stability Class: F
  No Inversion Height                    Relative Humidity: 75%

SOURCE STRENGTH:
  Leak from hole in horizontal cylindrical tank
  Flammable chemical escaping from tank (not burning)
  Tank Diameter: 12 feet                 Tank Length: 40 feet
  Tank Volume: 33,841 gallons
  Tank contains liquid                   Internal Temperature: 68° F
  Chemical Mass in Tank: 127 tons        Tank is 99% full
  Circular Opening Diameter: 2.5 inches
  Opening is 12 inches from tank bottom
  Release Duration: 54 minutes
  Max Average Sustained Release Rate: 5,560 pounds/min
     (averaged over a minute or more)
  Total Amount Released: 252,306 pounds
  Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

THREAT ZONE:
  Model Run: Heavy Gas
  Red   : 424 yards --- (20000 ppm = TEEL-3)
  Orange: 790 yards --- (5000 ppm = TEEL-2)
  Yellow: 4.4 miles --- (50 ppm = TEEL-1)
```

According to the ALOHA parameters, approximately 5,560 pounds of material would be released per minute. The image in Figure 4-21 depicts the plume footprint generated by ALOHA.

Figure 4-21: Plume Footprint Generated by ALOHA



As the substance moves away from the source, the level of substance concentration decreases. Each color-coded area depicts a level of concentration measured in parts per million (ppm). For the purpose of clarification, this report will designate each level of concentration as a specific zone. The zones are as follows:

- TEEL-3: The red buffer (≥20,000 ppm) extends no more than 4.8 miles from the point of release after one hour.
- TEEL-2: The orange buffer (≥ 5,000 ppm) extends no more than six miles from the point of release after one hour.
- TEEL-1: The yellow buffer (≥ 50 ppm) extends more than six miles from the point of release after one hour.
- Confidence Lines: The dashed lines depict the level of confidence in which the exposure zones will be contained. The ALOHA model is 95% confident that the release will stay within this boundary.

- TEELs (Temporary Emergency Exposure Limits) are derived using existing LOCs (Levels of Concerns) and by manipulating current data. This process is less intensive than the AEGL or ERPG process, and TEELs have been defined for more than 3,000 chemicals.

- TEELs are used to help protect the public when AEGLs or ERPGs are not available and there has been a chemical release that is short-term in duration.

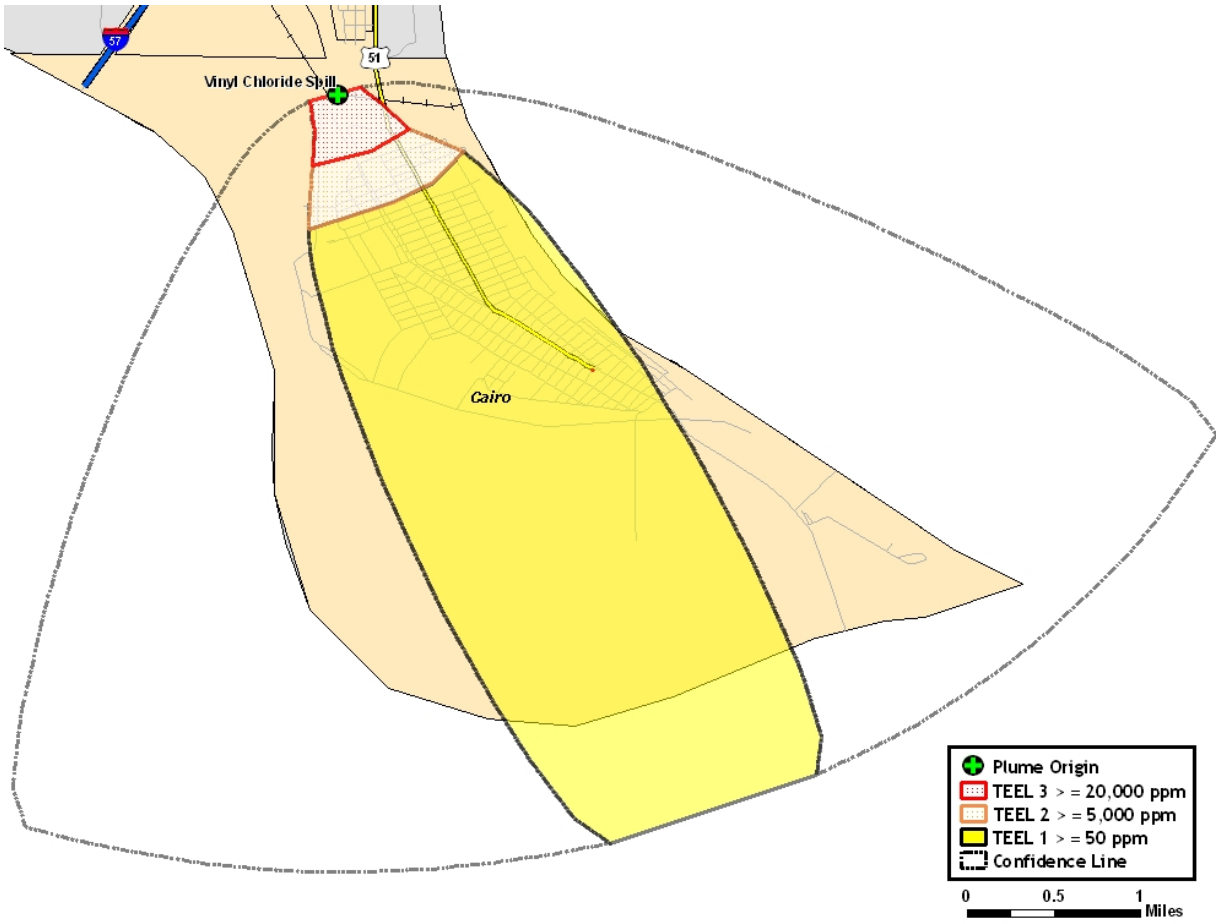
- TEELs estimate how nearly all of the public (except for sensitive individuals) would react to a release of this nature, so they can be used to identify areas where a hazard exists if the toxic gas concentration is exceeded for a given duration. For example, in areas with concentrations above the TEEL-1, most people would detect the chemical and may experience temporary, mild effects. On the other hand, in areas with concentrations above the TEEL-2, most people would experience significant, but not life-threatening, health effects.

- TEELs are derived by the U.S. Department of Energy Subcommittee on Consequence Assessment and Protective Actions (SCAPA) according to a specific, standard methodology. The TEEL methodology uses available levels of concern and manipulates current data using a peer-reviewed, approved procedure in order to establish the TEELs.

- TEELs can be derived relatively quickly for almost any chemical; as a result, TEELs are available for thousands of chemicals. TEELs can provide a useful reference when no other public exposure guidelines are available.

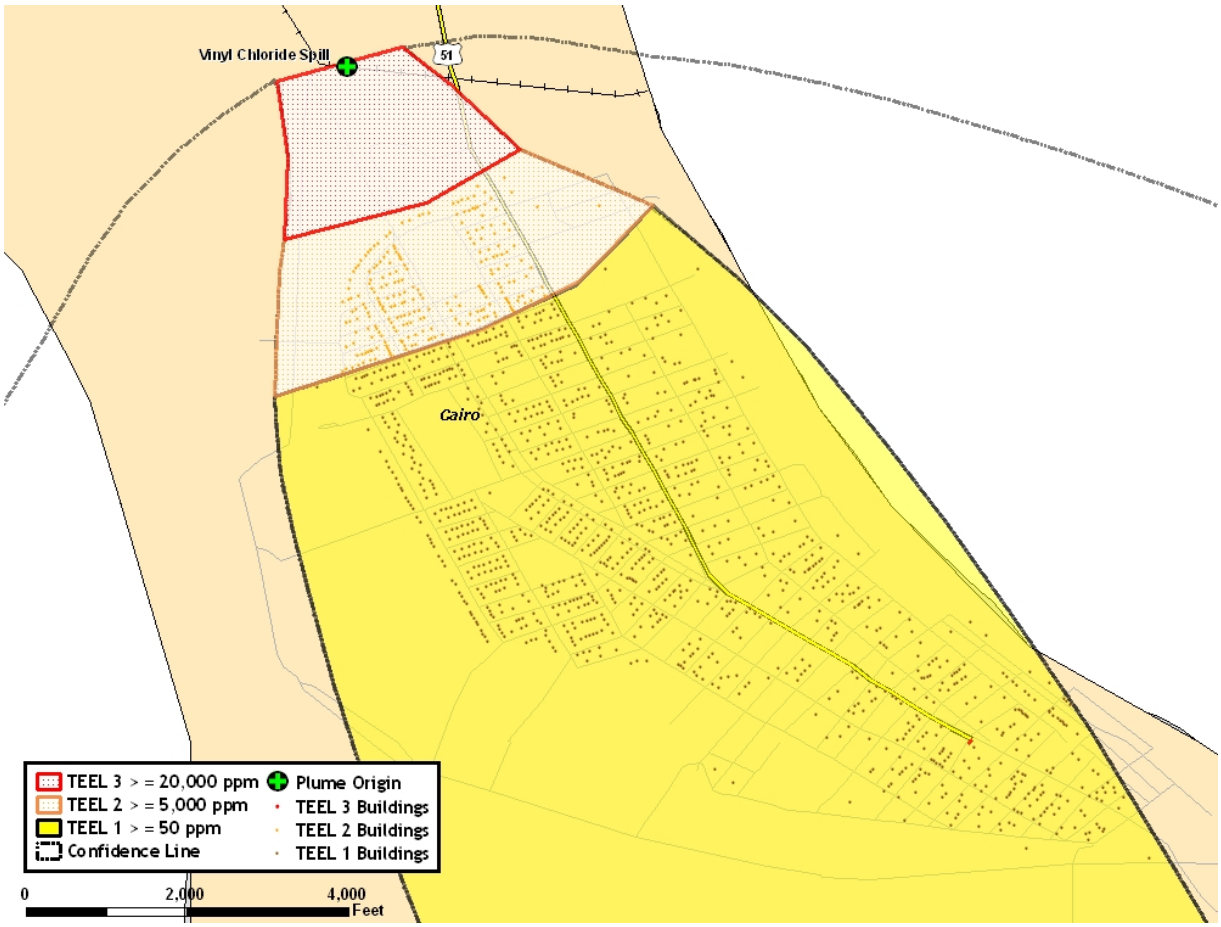
The image in Figure 4-22 depicts the plume footprint generated by ALOHA.

Figure 4-22: ALOHA Plume Footprint Overlaid in ArcGIS



The Alexander County Building Inventory was added to ArcMap and overlaid with the plume footprint. The Building Inventory was then intersected with each of the four footprint areas to classify each point based upon the plume footprint in which it is located. Figure 4-23 depicts the Alexander County Building Inventory after the intersect process.

Figure 4-23: Alexander County Building Inventory Classified By Plume Footprint



Results

By summing the building inventory within all TEEL zones (Zone 1: ≥20,000 ppm, Zone 2: ≥5,000 ppm, and Zone 3: ≥50 ppm) the GIS overlay analysis predicts that as many as 1,389 buildings could be exposed at a replacement cost of $31.2 million If this event were to occur, approximately 3,900 people would be affected.

Building Inventory Damage

The results of the analysis against the Building Inventory points are depicted in Tables 4-39 through 4-41. Table 4-39 summarizes the results of the chemical spill by combining all TEEL zones.

Table 4-39: Estimated Exposure for all Zones (all ppm)

Occupancy	Population	Building Counts	Building Exposure
Residential	3,008	1,203	$14,943,945
Commercial	0	172	$3,966,465
Industrial	0	8	$12,335,097
Agriculture	0	1	$7,695
Exempt*	917	5	$13,950
Total	**3,925**	**1,389**	**$31,267,152**

* Assumes release occurred when school was in session.

Tables 4-40 through 4-42 summarize the results of the chemical spill for each zone separately.

Table 4-40: Estimated Exposure for Zone 1 ≥ 20,000 ppm)

Occupancy	Population	Building Counts	Building Exposure
Residential	0	0	$0
Commercial	0	0	$0
Industrial	0	0	$0
Agriculture	0	0	$0
Exempt	0	0	$0
Total	**0**	**0**	**$0**

Table 4-41: Estimated Exposure for Zone 2 ≥ 5,000 ppm)

Occupancy	Population	Building Counts	Building Exposure
Residential	523	209	$1,612,380
Commercial	0	17	$473,175
Industrial	0	1	$11,667
Agriculture	0	0	$0
Exempt*	197	1	$300
Total	**720**	**228**	**$2,097,522**

* Assumes release occurred when school was in session.

Table 4-42: Estimated Exposure for Zone 3 ≥ 50 ppm)

Occupancy	Population	Building Counts	Building Exposure
Residential	2,485	994	$13,331,565
Commercial	0	144	$3,493,290
Industrial	0	7	$12,323,430
Agriculture	0	1	$7,695
Exempt*	730	4	$13,650
Total	**3,219**	**1,150**	**$29,169,630**

* Assumes release occurred when school was in session.

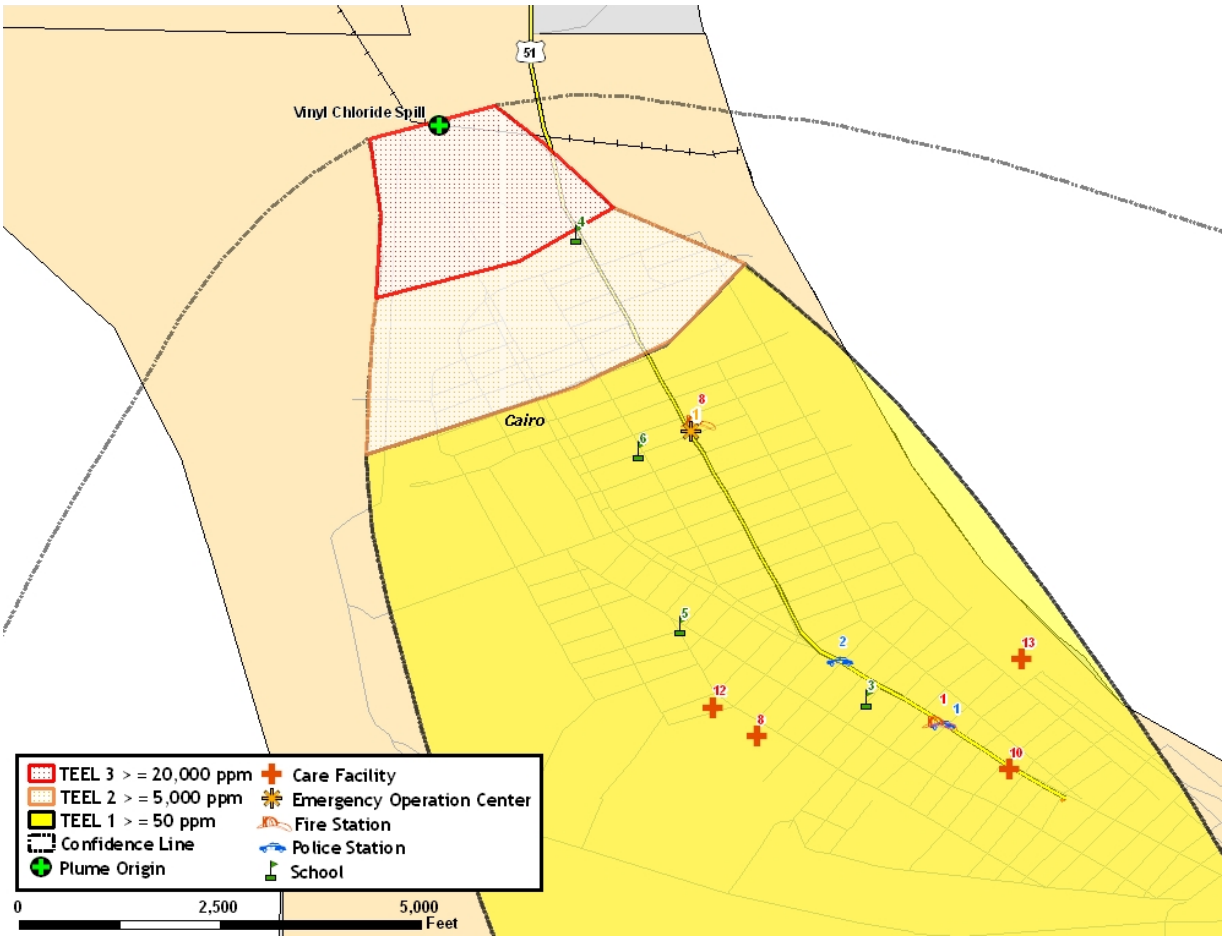
Essential Facilities Damage

There are 13 essential facilities within the limits of the chemical spill plume. The affected facilities are identified in Table 4-43. Their geographic locations are depicted in Figure 4-24.

Table 4-43: Essential Facilities within Plume Footprint

Name
Pilot House
Daystar Care Center
Delta House
Stinger Building
Cairo Emergency Operations Center
Cairo Fire Department
Cairo Auxiliary Fire Department
Cairo Police Records Station
Alexander County Sheriff's Office
Bennett Elementary School
Cairo Junior High School
Emerson Elementary School
Cairo High School

Figure 4-24: Essential Facilities within Plume Footprint



Vulnerability to Future Assets/Infrastructure for Hazardous Materials Storage and Transport Hazard

A significant portion of the Alexander County's population lives in close proximity to transportation corridors, such as the Canadian National Rail Road Line, the Union Pacific Rail Line, Interstate 57, Illinois State Route 3, 13, and 127. These areas are particularly vulnerable to chemical releases because of transportation of hazardous materials.

Analysis of Community Development Trends

Because of the concentration of Alexander County's Population to the transportation network, future development is likely to be vulnerable. The major transportation routes in Alexander County pose a threat of dangerous chemicals and hazardous materials release Alexander County will continue to provide a comprehensive means to mitigate, prepare for, respond to, and recover from hazards relating to hazardous materials releases.

4.4.8 Fire\Explosion

Hazard Definition for Fire\Explosion Hazard

The Alexander County has identified three major categories of fires within the county. These include structure fires, wildland fires, and other fires. A structure fire is any fire involving an assembly of materials for occupancy or use to serve a specific purpose. This includes buildings, open platforms, bridges, or roof assemblies over open storage or process areas. A wildland fire is any fire involving vegetative fuels that occurs in the wildland or urban-wildland interface areas. The other category captures all other fires not covered by wildland or structure fire. Examples of such fires included vehicle fires, trash or rubbish fires, and outside gas or vapor combustion.

Previous Occurrences of Fire\Explosion

Record of all fires in Alexander County between January 1, 2007 and February 8, 2009 were obtained from the Illinois State Fire Marshal. In addition to these data, wildland fire data were obtained for the Shawnee National Forest and adjacent areas from the U.S. Forest Service for the period January 1986 through December 2008.

Alexander County has not experienced a significant or large-scale explosion at a fixed site or transportation route that has resulted in multiple deaths or serious injuries.

Structural Fires

In terms of average annual loss of life and property, structural fires are by far one of the most significant hazards facing Alexander County. Between January 2007 and February 2009 structure fires were attributed with one death, four injuries and over one million dollars in property damage. Table 4-44 presents the number of fires, causes, estimated losses and casualties attributed to these fires by jurisdiction.

Wildland Fires

Forested areas cover approximately one fourth of Alexander County's total land base (Figure 3-2). When conditions are right, forests may become vulnerable to wildfires. Between January 2007 and February 2009 11 wildland fires occurred in Alexander County (Table 4-44). Between 1986 and 2008, U.S. Forest Service Records revealed the occurrence of 41 wildland fires within and near the Shawnee Nation Forest. These fires range in size from less than 1 up to 245 acres. However, most (75%) of these fires are less than 10 acres in size. These fires generally occur near roads, railroad, campgrounds, and the urban wildland interface. Figure 4-25 shows the location of the Shawnee Nation Forest in Southern Illinois and the wildland fire density within and near the Forest.

Other Fires

Other Fires in Alexander County include vehicle fires, dumpster fires, and the burning of rubbish (e.g., house hold trash, construction debris, tires, or old railroad ties). Between January 2007 and February 2009, 12 such fires occurred resulting $15,000 in property damage. Most of the property damage was to vehicles. Table 4-44 presents the number of fires, causes, and estimated losses attributed to these fires by jurisdiction, and Figure 4-25 shows density of wildland fires within the Shawnee National Forest.

Table 4-44 Alexander County Fires

Structure Fires

Jurisdiction	Cause						Estimated Losses		Injuries	Deaths
	Accidental	Intentional	Natural	Un-determined	Under Investigation	Total	Property	Total		
Alexander County	5	2	0	12	3	22	$458,300	$616,300	0	0
Cairo	10	0	0	2	12	24	$324,000	$489,110	4	0
East Cape Girardeau	0	0	0	0	0	0	$0	$0	0	0
McClure	0	0	0	0	0	0	$0	$0	0	0
Tamms	3	0	0	7	2	12	$248,100	$378,100	0	1
Thebes	0	0	0	1	0	1	$3,000	$4,000	0	0
Total	18	2	0	22	17	59	$1,033,400	$1,487,510	4	1

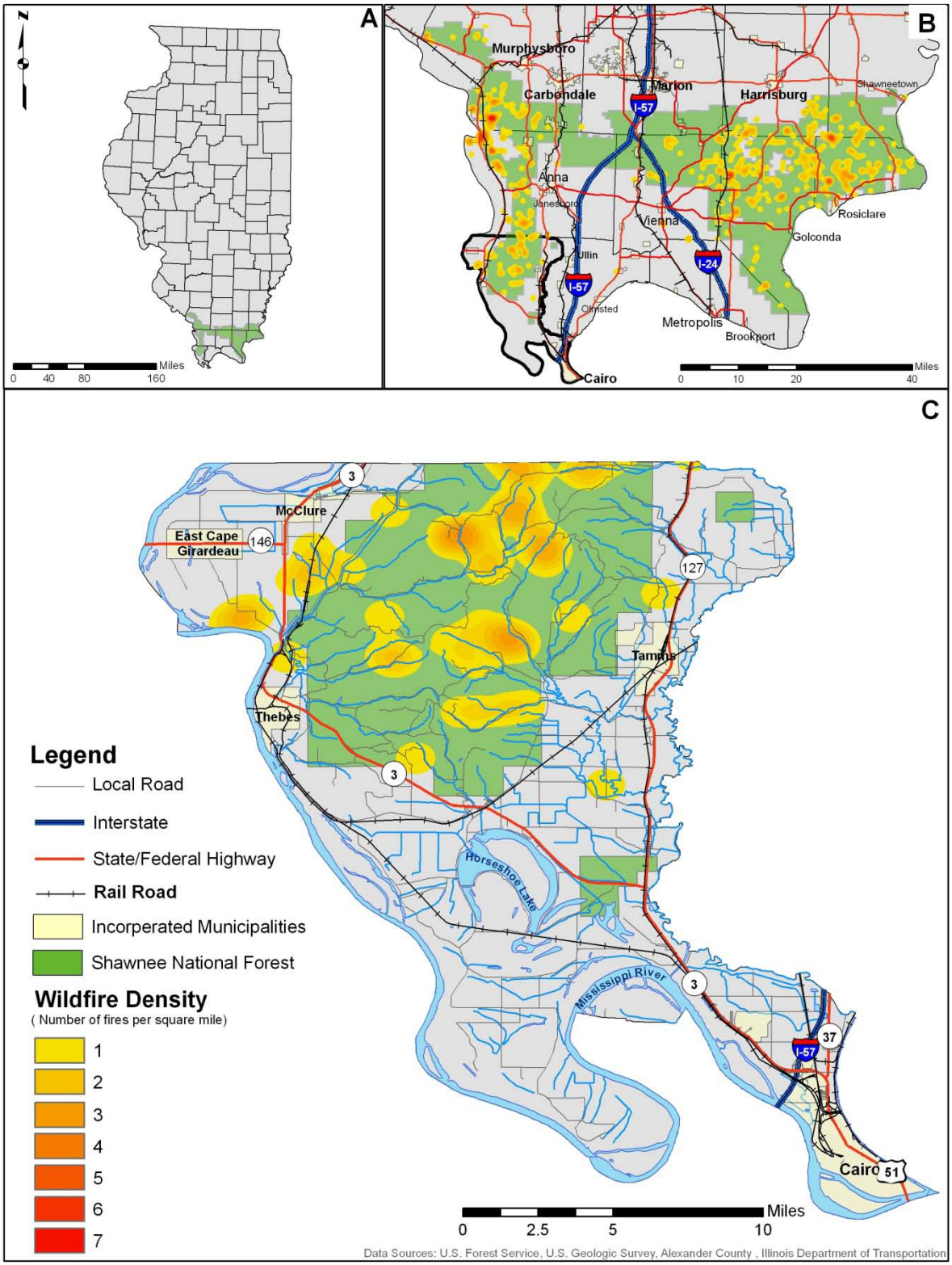
Wildland Fires

Jurisdiction	Cause						Estimated Losses		Injuries	Deaths
	Accidental	Intentional	Natural	Un-determined	Under Investigation	Total	Property	Total		
Alexander County	10	0	0	0	0	10	0	0	0	0
Cairo	1	0	0	0	0	1	0	0	0	0
East Cape Girardeau	0	0	0	0	0	0	0	0	0	0
McClure	0	0	0	0	0	0	0	0	0	0
Tamms	0	0	0	0	0	0	0	0	0	0
Thebes	0	0	0	0	0	0	0	0	0	0
Total	11	0	0	0	0	11	0	0	0	0

Other Fires

Jurisdiction	Cause						Estimated Losses		Injuries	Deaths
	Accidental	Intentional	Natural	Un-determined	Under Investigation	Total	Property	Total		
Alexander County	1	0	0	2	0	3	$6,000	$6,000	0	0
Cairo	3	1	0	1	1	6	$3,500	$20,800	0	0
East Cape Girardeau	0	0	0	0	0	0	$0	$0	0	0
McClure	1	0	0	0	0	1	$0	$0	0	0
Tamms	0	0	0	1	0	1	$5,000	$5,000	0	0
Thebes	1	0	0	0	0	1	$0	$0	0	0
Total	6	1	0	4	1	12	$14,500	$31,800	0	0

Figure 4-25 Shawnee National Forest Wildland Fire Density



Geographic Location for Fire Hazard

The structure and other fire hazards are countywide. Wildland Fires are limited to forested areas located in the north-central portion of the county.

Hazard Extent for Fire Hazard

The extent of the fire hazard varies both in terms of the extent of the fire and the type of material being ignited.

Calculated Priority Risk Index for Fire Hazard

Based on historical data and input from the Alexander County ESDA and U.S. National Forest Service large damaging structure fires, wildland fires and explosions are possible. However, the magnitude of the damage from such an event at the county level will likely be negligible. According to the CPRI, Hazardous fires are ranked as the number seven hazard in the county.

Probability	x	Magnitude /Severity	=	RPI
2	x	1	=	2

Vulnerability Analysis for Fire\Explosion Hazard

Fires and explosions are local phenomena. A large fire or explosion can possibly occur in Alexander County and the damage maybe locally severe. However, the extent of damage to county as a whole is likely to be negligible. Alexander County has a well-established network of fire departments with equipment capacities that enable an effective response. However for wildland fires, Alexander County fire services and private land owners near the National Forest should work with the U.S. Forest Service to reduce fuel loads and developed the necessary wildland urban interface buffers to limit potential property damage from such fires.

Analysis of Community Development Trends

Vulnerable of Alexander County to fires and explosions is countywide. Mitigation of the structure fire and explosions is depended on property and business owners to properly maintain their structures and machinery / equipment contained within. New development may occur within the wildland urban interface potentially increasing the risk of property damage due to wildland fire. Planned construction in these areas should be reviewed so proper protective measures are taken to minimize the wildland risk to these properties.

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Section 5 - Mitigation Strategy

The goal of mitigation is to reduce a hazard's future impacts including property damage, disruption to local and regional economies, and the amount of public and private funds spent to assist with recovery. The goal of mitigation is to build disaster-resistant communities. Mitigation actions and projects should be based on a well-constructed risk assessment; Alexander County's is provided in Section 4 of this plan. Mitigation should be an ongoing process that adapts over time to accommodate the community's needs.

5.1 Community Capability Assessment

The capability assessment identifies current activities used to mitigate hazards. The capability assessment identifies the policies, regulations, procedures, programs, and projects that contribute to the lessening of disaster damages. The assessment also provides an evaluation of these capabilities to determine whether the activities can be improved in order to more effectively reduce the impact of future hazards. The following sections identify existing plans and mitigation capabilities within all of the communities listed in Section 2 of this plan.

5.1.1 National Flood Insurance Program (NFIP)

Alexander County, the City of Cairo, the Village of East Cape Girardeau, the Village of Tamms, and the Village of Thebes are members of the NFIP. The Village of McClure has identified flood boundaries but, has previously chosen not to participate in the program due to lack of interest or perceived need. The County will continue to educate this jurisdiction on the benefits of the program.

The county and all of its communities are members of the NFIP. HAZUS-MH estimates that approximately 1,692 households were located in the Alexander County Special Flood Hazard Area; as of June 18, 2007, the Federal Emergency Services Disaster Agency NFIP Insurance Report for Illinois stated that 209 households paid flood insurance, insuring $14,494,200 in property value. The total premiums collect amounted to $118,376, which on average was $556 annually. From 1978 to 2007, 351 claims were filed, totaling $726,491. The average claim was $2,070.

The county and incorporated areas do not participate in the National Flood Insurance Program's (NFIP) Community Rating System (CRS). The CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community meeting the three goals of the CRS: 1) reduce flood losses; 2) facilitate accurate insurance rating; and 3) promote the awareness of flood insurance. Table 5-1 identifies each community and the date each participant joined the NFIP.

Table 5-1: Additional Information on Communities Participating in the NFIP

Community	Participation Date	DFIRM Date	CRS Date	CRS Rating	Flood Plain Zoning Ordinance Adopted Last
Alexander County	1/3/1986	5/4/2009	NA	NA	3/3/2009
City of Cairo	2/1/1978	5/4/2009	NA	NA	3/22/1988
East Cape Girardeau	12/4/1985	5/4/2009	NA	NA	10/2009
McClure		5/4/2009	NA	NA	NA
Tamms	5/25/1985	5/4/2009	NA	NA	1/2009
Thebes	4/3/1984	5/4/2009	NA	NA	2/2009

5.1.2 Stormwater Management Stream Maintenance Ordinance

Alexander County nor its cities or villages have a storm water management plan or ordinances.

5.1.3 Zoning Management Ordinance

Alexander County nor its cities or villages have land use planning or zoning ordinances.

5.1.4 Erosion Management Program/ Policy

Alexander County utilizes the Illinois Administrative Code Title 35 and the Illinois Environmental Protection Act, administered by the Illinois Environmental Protection Agency. This requires the submission of a stormwater pollution prevention plan (SWPPP) for projects involving more than one acre of land disturbance.

5.1.5 Fire Insurance Rating Programs/ Policy

Table 5-3 lists the fire departments in Alexander County, as well as the ISO rating and the number of members in each department.

Table 5-3: Listing of Fire Departments, Ratings, and Number of Firefighters

Fire Department	Fire Insurance Rating	Number of Firefighters
Cairo Fire Department	5	20
Horseshoe Lake Fire Department	10	25
McClure/East Cape Fire Protection District	3	20
Tamms Fire Department	8	12
Thebes Fire Department	10	10

5.1.6 Land Use Plan

The land use planning for Alexander County is outlined in the Southern Five Comprehensive Economic Development Strategy (CEDS).

5.1.7 Building Codes

Alexander County and some of its communities have adopted the National Building Code and used Illinois Capital Development Board's Building Codes as its guide for public building standards. Many of the building codes for manufactured homes require tie-downs to minimize wind effects. There are no building codes specific to seismic control.

5.2 Mitigation goals

The Alexander County Emergency Services Disaster Agency, Southern Illinois University-Carbondale Geology Department, the Polis Group of IUPUI, and the Southern Five Regional Planning District and Planning Commission assisted the Alexander County Multi-Hazard Mitigation Planning Team in the formulation of mitigation strategies and projects for Alexander County. The goals and objectives set forth were derived through participation and discussion of the views and concerns of the Alexander County Multi-Hazard Mitigation Team members and related public input. The MHMP will focus on these goals, with a great deal of public input, to ensure that the priorities of the communities are represented.

The goals represent long-term, broad visions of the overall vision the county would like to achieve for mitigation. The objectives are strategies and steps which will assist the communities to attain the listed goals. Table 5-5 lists mitigation actions, which are defined projects that will help to complete the defined goals and objectives.

Goal 1: Lessen the impacts of hazards to new and existing infrastructure

(a) Objective: Retrofit critical facilities and structures with structural design practices and equipment that will withstand natural disasters and offer weather-proofing.

(b) Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards.

(c) Objective: Minimize the amount of infrastructure exposed to hazards.

(d) Objective: Evaluate and strengthen the communication and transportation abilities of emergency services throughout the county.

(e) Objective: Improve emergency sheltering in Alexander County.

Goal 2: Create new or revise existing plans/maps for Alexander County

(a) Objective: Support compliance with the NFIP for each jurisdiction in Alexander County.

(b) Objective: Review and update existing, or create new, community plans and ordinances to support hazard mitigation.

(c) Objective: Conduct new studies/research to profile hazards and follow up with mitigation strategies.

Goal 3: Develop long-term strategies to educate Alexander County residents on the hazards affecting their county

(a) Objective: Raise public awareness on hazard mitigation.

(b) Objective: Improve education and training of emergency personnel and public officials.

5.3 Mitigation Actions/Projects

Upon completion of the risk assessment and development of the goals and objectives, the Planning Committee was provided with a list of the six mitigation measure categories from the *FEMA State and Local Mitigation Planning How to Guides*. The measures are listed as follows.

- **Prevention:** Government, administrative, or regulatory actions or processes that influence the way land and buildings are developed and built. These actions also include public activities to reduce hazard losses. Examples include planning and zoning, building codes, capital improvement programs, open space preservation, and stormwater management regulations.

- **Property Protection:** Actions that involve the modification of existing buildings or structures to protect them from a hazard or removal from the hazard area. Examples include acquisition, elevation, structural retrofits, storm shutters, and shatter-resistant glass.

- **Public Education and Awareness:** Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and school-age and adult education programs.

- **Natural Resource Protection:** Actions that, in addition to minimizing hazard losses, preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.

- **Emergency Services:** Actions that protect people and property during and immediately after a disaster or hazard event. Services include warning systems, emergency response services, and protection of critical facilities.

- **Structural Projects:** Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, levees, floodwalls, seawalls, retaining walls, and safe rooms.

After Meeting #3, held June 30, 2009, MHMP members were presented with the task of individually listing potential mitigation activities using the FEMA evaluation criteria. The MHMP members brought their mitigation ideas to Meeting #4, which was held September 21, 2009. The evaluation criteria (STAPLE+E) involved the following categories and questions.

Social:

- Will the proposed action adversely affect one segment of the population?
- Will the action disrupt established neighborhoods, break up voting districts, or cause the relocation of lower income people?

Technical:

- How effective is the action in avoiding or reducing future losses?
- Will it create more problems than it solves?
- Does it solve the problem or only a symptom?
- Does the mitigation strategy address continued compliance with the NFIP?

Administrative:

- Does the jurisdiction have the capability (staff, technical experts, and/or funding) to implement the action, or can it be readily obtained?
- Can the community provide the necessary maintenance?
- Can it be accomplished in a timely manner?

Political:

- Is there political support to implement and maintain this action?
- Is there a local champion willing to help see the action to completion?
- Is there enough public support to ensure the success of the action?
- How can the mitigation objectives be accomplished at the lowest cost to the public?

Legal:

- Does the community have the authority to implement the proposed action?
- Are the proper laws, ordinances, and resolution in place to implement the action?
- Are there any potential legal consequences?
- Is there any potential community liability?
- Is the action likely to be challenged by those who may be negatively affected?
- Does the mitigation strategy address continued compliance with the NFIP?

Economic:

- Are there currently sources of funds that can be used to implement the action?
- What benefits will the action provide?
- Does the cost seem reasonable for the size of the problem and likely benefits?

- What burden will be placed on the tax base or local economy to implement this action?
- Does the action contribute to other community economic goals such as capital improvements or economic development?
- What proposed actions should be considered but be "tabled" for implementation until outside sources of funding are available?

Environmental:

- How will this action affect the environment (land, water, endangered species)?
- Will this action comply with local, state, and federal environmental laws and regulations?
- Is the action consistent with community environmental goals?

The development of the MHMP is the first step in a multi-step process to implement projects and policies to mitigate hazards in the county and its communities.

5.3.1 Completed or Current Mitigation Actions/Projects

Since this is the first mitigation plan developed for Alexander County, there are no deleted or deferred mitigation items. The following tables will refer to completed, ongoing, or future mitigation actions. Table 5-4 presents the completed and ongoing mitigation actions and projects in the county.

Table 5-4: Completed or Current Mitigation Actions

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Jurisdictions Covered	Comments
Establish an NRCS easement	**Goal:** Create new or revise existing plans/maps for Alexander County **Objective:** Review and update existing, or create new, community plans and ordinances to support hazard mitigation.	Flood	Alexander County	The county has implemented this project.

5.4 Implementation Strategy and Analysis of Mitigation Projects

Implementation of the mitigation plan is critical to the overall success of the mitigation planning process. The first step is to decide based upon many factors, which action will be undertaken initially. In order to pursue the top priority first, an analysis and prioritization of the actions is important. Some actions may occur before the top priority due to financial, engineering, environmental, permission, and/or site control issues. Public awareness and input of these mitigation actions can increase knowledge to capitalize on funding opportunities and monitoring the progress of an action.

In Meeting #4, the planning team prioritized mitigation actions based on a number of factors. A rating of High, Medium, or Low was assessed for each mitigation item and is listed next to each item in Table 5-6. The factors were the STAPLE+E (Social, Technical, Administrative, Political, Legal, Economic, and Environmental) criteria listed in Table 5-5.

Table 5-5: STAPLE+E planning factors

S – Social	Mitigation actions are acceptable to the community if they do not adversely affect a particular segment of the population, do not cause relocation of lower income people, and if they are compatible with the community's social and cultural values.
T – Technical	Mitigation actions are technically most effective if they provide a long-term reduction of losses and have minimal secondary adverse impacts.
A – Administrative	Mitigation actions are easier to implement if the jurisdiction has the necessary staffing and funding.
P – Political	Mitigation actions can truly be successful if all stakeholders have been offered an opportunity to participate in the planning process and if there is public support for the action.
L – Legal	It is critical that the jurisdiction or implementing agency have the legal authority to implement and enforce a mitigation action.
E – Economic	Budget constraints can significantly deter the implementation of mitigation actions. Hence, it is important to evaluate whether an action is cost-effective, as determined by a cost benefit review, and possible to fund.
E – Environmental	Sustainable mitigation actions that do not have an adverse effect on the environment, comply with federal, state, and local environmental regulations, and are consistent with the community's environmental goals, have mitigation benefits while being environmentally sound.

For each mitigation action related to infrastructure, new and existing infrastructure was considered. Additionally, the mitigation strategies address continued compliance with the NFIP. While an official cost benefit review was not conducted for any of the mitigation actions, the estimated costs were discussed. The overall benefits were considered when prioritizing mitigation items from High to Low. An official cost benefit review will be conducted prior to the implementation of any mitigation actions. Table 5-6 presents mitigation projects developed by the planning team.

Table 5-6: Mitigation Strategies

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Jurisdictions Covered	Priority	Comments
Establish warming centers in key locations within the county	**Goal:** Lessen the impacts of hazards to new and existing infrastructure **Objective:** Improve emergency sheltering in Alexander County.	Winter Storm	McClure, East Cape, Cairo, Thebes	Medium	The county ESDA director will work with local shelters, schools, healthcare facilities, and first responders to identify locations to establish warming centers. The PDM program or local resources are funding options. If funding is available, implementation will begin within three years.
Develop a public education program to explain hazard communications, emergency plans, and generator safety	**Goal:** Develop long-term strategies to educate Alexander County residents on the hazards affecting their county **Objective:** Raise public awareness on hazard mitigation.	Flood, Tornado, Earthquake, Thunderstorm, Winter Storm, Hazmat	Alexander County, Cairo, East Cape, McClure, Tamms, Thebes	Medium	The county ESDA director will oversee this project. Local resources, such as railroad/train companies and schools, will be used to develop educational literature and present to each jurisdiction at public events or in schools. If resources are available, the project will be implemented within three years

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Jurisdictions Covered	Priority	Comments
Procure generators for Cairo Sewer lift stations, pumping stations and County Highway Department	**Goal:** Lessen the impacts of hazards to new and existing infrastructure **Objective:** Equip public facilities and communities to guard against damage caused by secondary effects of hazards.	Tornado, Thunderstorm, Flood	Alexander County, Cairo, East Cape	High	The county engineer will oversee the implementation of this project. Funding has not been secured as of 2010, but the pre-disaster mitigation program and community development grants are possible funding sources. If funding is available, it is forecasted to begin within one year.
Procure warning sirens with remote activation	**Goal:** Lessen the impacts of hazards to new and existing infrastructure **Objective:** Evaluate and strengthen the communication and transportation abilities of emergency services throughout the county.	Tornado, Thunderstorm	Alexander County, Cairo, East Cape, McClure, Tamms, Thebes	Medium	The county ESDA director oversees the implementation of the project. Local resources will be used to research possible systems. Additional funding will be sought from other funding sources, e.g. PDM program. Implementation, if funding is available, is forecasted to begin within three years.
Develop a program to distribute weather radios in nursing homes, schools, and police stations	**Goal:** Develop long-term strategies to educate Alexander County residents on the hazards affecting their county **Objective:** Raise public awareness on hazard mitigation.	Tornado, Flood	Alexander County, Cairo	Low	The county ESDA director will oversee implementation of this project. Local resources will be used to determine how many radios are needed and when/where to distribute them. Funding has not been secured as of 2010, but the PDM program and community grants are an option. Implementation, if funding is available, will begin within five years.
Institute a buy-out/mitigation plan for several homes in floodplains within the county	**Goal:** Create new or revise existing plans/maps for Alexander County **Objective:** Support compliance with the NFIP for each jurisdiction in Alexander County.	Flood	Alexander County	High	The county floodplain administrator will oversee the implementation of the project. Funding has not been secured as of 2010 but will be sought from funding sources such as IEMA. Implementation, if funding is available, is forecasted to begin within one year.
Establish a program for equipment transfer from National Forest Service to Horseshoe Lake Fire Department (slip-on tank to McClure Fire Dept and future prescribed burning of 3,000 acres in the county	**Goal:** Lessen the impacts of hazards to new and existing infrastructure **Objective:** Minimize the amount of infrastructure exposed to hazards.	Hazmat, Fire	Alexander County, McClure	Low	The Fire Chiefs from Horseshoe Lake and McClure Fire Department will work with the National Forest Service to oversee this project. Local resources will be used to implement this project. If funding and resources are available, the project will begin within five years.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Jurisdictions Covered	Priority	Comments
Install inertial valves at critical facilities	**Goal:** Lessen the impacts of hazards to new and existing infrastructure **Objective:** Retrofit critical facilities with structural design practices and equipment that will withstand natural disasters and offer weather-proofing.	Earthquake	Alexander County, Cairo, East Cape, McClure, Tamms, Thebes	Medium	The county ESDA director will oversee implementation of this project. Funding has not been secured as of 2010, but the PDM program and community grants are an option. If funding is available, implementation will begin within three years.
Secure funding for equipment to remove debris and develop mutual aid agreement with surrounding counties	**Goal:** Develop long-term strategies to educate Alexander County residents on the hazards affecting their county **Objective:** Improve education and training of emergency personnel and public officials	Winter Storm	Alexander County	High	The county ESDA director will contact neighboring EMAs and ESDA directors to discuss mutual aid agreements. The county will request funding for equipment from IEMA or other state funders. If funding is available, implementation will begin within one year.
Establish safe rooms in key locations within the county, e.g. mobile parks, schools, community centers	**Goal:** Lessen the impacts of hazards to new and existing infrastructure **Objective:** Improve emergency sheltering in Alexander County.	Tornado, Thunderstorm	Alexander County, Cairo, East Cape, McClure, Tamms, Thebes	Medium	The county ESDA director will work with local shelters, schools, healthcare facilities, and first responders to identify locations to establish safe rooms. The county may opt to conduct an engineering study to determine best locations. The PDM program or local resources are funding options. If funding is available, implementation will begin within three years.
Upgrade county radios to “narrow band”	**Goal:** Lessen the impacts of hazards to new and existing infrastructure **Objective:** Evaluate and strengthen the communication and transportation abilities of emergency services throughout the county.	Tornado, Thunderstorm	Alexander County	High	The county’s existing radios need to be upgrades. Funding has not been secured as of 2010, but the PDM program and community grants are an option. If funding is available, implementation will begin within one year.
Conduct a commodity flow study along major roadways	**Goal:** Create new or revise existing plans/maps for Alexander County **Objective:** Conduct new studies/research to profile hazards and follow up with mitigation strategies.	Hazmat	Alexander	High	Community planners and local government leaders will coordinate this study. Funding will be sought from county, state, and federal sources. Implementation, if funding is available, will begin within one year.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Jurisdictions Covered	Priority	Comments
Develop a wildfire mitigation plan	**Goal:** Create new or revise existing plans/maps for Alexander County **Objective:** Review and update existing, or create new, community plans and ordinances to support hazard mitigation.	Hazmat, Fire	Alexander County	Low	The county ESDA director will work with local first responders and the National Forest Service to draft an emergency response plan. The MHMP planning committee will review and revise the plan as necessary. If local resources are available, implementation of this project will begin within five years.
Develop a hazmat response plan	**Goal:** Create new or revise existing plans/maps for Alexander County **Objective:** Review and update existing, or create new, community plans and ordinances to support hazard mitigation.	Hazmat, Fire	Alexander County	Low	The county ESDA director will work with local planning commission to establish a plan which will include evacuation and alternative routes. Local resources will be used to write the plan. If resources are available, implementation will begin within five years.
Develop a plan for identifying tree hazards on roads to clear before they fall	**Goal:** Lessen the impacts of hazards to new and existing infrastructure **Objective:** Minimize the amount of infrastructure exposed to hazards.	Winter Storm	Alexander County	Medium	The county ESDA director will work with the county engineer, local resources, and ILDOT to determine potential tree hazards. Funding will be sought from ILDOT. If funding is available, implementation will begin within three years.
Develop a debris management plan	**Goal:** Create new or revise existing plans/maps for Alexander County **Objective:** Review and update existing, or create new, community plans and ordinances to support hazard mitigation.	Winter Storm	Alexander County	Low	The county ESDA director will work with local planning commission to establish a plan. Local resources will be used to write the plan; IEMA will be contacted for assistance. If resources are available, implementation will begin within five years.
Develop a plan for identifying an alternate fuel supply for generators and emergency vehicles	**Goal:** Create new or revise existing plans/maps for Alexander County **Objective:** Conduct new studies/research to profile hazards and follow up with mitigation strategies.	Winter Storm	Alexander County	Low	The county ESDA director will oversee this project. The county will seek help and potential funding from IDNR to implement the study. If funding is available, implementation will begin within five years.
Repair/replace the pump at 28th and 10th Street pump stations	**Goal:** Lessen the impacts of hazards to new and existing infrastructure **Objective:** Equip public facilities and communities to guard against damage caused by secondary effects of hazards.	Flood	Cairo	High	Community planners and local government leaders will coordinate this study. Funding will be sought from county, state, and federal sources. Implementation, if funding is available, will begin within one year.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Jurisdictions Covered	Priority	Comments
Construct a new culvert in East Cape Girardeau to help improve drainage issues	**Goal:** Lessen the impacts of hazards to new and existing infrastructure **Objective:** Equip public facilities and communities to guard against damage caused by secondary effects of hazards.	Flood	East Cape	Low	Community planners and local government leaders will coordinate this study. Funding will be sought from county, state (e.g. ILDOT or IDNR), and federal sources. Implementation, if funding is available, will begin within one year.
Implement a reforestation project to help with flood retention of the Mississippi River Floodplain	**Goal:** Lessen the impacts of hazards to new and existing infrastructure **Objective:** Minimize the amount of infrastructure exposed to hazards.	Flood	Alexander County	Low	Community planners and local government leaders will work with the National Forest Service for funding and planning of this project. If funding is available, implementation will begin within five years.
Reestablish an education program for wildfire prevention	**Goal:** Develop long-term strategies to educate Alexander County residents on the hazards affecting their county **Objective:** Raise public awareness on hazard mitigation.	Fire	Alexander County	Low	The county ESDA director will oversee implementation of this project, working with the National Forest Service for funding and distribution of educational literature. Implementation, if funding is available, will begin within five years.
Develop an education program that focuses on non-structural mitigation, e.g. securing hot water heaters, book shelves, etc.	**Goal:** Develop long-term strategies to educate Alexander County residents on the hazards affecting their county **Objective:** Raise public awareness on hazard mitigation.	Earthquake	Alexander County	High	The county ESDA director will work with local resources to develop the program. Local businesses and officials will be contacted for any funding to develop materials. If funding and resources are available, implementation will begin within one year.
Create a flood evacuation plan	**Goal:** Create new or revise existing plans/maps for Alexander County **Objective:** Conduct new studies/research to profile hazards and follow up with mitigation strategies.	Flood	Alexander County, Cairo, East Cape, McClure, Tamms, Thebes	Low	The county ESDA director will oversee this project. The county will seek help and potential funding from IEMA, IDOT and IDNR to implement a study to route an evacuation route. If funding is available, implementation will begin within five years.

The Alexander County Emergency Services and Disaster Agency will be the local champions for the mitigation actions. The county commissioners and the city and town councils will be an integral part of the implementation process. Federal and state assistance will be necessary for a number of the identified actions. Southern Five Regional Planning District and Planning Commission qualified to provide technical grant writing services to assist the county in seeking resources to achieve the recommended mitigation action.

5.5 Multi-Jurisdictional Mitigation Strategy

As a part of the multi-hazard mitigation planning requirements, at least two identifiable mitigation action items have been addressed for each hazard listed in the risk assessment and for each jurisdiction covered under this plan.

Each of the six jurisdictions, including Alexander County, were invited to participate in brainstorming sessions in which goals, objectives, and strategies were discussed and prioritized. Each participant in these sessions was armed with possible mitigation goals and strategies provided by FEMA, as well as information about mitigation projects discussed in neighboring communities and counties. All potential strategies and goals that arose through this process are included in this plan. The county planning team used FEMA's evaluation criteria to gauge the priority of all items. A final draft of the disaster mitigation plan was presented to all members to allow for final edits and approval of the priorities.

Section 6 - Plan Maintenance

6.1 Monitoring, Evaluating, and Updating the Plan

Throughout the five-year planning cycle, the Alexander County Emergency Management Director will reconvene the MHMP planning committee to monitor, evaluate, and update the plan on an annual basis. Additionally, a meeting will be held during March 2015 to address the five-year update of this plan. Members of the planning committee are readily available to engage in email correspondence between annual meetings. If the need for a special meeting arises, due to new developments or a declared disaster, the team will meet as necessary to update mitigation strategies. Depending on grant opportunities and fiscal resources, mitigation projects may be implemented independently by individual communities or through local partnerships.

The committee will review the county goals and objectives to determine their relevance to changing situations in the county. In addition, state and federal policies will be reviewed to ensure they are addressing current and expected conditions. The committee will also review the risk assessment portion of the plan to determine if this information should be updated or modified. The parties responsible for the various implementation actions will report on the status of their projects and will include which implementation processes worked well, any difficulties encountered, how coordination efforts are proceeding, and which strategies should be revised.

Updates or modifications to the MHMP during the five-year planning process will require a public notice and a meeting prior to submitting revisions to the individual jurisdictions for approval. The plan will be updated via written changes, submissions as the committee deems appropriate and necessary, and as approved by the county commissioners.

The GIS data used to prepare the plan was obtained from existing county GIS data as well as data collected as part of the planning process. This updated HAZUS-MH GIS data has been returned to the county for use and maintenance in the county's system. As newer data becomes available, this updated data will be used for future risk assessments and vulnerability analyses.

6.2 Implementation through Existing Programs

The results of this plan will be incorporated into ongoing planning efforts. Many of the mitigation projects identified as part of this planning process are ongoing. Where needed, modifications will be made to the county and community planning documents and ordinances as part of regular updates. The mitigation plan will be used to help guide building code changes and land use planning.

6.3 Continued Public Involvement

Continued public involvement is critical to the successful implementation of the MHMP. Comments from the public on the MHMP will be received by Alexander County Emergency Management Director and forwarded to the MHMP planning committee for discussion. Education efforts for hazard mitigation will be ongoing through the local television stations, brochures, and yearly public meetings. Once adopted, a copy of this plan will be posted in the library and on the county website.

Glossary of Terms

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

A

AEGL – Acute Exposure Guideline Levels
ALOHA – Areal Locations of Hazardous Atmospheres

B

BFE – Base Flood Elevation

C

CAMEO – Computer-Aided Management of Emergency Operations
CEMA – County Emergency Services Disaster Agency
CEMP – Comprehensive Emergency Management Plan
CERI – Center for Earthquake Research and Information
CRS – Community Rating System

D

DEM – Digital Elevation Model
DFIRM – Digital Flood Insurance Rate Map
DMA – Disaster Mitigation Act

E

EAP – Emergency Action Plan
ERPG – Emergency Response Planning Guidelines
EMA – Emergency Services Disaster Agency
EPA – Environmental Protection Agency

F

FEMA – Federal Emergency Services Disaster Agency
FIRM – Flood Insurance Rate Maps
FIS – Flood Information Study

G

GIS – Geographic Information System

H

HAZUS-MH – **Ha**zards **US**A **M**ulti-**H**azard
HUC – Hydrologic Unit Code

I

IDNR – Illinois Department of Natural Resources
IEMA – Illinois Emergency Services Disaster Agency

M

MHMP – Multi-Hazard Mitigation Plan

N

NCDC – National Climatic Data Center
NEHRP – National Earthquake Hazards Reduction Program
NFIP – National Flood Insurance Program
NOAA – National Oceanic and Atmospheric Administration

P

PPM – Parts Per Million

R

RPI – Risk Priority Index

S

SPC – Storm Prediction Center
SWPPP – Stormwater Pollution Prevention Plan

U

USGS – United States Geological Survey

Appendix A – Minutes of the Multi-Hazard Mitigation Planning Team Meetings

IEMA Pre-Disaster Mitigation Plan

Assembly of the Alexander County Planning Team Meeting 1:
Chairman: Martha Nicholson, Alexander County ESDA
Plan Directors: Southern Five Regional Planning Commission, SIUC Geology Department, and IUPUI - Polis

Meeting Date: Wednesday, October 29, 2008

Meeting Time: 2 pm

Place: Cairo City Hall, Cairo, IL

Planning Team/Attendance:

Jonathan Remo	**SIUC Geology**
Andy Flor	**SIUC Geology**
John Beuchler	**IUPUI – Polis**
Dave Coats	**IUPUI – Polis**
Lisa Thurston	**Southern Five Regional Planning Commission**
Twyla Wareing	**Alexander County Floodplain Administrator**
Judson Childs	**Mayor, City of Cairo**
Jeff Denny	**Alexander County Highway Engineer**
J.R. (Bob) Simpson	**Private Citizen – Cairo**
Donald McGinniss	**Alexander County EMA**
John Meyer	**Cairo Fire Dept.**
Stephen Thomas	**Alexander County Sheriff's Office**

Introduction to the Pre-Disaster Mitigation Planning Process

The meeting is called to order

Narrative: A power-point presentation was given by Jonathan Remo. He explained that this project is in response to the Disaster Mitigation Act of 2000. The project is funded by a grant awarded by FEMA. A twenty-five percent match will be required from the county to fund this project. The county match will be met by sweat equity and GIS data acquired from the County Assessor's Office. The sweat equity will be an accumulation of time spent at the meetings, on research assignments, surveys, along with the time spent reviewing and producing the planning document.

Jonathan Remo introduced the Pre-Disaster Mitigation Website to the planning team. A username and password was given to the planning team, which will grant them access to the web site. The web site is used to schedule meetings, post contact information and download material pertaining to the planning process.

Jonathan Remo divided the planning project into five to six meetings. At the 1st meeting, the planning team will review critical facility maps. The planning team will be asked to research and verify the location of all critical facilities within the county. Jonathan stated that public participation is very important throughout the planning process. He explained that all of the meetings are open to the public but there will be a particular effort made to invite the public to the 3rd meeting. At that meeting, the SIUC Geology Department will present historic accounts of natural disasters that have affected this area. At the 2nd meeting the discussion will focus on natural disasters that are relevant to this area. These hazards will be given a probability rating and ranked by their occurrence and potential level of risk. Polis and SIUC Geology will research these hazards and present them to the planning team. The 3rd meeting is publicized in order to encourage public participation. Polis and SIUC Geology will produce a risk assessment in draft form; each planning team member will get a copy. Also they will present strategies and projects that FEMA and other counties have undertaken for the planning team to review. The 4th meeting consists of a brain storming session focused on disasters that were analyzed in the risk assessment report. The Planning Team will list strategies and projects that could be implemented to mitigate the potential hazards that threaten the county. FEMA requires that for every identified hazard, a strategy to mitigate the loss and damage must be in place. The strategies may range from educational awareness to hardening a building or building a levee. After the 4th meeting the plan will be in its final draft form. At the 5th meeting the planning team will need to review the plan prior to sending it to IEMA. IEMA will review the plan and will make recommendation to it as they see fit, then it is submitted to FEMA for review and approval. Once the plan has been submitted to FEMA, local governments are eligible to apply for grants to mitigate these established hazards. After FEMA approves the plan, it is sent back to the Planning Team. At the 6th meeting the Planning Team will present the Pre-Disaster Mitigation Plan to the County Board for adoption. Incorporated communities must either adopt the county plan or prepare its own plan, in order to access mitigation assistance from FEMA. The communities are encouraged to participate and contribute to development of the plan. Once the County Board has adopted the plan, each incorporated community will have the opportunity to adopt the plan as well.

Jonathan Remo then introduced Andy Flor of SIUC. Andy Flor presented three maps that identified critical facilities in the county. He asked the planning team to come up to review the maps to identify any corrections that need to be made to the maps. He assigned research homework arranged by categories to individual planning team members to locate missing or incorrect critical facilities.

Narrative: A few clarifications were made about the planning process and the participation needed to complete the plan along with dialog between the Planning Team members and Andy and Jonathan about the critical facilities maps. There was discussion about the communities that were not represented and how to contact those communities for the meetings. It was also made known by Lisa Thurston of Southern Five Regional Planning Commission that all of the planning team members would be notified of the next meeting time and place.
Meeting was adjourned.

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CITY OF CAIRO & ALEXANDER COUNTY
PRE-DISASTER MITIGATION MEETING #1

2:00 p.m. October 29, 2008
Cairo City Hall

	Attendee	Agency	Phone #	Email address
1.)	Terfa Wanging	Floodplain Adm.	618-776-5431	twarcing57@yahoo.com
2.)	Stephen W. Thomas	ALEX.Co.SO	618-734-2141	ALEXANDERCntySO.@YAHOO.Com
3.)	Judson Childs	city of Cairo	618-734-4127	
4.)	JEFF DENNY	ALEX. CO. HWY DEPT.	618-776-5242	ALEXCOHWY@ACCESSUS.NET
5.)	J.R.(Bob) Simpson		618-734-2459	
6.)	DONALD MCGINNESS	AC EMA	618 734-2866	DM1062@SBCGLOBAL.NET
7.)	John Buechler	Polis	317-278-2433	Jobuechl@iupui.edu
8.)	Dane Coats	"	"	DeCOATS@iupui.edu
9.)	Lisa Thurston	So. Five RPC	618-634-2284	lthurston@southernfive.org
10.)	John A. Meyer	CAIRO FIRE DEPT.	618-734-1947	cairoFD@lazernetwireless.neT
11.)	JONATHAN REMO	SIUC		
12.)	ANDY FLOR	SIUC		
13.)				
14.)				
15.)				
16.)				
17.)				
18.)				
19.)				
20.)				

IEMA Pre-Disaster Mitigation Plan

Assembly of the Alexander County Planning Team Meeting 2:
Chairman: Martha Nicholson, Alexander County ESDA
Plan Directors: Southern Five Regional Planning Commission, SIUC Geology Department, and IUPUI - Polis

Meeting Date: Wednesday, December 10, 2008

Meeting Time: 1 pm

Place: Cairo City Hall, Cairo, IL

Planning Team/Attendance:

Jonathan Remo	**SIUC Geology**
Crystal Davenport	**Southern Five Regional Planning Commission**
Jeff Denny	**Alexander County Highway Engineer**
Twyla Wareing	**Alexander County Floodplain Administrator**
Marty Nicholson	**Alexander County EMA Director**
Stanley Mouser	**McClure/East Cape Girardeau Fire Dept.**
Donald McGinness	**Alexander County EMA**
John Meyer	**Cairo Fire Dept**
Judson Childs	**Mayor, City of Cairo**
Monica Smith	**Special Projects Coordinator, City of Cairo**
Scott Crist	**USDA Forest Service, Shawnee National Forest**

The meeting was called to order.

Jonathan Remo began the meeting by re-introducing the objectives of the PDM Planning document. The planning document is mandated as a result of the "Disaster Mitigation Act of 2000". Jonathan stated that the objective of the meeting was to prioritize a list of disasters that are relevant to Johnson County.

Jonathan Remo provided the planning team with a handout to direct the focus of the meeting discussion. As Jonathan began to conduct the prioritizing process, he described the risk assessment ranking that FEMA has established.
Narrative: The Planning Team was then asked to assess a risk level to each disaster that was identified in Alexander County. The risk level is ranked as followed:

#1: Annual River Flooding
#2: Earthquake
#3: Severe Thunderstorms with Tornados
#4: Transportation Hazardous Material Release

#5: Winter Storms
#6: Thunderstorms/High Winds/Hail/Lightening
#7: Dam or Levee Failure
#8: Fire/Explosion

Narrative: The planning team was then asked to analyze the historical weather events that have been plotted on a map of the county and communities therein. No corrections were noted by the planning team.

The planning team agreed to complete any missing information pertaining to critical facilities by the next meeting.

Meeting was adjourned.

ALEXANDER CO
PRE DISTASTER MITIGATION MTG #2
12-10-08

NAME	AFFILIATION	PHONE OR EMAIL
JEFF DENNY	ALEXANDER COUNTY	776-5242 ALEYCOHWY@ACCESS.USNET
Twyla Wareing	Alexander County-Floodplain Adm.	776-5431 twarcing57@yahoo.com
MARTY Nicholson	ALEX. Co. EMA DIRECTOR	618-306-0870 cell
STANLEY Mouser	McClure Cape FPD	573-979 1478
DONALD McGINNESS	ALEX CO EMA BOARD MEMBER	618-734-2866 DM1063@SBCGLOBAL.NET
John A. Meyer	CAIRO FIRE DEPARTMENT	734-1947 CAIROFD@LAZERNETWIRELESS.NET
Judson Childs	Mayor city of Cairo	734. 4127
MONICA SMITH	SPEC. PROJ. COOR. CITY OF CAIRO IL	734-1840
Scott Gist	USDA Forest Service, Shawnee National Forest	618-687-1731 scgist@fs.fed.us
CRYSTAL DAVENPORT	So Five RPC	618.634.2284 cdaven@southernfive.org
JONATHAN REMO	SIUC	

IEMA Pre-Disaster Mitigation Plan

Assembly of the Alexander County Planning Team Meeting 3:
Chairman: Martha Nicholson, Alexander County ESDA
Plan Directors: Southern Five Regional Planning Commission, SIUC Geology Department, and IUPUI – Polis

Meeting Date: Tuesday, June 30, 2009

Meeting Time: 6 pm

Place: Olive Branch Community Center, Olive Branch, IL

Planning Team/Attendance:

Jonathan Remo	**SIUC Geology**
John Buechler	**IUPUI – Polis**
Lisa Thurston	**Southern Five Regional Planning Commission**
David Barkett	**Alexander County Sheriff**
Jeff Denny	**Alexander County Highway Engineer**
Twyla Wareing	**Alexander County Floodplain Administrator**

The meeting was called to order.

Jonathan Remo opened the meeting with an overview of the planning process and the roles of SIU and the Polis Center. Then he went on to explain the topics and objectives of the current meeting. Jonathan first presented the planning team with the list of hazards that the team had ranked by their level of risk from the previous meeting. He also presented a power point presentation of the history of Alexander County's past disasters. This included covering each hazard that the County had focused on, the history of each and then the mitigation strategies. He defined mitigation as the act of avoidance and preparedness.

A copy of Mitigation Idea, produced by FEMA Region 5 in July 2002, was given to each of the planning team members for review. It was explained by Jonathan the contents of the booklet and that each of the planning team members should return to meeting 4 with three mitigation strategies for each of the hazards identified by the planning team.

Jonathan Remo then asked the audience for questions or comment. After some discussion about the plan and how it would affect the community and its residents, he thanked those who came and a closed the presentation.

Meeting was adjourned.

Sign-In Sheet

Alexander County
Public Hearing (Pre-Disaster Mitigation Plan)
June 30, 2009; 6:00pm
Olive Branch Community Center
(#3)

NAME	ADDRESS
DAVID BARKETT	ALEX CO. S.O.
[illegible]	P.O. BOX 216 OLIVE BRANCH IL 62969
Twyla Wareing	P.O. Box 216 Olive Branch, Ill 62969
LISA THURSTON	SIRPC

IEMA Pre-Disaster Mitigation Plan

Assembly of the Alexander County Planning Team Meeting 4:
Chairman: Martha Nicholson, Alexander County ESDA
Plan Directors: Southern Five Regional Planning Commission, SIUC Geology Department, and IUPUI – Polis

Meeting Date: Monday, September 21, 2009

Meeting Time: 2 pm

Place: Cairo Public Library, Cairo, IL

Planning Team/Attendance:

Jonathan Remo	**SIUC Geology**
John Buechler	**IUPUI – Polis**
Crystal Davenport	**Southern Five Regional Planning Commission**
Donald McGinness	**Alexander County EMA**
Al Bloomenberg	**Village President, Village of East Cape Girardeau**
Scott Crist	**US Forest Service/Shawnee National Forest**
Monica Smith	**Special Projects Coordinator, City of Cairo**
Judson Childs	**Mayor, City of Cairo**

The meeting was called to order.

Jonathan Remo thanked everyone for attending the meeting and stated that if the planning team members needed extra mitigation strategy handbooks that they were available upon request. He introduced John Buechler from the Polis Center that was in attendance that day also.

John Buechler began by explaining that today's meeting would cover mitigation strategies that the planning team believed would prevent or eliminate the loss of life and property. He explained that the planning team should not make any reservations in the form of money or resources when developing this list. Also whenever possible, the planning team was directed to be specific about the location or focus area of a strategy, in respect to being within a municipality or county wide. Each hazard was addressed one at a time. The planning team listed new and current on-going mitigation strategies in respect to each hazard. The planning team prioritized mitigation actions based on a number of factors. A rating of High, Medium, or Low was assessed for each mitigation item. Listed below are the New Mitigation Strategies that the Planning Team came up with:

Mitigation Item	Hazards Addressed	Jurisdictions Covered	Priority
Establish warming centers in key locations within the county	Winter Storm	McClure, East Cape, Thebes	Medium
Develop a public education program to explain hazard communications, emergency plans, and generator safety	Flood, Tornado, Earthquake, Thunderstorm, Winter Storm, Hazmat	Alexander County, Cairo, East Cape, McClure, Tamms, Thebes	Medium
Procure generators for Cairo Sewer Plan/Lift Stations	Tornado, Thunderstorm, Flood	Alexander County, Cairo, East Cape	Medium
Procure warning sirens with remote activation	Tornado, Thunderstorm	Alexander County, East Cape, McClure, Tamms, Thebes	Medium
Develop a program to distribute weather radios in nursing homes, schools, and police stations	Tornado, Flood	Alexander County, Cairo	Low
Institute a buy-out plan for several homes in Urbandale and Miller City	Flood	Alexander County	High
Establish a program for equipment transfer from National Forest Service to Horseshoe Lake Fire Department (slip-on tank to McClure Fire Dept and future prescribed burning of 3,000 acres in the county	Hazmat, Fire	Alexander County, McClure	Low
Install inertial valves at critical facilities	Earthquake	Alexander County, Cairo, East Cape, McClure, Tamms, Thebes	Medium
Secure funding for equipment to remove debris and develop mutual aid agreement with surrounding counties	Winter Storm	Alexander County	High
Establish safe rooms in key locations within the county, e.g. mobile parks, schools, community centers	Tornado, Thunderstorm	Alexander County, Cairo, East Cape, McClure, Tamms, Thebes	Medium
Upgrade county radios to “narrow band”	Tornado, Thunderstorm	Alexander County	High
Conduct a commodity flow study along major roadways	Hazmat	Alexander	High
Develop a wildfire mitigation plan	Hazmat, Fire	Alexander County	Low
Develop a hazmat response plan	Hazmat, Fire	Alexander County	Low
Develop a plan for identifying tree hazards on roads to clear before they fall	Winter Storm	Alexander County	Medium
Develop a debris management plan	Winter Storm	Alexander County	Low
Develop a plan for identifying an alternate fuel supply for generators and emergency vehicles	Winter Storm	Alexander County	Low
Repair/replace the pump at 28th and 10th Street pump stations	Flood	Cairo	High
Construct a new culvert in East Cape Girardeau to help improve drainage issues	Flood	East Cape	Low
Implement a reforestation project to help with flood retention of the Mississippi River Floodplain	Flood	Alexander County	Low
Reestablish an education program for wildfire prevention	Fire	Alexander County	Low
Develop an education program that focuses on non-structural mitigation, e.g. securing hot water heaters, book shelves, etc.	Earthquake	Alexander County	High
Create a flood evacuation plan	Flood	Alexander County, Cairo, East Cape, McClure, Tamms, Thebes	Low

SIGN IN SHEET

PLACE: *Cairo City Hall Council Room, Cairo, IL*

DATE: *September 21, 2009*

TIME: *2:00 pm*

PURPOSE: *Alexander Co Pre Disaster Mitigation Committee Meeting #4*

NAME	ORGANIZATION	EMAIL or PHONE
Jonathan Reno	SIUC	
Roland Buechler	IDNR	
DONALD McGINNESS	ACEMA	618 734 2866 DM1062@SBCGLOBAL.NET
AL BLUMENBERG	Ex Cairo Dir (MAYOR)	(573) 450-4961
Scott Crist	SIUC	618-687-1731
Monica Smith	City of Cairo	618-734-1840
[illegible]	city of Cairo	618-734-8447
CRYSTAL DAVENPORT	SFRPC	

IEMA Pre-Disaster Mitigation Plan

Assembly of the Alexander County Planning Team Meeting 5:
Chairman: Martha Nicholson, Alexander County ESDA Director
Plan Directors: Southern Five Regional Planning Commission, SIUC Geology Department, and IUPUI – Polis

Meeting Date: **Tuesday, March 9, 2010**

Meeting Time: **1 pm**

Place: **Cairo Public Library, Cairo, IL**

Planning Team/Attendance:

Jonathan Remo	**SIUC Geology**
Crystal Davenport	**Southern Five Regional Planning Commission**
Joseph Dakin	**Tamms Village Board Member**
Monica Smith	**City of Cairo Special Projects Coordinator**
Al Blumenberg	**Village President, Village of East Cape Girardeau**
Brandon Craig	**Tamms Fire Dept**
Donald McGinness	**Alexander Co EMA Board Member**
Twyla Wareing	**Alexander Co Floodplain Administrator**
Jeff Denny	**Alexander Co Highway Dept Engineer**
John Meyer	**Cairo Fire Dept**

The meeting was called to order.

Jonathan Remo opened the meeting with an overview of what was to happen from this point on with the plan. He stated that the plan could be reviewed by the Planning Team members for about 2 weeks so everyone would have ample amount of time look at and review the plan for any discrepancies. He also stated that in approximately 3 weeks the plan would be sent to IEMA/FEMA. They would then review it and if everything is OK with the plan, then we should hear back from IEMA/FEMA hopefully by May for their approval.

Jonathan then explained that once it comes back approved, then a Resolution will have to be passed by all municipalities. He stated that Crystal Davenport of Southern Five RPC will have an example of this resolution that she will give to the municipalities in order for them to pass it at their board/council meetings. After they are passed, Jonathan stated that they needed to be returned to Crystal and she will forward them on to FEMA. Once

FEMA gets the Resolutions, they will send notification that the municipality has a completed and approved plan.

He also explained that once the plan is submitted to IEMA/FEMA for their review, the municipalities can begin formulating and putting together their projects for funding. There is a pool of funds from FEMA that these lower five counties can access that was allowed for the '08 winter/ice storm that is earmarked just for the lower counties of IL. The projects must be related to the affects of this storm. He stated that if individuals wanted more specific information of this funding, they could go to the IEMA website.

It was also explained to the planning team that FEMA will require a five-year update to the plan. Jonathan told the planning team that in another five years, the members should come together again, most likely under the direction of the ESDA Director, to review the plan and make any necessary changes to it. He explained that FEMA will probably send out a reminder as to when this is supposed to take place.

After Jonathan explained the above process, he pointed out specific tables and places in the plan that needed clarification from the team members. After discussing a few changes, the planning team members looked at the plan for a while longer.

Since there were no more comments about the plan, the meeting was adjourned.

SIGN IN SHEET

PLACE: *Cairo Public Library, Cairo, IL*

DATE: *March 9, 2010*

TIME: *1 pm*

PURPOSE: *Alexander County Pre-Disaster Mitigation Committee Meeting #5*

NAME	AFFILIATION	PHONE & EMAIL
Joseph Dakin	Tamms Village Board	618-747-2614 eagle690-@hotmail.com
Monica Smith	City of Cairo	618-734-1840
Al Blumenberg	VILLAGE OF E. CAPE	573 450-4961 Cell
Brandon Crais	Tamms F.D.	618-747-2202
DONALD McGINNESS	BOARD MEMBER ACEMA	618-734-2586 DM1062@SBCGLOBAL.NET
Twyla Waring	Headplain Off.	619-776-5431
JEFF DENNY	ALEX. CO. HIGHWAY DEPT.	618-776-5242 ALEXCOHWY@WILDBLUE.NET
CRYSTAL DAVENPORT	SIRPC	
JONATHAN REMO	SIUC	
John A. Meyer	CAIRO FD	618-734-1947 CAIROFD@LAZERNET.NWPCCESS.NET

Appendix B: Local Newspaper Articles

y is William B. Jr., 500 South reet, Anna, Illi-06.

s against the es- be filed in the this Court at the er County Court- 000 Washington airo, Illinois, or representative, on or before De- 10th, 2009 which not less than six hs from the date st publication of olication of this nd any claim not thin that period d. Copies of any ed with the Clerk mailed or deliv- the representa- to the attorney en (10) days after

Representative: amy Rae Kearce, 204 W. Jefferson,

Cape Girardeau, Illinois 62957; #26 Kiowa Circle, East Cape Girardeau, Illinois 62957; and #45 Sioux, East Cape Girardeau, Illinois 62957.

3. The legal description of the subject real estate is as follows:

PARCEL 1:

Lot Numbered Fourteen (14) in East Cape Terrace No. 1 Subdivision, being part of the Southwest Quarter (SW 1/4) of the Southeast Quarter (SE 1/4) of Section Thirteen (13), Township Fourteen (14) South, Range Four (4) West of the Third Principal Meridian in Alexander County, Illinois.

Except the coal, oil, gas and other minerals underlying said premises and the right to mine and remove same

PUBLIC MEETING NOTICE

The Alexander County Pre-Disaster Mitigation Committee would like to invite everyone to a public meeting on Tuesday, June 30th at 6pm at the Olive Branch Community Center. This meeting is to inform the public of the potential disasters that could strike the county, the losses expected from those disasters and how to reduce the vulnerability to these disasters. FEMA / IEMA is the funding agency of this mitigation plan for the County. All are invited to attend this informative meeting. Faculty members of Southern Illinois University at Carbondale will be the presenters at this meeting.

26A

TO AUTHORIZE THE

scribed real estate. Further, all offers must be in writing and shall be accompanied by a cashier's check made payable to the City of Cairo in an amount not less than 10% of the offer as earnest money. Such funds shall be held until the city has accepted and approved an offer and the closing of the sale

of the real estate has been completed. The earnest money of any unsuccessful offeror shall be returned following the closing.

6. That offers to purchase the above-described real estate shall be received in the Office of the City Clerk until 12:00 Noon, Monday, July 6, 2009. No offer will be received after said date and time and no offer will be received that is less than 80% of

accept written offers for the purchase of the Real Estate described below in the Office of the City Clerk until Monday, July 6, 2009, at 12:00 Noon. No offer shall be received after that date. No offer shall be considered that is less than 80% of the appraised value of the property. A copy of the appraisal report for the property described below may be examined in the Office of the City Clerk anytime after June 23, 2009.

The property offered for sale and legally described as follows:

19' 6" N Side of 3 and all of 4
Blk 26
First Addition

Common Address: 2605 Commercial Avenue

A Pre be held July 20 prevail PHA Of Terrace, The Pre include Typical Bidders this wil that acc of the d be mad

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Alexander County Pre-Disaster Mitigation committee to host Public Meeting

The Alexander County Pre-Disaster Mitigation Committee will host a public meeting, Tuesday, June 30 at the Olive Branch Community Center.

The meeting will begin at 6 p.m.

This meeting is to inform the public of the potential disasters that could strike the county, the losses expected from those disasters and how to reduce the vulnerability to these disasters.

FEMA / IEMA is the funding agency of this mitigation plan for the County.

All are invited to attend this informative meeting.

Faculty members of Southern Illinois University at Carbondale will be the presenters at this meeting.

to Hess the county hasn't mailed tax bills yet and she has no idea when they are being mailed out, calling the situation a crisis situation.

Alexander County 911 Coordinator Kyle Smith introduced himself to the commissioners and said he was making strides in bringing an enhanced 911 service to Alexander County.

Smith explained the Southern Illinois 911 Consortium to the commissioners and said he would be receiving assistance from them. The Southern Illinois 911 Consortium is made up of 17 southern Illinois county 911 offices.

County Treasurer Frances Lee told the commissioners if the 911 board is paying Smith directly for his insurance premium, that money is part of his taxable payroll. Otherwise, the 911 board would need to make the check payable to Smith's insurance provider.

Smith also announced he has applied for a $7,500 grant through the National Emergency Number Association through the Vonage surcharges which is held in an endowment fund.

district's bank account.

Greenwell made a motion, seconded by Matlock to approve the corporate authorization resolution updating the information on file at Capaha Bank as the county's depositor.

Lee presented the commissioners with the county's fund balances, stating the county had received $59,000 in forestry money.

Lee told the commissioners that the county paid $37,212 in probation costs with the county paying half and the court system paying the other half. Also paid was the county's pension fund in the amount of $19,724 which still leaves $4,000 in late fees to the pension fund; $1,245 in association fees for the county board, county clerk, treasurer and sheriff.

Currently, the county has $71,000 in its general fund with payroll and health insurance due to be paid this week.

Board Chairman Mike Caldwell said he would speak with John Price about the pension fund late fees.

Lee also informed the commissioners that Stacey Thomas had turned

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Appendix C: Adopting Resolutions

Resolution #_____

ADOPTING THE ALEXANDER COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, Alexander County recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted multi-hazard mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHERAS, Alexander County participated jointly in the planning process with the other local units of government within the County to prepare a Multi-Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the Alexander County Commissioners hereby adopt the Alexander County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED that the Southern Five Regional Planning District and Development Commission will submit on behalf of the participating municipalities the adopted Multi-Hazard Mitigation Plan to the Illinois Emergency Management Agency and the Federal Emergency Management Agency for final review and approval.

ADOPTED THIS _____ Day of _____, 2010.

_____
County Commissioner Chairman

_____
County Commissioner

_____
County Commissioner

_____
Attested by: County Clerk

Resolution #_____

ADOPTING THE ALEXANDER COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the City of Cairo recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted multi-hazard mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHERAS, the City of Cairo participated jointly in the planning process with the other local units of government within the County to prepare a Multi-Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the City of Cairo hereby adopts the Alexander County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Southern Five Regional Planning District and Development Commission will submit on behalf of the participating municipalities the adopted Multi-Hazard Mitigation Plan to the Illinois Emergency Management Agency and the Federal Emergency Management Agency for final review and approval.

ADOPTED THIS _____ Day of _____, 2010.

_____
City Mayor

_____
City Council Member

_____
City Council Member

_____
City Council Member

_____
City Council Member

_____
Attested by: City Clerk

Resolution #_____

ADOPTING THE ALEXANDER COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the Village of East Cape Girardeau of recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted multi-hazard mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHERAS, the Village of East Cape Girardeau participated jointly in the planning process with the other local units of government within the County to prepare a Multi-Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the Village of East Cape Girardeau hereby adopts the Alexander County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that Southern Five Regional Planning District and Development Commission submit on behalf of the participating municipalities the adopted Multi-Hazard Mitigation Plan to the Illinois Emergency Management Agency and the Federal Emergency Management Agency for final review and approval.

ADOPTED THIS _____ Day of _____, 2010.

_____
Village President

_____
Village Council Member

_____
Village Council Member

_____
Village Council Member

_____
Village Council Member

_____
Attested by: Village Clerk

Resolution #_____

ADOPTING THE ALEXANDER COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the Village of McClure recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted multi-hazard mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHERAS, the Village of McClure participated jointly in the planning process with the other local units of government within the County to prepare a Multi-Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the Village of McClure hereby adopts the Alexander County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that Southern Five Regional Planning District and Development Commission will submit on behalf of the participating municipalities the adopted Multi-Hazard Mitigation Plan to the Illinois Emergency Management Agency and the Federal Emergency Management Agency for final review and approval.

ADOPTED THIS _____ Day of _____, 2010.

_____
Village President

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Village Council Member

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Village Council Member

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Village Council Member

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Village Council Member

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Attested by: Village Clerk

Resolution #_____

ADOPTING THE ALEXANDER COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the Village of Tamms recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted multi-hazard mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHERAS, the Village of Tamms participated jointly in the planning process with the other local units of government within the County to prepare a Multi-Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the Village of Tamms hereby adopts the Alexander County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that Southern Five Regional Planning District and Development Commission will submit on behalf of the participating municipalities the adopted Multi-Hazard Mitigation Plan to the Illinois Emergency Management Agency and the Federal Emergency Management Agency for final review and approval.

ADOPTED THIS _____ Day of _____, 2010.

_____
Village President

_____
Village Council Member

_____
Village Council Member

_____
Village Council Member

_____
Village Council Member

_____
Attested by: Village Clerk

Resolution #_____

ADOPTING THE ALEXANDER COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the Village of Thebes recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted multi-hazard mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHERAS, the Village of Thebes participated jointly in the planning process with the other local units of government within the County to prepare a Multi-Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the Village of Thebes hereby adopts the Alexander County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that Southern Five Regional Planning District and Development Commission will submit on behalf of the participating municipalities the adopted Multi-Hazard Mitigation Plan to the Illinois Emergency Management Agency and the Federal Emergency Management Agency for final review and approval.

ADOPTED THIS _____ Day of _____, 2010.

_____
Village President

_____
Village Council Member

_____
Village Council Member

_____
Village Council Member

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Village Council Member

_____
Attested by: Village Clerk

Appendix D: Alexander County Historical Disaster Pictures and NCDC Historical Hazards

Appendix D - Alexander County Historical Hazards

Alexander County Photo Index

Included in this document are the photos, date of events, type of events and description. In the addition to this document there should be attachments to the email with a pdf or jpg form of each of the pictures. Note: the size of the picture seen in this index is usually not the actual size of the photo.

Flood

Date: March 1927
Location: Mounds, IL to Cairo, IL

Description: "The Great Mississippi Flood of 1927, US Route 51 between Mounds, IL and Cairo, IL . River stage at Cairo, 52.8 feet.
File Name: Flood_Jan_1937
Date of Photo: March 25, 1927
Source: From "The Floods of 1927 in the Mississippi Basin", Frankenfeld, H.C., 1927 Monthly Weather Review Supplement No. 29.
http://upload.wikimedia.org/wikipedia/commons/e/e1/1927_Mississippi_Flood_Alexander_Illinois.jpg.jpg

Date: January-February 1937
Location: Cairo, IL

Description: Piling sandbags along the levee during the height of the flood. Cairo. February, 1937
File Name: Flooding_Feb_1937
Source: Picture provided by Russell Lee A Southern Illinois Album:Farm Security Administration Photographs, 1936-1943

Description: " Flood zone near Cairo, IL…photo shows lineman of the telephone company as they go about in their roles of unsung heroes, keeping lines in repair.
File Name: Flood_Jan_1937
Date of Photo: January, 29, 1937
Source: The Southern

Description: "Workers on the Levee at Cairo" "Cairo, IL – Two of the army of relief workers, shipped in by the government, busy piling sandbags on the levee, here, to hold of the raising Ohio River. Warriors of a city under siege, these men have so far been successful in their efforts to keep back the mighty River."
File Name: Flooding2_Feb_1937
Date Picture Taken: 2/3/37
Source: (Ohio River 1937 flood scrapbook), Special Collections Research Center, Morris Library, Southern Illinois University Carbondale. "Published work,"

Description: "Floodwall Separates Cairo from destruction" " Cairo, IL—A view showing part of the long 63-foot wall which protects this Illinois City as it plays a waiting game with flood-laden waters of the Ohio and the Mississippi which converge here. A three-foot bulk heading of earth and timber on top of the wall is all that will stand between the city and destruction in the river should raise above the concrete"
File Name: Flooding3_Feb_1937
Date Picture Taken: 2/3/37
Source: (Ohio River 1937 flood scrapbook), Special Collections Research Center, Morris Library, Southern Illinois University Carbondale. "Published work,"

Date: May 1983
Location: Cairo, IL

Description: Flooding in Cairo where the Ohio and Mississippi Rivers meet
Source: The Southern
Date: May 5, 1983
File Name: Flood_May_1983

Description: Rout 3 South to Cairo near Gale, IL
File Name: Flood2_May_1983
Date: May 11, 1983
Source: The Southern

Tornado

Date: April 25, 2003
Location: Olive Branch, IL

Description: Tornado touchdown just outside of Olive Branch, IL
File Name: Tornado_Apr_2003
Date: April 25, 2003
Source: http://www.crh.noaa.gov/pah/storm/dat/pahapr03.pdf

Date: January 21, 1999
Location: Thebes, IL

Description: Photo taken between Thebes (Alexander County) and McClure (Union County) in Southern Illinois. Damages were a result of a F-2 tornado.
File: Tornado_Jan_1999
Source: http://www.crh.noaa.gov/pah/storm/1999jan21/jan17stm.php

Appendix D - Historic Hazards: National Climatic Data Center U.S. Storm Event Database for Alexander County Illinois

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	2/1/1998	Abnormal Warmth	N/A	0	0	0	0	The month of February was one of the six warmest Februarys on record at both Paducah and Evansville. The mild temperatures provided area residents with unusual opportunities for outdoor recreation. Many trees and plants, including daffodils and forsynthia, blossomed early. Unfortunately, the premature blossoms were vulnerable to late season cold snaps.
Alexander	12/9/1995	Cold Wave	N/A	0	0	0	0	An arctic air mass swept across southern Illinois in the wake of the snowstorm a day earlier. Temperatures during the early morning hours of the 9th plunged to near zero. Wind chill indicies ranged from 20 to 30 below zero for a short while.
Alexander	8/8/2005	Dense Fog	N/A	0	0	0	0	Dense fog blanketed southern Illinois for several hours, reducing visibility to a quarter mile or less in many areas.
Alexander	2/10/2006	Dense Fog	N/A	0	0	0	0	Widespread dense fog reduced visibility to one quarter mile or less, mainly to the south of Interstate 64.
Alexander	11/8/2006	Dense Fog	N/A	0	0	0K	0K	Clearing skies and calm winds caused formation of widespread dense fog. Visibility was less than one quarter mile.
Alexander	3/29/2007	Dense Fog	N/A	0	0	0K	0K	Widespread dense fog occurred during the early morning hours. A light east to southeast wind flow around high pressure over the southern Appalachians brought increased humidity. The dense fog was south of the Marion, Carbondale, and Harrisburg areas. Visibility was frequently below one-quarter mile.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	12/8/2007	Dense Fog	N/A	0	0	0K	0K	Widespread dense fog shrouded the Ohio River counties of southern Illinois during the night of the 8th and through the early morning hours of the 9th. Visibility was reduced to one-quarter mile or less. A warm front along the Kentucky/Tennessee border during the evening moved north to the Ohio River Valley by early on the 9th. The dense fog formed along and ahead of the warm front, then lifted as southwest winds increased following the passage of the front.
Alexander	12/11/2007	Dense Fog	N/A	0	0	0K	0K	Widespread dense fog blanketed southern Illinois during the morning hours. Visibility was reduced to one-quarter mile or less. A very light southerly wind flow of moist air contributed to the dense fog.
Alexander	8/15/1996	Drought	N/A	0	0	0	0	The drought severity index indicated extreme drought conditions over parts of southern Illinois the last week of August. Only 0.11 inches of rain fell at Paducah during the month. This was the second driest month since 1962 at Paducah, and it was the driest August on record. River levels dropped well below normal, but no serious navigation problems were reported.
Alexander	9/1/1998	Drought	N/A	0	0	0	0	September, 1998 was one of the driest Septembers on record in southern Illinois. Across the Ohio River at Paducah, Kentucky, where the monthly rainfall total was only 0.12 inch, it was the driest September on record. The dry weather was costly to farmers of certain crops, especially soybeans. The drought reduced yields for soybeans and late-planted corn by 25 to 30 percent in some counties. The drought, which was classified as "mild," began in early August. The lack of rainfall late in the summer was mitigated by one of the wettest springs on record.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	8/1/1999	Drought	N/A	0	0	0	0	After one of the wettest Junes on record, the rest of the summer was quite dry. By the end of August, parts of Southern Illinois were in a moderate drought, according to the Palmer Drought Index. There was a wide range in drought conditions. Places close to the Ohio River bordered on severe drought, while farther northwest from Mount Vernon to Carbondale, the drought was mild. A couple of times during August, thunderstorms produced heavy rain west and north of Carbondale but dissipated before reaching the Ohio River. The effect of the drought on crops was greatest for soybeans, which rely more heavily on summer rainfall. The corn crop fared relatively well because it matured in the late spring, when abundant rains fell. The dry weather raised the fire danger into the very high category at times. During one of the larger grass fires about 10 miles northeast of Carbondale, a fire truck was destroyed by fire. Drinking water supplies were threatened in the Marion area, mainly because Marion's water supply depends on a fairly small lake. As a precautionary measure, Marion began pumping water from a lake near Herrin, but water levels in that lake dropped significantly. On the Ohio River, low water levels made navigation more hazardous for barge traffic, and voluntary load limits were put in place downriver from Paducah, KY.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	9/1/1999	Drought	N/A	0	0	0	0	The moderate to severe summer drought took a considerable toll on crops across southern Illinois. The worst drought conditions were along the Ohio River, where Paducah, KY, received only 1.5 inches of rain in the three-month period from July to September. Carbondale received much more generous rainfall, with a three-month total of 5.5 inches. The soybean crop suffered the greatest effects from the drought, with yields in most areas only near 20 percent of normal. Corn yields were much closer to normal due to plentiful rains in June and early July, when the corn crop matures most rapidly. Small ponds and reservoirs became very low. The city of Marion, which relies on a small lake for its drinking water supply, was forced to siphon water from its neighboring city of Herrin. Low water levels in Union and Jackson Counties forced some cattle farmers to haul water to their herds. The fire danger reached extreme levels at times. The Illinois Department of Natural Resources issued a wildfire alert for southern Illinois due to the combination of drying grasses, brisk winds, and low humidity. Outdoor burning was banned in seven counties, including Alexander, Pope, Johnson, Jackson, Union, Pulaski, and Hardin. Local burning bans were posted in other counties. Among the many wildland fires that occurred, one of the largest was near West Frankfort, where 80 acres were scorched. River levels on the Ohio River became unsafe for navigation in places. Fully loaded barges could not safely navigate the river, so tonnage was reduced by 10 to 20 percent.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	10/1/1999	Drought	N/A	0	0	0	0	The moderate to severe summer-long drought conditions were greatly alleviated by heavy rain on October 8th and 9th. Rainfall totals were mainly between 2 and 4 inches during a 24-hour time frame. Even though the rain was too late for most crops, it replenished ponds used for watering cattle. Bans on open burning were lifted after the rain fell. No rain fell during the rest of the month, which renewed drought concerns by the end of October.
Alexander	11/1/1999	Drought	N/A	0	0	0	0	The unseasonably warm and dry fall allowed drought conditions to worsen. The Palmer Drought Index fell deeper into the moderate drought category during the month. Total rainfall for the month of November at Carbondale was about a quarter of an inch, which is about 3.5 inches below normal. Since the official growing season was over, crop damage was no longer a major concern. As a result of temperatures in the 70s, gusty winds, and low humidity, wildfire activity was above normal. Burning bans were imposed across much of southern Illinois, including the counties of Jackson, Union, Alexander, Pulaski, Johnson, Pope, Saline, and Hardin. A rash of grass and brush fires occurred early in the month, keeping area fire departments busy. A controlled trash fire near West Salem, in Edwards County, got out of hand and burned down a storage shed and all of its contents.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	12/1/1999	Drought	N/A	0	0	0	0	Moderate drought conditions continued to plague parts of southern Illinois into early winter. Heavy rainfall at mid-month brought significant relief. Before then, the dry weather caused unusually high wildfire activity. Campfires and other outdoor burning was banned in several counties, including Alexander, Hardin, Jackson, Johnson, Pope, Pulaski, and Union.
Alexander	8/1/2002	Drought	N/A	0	0	0	0	Moderate drought conditions developed over southern Illinois during August as a result of persistent dryness that began in June. At Carbondale, no measurable rainfall was reported during the entire month of July, and August rainfall was just over half an inch. This dry period came on the heels of a very wet first half of the year, when 24 t0 30 inches fell from January through May. The main effect of the drought was on agriculture. Farmers anticipated substantial crop losses at harvest time. Heavy spring rains delayed planting of many crops until late May, which made them especially susceptible to the summer heat and drought.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	9/1/2002	Drought	N/A	0	0	0	53.0M	A prolonged summer drought gradually worsened, becoming severe by early September. Many parts of southern Illinois received little or no measurable rainfall in July. At Paducah, Kentucky, the three-month period from June through August of 2002 was the second driest such period on record. The main effect of the drought was on agriculture. Crop loss estimates totalled around 53 million dollars in southern Illinois. The corn crop, which was especially susceptible to the combined effects of heat and drought, took the biggest hit. About 33 million dollars in corn was lost in southern Illinois. Another 20 million dollars was lost in soybean production. Some trees and shrubs died in the drought, especially newly planted ones with shallow root systems. A few outdoor fires broke out, including a 20-acre blaze in Saline County, several miles west of Eldorado. The remnants of Tropical Storm Isidore provided much-needed heavy rainfall late in September. One to three inches of rain fell over most of southern Illinois, which greatly eased the drought.
Alexander	6/1/2005	Drought	N/A	0	0	0	0	Southern Illinois was classified in a moderate drought as June became the fourth consecutive month of below normal rainfall. Some locations received heavy rainfall in June from thunderstorms, but the storms were rather short-lived and infrequent. Farmers faced a variety of significant problems. Hay growth and production was halted, prompting concern about a hay shortage. Other crops, such as corn and soybeans, were slowed or stunted by the dry weather. Some yield reductions were anticipated, depending on July rainfall amounts. Levels of smaller rivers and creeks fell far below normal.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	7/1/2005	Drought	N/A	0	0	0	0	Moderate drought conditions persisted over southern Illinois until the remnants of Hurricane Dennis arrived, producing from 2 to 5 inches of rain. Although the rain was beneficial, it came too late for some crops. All of southern Illinois except for Alexander County was designated as an agricultural disaster area by the U.S. Department of Agriculture. A local newspaper in the lower Wabash Valley reported that the local corn and soybean crop would suffer a 50 percent yield reduction due to the drought. Final crop figures will not be available until the fall harvest.
Alexander	8/1/2005	Drought	N/A	0	0	0	0	Drought conditions eased considerably during early and mid August as thunderstorm activity increased to typical levels for mid-summer. Timely rainfall offset the potentially devastating agricultural impacts of this drought. River levels on the Ohio and Mississippi Rivers continued to drop through the middle of the month. At Cairo, the Ohio River stage fell as low as 7.2 feet. The effects on Ohio River traffic were comparable to those observed in the 1997 and 1988 droughts. Barges ran aground, forcing the Coast Guard to close a seven-mile stretch of the Ohio River from Mound City to Olmsted for almost a week. Several hundred barges were reportedly waiting to pass through the bottleneck. The U.S. Army Corps of Engineers conducted emergency dredging operations to reopen the river. A casino riverboat in Metropolis was closed due to complications from the low water, only eight months after having been closed by high water. Along the Mississippi River, a power generation plant in Grand Tower (Jackson County) closed for a couple weeks because water levels were too low to generate electricity.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Extreme South Illinoi	11/15/1995	Early Snow	N/A	0	0	0	0	The extreme southern tip of Illinois around Cairo was affected by a very early season snowfall. Up to an inch of snow was measured in Cairo. Most of the snow was across the Mississippi River in Missouri, where up to three inches fell near Cape Girardeau.
Alexander	7/2/1997	Excessive Heat	N/A	1	0	0	0	Temperatures rose well into the 90s, and high humidity raised the heat index to between 105 and 110 degrees. Near Carmi, a 32-year-old male construction worker died as a result of the heat. The man's body temperature was 106 degrees. The coroner ruled that the man, who alternated between digging and operating a backhoe, was primarily a victim of the heat and humidity. The heat index at Evansville at the time of death was 105 degrees. M32EQ
Alexander	7/25/1997	Excessive Heat	N/A	0	12	0	0	High temperatures rose well into the 90s, with even a few 100 degree readings. High humidity pushed heat index values to between 105 and 115 degrees. A heat advisory was issued for the potentially hazardous conditions. Area hospitals reported at least a half dozen cases of dehydration or other heat-related illnesses. An increase in the number of disabled vehicles was reported, as well.
Alexander	6/22/1998	Excessive Heat	N/A	1	0	0	0	Temperatures exceeded 90 degrees for at least 7 consecutive days. Oppressive humidity produced heat indicies as high as 110 degrees. The prolonged heat and humidity resulted in the death of an elderly man in Johnston City, near Marion. The coroner measured the temperature in his apartment, where his body was found, at 110 degrees. M83PH

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	7/18/1999	Excessive Heat	N/A	4	0	0	0	Prolonged heat and humidity during the latter half of July took its toll on the unprepared. Four fatalities were blamed on the heat, including two in Wayne County. Near Fairfield, a 78-year-old man died after driving his riding lawn mower to a trucking firm to gather landscape rocks. The man was found near a pile of rocks he had been gathering in 95-degree heat. Near Mount Erie, an 85-year-old man was found dead in his home. The windows were closed, and there was no air conditioning. Elsewhere in southern Illinois, a 53-year-old migrant worker died while laboring in a field near Shawneetown in Gallatin County. The man died at an Evansville hospital after suffering a heat stroke. The fourth death occurred in the Ohio River city of Metropolis, where an 82-year-old woman was found dead in her bathroom. This was the first time in his tenure as Massac County coroner that the cause of death was ruled as heat exhaustion. The woman did not use a fan in the house, and the indoor temperature was measured at 98 degrees. Daily highs were near 100 degrees on the 29th and 30th, with afternoon heat indices from 110 to 115 degrees. At Paducah, Kentucky, across the Ohio River from Metropolis, this was the fifth warmest July on record. M53OU, F82PH, M78OU, M85PH
Alexander	7/7/2001	Excessive Heat	N/A	0	0	0	0	Daytime high temperatures in the mid to upper 90's, combined with dew points in the mid 70's, resulted in heat indices from 105 to 112 degrees. Nighttime heat indices only fell to around 80.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	8/3/2002	Excessive Heat	N/A	0	8	0	0	High temperatures reached 100 degrees for three consecutive days in parts of southern Illinois. At Carbondale, the high was 100 degrees on the 3rd and 4th, and 101 on the 5th. Humidity contributed to the problem, with afternoon heat indices peaking near 105 degrees. Area hospitals reported surprisingly few cases of heat exhaustion, and no heat-related fatalities occurred. Hospitals reported seeing many people with pre-existing health conditions that were aggravated by the heat and humidity.
Alexander	7/21/2005	Excessive Heat	N/A	0	62	0	0	Several days of excessive heat and humidity caused a significant increase in heat-related illnesses. Hospitals reported that a majority of those treated were outdoor workers. The heat index peaked around 110 degrees each afternoon, and dropped to only around 80 degrees at night. True air temperatures reached the mid 90's, with overnight lows in the mid 70's. At Carbondale, the heat index topped out at 112 degrees on the 21st and the 22nd, 105 on the 23rd, 115 on the 24th, 106 on the 25th, and 109 on the 26th. These heat indices were representative of the rest of southern Illinois. The heat wave was the result of an expansive surface high pressure system extending from the Gulf of Mexico to the Great Lakes. A light southerly wind flow, combined with moist ground from the remnants of Hurricane Dennis earlier in the month, allowed dew points to hover around 80 degrees.
Alexander	8/19/2005	Excessive Heat	N/A	0	0	0	0	The heat index exceeded 105 degrees on two consecutive afternoons across most of southern Illinois. At Carbondale, the peak heat index was 111 degrees on the 19th and 106 on the 20th.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	2/2/1996	Extreme Cold	N/A	0	0	0	0	The most severe cold snap of the 1995-96 winter season caused many problems with burst pipes and overworked furnaces. Calls to one heating system specialist were up 30 to 40 percent. Central Illinois Public Service Co. broke its winter electric peak record. Residents of Pinckneyville were asked to conserve natural gas due to dwindling supplies. The shortage was partly the result of gas wells that were freezing up. The overflow valve on the water tower in DeSoto froze up, causing thousands of gallons of water to escape from the top. Many cities dealt with water main breaks as the cold weather put stress on the pipes. Wind chills were occasionally as low as minus 40 degrees. Actual daytime highs on the third were in the single digits, with overnight lows from minus 6 to minus 11. The extreme cold significantly damaged the peach crop, which is vulnerable to severe winter cold snaps.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	12/12/2000	Extreme Cold	N/A	0	0	0	0	An invasion of arctic air occurred on December 12. The arctic air became permanently entrenched over the region for the remainder of the month, resulting in the coldest December on record at Paducah, KY. The average monthly temperature of 25.9 degrees was 11.4 below normal. On the coldest day of the month, the 17th, the high was 17 and the low was 6. Unusually high energy prices, combined with the record cold, caused homeless shelters to fill to capacity. The usual problems associated with frigid temperatures, such as frozen pipes and water main breaks, were common during the latter half of the month. At Brookport, across the river from Paducah, the pipe extending down from the water tower froze, causing it to burst. As a result, Brookport temporarily had no water supply until emergency wells were dug. Heavy ice on the Mississippi River prompted the Coast Guard to restrict barge traffic from Cairo, IL northward.
Alexander	1/1/2001	Extreme Cold	N/A	0	0	0	0	The prolonged arctic freeze that began during the second week of December finally ended by January 4. During the first few days of the new year, temperatures averaged 15 to 25 degrees below normal. Overnight lows were around zero. As a result, ice continued to be a problem on the Mississippi River. The combination of ice and low river levels made navigation for barges very hazardous. About 10 miles north of Cape Girardeau, MO, 15 barges loaded with coal went aground.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	1/23/2003	Extreme Cold/wind Chill	N/A	0	0	0	0	Wind chills fell to between minus 10 and minus 15 across southern Illinois during the morning. This cold snap was just one of many cases of harsh winter weather during January. At Paducah, KY, preliminary figures indicate January of 2003 was the eighth coldest January on record, and the coldest since 1985. After the relatively mild winters of the past several years, the bitter mid-winter cold came as a shock to many. Temperatures fell below zero at many locations for the first time in several years. At Carbondale, the low temperature on January 24 was minus 6. The prolonged cold weather resulted in numerous frozen pipes, as well as problems with heating systems. A number of house fires were blamed on overtaxed heating systems. At least one ice rescue was conducted when children fell through thin ice on a pond in Fort Massac State Park in Metropolis.
Alexander	12/23/2004	Extreme Cold/wind Chill	N/A	1	0	0	0	Bitterly cold temperatures arrived in the wake of a paralyzing snowstorm. In Murphysboro, an 84-year-old woman died from hypothermia after venturing outdoors to locate her pet dog on the evening of December 22. The woman apparently became disoriented and collapsed from hypothermia. Although she was located about an hour after venturing outdoors from the assisted living facility, she was pronounced dead shortly after midnight on December 23. The low temperature on Christmas morning was 11 degrees below zero at Carbondale. Co-operative observers reported Christmas morning lows of 6 below at Grayville and 2 below zero at Cairo. Winds were light during the coldest weather, which reduced the wind chill hazard somewhat. F85OU

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	1/10/1997	Extreme Windchill	N/A	1	0	0	0	Arctic air blew into the region in the wake of a departing snowstorm. A wind chill advisory was issued for wind chills as low as minus 30. A woman in her 60s froze to death after she slipped and fell outside her home near Orient in Franklin County. The city of Murphysboro recommended letting faucets drip to prevent pipes from freezing. F65OU
Extreme South Il	4/9/1995	Flash Flood	N/A	0	0	50K	0	A slow-moving line of thunderstorms dumped up to two inches of rain per hour along the Ohio River. At Dixon Springs, 1.70 inches fell in 20 minutes. Counties adjacent to the Ohio River experienced widespread flooding of roads and low-lying fields. One home was evacuated in Joppa.
Cairo	3/1/1997	Flash Flood	N/A	0	0	400K	0	A pump operated by the Army Corps of Engineers failed in Cairo, contributing to the flooding of about 160 basements. Rainfall totals in the 3 to 5 inch range over a 48-hour period caused a few road washouts.
Alexander	1/21/1999	Flash Flood	N/A	0	0	30K	0	Thunderstorms with very heavy rain repeatedly moved over the same counties during the evening. Rainfall amounts from 2 to 4 inches were common. Even though the axis of heaviest rain occurred from Cape Girardeau to Carbondale, areas on either side of this axis received enough rain to flood roadways and small streams.
Alexander	1/22/1999	Flash Flood	N/A	0	0	0	0	More heavy rain following the thunderstorms the previous evening caused a renewal of flooding problems. In Alexander County, Cairo High School was closed due to flooding problems.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Olive Branch	7/19/2001	Flash Flood	N/A	0	0	0	0	Slow-moving thunderstorms persisted for several hours in a narrow band along the Mississippi River. On the Illinois side of the river, the heaviest rain was north of Cairo in Alexander County. Radar estimated rainfall amounts from 4 to 6 inches in this band. The automated observing system at the Cape Girardeau, Missouri airport measured about 5 inches of rain in six hours. Sections of Route 3 in Olive Branch were under water. Several smaller roads were closed.
Alexander	5/13/2002	Flash Flood	N/A	0	0	300K	0	In Union County, flash flooding struck the small community of Mill Creek, forcing some residents out of their homes. An elderly woman was rescued by boat from her flooded home, and Route 127 was closed. Some residents of the Reynoldsville area of Union County were only able to boat to and from their homes. In Alexander County, flash flooding damaged about 12 homes, mainly in the Tamms and Elco areas. Twelve to 14 bridges and about 40 roads were washed out or damaged. In other counties, many secondary roads were closed across southern Illinois, including 8 in Jackson County. Water was over Route 4 near Campbell Hill in northwest Jackson County. In Edwards County, a 24-hour rainfall amount of 4.95 inches was reported at Browns, and 4.5 inches was reported at West Salem. High water caused one stranded motorist to be rescued near West Salem. Floodwaters from Little Bonpas Creek closed at least one road and flooded others. There were numerous roads with water over them in Wayne and Edwards Counties, including Highway 15 about 2 miles west of Fairfield and Route 45 between Geff and Cisne. In Jefferson County, water was over Two Mile Creek Road and Brownsville Road.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	5/17/2002	Flash Flood	N/A	0	0	0	0	Water was over several roads in each county. In Union County, Highway 127 in Jonesboro and Highway 146 just west of Jonesboro were flooded.
Tamms	4/25/2003	Flash Flood	N/A	0	0	2K	0	A county road was closed due to flooding.
Alexander	5/4/2003	Flash Flood	N/A	0	0	0	0	Very heavy rain from thunderstorms produced estimated rainfall rates of 1 to 2.5 inches per hour across parts of southern Illinois. Water covered some roads. Several roads were closed in southern Johnson County. Several roads in Saline County experienced flash flooding, and snow plows were used to remove debris and corn stalks washed onto roads.
Cairo	11/1/2004	Flash Flood	N/A	0	0	0	0	An underpass was flooded in Cairo, and water was over a few side streets. A broad area of heavy rain produced average rainfall from three quarters to one inch an hour.
Cairo	8/27/2006	Flash Flood	N/A	0	0	0	0	Street flooding was reported.
Alexander	2/1/1996	Flood	N/A	0	0	0	0	Minor to moderate flooding of the Ohio River continued from the end of January into the first week of February. At Paducah, KY, the river dropped from 41.5 feet on the 1st to 39 feet on the 6th. Flood stage is 39 feet. This flooding was enough to submerge parts of Fort Massac State Park at Metropolis, IL, as well as a few roads in bottomland areas.
Alexander	4/26/1996	Flood	N/A	0	0	40K	20K	The Ohio River rose above flood stage at Cairo on the 26th. Between 5 and 8 inches of rain over parts of southern Illinois and southwest Indiana pushed the river over its banks at a few other locations, including Shawneetown and Grand Chain. Mainly low-lying unprotected farmland was affected through the end of April.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	5/1/1996	Flood	N/A	0	0	50K	0	The Mississippi River was above flood stage all month at Thebes. It crested there at 40.5 feet on May 17, which is 7.5 feet over flood stage. The main effects were several closed roads and many acres of flooded crops. Flooding was widespread in the low-lying areas around Cache and Miller City. Very few homes were threatened by the rising water. Although crop damage estimates were not yet available, property damage was minimal.
Alexander	5/1/1996	Flood	N/A	0	0	80K	0	The Ohio River was above flood stage all month at Cairo and Brookport (Lock and Dam 52). The river crested around mid month at both places. At Cairo, the crest was 53.5 feet, 13.5 feet above flood stage. Brookport crested at 46.6 feet, 9.6 feet over flood stage. Crop damage estimates were not yet available. Thousands of acres of Ohio River bottomlands were under as much as 12 feet of water. This delayed planting of some crops, or forced farmers to change the crop they planned to grow. The ferry from Cave In Rock, Illinois to the Kentucky shore was closed for well over a week because of water over Kentucky route 91. The flood gates were closed at Rosiclare, Illinois for the second time this year. Although most of the damage was to cropland, some property damage occurred to roads, campgrounds, and parks.
Alexander	6/1/1996	Flood	N/A	0	0	0	0	The Mississippi River remained above flood stage from late April well into June. At Thebes, the river crested at 39.5 feet on June 4, and fell below flood stage on June 20. Flood stage at Thebes is 33 feet. A few homes that were evacuated in May remained vacant. Agricultural bottomland and roads closest to the river remained flooded.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	6/1/1996	Flood	N/A	0	0	0	0	The Ohio River remained above flood stage at several points well into June. The first crest, on June 3 and 4, was up to 9 feet above flood stage at Cairo. A second crest around June 15 was 7 feet above flood stage at Cairo. The river finally fell below flood stage at all points by June 22. Thousands of acres of agricultural bottomland were flooded, and some roads closest to the river were water covered. The primary effect of the bottomland flooding was to delay the planting of crops. For the most part, the river receded in time for corn to be planted.
Alexander	12/4/1996	Flood	N/A	0	0	0	0	The Ohio River crested 2 to 3 feet above flood stage at several locations. At Cairo, where the flood stage is 40 feet, the Ohio crested at 42.93 feet on the 9th. At Shawneetown, where flood stage is 33 feet, the river crested at 36.1 feet on the 8th. The river was above flood stage for about a week at both locations. Flooding was confined mainly to parks and agricultural bottomlands. Fort Defiance State Park near Cairo was closed due to flooding of roads.
Alexander	12/19/1996	Flood	N/A	0	0	0	0	The Ohio River once again exceeded flood stage late in the month. Two heavy precipitation events on already saturated ground from the 11th through the 19th caused secondary crests between the 19th and 22nd. The Ohio crested about 2 feet above flood stage at Brookport and Shawneetown, and 3 inches over flood stage at Cairo. Minor flooding of agricultural bottomland occurred.
Alexander	1/30/1997	Flood	N/A	0	0	0	0	Heavy rain and snowmelt late in the month sent the Ohio River above flood stage at Shawneetown, Brookport, and Grand Chain on the 30th, and at Cairo on the 31st. The flooding was very minor. No damage was reported.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	2/1/1997	Flood	N/A	0	0	0	0	Snowmelt and thunderstorms producing heavy rainfall in January sent the Ohio River rising and cresting during the first half of February. The Ohio River crested at 35.8 feet at Shawneetown on the 2nd and again on the 10th. Flood stage there is 33 feet. At Brookport and Cairo, the Ohio River crested between 1 and 3 feet above flood stage on the 1st. Minor flooding of bottomland occurs at these stages. No significant damage occurred.
Alexander	2/26/1997	Flood	N/A	0	0	0	0	Heavy rainfall during the last half of February across the upper Plains sent the Mississippi River rising over flood stage by month's end. At Thebes, the river rose above the 33 foot flood stage on the 26th. Only minor bottomland flooding occurred through the end of the month.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	3/1/1997	Flood	N/A	0	0	2.5M	0	A massive flood crest moved down the Ohio River during the first few weeks of March. Around 10 inches of rain fell in the middle Ohio River Valley from the Louisville area to Cincinnati within a one to three day period. This resulted in the worst river flood in about 30 years along the Illinois shore, and one of the five worst on record. Riverfront neighborhoods in Metropolis were evacuated, and the riverboat casino was briefly shut down. Smaller communities protected by levies or floodwalls, such as Brookport and Old Shawneetown, fared better. A mechanical problem with a valve in Brookport allowed Ohio River water to back into the town, causing tens of thousands of dollars in property damage there. Massive sandbag levees were constructed by volunteers in most unprotected riverfront communities, including Metropolis, Ridgway, Elizabethtown, and Omaha. A towboat struck the Shawneetown bridge, prompting its closure until it could be inspected. A voluntary evacuation of Old Shawneetown was conducted. The levee protecting the town developed a few seeps, but no major leaks were observed. A total of about 50 families were displaced by flooding in Gallatin County, mainly from the towns of Junction, Equality, and New Haven. Numerous county roads were closed near the river, including 52 just in Gallatin County alone. All but one road into the town of Junction was flooded. A few state highways, such as Illinois Route 1 in Gallatin County, were closed by high water. In Pope County, between 30 and 50 families were affected by flooding of the Ohio River or Lusk Creek, which flows into the Ohio at Golconda. About 50 Massac County families were forced out of their homes by the Ohio River or Mud Creek, which runs through the center of Metropolis into the

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
								Ohio. In Pulaski County, the flood forced the temporary abandonment of the Olmsted Lock and Dam construction project. Engineers decided to let water flood the project area, which had been protected by a cofferdam. If floodwater had crested over the top of the cofferdam, it could have undermined the structure. About 250 workers were laid off when the project was halted. Water backed up the Saline River from the Ohio River, causing problems as far inland as Harrisburg in Saline County. A mud slide at the old Lock and Dam 51 site demolished the office area and heavily damaged other buildings. In Hardin County, the Saline River flooded about 34 homes and forced workers to rescue two people in Saline Landing. The following are specific river crest heights and the flood stages for various points: Shawneetown crested at 54.40 (flood stage 33 feet), Brookport crested at 53.60 feet (flood stage is 37 feet), and Cairo crested at 56.20 feet (flood stage is 40 feet). The crest occurred on the 11th or 12th at all points.
Alexander	3/1/1997	Flood	N/A	0	0	20K	0	The Mississippi River remained above flood stage from late February well into March at Thebes. The river crested about 6 feet above flood stage at Thebes on March 3, then a couple feet over flood stage on the 17th. Generally minor to moderate flooding of the river caused agricultural fields to flood. Water lapped against some of the levees, including the one near Ware. A half mile stretch of Old Cape Road was closed because of 8 inches of water across it.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	6/1/1997	Flood	N/A	0	0	0	0	The Ohio River crested above flood stage twice during the month at a few points. The flooding was considered to be minor bottomland flooding, except where farmers had planted crops. Bottomland cropland flooding destroyed or damaged thousands of acres.
Alexander	1/11/1998	Flood	N/A	0	0	0	0	Due to heavy rains in the upper Ohio River Basin, the Ohio River rose slightly above flood stage at many locations. The river exceeded flood stage at Shawneetown, Brookport, Grand Chain, and Cairo. At most of these locations, the crests were about 2 feet above flood stage. The exception was at Shawneetown, where the crest was four feet over flood stage. The minor flooding affected primarily agricultural bottomlands.
Alexander	3/21/1998	Flood	N/A	0	0	0	0	The Mississippi River crested at 35.5 feet at Thebes, where flood stage is 33 feet. This resulted in minor flooding of agricultural bottomlands and river access roads.
Alexander	3/22/1998	Flood	N/A	0	0	0	0	The Ohio River crested just above flood stage at several locations. This resulted in some minor flooding of agricultural bottomlands and river access roads. The river crested right at the 37 foot flood stage at Brookport, 3 feet above the 33-foot flood stage at Shawneetown, and 4.6 feet above the 40-foot flood stage at Cairo.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	4/1/1998	Flood	N/A	0	0	0	0	The Ohio River crested 8 to 10 feet above flood stage at some locations, causing moderate agricultural bottomland flooding. Some roads near the river were flooded, and parts of Fort Massac State Park were underwater. The river crested at 51.3 feet at Cairo, where flood stage is 40 feet. At Shawneetown, where flood stage is 33 feet, the river crested at 41.9 feet. Minor flooding occurred in the Hall Town area near Golconda, where the river crested at 42.7 feet. Flood stage there is 40 feet.
Alexander	4/4/1998	Flood	N/A	0	0	0	0	The Mississippi River crested at 38.3 feet at Thebes on the 20th. Flood stage there is 33 feet. Moderate flooding of lowland agricultural areas occurred, and some roads were inundated. This forced some school busses to be rerouted around flooded areas.
Alexander	5/1/1998	Flood	N/A	0	0	0	0	Minor flooding of the Mississippi River continued into early May. The river crested two feet above flood stage at Thebes on the 3rd of May. Flooding was generally confined to low-lying agricultural areas and access roads.
Alexander	5/1/1998	Flood	N/A	0	0	0	0	Moderate flooding of the lower Ohio River continued into mid May. The river crested 6 to 8 feet above flood stage at Shawneetown, Brookport, and Grand Chain. The crest at Cairo was 10 feet over the 40-foot flood stage due partly to backwater from the swollen Mississippi River. The dates of the crest were on the 5th or 6th at Brookport, Grand Chain, and Cairo. The crest date upstream at Shawneetown was on the 12th. Flooding of low-lying agricultural areas, riverside parks, and river access roads was significant.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	6/15/1998	Flood	N/A	0	0	0	0	The Ohio River crested 2 to 4 feet above flood stage at Shawneetown, Grand Chain, and Cairo between June 21 and 25. This resulted in minor agricultural bottomland flooding.
Alexander	6/21/1998	Flood	N/A	0	0	0	0	The Mississippi River crested at 35.4 feet at Thebes on June 26. Flood stage there is 33 feet. This resulted in minor flooding of agricultural bottomland.
Alexander	7/1/1998	Flood	N/A	0	0	0	0	The Ohio River, which had been above flood stage at Cairo in late June, finally fell below flood stage there on the 9th of July. The flood stage at Cairo is 40 feet, and a crest of 42.6 feet was observed on the 6th. Further upstream at Shawneetown, the Ohio River was above flood stage from the 3rd to the 7th as a result of heavy rain on the 3rd. Flood stage at Shawneetown is 33 feet, and a crest of 35.8 feet was observed on the 5th. This resulted in minor flooding of agricultural bottomland.
Alexander	7/4/1998	Flood	N/A	0	0	0	0	The Mississippi River crested just a few inches above the flood stage of 33 feet at Thebes. The crest occurred late in the evening of the 5th. Very minor flooding of low-lying agricultural bottomland occurred.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	1/22/1999	Flood	N/A	0	0	0	0	Repeated heavy rainfall events from a succession of March-like storm systems caused the Ohio River to rise 5 to 10 feet above flood stage. At Shawneetown, where flood stage is 33 feet, the river crested at 43.5 feet on the 30th. At Brookport, where flood stage is 37 feet, the river crested at 45.9 feet on the 27th. Further downstream, the river crested 8 feet above flood stage at both Grand Chain and Cairo by early on the 28th. At these stages, flooding is minor, but approaches the moderate category. Considerable flooding of farmland occurs, and some county roads are closed. Riverside parks become inundated and are closed.
Alexander	2/1/1999	Flood	N/A	0	0	30K	0	The Ohio River remained well above flood stage into early February. The river crested at Shawneetown in late January, but did not crest from Golconda downriver to Cairo until the first few days of February. At Golconda, where flood stage is 40 feet, the crest was 45.38 feet. At Brookport, where flood stage is 37 feet, the crest was 46.50 feet. At Grand Chain, where flood stage is 42 feet, the crest was 51.10 feet. Cairo crested at 49.47 feet, nearly 10 feet over flood stage. All points fell below flood stage by mid month. The crests between 5 and 10 feet over flood stage produced minor to moderate flooding. The primary affected areas were agricultural bottomlands. Roads and parks along the river were also affected, including Fort Massac State Park in Metropolis. At Cairo, a stage of 50 feet prompts the closure of the first flood gate.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	3/9/1999	Flood	N/A	0	0	0	0	Two organized storm systems moved out of the southern Plains on the 5th and 6th and the 8th and 9th. Total rainfall from these two storms averaged between 1 and 2 inches. Although not excessive, this was enough rainfall to cause minor flooding of the Ohio River at most points on the Illinois shore. At Shawneetown, where flood stage is 33 feet, the crest of 36.5 feet occurred on March 12. Crests at Brookport, Grand Chain, and Cairo were all less than a foot and a half above flood stage. Some agricultural lowland was flooded.
Alexander	4/20/1999	Flood	N/A	0	0	0	0	Heavy rain during the first half of April caused the Mississippi River to rise above flood stage. Rainfall amounts during the first six days of the month ranged from one and one half to over 4 inches. At Thebes, where flood stage is 33 feet, the river crested at 34.6 feet on the 23rd. This caused minor flooding of mainly agricultural areas.
Alexander	5/1/1999	Flood	N/A	0	0	12K	0	The Mississippi River was above flood stage at the Thebes gage for most of the month. The flooding was minor to moderate, confined to unprotected bottomlands and adjacent access roads. The first crest of 37.0 feet occurred on the 10th, with a second crest of 33.7 feet on the 28th. Flood stage is 33 feet. Between the two crests, the river was below flood stage from the 14th to the 22nd. Another effect of the high river levels was to raise tributary creeks and rivers above their banks, including the Big Muddy River.
Alexander	5/8/1999	Flood	N/A	0	0	0	0	Very minor flooding of the Ohio River occurred near the confluence of the Mississippi River. High water levels on the Mississippi backed a short distance up the Ohio River, causing the gage at Cairo to rise a few inches above flood stage. Some bottomlands and low-lying areas were flooded.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	6/1/1999	Flood	N/A	0	0	0	0	After being over flood stage for much of May, the Mississippi River remained slightly above flood stage through early June. The river was no more than a few inches above flood stage in early June, which caused only minor flooding of some agricultural bottomland.
Alexander	2/19/2001	Flood	N/A	0	0	0	0	The Ohio RIver rose above its flood stage at several points along the Illinois shore. The crests were 2 to 3 feet above flood stage, which resulted in minor to moderate flooding of low-lying agricultural bottomland. The locations which exceeded flood stage were Shawneetown, Brookport, Grand Chain, and Cairo. All locations crested on February 23. Cairo and Grand Chain remained slightly above flood stage into early March, while locations upriver fell below flood stage by the end of the month.
Alexander	2/28/2001	Flood	N/A	0	0	0	0	The Mississippi River rose to flood stage at Thebes on the last day of the month. Since the river was barely above flood stage, no significant flooding occurred.
Alexander	3/1/2001	Flood	N/A	0	0	0	0	The Mississippi River remained just above flood stage from late February. At Thebes, which is several miles downriver from Cape Girardeau, MO, the river crested at 33.92 feet. Flood stage is 33 feet at Thebes. This resulted in minor flooding of low-lying bottomlands. The crest occurred about 8 A.M. on March 2, and the river was back below flood stage on March 3.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	3/1/2001	Flood	N/A	0	0	0	0	Minor flooding on the Ohio River continued from late February. The early March flooding was downriver from Metropolis and Paducah to Cairo. The river fell below flood stage at Grand Chain on March 2, and at Cairo on March 4. Crests at both locations were on February 23. The river was held above flood stage longer at Cairo due to some backwater effects from the flooding Mississippi River. A secondary crest of 43.24 feet occurred at Cairo on March 1. The flood stage at Cairo is 40 feet.
Alexander	5/21/2001	Flood	N/A	0	0	0	0	Even though rainfall was generally below normal across southern Illinois, the Mississippi River rose above flood stage at Thebes due to heavy rains in the Missouri River basin and upper Mississippi Valley. The river gage at Thebes crested about one foot above the 33-foot flood stage on May 24, which resulted in minor flooding of agricultural bottomland. Most planting was completed before this flooding event, which prompted some bottomland farmers to take action to save their crops. Along the Mississippi River just above Cairo, a farmer used heavy equipment to build more than a half mile of earthen levees to protect 100 acres of threatened cropland.
Alexander	6/8/2001	Flood	N/A	0	0	0	0	Heavy rains across the Missouri River basin and parts of the Mississippi River basin caused rises on the Mississippi River. Thebes crested about 5 feet above flood stage on the 12th. The river was slow to fall, finally going below flood stage at Thebes on the 17th. This was short-lived, as another round of heavy rains in the above-mentioned basins caused another crest on the 27th. Thebes crested about a foot below flood stage this time. The first crest on June 12 resulted in moderate flooding that was primarily agricultural.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	6/10/2001	Flood	N/A	0	0	0	0	Backwater on the Ohio River caused the stage at Cairo to rise slightly above flood stage. The backwater was from the Mississippi River, which was above flood stage. At Cairo, the crest of 40.89 feet occurred at midnight on the 13th. Flood stage is 40 feet.
Alexander	12/17/2001	Flood	N/A	0	0	8K	0	Numerous roads were flooded in most southern Illinois counties, including a few primary routes. In Hamilton County, Route 142 was closed south of Mcleansboro. In Alexander County, a residence near Tamms was evacuated. Rainfall amounts for December 16-17 were commonly 3 to 5 inches in the flooded areas. In Union County, 4.35 inches was measured at Anna. Flooding blocked railroad tracks in Union County. An Amtrak train was forced to make an unplanned stop at the Anna station, and all 75 passengers found alternate means of travel.
Alexander	12/18/2001	Flood	N/A	0	0	0	0	The Ohio River crested one to two feet above flood stage at Shawneetown, Brookport, Grand Chain, and Cairo on December 20 or early on December 21. Minor flooding of bottomland and low-lying areas occurred. This flood crest was the second of the month for Brookport and Grand Chain. This flooding was due to a series of heavy rainfall events that began in late November and ended around December 17. The heaviest rainfall event produced between 4 and 5 inches between the 15th and 17th.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	1/23/2002	Flood	N/A	0	0	30K	0	Thunderstorms repeatedly moved over the same corridor from Scott County, Missouri northeast across Alexander and Pulaski Counties in Illinois. Rainfall totals were 3 to 5 inches in a few hours' time. In Johnson County, the sheriff's office in Vienna reported 3 inches. Two vehicles were involved in flooding incidents in Johnson County, but no injuries were reported. One of the incidents was in Vienna and the other was southeast of Reevesville. Pulaski County officials reported flooding at State Highways 37 and 169 near Karnak. Numerous other smaller roads were flooded, and at least one was washed out by a creek. Several vehicles and a house were flooded in Mounds.
Alexander	1/26/2002	Flood	N/A	0	0	0	0	The Ohio River rose above flood stage along the Illinois side late in January. Flood stage was exceeded downriver from the confluence of the Tennessee River at Paducah. At Brookport, where flood stage is 37 feet, the river crested at 41.1 feet on January 31. This resulted in minor flooding of lowlands, including portions of Fort Massac State Park, where an access road was closed. Further downriver at Grand Chain and Cairo, the crest did not occur before the end of the month.
Alexander	2/1/2002	Flood	N/A	0	0	0	0	The Ohio River was already above flood stage from Brookport Dam to Cairo at the beginning of the month. The river had already crested 4.1 feet above flood stage at Brookport on January 31. Grand Chain crested 3.4 feet above flood stage on February 1. The crest finally reached Cairo on February 3. Minor flooding was observed at all points, with no property damage reported. Mainly agricultural low-lying areas and bottomlands near the river were flooded.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	3/20/2002	Flood	N/A	0	0	3K	0	The Ohio River rose above flood stage at most locations along the Illinois shore on March 20th or 21st. At Shawneetown, where flood stage is 33 feet, the river crested at 43.70 feet on the morning of the 29th. At Golconda, where flood stage is 40 feet, the river crested at 44.12 feet on the 28th. Crests at Brookport, Grand Chain, and Cairo were all 7 to 8 feet above flood stage on the 26th and 27th. The impact of this flooding was minor to moderate. Several county roads were closed near Shawneetown. Water reached the power house at Lock and Dam 53 near Grand Chain. Low-lying agricultural bottomlands were flooded, but planting season had not yet begun.
Alexander	4/1/2002	Flood	N/A	0	0	0	0	The Ohio River fell back below flood stage between April 6th and 9th at all gage sites on the Illinois side of the river. The crest occurred in late March, about 10 feet above flood stage at Shawneetown, and 4 to 8 feet above flood stage elsewhere. The April flooding was minor, consisting mostly of agricultural bottomland.
Alexander	4/24/2002	Flood	N/A	0	0	0	0	The Ohio River rose above flood stage toward the end of the month at Shawneetown, Grand Chain, and Cairo. Through May 1, only minor flooding of low-lying agricultural bottomland occurred.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	5/1/2002	Flood	N/A	0	0	762K	0	The Ohio River was above flood stage for virtually the entire month from Grand Chain to the confluence of the Mississippi River at Cairo. Major flooding occurred from Grand Chain to Cairo, where flooding was the worst since the Flood of 1997. The severity of the flooding in this area was due partly to very high levels on the Mississippi River, which caused water to back into the already swollen Ohio River. The crest at Cairo was 55.0 feet, which is the 7th highest on record. The community of Urbandale, just upriver from Cairo, was almost completely flooded. Despite levy protection there, flooding occurred either due to the failure of pumps or the failure of a gate in the levy. Most of the residents evacuated their homes, and about 25 homes were flooded. Many of those that were affected had been flooded in recent years and were generally low dollar-value buildings. Flooding of farmland was extensive, and farmers were forced to delay the planting of crops. Corn is normally planted by mid May. In the Cairo area, property not protected by levees was inundated. Upriver from Grand Chain, including Metropolis and Shawneetown, the flooding was generally moderate. The crest at Shawneetown was 45.4 feet, well above the 33-foot flood stage. Brookport crested about 10 feet above flood stage, and Golconda crested about 5 feet over flood stage. The main consequence was numerous flooded secondary roads, especially in Gallatin County. There was extensive flooding of farmland and parks near the river, and at least one mobile home was evacuated.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	5/8/2002	Flood	N/A	0	0	1.5M	0	Major flooding of the Mississippi River occurred. The river rose above flood stage at Thebes on May 8, then reached its crest of 44.3 feet on May 18. Flood stage at Thebes is 33 feet. This resulted in extensive flooding of farmland and threats to some developments. Backwater from the Mississippi threatened dozens of homes in the Horseshoe Lake area, including the Miller City and Olive Branch communities. These communities are between Cairo and East Cape Girardeau. As was the case in the floods of 1993 and 1995, emergency measures were taken to reinforce and build up levees around Olive Branch and Miller City. The levees held up, but structures not protected by levees were flooded. About 30 families evacuated due to flooding of their residences, mainly in the Miller City and McClure areas. At Thebes, the town's riverfront park was flooded, and a house and a church were flooded. Elsewhere, from Jackson County to Cairo, secondary roads near the river were closed, and parks and farmland were underwater.
Alexander	6/1/2002	Flood	N/A	0	0	0	0	The Ohio River fell below flood stage at Cairo and Grand Chain for the first time since late April.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	2/18/2003	Flood	N/A	0	0	0	0	The Ohio River rose above flood stage on the Illinois side around the 20th, and crested at most locations on the last day of the month. The flooding was minor to moderate in intensity. The crest was 6 to 10 feet above flood stage at Brookport, Grand Chain, and Cairo. Upriver from Brookport, the river had not crested as of month's end. Across the river from Paducah, KY, the crest of 46.8 feet at Brookport was almost 10 feet over the 37-foot flood stage. Riverside parks and campgrounds were inundated. Extensive flooding of low-lying woods and fields occurred. Some rural county roads were closed. Very few if any structures were affected.
Alexander	3/1/2003	Flood	N/A	0	0	0	0	The Ohio River remained above flood stage from late February. Below the confluence with the Tennessee River, the river had already crested in February. Above the Tennessee River at Paducah, including Golconda and Shawneetown, the river crested on March 2. The crest was exactly 10 feet above the 33-foot flood stage at Shawneetown, and about 4 feet above the 40-foot flood stage at Golconda. This resulted in extensive flooding of low-lying woods and fields. Some rural county roads were closed. Very few if any structures were directly affected. The river fell back below flood stage by March 11.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	5/7/2003	Flood	N/A	0	0	0	0	The Ohio River rose above flood stage in response to repeated very heavy thunderstorms. The flooding was more significant downriver from the confluence of the Tennessee and Cumberland Rivers. Flood crests were generally 7 to 10 feet above flood stage. The flooding had a major impact on farming operations in the flood plain, causing some farmers to lose planted crops. Flooding of riverside parks and recreational facilities occurred. A few side roads near the river were flooded. At Shawneetown, where flood stage is 33 feet, the crest of 40 feet was on May 17. At Brookport Lock, across from Paducah, the crest of 46.5 feet was on May 14. Flood stage at Brookport is 37 feet. At Grand Chain, where flood stage is 42 feet, the crest of 52 feet was on May 14. The river crested at 50.6 feet at Cairo, well above the 40-foot flood stage.
Alexander	5/13/2003	Flood	N/A	0	0	0	0	The Mississippi River rose above flood stage in response to frequent severe thunderstorm activity in early May. The flooding was minor, with some low-lying agricultural land affected. Since springtime farming operations had begun, the effect of this flooding was relatively significant compared to winter season flooding. The river crested about one foot above flood stage. At Thebes, where flood stage is 33 feet, the crest was 33.6 feet on May 14.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	1/5/2004	Flood	N/A	0	0	0	0	The Ohio River rose above flood stage in response to heavy rains from Illinois to Ohio at the end of December. These heavy rains continued into the first days of January. The Ohio River first reached flood stage on the 5th at Shawneetown, and last fell below flood stage on the 20th at Shawneetown. Other points in Illinois that rose above flood stage were Golconda, Brookport, Grand Chain, and Cairo. The river crested at all these points on the 14th and 15th. Shawneetown crested at 44.7 feet, well above the flood stage of 33 feet. The crests were two to three feet above flood stage from Golconda to Grand Chain, and just inches above flood stage at Cairo. These river stages resulted in minor flooding. The flooding was confined mostly to low-lying woods and fields near the river. Several county roads were closed in the Shawneetown area.
Alexander	2/8/2004	Flood	N/A	0	0	0	0	The Ohio River rose above flood stage in southern Illinois for about a week and a half. The flooding was minor, with only bottomland and surrounding low-lying areas affected. This included some parks and recreational grounds near the river, as well as agricultural land that was dormant this time of year. At Shawneetown, where flood stage is 33 feet, the river crested at 39.6 feet on the 15th. At Golconda, where flood stage is 40 feet, the river crested at 40.4 feet on the 15th. The crests at Brookport and Grand Chain were 4 to 5 feet above flood stage on the 13th. The crest at Cairo was about a foot above flood stage on the 15th.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	3/9/2004	Flood	N/A	0	0	0	0	Minor flooding of the Ohio River occurred along most of the Illinois side. The flooding consisted mostly of inundated agricultural bottomland, along with some parks and recreational areas. The agricultural land was dormant for the most part, so crop losses were minimal. The crest at Shawneetown was 37.90 feet on the 14th, almost 5 feet above flood stage. At Brookport, where flood stage is 37 feet, the river crested at 40.10 feet on the 11th. Crests at Grand Chain and Cairo were 4 to 6 feet above flood stage. Flood stage is 42 feet at Grand Chain and 40 feet at Cairo. The duration of the flooding was a week to 10 days.
Alexander	5/28/2004	Flood	N/A	0	0	0	0	Minor flooding of the Ohio River occurred at the end of the month. The river rose above flood stage at Shawneetown on the 28th, at Grand Chain on the 31st, and at Cairo on the 30th. Minor flooding of low-lying bottomlands near the river occurred. The flood crest was in June. The river did not reach flood stage at gage sites between Shawneetown and Grand Chain.
Alexander	5/31/2004	Flood	N/A	0	0	0	0	Minor flooding of the Mississippi River occurred at the end of the month. At Thebes, the river crested at 33.45 feet on May 31, about one-half foot above flood stage. This resulted in minor flooding of low-lying woods and fields in the bottomlands.
Alexander	6/1/2004	Flood	N/A	0	0	0	0	Minor flooding of the Mississippi River continued from late May into early June. The river briefly dropped below flood stage at Thebes from June 2 to June 4. The river crested at Thebes on June 6 at 33.67 feet, less than one foot above flood stage. This resulted in minor flooding of low-lying fields and bottomlands near the river.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	6/1/2004	Flood	N/A	0	0	0	0	Minor to moderate flooding of the Ohio River continued from late May into early June. The river crested above flood stage at all gage points on the Illinois side. Crests were only about a foot or two above flood stage at Brookport and Golconda. At Grand Chain and Cairo, the river crested 3 to 5 feet above flood stage. Flood stage at Grand Chain is 42 feet, and at Cairo flood stage is 40 feet. The crest at Shawneetown was 42.1 feet, well above the 33-foot flood stage. Flooding of bottomlands and low-lying fields near the river was considerable in some areas. A few river access roads were flooded, and some riverside parks were partially inundated.
Alexander	12/3/2004	Flood	N/A	0	0	0	0	The Ohio River rose above flood stage along most of the Illinois shore. The flooding was minor as far downriver as the confluence with the Tennessee River at Paducah. Primarily bottomland fields and woodlands were affected in these areas. From Paducah to the confluence with the Mississippi River at Cairo, the flooding was moderate. Some river access roads, boat ramps, and park facilities near the river were under water. The flood crest was only two feet above flood stage at Shawneetown, and 7 feet above flood stage at Brookport, Grand Chain, and Cairo. Flood crest dates ranged from the 10th to the 17th.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	1/5/2005	Flood	N/A	0	0	700K	0	Moderate to major flooding of the Ohio River and some of its tributaries occurred. A state disaster declaration included Massac, Pope, Hardin, and Gallatin Counties. Floodfighting activities included the construction of temporary sandbag levees. Isolated evacuations of some lowland residents were conducted. In the city of Metropolis in Massac County, several streets were closed, a few residences were evacuated, and a casino riverboat was closed for several days. The closure of the casino had a major impact on the local economy. Flooding of the casino's parking lot and entrance prompted the closure. There was very little property damage to the casino itself. In Gallatin County, the community of Old Shawneetown was threatened, resulting in extensive sandbagging and levee patrols. Very little if any structural flooding was reported in Old Shawneetown. In Hardin County, cabins at a campground at Saline Landing were flooded, and Front Street was flooded in Elizabethtown. There was sandbagging around homes in Elizabethtown and Cave-In-Rock. Several mobile homes and trailers in Hardin County were pulled away from the water. At Rosiclare, Illinois Route 146 was closed leading into town, and water was up about 5 feet along the floodgates. In Pope County, a home on Lusk Creek near Golconda was standing in water. Rural Pope County roads were flooded around Brownfield and Hamletsburg. In Pulaski County, a road was closed at the Cache River (a tributary of the Ohio). In Alexander County, streets were damaged or collapsed in Cairo due to chronic sewer backups. Some of the backups were into homes. Several Alexander County roads were closed. A tributary of the Ohio River, the Saline River, experienced major backwater flooding extending across

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
								Gallatin and Saline Counties to the city of Harrisburg. Isolated homes were accessible only by boat in areas around Junction, Equality, and New Haven. Isolated barns and outbuildings were flooded in the Junction and Equality areas. About 40 roads were closed in Gallatin County, and about 9 county roads were closed in Saline County. In Harrisburg, one street was closed and a restaurant was threatened. State police manned barricades limiting access to New Haven and Old Shawneetown. This Ohio River flood crest was lower than in March of 1997, when the last major flood occurred. The river crested at a height of 52.00 feet at Shawneetown, compared to a crest of 54.4 feet in 1997. The crest at Brookport (near Metropolis) was 49.50 feet, which compares to 53.6 feet in 1997. At Cairo, where flood gates were closed, the crest of 53.20 feet was significantly lower than the crest of 56.2 in 1997. The dates of the crests were on the 16th or 17th at all sites. The monetary property damage estimate for this event is a rough guesstimate. The major flooding was partially the result of a record-setting snowstorm on December 22 that dumped from 14 to 22 inches across the Lower Ohio Valley. The snowpack, which contained liquid equivalents from 1 to 2 inches, melted rapidly by New Year's Day. A series of heavy rainfall events in early to mid January contributed to serious flooding. Average rainfall from 3 to 4 inches occurred from the 1st to the 5th. Another 1 to 2 inches fell between the 10th and 13th. Very cold conditions from the 15th to the 18th hampered flood-fighting activities. Low temperatures were around 10 degrees each day.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	1/7/2005	Flood	N/A	0	0	0	0	Minor flooding of the Mississippi River occurred. Residents of a mobile home park in Thebes moved campers and trailers about two blocks further away from the water. At Thebes, where flood stage is 33 feet, the river crested at 35.63 feet on the 16th. This resulted in flooding of bottomland and surrounding low-lying areas.
Alexander	2/1/2005	Flood	N/A	0	0	0	0	The Ohio River fell below flood stage at Cairo on the 1st of the month. This was the end of a prolonged major flood event that began early in January.
Alexander	2/18/2005	Flood	N/A	0	0	0	0	Minor flooding occurred on sections of the Ohio River. At Shawneetown, where flood stage is 33 feet, the river crested at 33.6 feet on the 21st. At Cairo, where flood stage is 40 feet, the river crested at 40.8 feet on the 20th. At both locations, this produced minor flooding of low-lying bottomlands and fields. Cropland was mainly dormant during this winter flood event. The flooding at Shawneetown was the result of heavy rainfall in the Ohio River Basin around mid-month. The flooding at Cairo, located near the confluence of the Mississippi River, was due to a combination of heavy rainfall in the Mississippi and Ohio River Basins.
Alexander	4/1/2005	Flood	N/A	0	0	0	0	Minor flooding of the Ohio River occurred. At Shawneetown, where flood stage is 33 feet, the river crested at 37.8 feet on April 8. At Brookport, where flood stage is 37 feet, the river crested at 38.2 feet on the 10th. At Grand Chain, where flood stage is 42 feet, the crest of 43.0 feet occurred on the 11th. At Cairo, where flood stage is 40 feet, the crest of 40.7 feet was on the 12th. Minor flooding of low-lying fields and woodlands occurred.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Cairo	1/15/2007	Flood	N/A	0	0	0K	0K	At Cairo, where flood stage is 40 feet, the Ohio River crested at 42.14 feet on the 16th. This resulted in minor flooding. Bottomland fields and woodlands were flooded, along with some remote access roads.Several smaller rounds of rainfall during the first week of January set the stage for a heavy rain event about mid-month. The Ohio River responded quickly. Minor flooding occurred along the river.
Tamms	1/8/2008	Flood	N/A	0	0	0K	0K	A strengthening warm front over far southern Illinois and western Kentucky became the focus for strong thunderstorms on the 8th. As this warm front moved slowly north, dew points in the upper 50's spread north from Tennessee. Heavy rain caused flooding of the Cache River. At least two roads across the river were closed or impassable.
Cairo	2/10/2008	Flood	N/A	0	0	0K	0K	The Ohio River crested at 43.17 feet on the Cairo gage on the 21st. Flood stage is 40 feet. Minor flooding of low-lying bottomlands and fields occurred.Numerous thunderstorms on the 5th accompanied a strong storm system that tracked northeast across southeast Missouri and southern Illinois. Heavy rainfall on ground that was already moist from January storms caused flooding of the Ohio River.
Alexander	12/9/1997	Fog	N/A	0	0	0	0	Widespread dense fog caused hazardous travel conditions. Visibility was generally a quarter mile or less over the area.
Alexander	12/18/1997	Fog	N/A	0	0	0	0	Patchy dense fog reduced visibility to near zero in some spots. With temperatures in the mid 20s, a layer of frost formed, even on some roads. This resulted in slick spots for early morning commuters.
Alexander	1/6/1998	Fog	N/A	0	0	0	0	Dense fog reduced visibility to a quarter mile or less across much of the area.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	1/27/1998	Fog	N/A	0	0	0	0	Widespread dense fog developed over far southern Illinois during the early morning hours. The most persistent dense fog occurred in the Marion/Carbondale area, where visibility was locally near zero for several hours. The dense fog hindered early morning commuters.
Alexander	1/30/1998	Fog	N/A	0	0	0	0	Widespread dense fog caused travel difficulties during the early morning hours. Illinois State Police reported visibility as low as two car lengths near Metropolis in Massac County.
Alexander	10/15/2000	Fog	N/A	0	0	0	0	Widespread dense fog blanketed all of southern Illinois from late evening on the 15th until the mid morning hours on the 16th. State police reported a rollover vehicle accident in the Mount Vernon area was due to the fog.
Alexander	3/31/2001	Fog	N/A	0	0	0	0	Widespread dense fog formed around midnight. During the early morning hours, visibility was below a quarter mile. One fatal accident was attributed to the fog. An elderly man driving east on Illinois 146 in Hardin County failed to stop where the road ends at Illinois Route 1. His vehicle struck a stone wall. The accident occurred at 7:15 A.M. The fog lifted between 8 and 9 A.M.
Alexander	1/17/1998	Freezing Drizzle	N/A	0	0	0	0	Light freezing drizzle caused icing of bridges and overpasses. Several accidents occurred on the Interstate 57 bridge over the Mississippi River. The U.S. 62 bridge over the Ohio River also became icy.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	12/21/1998	Freezing Rain	N/A	0	0	0	0	Rain changed to freezing rain and sleet late in the afternoon as a sharp cold front moved across the region. Temperatures plummeted from the upper 50s during the morning into the upper 20s by early nightfall. The wintry precipitation lasted for only a few hours, but was sufficient to cause numerous accidents. Most involved vehicles spinning out of control and sliding into ditches, but one accident was fatal. In Williamson County, a vehicle left the road and flipped over, killing the driver.
Alexander	1/26/2001	Freezing Rain	N/A	0	0	0	0	Light freezing rain overspread southern Illinois just before the early morning commute time. The precipitation, which amounted to less than a tenth of an inch, lasted a few hours. Along and north of Interstate 64, there was more sleet than ice. Vehicle wrecks were most numerous from the Marion and Carbondale area north. State police reported several jack-knifed semis on Interstate 57, mainly from Marion to Benton.
Alexander	9/24/1995	Frost	N/A	0	0	0	0	An early frost caused some minor damage to crops and gardens. Since most corn and soybeans were harvested, and because shelter-level temperatures stayed above freezing in some areas, financial losses were generally not severe.
Alexander	4/18/1997	Frost	N/A	0	0	0	0	An unseasonably cold April caused problems for growers, especially fruit growers. The peach crop was especially vulnerable because above normal temperatures in March caused peach trees to blossom early. Lows on April 18 were in the upper 20s in some of the colder valleys. A fruit grower in Union County estimated nearly half of his peach crop was destroyed by cold temperatures.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	4/9/2000	Frost	N/A	0	0	0	0	A freeze caused some damage to fruit tree blossoms, mainly in low-lying areas. The peach blossoms were most heavily impacted. Estimates of peach losses at one orchard in Massac County ranged up to 50 percent. Warmer than normal temperatures in January and February caused peach trees to blossom too early, as early as the first part of March.
Alexander	10/9/2000	Frost	N/A	0	0	0	0	A widespread killing frost and freeze affected southern Illinois, bringing an end to the growing season. Low temperatures were in the middle 20s.
Alexander	4/18/2001	Frost	N/A	0	0	0	0	An unusually late frost damaged unprotected crops and gardens. The low temperature at Carbondale was 27 degrees, and Mcleansboro in Hamilton County got down to 24 degrees. At an orchard 10 miles northeast of Metropolis, about half the peach and nectarine crop was killed.
Alexander	10/28/2005	Frost/freeze	N/A	0	0	0	0	Widespread frost was observed across southern Illinois. Low temperatures were around 30 degrees at most locations.
Miller City	10/26/2004	Funnel Cloud	N/A	0	0	0	0	The funnel clouds over southern Illinois were associated with a supercell thunderstorm that began in southeast Missouri and moved east along a warm front. The storm showed signs of strong rotation as it moved east across Alexander, Pulaski, and Massac Counties.
Alexander	6/7/1966	Hail	1.75 in.	0	0	0	0	None Reported
Alexander	6/7/1966	Hail	1.75 in.	0	0	0	0	None Reported
Alexander	4/3/1989	Hail	1.75 in.	0	0	0	0	None Reported
Alexander	5/5/1989	Hail	1.00 in.	0	0	0	0	None Reported
Alexander	11/15/1989	Hail	0.75 in.	0	0	0	0	None Reported

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	7/20/1990	Hail	1.75 in.	0	0	0	0	None Reported
Alexander	7/4/1992	Hail	1.75 in.	0	0	0	0	None Reported
Tamms	4/12/1993	Hail	1.00 in.	0	0	0	0	
Mcclure	9/2/1993	Hail	0.75 in.	0	0	0	1K	
Dixon Springs	4/20/1995	Hail	1.50 in.	0	0	0	0	A slow-moving line of thunderstorms dumped up to two inches of rain per hour along the Ohio River. At Dixon Springs, 1.70 inches fell in 20 minutes. Counties adjacent to the Ohio River experienced widespread flooding of roads and low-lying fields. One home was evacuated in Joppa.
Cairo	5/13/1995	Hail	0.75 in.	0	0	0	0	
Olive Branch	5/16/1995	Hail	0.75 in.	0	0	0	0	
Cairo	5/16/1995	Hail	0.75 in.	0	0	0	0	
Cairo Arpt	2/28/1997	Hail	1.75 in.	0	0	0	0	None Reported
Cairo	7/14/1997	Hail	0.75 in.	0	0	0	0	None Reported
Urbandale	4/13/1998	Hail	0.88 in.	0	0	0	0	None Reported
Cairo	4/16/2000	Hail	1.75 in.	0	0	0	0	A supercell thunderstorm tracked east from Scott County, Missouri over sparsely populated Mississippi River bottomland to Cairo. Golf ball size hail fell at Cairo.
Urbandale	4/16/2000	Hail	1.75 in.	0	0	0	0	Golf ball hail was reported on Interstate 57 at the Alexander/Pulaski County line, just south of the Mounds exit.
Mc Clure	4/27/2000	Hail	0.75 in.	0	0	0	0	None Reported
Tamms	5/12/2000	Hail	0.75 in.	0	0	0	0	None Reported
Tamms	9/22/2000	Hail	1.75	0	0	0	0	Golf ball size hail fell.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
			in.					
Tamms	5/20/2001	Hail	0.75 in.	0	0	0	0	None Reported
Cairo	5/2/2002	Hail	1.00 in.	0	0	0	0	A severe thunderstorm moved east across the Mississippi River from Missouri, produced quarter size hail over Cairo, then crossed the Ohio River into Ballard County, Kentucky.
East Cape Girardeau	4/25/2003	Hail	1.25 in.	0	0	0	0	None Reported
Olive Branch	5/4/2003	Hail	1.75 in.	0	0	0	0	A long-lived supercell thunderstorm crossed the Mississippi River about 10 miles northwest of Cairo, then moved east along the Ohio River. While crossing the southernmost tip of Illinois, this storm was responsible for three tornadoes, large hail up to the size of golf balls, and damaging winds.
Olive Branch	5/6/2003	Hail	0.75 in.	0	0	0	0	A severe thunderstorm produced damaging winds in Cairo that downed numerous trees. Outside of Cairo, the storm produced a weak tornado and dime size hail.
Elco	7/28/2003	Hail	0.75 in.	0	0	0	0	Dime-size hail was reported on Interstate 57 between mile markers 20 and 23.
East Cape Girardeau	3/30/2005	Hail	2.50 in.	0	0	0	0	This severe thunderstorm crossed the Mississippi River, producing quarter-size hail in East Cape Girardeau and tennis ball size hail in Thebes. Severe thunderstorms moved northeast across the southern tip of Illinois, passing south and east of the Marion/Carbondale area. The storms produced numerous reports of large hail.
Olive Branch	3/30/2005	Hail	0.88 in.	0	0	0	0	Severe thunderstorms moved northeast across the southern tip of Illinois, passing south and east of the Marion/Carbondale area. The storms produced numerous reports of large hail.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
East Cape Girardeau	5/13/2005	Hail	0.75 in.	0	0	0	0	Scattered thunderstorms developed during the midday hours and continued through the evening. Several storms reached severe levels for a brief time, producing hail up to one inch in diameter and wind gusts to around 60 MPH.
Cairo	5/13/2005	Hail	0.75 in.	0	0	0	0	Scattered thunderstorms developed during the midday hours and continued through the evening. Several storms reached severe levels for a brief time, producing hail up to one inch in diameter and wind gusts to around 60 MPH.
Thebes	3/12/2006	Hail	0.75 in.	0	0	0	0	None Reported
Mc Clure	4/2/2006	Hail	0.75 in.	0	0	0	0	None Reported
Cairo	4/2/2006	Hail	1.75 in.	0	0	0	0	None Reported
Mc Clure	5/25/2006	Hail	1.75 in.	0	0	0	0	None Reported
Cairo	5/25/2006	Hail	0.75 in.	0	0	0	0	None Reported
Tamms	6/9/2006	Hail	1.00 in.	0	0	0	0	None Reported
Thebes	2/20/2007	Hail	1.75 in.	0	0	0K	0K	A swath of golf-ball size hail crossed central Alexander County.The first severe weather episode of 2007 occurred across southern Illinois during the evening. A cold front pressed southeast across the region during the afternoon as a wave of low pressure shifted east along the front into the Ozarks of northern Arkansas. Southerly flow ahead of the low brought warm moist air northward as temperatures reached the 60s. The atmosphere destabilized enough by late afternoon to allow for the development of thunderstorms over southeast Missouri. These storms were prolific hail producers as they crossed into southern Illinois.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Tamms	1/29/2008	Hail	0.88 in.	0	0	0K	0K	A powerful cold front moved rapidly southeast across southern Illinois during the late afternoon hours. An organized line of severe thunderstorms developed along the front as it approached southern Illinois. Widespread damaging winds accompanied the line of storms. Temperatures fell about 30 degrees in less than one hour when the very strong cold front passed through.
Alexander	7/19/2006	Heat	N/A	0	0	0	0	The heat index peaked between 105 and 110 across southern Illinois for up to three consecutive afternoons. At Carbondale, the heat index rose to 105 degrees on the 19th and 20th, and fell just shy of 105 on the 21st. At Mount Vernon, the heat index rose to 105 on the 19th, but did not reach that threshold on the 20th or 21st. At Cairo, the heat index peaked at 108 degrees on the 19th and 20th, and 105 on the 21st. The only three counties that did not register heat indices of at least 105 degrees were in the Lower Wabash Valley.
Alexander	8/1/2006	Heat	N/A	0	0	0	0	The heat index peaked between 105 and 113 degrees across southern Illinois on August 1st. Hourly measurements of the heat index peaked as high as 113 degrees at Harrisburg and Fairfield, 110 at Mount Vernon, 108 at Marion, 107 at Carbondale, and 105 at Cairo. Heat indices were a little lower in most areas the next day, but still peaked at or above 105 degrees in the Wabash Valley and near Cairo. The highest heat indices on August 2nd were 110 degrees at Fairfield, 108 at Harrisburg, and 105 at Cairo and Mount Vernon.
Alexander	8/19/2006	Heat	N/A	0	0	0	0	The heat index peaked between 105 and 110 degrees across far southern Illinois, mainly along and south of a line from Carbondale to Harrisburg. The highest hourly heat index readings were 109 degrees at Harrisburg, 107 at Carbondale, and 105 at Metropolis.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	8/6/2007	Heat	N/A	0	0	0K	0K	Surface high pressure located over the Deep South remained nearly stationary. A persistent hot and humid southwest wind flow around this high brought an extended period of dangerously high heat indices, ranging from 105 to 110 degrees on several afternoons. A number of persons were treated for heat exhaustion, including 37 at a Carbondale hospital. Several counties opened a cooling shelter.
Alexander	7/7/1995	Heat Wave	N/A	0	0	0	50K	Highs rose into the 90s with lows in the 70s for about two weeks. High humidity resulted in heat index values approaching 115 degrees. The prolonged heat caused parts of Interstate 57 to buckle. Illinois State Police diverted traffic from a badly damaged lane seven miles north of Cairo. At least one utility company reported that its all-time record for power usage was broken.
Alexander	8/10/1995	Heat Wave	N/A	0	1	0	0	Temperatures climbed well into the 90s with heat indicies peaking around 115 degrees on some afternoons. This resulted in severe heat stress to livestock and crops. Many schools dismissed students early in the afternoon, and extra water coolers were brought in by some schools. At least one heat-related illness occurred at an elementary school. A student in Frankfort fainted after an outdoor recess, but she was not taken to a hospital.
Alexander	5/10/2003	Heavy Rain	N/A	0	0	0	0	Thunderstorms containing very heavy rain caused some road flooding. In Pope County, water was over Routes 145 and 146. Numerous streets and county roads in Johnson County had water over them. Street flooding was reported in Alexander County.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Cairo	5/30/2004	Heavy Rain	N/A	0	0	0	0	Widespread damaging winds raked all of southern Illinois. The storms were in the form of short lines or bows as they moved through Jefferson, Perry, and Jackson Counties, including Mount Vernon and Carbondale. A couple of tornadoes were spawned in those areas. As the storms moved east, they evolved into an intense squall line, producing widespread damaging gusts around 60 MPH with isolated higher gusts to 90 MPH. Numerous trees were blown down in nearly every county. Some of the trees fell on roads and power lines. In Wayne County, trees and utility poles were down in Sims, but the northwest part of the county from Orchardville to Johnsonville was hardest hit with utility damage. In Hamilton County, the whole city of Mcleansboro was without power after numerous trees fell. Several of the trees landed on houses, causing severe damage to at least one house. Trees fell on vehicles in Mount Carmel, where gusts were reported to 68 MPH. At least two occupied vehicles were struck by falling trees, one on Route 34 north of Harrisburg, and another north of Old Shawneetown. In both cases, the occupants were freed by rescue workers without being injured. In Harrisburg, trees fell on several houses and vehicles, and a radio tower used for fire dispatch operations was blown down. Two roofs were blown off of houses in Raleigh, just north of Harrisburg. A tree fell on a house in Thebes, near the Mississippi River in Alexander County. The most intense winds (estimated near 90 MPH) occurred in Massac County about 5 miles west of Round Knob, where a house lost portions of its roof and attic. At least 10 to 15 trees were reported down in Massac County. The storms produced very heavy rain that caused street flooding. The U.S. Highway

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
								51 overpass on the north side of Cairo was blocked by high water.
Sandusky	1/15/2007	Heavy Rain	N/A	0	0	0K	0K	Ditches overflowed onto roads, causing some minor issues but no road closures.Heavy rain from a slow-moving low pressure system caused some minor water problems. About 2.25 inches fell at the Carbondale airport from the 13th through the 15th.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Southern Illinois	3/8/1994	Heavy Snow	N/A	0	0	500K	0	Four to 12 inches of snow fell across southern Illinois. The heaviest snow fell in the far south tip near the Ohio River. Many schools and businesses were closed. There were many traffic accidents due to slick, snow-covered roads. Some older barns and homes suffered roof damaged from the weight of the snow in far southern Illinois.
Alexander	3/14/1999	Heavy Snow	N/A	0	0	0	0	A major snowstorm dumped as much as a foot of snow over parts of far southern Illinois. The hardest hit area was the Marion-Carbondale area, where 11 to 12 inches was measured. Because most of the precipitation fell as rain further south, little if any snow occurred from Metropolis to Shawneetown along the Ohio River. There was a sharp division between no snow and heavy snow. For example, in Johnson County (between Metropolis and Carbondale), accumulations ranged from 1 inch in the southeast corner to 7 inches in the northwest corner of the county. The swath of heaviest snow extended from Carbondale to Mount Carmel, where 9 to 12 inches fell. Other totals included 8 inches in Mount Vernon and Du Quoin, and 4 inches between Cairo and Anna. Snowfall rates were 1 to 2 inches per hour for several hours. This overtaxed the ability of most road crews to keep up with removal efforts. Interstate 57 was closed in the vicinity of Interstate 24 for several hours Sunday due to stranded tractor trailer rigs. In Johnson County, at least 30 vehicles slid off roads near Goreville. Drifting snow hampered road crews, forcing them to make several passes through previously cleared roads. Four-wheel drive vehicles and tractors were in high demand as smaller vehicles became stuck. Scattered power outages were reported due to heavy wet snow on power lines. Many schools cancelled classes the

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
								day following the storm. Many churches cancelled Sunday morning services. Carbondale's University Mall closed for the day. Numerous accidents occurred on area roadways, including Interstates 57 and 64. Only a few involved injuries. Rapidly warming temperatures began to melt the snow quickly within 48 hours.
Alexander	1/19/2002	Heavy Snow	N/A	0	0	0	0	Around four inches of snow fell across extreme southern Illinois, generally south of a line from Carbondale to Carmi. Lesser amounts of two to four inches fell north of there. Most of the snow fell in just a few hours time, when visibility was only around one quarter mile. Since surface temperatures were right near freezing during the event, snow removal was relatively easy. Traffic problems were relatively light because of the late night timing on a weekend. Some of the highest snowfall reports included: 4.5 inches at Grand Chain in Pulaski County, 4.3 inches at Carbondale, and 4 inches at Dixon Springs in Pope County.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	2/6/2003	Heavy Snow	N/A	0	0	0	0	A two-part winter storm dropped an average of 3 to 5 inches of heavy wet snow across extreme southern Illinois, mainly south of the Marion and Carbondale areas. The first round of snow occurred during the early morning and dropped 1 or 2 inches. The second round during the evening produced another 2 to 3 inches. Temperatures during the event were very close to freezing, and most of the accumulation was on grassy areas. Slushy roads were a concern at times, but the impact on travel was relatively minor. The snow was caused by an upper level disturbance moving east northeast from the Four Corners region. The highest reported snowfall amounts were along the Ohio River, including 4.5 inches at Metropolis and 4 inches at Cairo. Up to 3 inches of snow were reported as far north as Harrisburg, West Frankfort, and parts of the lower Wabash Valley around Grayville.
Alexander	4/30/1997	High Wind	52 kts.	0	0	20K	0	Strong southwest winds, not related to thunderstorms, gusted between 50 and 60 MPH during the late afternoon. Scattered reports of downed trees and power lines were received. Large sections of Murphysboro were without power, as were parts of Marion, Carbondale, Anna, and Harrisburg.
Alexander	1/29/2008	High Wind	61 kts.	0	0	100K	0K	A brief period of high winds followed in the wake of a cold front passage. In Cairo, a large portion of the roof was blown off an old, historic church 116 years old. The church was deemed unrepairable.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	11/11/1995	High Winds	0 kts.	0	0	0	0	A very strong cold front moved through southern Illinois, causing temperatures to fall 20 degrees in 30 minutes. Strong winds behind the cold front caused some isolated power outages and minor tree damage. Power outages were reported in Williamson County, and a small tractor shed was blown over two miles north of Carterville.
Alexander	2/5/1996	Ice Jam	N/A	0	0	0	0	Extremely cold weather in early February caused ice jams to form along the Mississippi River north of Cairo. The U.S. Coast Guard closed the river from Cairo, IL to St. Louis, MO for a few days. There was 100 percent ice blockage near Thebes, Illinois for several hours. This caused the river to rise 6 feet at Cape Girardeau, but it remained well below flood stage. Scores of barges were trapped by ice, resulting in significant losses to the river industry. Once the ice started moving, several barges broke loose from their moorings and had to be rounded up by the Coast Guard. Numerous navigational aids were displaced or damaged by the ice.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	1/15/1997	Ice Storm	N/A	0	0	0	0	Freezing rain coated surfaces with around a half inch of ice. Travel became very difficult in a short period of time. The weather prompted Southern Illinois University in Carbondale to shut down for the fourth time in 30 years. The freezing rain virtually shut down several counties, closing schools, government offices, and health facilities. Franklin County was nearly paralyzed by the storm. Most Franklin County businesses and public offices closed for the day. A large number of vehicle accidents occurred, but no serious injuries were reported. State Route 13 in Jackson County and some county roads in Johnson, Pulaski, and Union Counties were closed because vehicles were unable to climb hills. The Southern Illinois Airport was closed for two hours. Hospitals brought in extra staff to handle an overload due to weather-related injuries. Mail delivery was cancelled in some areas due to icy conditions.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	1/1/1999	Ice Storm	N/A	0	0	150K	0	Significant ice accumulations caused travel problems across southern Illinois beginning late on New Years Day and continuing through the night. Traffic volume was especially light because it was a holiday weekend. Those who had to be out found roads extremely difficult to navigate. The hardest hit areas, from Carbondale to Benton and West Frankfort, experienced numerous power outages due to snapped tree limbs and power lines. A rural electric co-op reported slow progress in restoring power because of treacherous roads and fallen trees. Estimates of the number of residences without power were around 10,000, primarily in Franklin and Jackson Counties. Ice accumulations were estimated to be one-half to one inch thick in the area from Carbondale to DuQuoin and Mt. Vernon. Shelters were set up for those without heat, but few people took advantage of them. Local emergency rooms reported a sharp increase in slip-and-fall injuries.Dozens of vehicle accidents or mishaps occurred, including a fatal wreck on Interstate 57 about 4 miles south of Mt. Vernon. The governor of Illinois issued a disaster declaration for the entire state.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	1/8/1999	Ice Storm	N/A	0	0	0	0	Freezing rain coated surfaces with around a quarter inch of ice in most areas. The exception was in the vicinity of the Ohio River from Massac County to Hardin County, where locally one half inch of ice was observed. Many schools cancelled classes again, only a day after re-opening in the wake of an ice storm on January 2. A semi-trailer overturned on Interstate 57 just south of Marion. A total of 25 ice-related falls were recorded at Union County Hospital. This ice storm was considerably less serious than the ice storm of January 1 and 2, which hit the Carbondale and West Frankfort areas worst.
Alexander	1/25/2004	Ice Storm	N/A	0	0	0	0	The areas hardest hit by this ice storm were along and north of a line from Harrisburg to Carbondale, where about one half inch of ice glazed all surfaces. Numerous accidents were reported. At least one overturned vehicle and a jackknifed semi were reported on Interstate 57 between West Frankfort and Mount Vernon. Scattered power outages occurred as brisk winds downed ice-laden trees and power lines. One of the largest utility companies in southern Illinois reported about 1,500 customers without power. In Saline County, a downed power line blocked Illinois Route 34 near West End and U.S. Route 45 near Ledford. Most schools were closed for at least a day following the ice storm, which occurred on a Sunday. To the south of a line from Carbondale to Harrisburg, around one quarter inch of ice coated trees and power lines, but roads were mainly wet with scattered icy spots. There were some ice-laden tree limbs and power lines brought down by gusty winds. Illinois Route 145 in Massac County was one of a number of roads partially blocked by downed limbs.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	5/15/1995	River Flood	N/A	0	1	0	0	Rend Lake in Franklin County set a new record high level as a result of frequent thunderstorms in mid May. Over six inches of rain fell in 48 hours at Mount Vernon. The Big Muddy River, which drains Rend Lake, crested about 20 feet above flood stage at Murphysboro. The river crested on May 23 at 35.9 feet, about two feet below the record crest of 37.97 feet in May 1961. During the event, several state highways and numerous secondary roads were closed. In Franklin County, two vehicles were lost after being washed off bridges. A pickup truck was swept off a bridge about 0100 CST on May 25. The male driver was found clinging to a tree above floodwaters about three hours later. Although the man briefly lost consciousness during the rescue effort, he was treated and released by a local hospital that night. The man's truck was swept away when he drove through river floodwaters about six feet deep and 200 yards from dry land. The bridge was closed at the time, but the man ignored the warning signs. In Murphysboro, the Big Muddy River caused extensive flooding of Riverside Park. Three homes were evacuated in Murphysboro. The Big Muddy River came close to washing over the Illinois Route 3 bridge near Grand Tower. Damage estimates were still being calculated.
Alexander	6/1/1995	River Flood	N/A	0	0	0	0	Near the Big Muddy River and Rend Lake,The Big Muddy River and Rend Lake continued their slow recessions after cresting near record high levels in late May. All the damage caused by the flood occurred in May before and during the crest. Damage was limited to mainly vacant woods and fields. The first floor of a building at the Carbon Lake Club in Jackson County was flooded out.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	6/1/1995	River Flood	N/A	0	0	1.9M	0	Near the Mississippi River,The Mississippi River continued to recede after cresting in late May. Nevertheless, the waters were still high enough in early June to keep some residents from their homes. Others were still forced to go to and from their homes by boat. Most rural roads near the river stayed closed into early parts of the month. Tens of thousands of bottomland remained submerged during the early part of the month. Damage to public property was tabulated to be $809,000 in Alexander County, $687,000 in Union County, and $419,000 in Jackson County. Damage to private homes was relatively insignificant. No monetary estimate of crop damage was available.
Alexander	12/8/1995	Snow	N/A	0	0	0	0	Between three and four inches of snow fell across most of southern Illinois. At least two dozen traffic accidents occurred, including a fatal crash near Mt. Vernon. A vehicle slid across the median of Interstate 57, colliding head on with another vehicle. Two people were killed. The snow closed one of the regional airports in the Carbondale area for most of the day.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	12/23/1998	Snow	N/A	0	0	0	0	A light snowfall, the first of the season in some areas, provided a one-inch coating. Road surfaces became extremely slippery, and numerous accidents were reported. Two of the accidents left drivers with major injuries and traffic backups stretching several miles. A tractor-trailer rig northbound on Interstate 57 near Marion jackknifed and crossed the median into the southbound lanes. The driver of a car that was struck by the truck was seriously injured. Traffic on Interstate 57 was detoured onto side roads until the accident could be cleared. Another accident on U.S. 51 about 8 miles south of Carbondale closed that road for a while. Three vehicles were involved in that wreck, and one person was seriously injured. Numerous other accidents were reported across the region, mostly minor.
Alexander	1/22/2000	Snow	N/A	0	0	0	0	Snow began during the morning hours and continued intermittently through the afternoon. Accumulations averaged only an inch or two, but roads still became quick slick. Slick roads may have contributed to a single-car accident in northern Pope County that critically injured a man.
Alexander	1/8/2006	Strong Wind	N/A	0	0	19K	0	Strong southwest winds were sustained from 30 to 35 MPH during the peak of this wind event. Measured wind gusts were as high as 45 MPH at the Carbondale airport.
Alexander	1/19/2006	Strong Wind	N/A	0	0	19K	0	Strong southwest winds were sustained around 30 MPH. Gusts were measured up to 48 MPH at Carbondale.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	2/16/2006	Strong Wind	N/A	0	0	14K	0	Strong winds gusted to between 40 and 50 MPH across most of southern Illinois except the Wabash Valley. At the Carbondale airport, the peak wind gust was measured at 49 MPH. Other airports recorded gusts from 40 to 45 MPH.
Alexander	12/1/2006	Strong Wind	N/A	0	0	1K	0K	A deepening low pressure system moved north across the Lower Ohio Valley. In the wake of the low, strong and gusty winds occurred. At airports near Cairo, Carbondale, Metropolis, and Harrisburg, highest sustained wind speeds were around 30 MPH, with peak wind gusts around 40 MPH. Winds were even higher in the Lower Wabash Valley, where peak wind gusts to 49 MPH were measured at Mount Carmel.
Alexander	12/22/2007	Strong Wind	N/A	0	0	1K	0K	A strengthening low pressure system tracked from the southern Plains northeast across the St. Louis, MO area during the night. South winds in advance of the low were strong and gusty. For a few hours, gusts reached 45 to around 50 mph. At Harrisburg in Saline County, a gust to 51 mph was measured by emergency management personnel. Nearby, minor roof damage to homes and utility buildings occurred in Eldorado. Trees were down on power lines and across roads. At the Mount Carmel Municipal Airport in the lower Wabash Valley, a wind gust of 54 mph was measured.
Alexander	2/7/1999	Strong Winds	N/A	0	0	23K	0	Strong winds ahead of an approaching cold front gusted to 55 MPH at times across all of southern Illinois. These winds were sufficient to bring down some tree limbs and even a few rotted or older trees. In McLeansboro in Hamilton County, a tree fell on a nursing home and damaged the roof. In Massac County, damage occurred at Joppa High School, where a light pole at the baseball field became airborne and penetrated the roof

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
								of the school.
Thebes	8/3/2007	Thunderstorm Wind	N/A	0	0	2K	0K	Trees were down on Old Route 3.A cluster of thunderstorms produced isolated wind damage as it tracked south to southwest through southern Illinois. The storms developed during the heat of the day along an inverted trough of low pressure extending northward from the Lower Mississippi Valley.
Cairo	10/18/2007	Thunderstorm Wind	N/A	0	0	0K	0K	The first of two rounds of severe weather occurred during the early morning hours. This first round was associated with strong low level southwest winds ahead of a deep low pressure center along the Missouri/Nebraska border. Most of the severe weather during the early morning hours was damaging wind associated with short lines of storms.
Olive Branch	1/29/2008	Thunderstorm Wind	N/A	0	0	20K	0K	Trees were blown down. A tree was down on a trailer. Road signs were down on Illinois Route 3 at Olive Branch.A powerful cold front moved rapidly southeast across southern Illinois during the late afternoon hours. An organized line of severe thunderstorms developed along the front as it approached southern Illinois. Widespread damaging winds accompanied the line of storms. Temperatures fell about 30 degrees in less than one hour when the very strong cold front passed through.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	11/14/1993	Thunderstorm Winds	N/A	0	0	5K	0	There was damage to power lines, power poles and trees blown down at several locations in the county.
Alexander	5/17/1995	Thunderstorm Winds	N/A	0	0	0	0	
Alexander	5/18/1995	Thunderstorm Winds	N/A	0	0	10K	0	Numerous trees were downed. Hardest hit was the area along the Union County line, where trees fell across roads and damaged utility lines.
Alexander	6/8/1995	Thunderstorm Winds	N/A	0	0	75K	0	Numerous trees and limbs were blown down. A few houses and mobile homes were damaged by falling trees in Thebes. In McClure, a grain silo was lifted off its foundation, and shed roofs were blown off. A tree landed on a house in Elco. The community of Thebes was without power for more than 24 hours.
Olive Branch	6/20/1995	Thunderstorm Winds	N/A	0	0	0	0	
Alexander	4/3/1957	Tornado	F2	0	5	250K	0	None Reported
Alexander	4/17/1960	Tornado	F1	0	4	25K	0	None Reported
Alexander	4/19/1970	Tornado	F1	0	0	3K	0	None Reported
Alexander	7/8/1970	Tornado	F1	0	1	25K	0	None Reported
Alexander	3/15/1971	Tornado	F1	0	0	0K	0	None Reported
Alexander	4/21/1972	Tornado	F2	0	1	25K	0	None Reported
Alexander	1/18/1973	Tornado	F1	0	0	0K	0	None Reported
Alexander	3/19/1984	Tornado	F0	0	0	0K	0	None Reported

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Thebes	1/21/1999	Tornado	F2	0	0	150K	0	Top winds were estimated near 130 MPH. Damage was relatively light due to the track of the tornado over rural portions of those counties. A few sheds and barns were destroyed, and a house sustained moderate damage. A fairly large metal barn, about 100 feet by 50 feet, was blown into a stand of trees, but remained fully intact in the upper reaches of the trees. Tree damage was complete along some wooded portions of the track. The tornado formed less than a half mile east of Thebes, and then tracked seven miles through the Shawnee National Forest. The damaged structures were near Thebes and Gale.
Unity	4/25/2003	Tornado	F0	0	0	0	0	A weak tornado, with peak winds estimated near 65 MPH, briefly touched down in woods and fields. The funnel cloud was observed and videotaped by a television news crew from the intersection of Highways 3 and 127, a distance of about 2 miles away. A witness reported that the funnel touched down in a field near the community of Olive Branch. Based on the video and the eyewitness account, it was determined that one or more brief touchdowns occurred. A few trees were blown down in the area of where the funnel appeared to have touched down. The thunderstorm that produced the apparent tornado formed underneath an upper level low and its associated cold pocket.
Miller City	5/6/2003	Tornado	F0	0	0	0	0	The tornado produced some minor tree damage. A severe thunderstorm produced damaging winds in Cairo that downed numerous trees. Outside of Cairo, the storm produced a weak tornado and dime size hail.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Willard	5/6/2003	Tornado	F2	0	1	300K	0	The tornado formed northwest of Cairo near the Mississippi River. Three tractor-trailer rigs were overturned on the Interstate 57 bridge over the Mississippi River. The tornado tracked through Cairo, damaging dozens of homes and several businesses. One single-family home was destroyed, injuring a child who was cut by flying debris. Of the damaged homes, about four sustained major damage, and the rest had mainly minor damage.
Alexander	6/2/1965	Tstm Wind	0 kts.	0	0	0	0	None Reported
Alexander	12/10/1971	Tstm Wind	0 kts.	0	0	0	0	None Reported
Alexander	9/28/1974	Tstm Wind	0 kts.	0	0	0	0	None Reported
Alexander	11/3/1974	Tstm Wind	0 kts.	0	0	0	0	None Reported
Alexander	7/19/1981	Tstm Wind	0 kts.	0	0	0	0	None Reported
Alexander	4/2/1982	Tstm Wind	0 kts.	0	0	0	0	None Reported
Alexander	8/31/1982	Tstm Wind	0 kts.	0	0	0	0	None Reported
Alexander	9/7/1990	Tstm Wind	0 kts.	0	0	0	0	None Reported
Alexander	7/3/1991	Tstm Wind	0 kts.	0	0	0	0	None Reported
Tatumville	1/18/1996	Tstm Wind	0 kts.	0	0	0	0	Two trees down.
Cache	5/5/1996	Tstm Wind	50 kts.	0	0	0	0	A tree and power lines were blown down.
Cairo	7/8/1996	Tstm Wind	52 kts.	0	0	0	0	Large tree limbs were blown down.
Cairo	10/22/1996	Tstm Wind	50 kts.	0	0	0	0	None Reported
Sandusky	4/20/1997	Tstm Wind	53 kts.	0	0	0	0	The county sheriff department reported trees down.
Olive Branch	6/13/1997	Tstm Wind	50 kts.	0	0	0	0	The county road department reported trees and limbs were blown down near Olive Branch and Miller City.
Mc Clure	7/4/1997	Tstm Wind	52 kts.	0	0	0	0	A few trees were blown down.
Cairo	7/14/1997	Tstm Wind	50 kts.	0	0	5K	0	Downed tree limbs blocked some side streets and may have damaged some houses. The wind knocked out power in Cairo for at least 90 minutes. Several restaurant signs were downed.
Urbandale	6/12/1998	Tstm Wind	52 kts.	0	0	5K	0	A co-operative observer reported several trees down over power lines.
Miller City	1/17/1999	Tstm Wind	0 kts.	0	0	50K	0	A carport and shed were demolished, and a one third of the roof was blown off a

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
								house.
Willard	5/17/1999	Tstm Wind	70 kts.	0	1	75K	0	A wood-frame house sustained major damage to its roof and an attached garage. The garage was totally destroyed. A large section of the house's roof was blown off. A woman, who was standing in front of the window when the storm hit, received cuts to an artery in her neck. She was hospitalized overnight. Heavy rain coming through the damaged roof caused extensive water damage. About half a dozen trees were uprooted or snapped. Near the community of Willard, a garage was severely damaged by high winds. The walls of the garage were bowed outward, and the door was caved in.
Cairo	2/18/2000	Tstm Wind	100 kts.	0	0	500K	0	A short-lived but very intense thunderstorm microburst caused about a half million dollars damage in the center of Cairo. The affected area, which was 5 city blocks wide and about a mile long, was primarily residential. A total of 52 buildings were damaged or destroyed. Of these 52, eight were businesses, seven were outbuildings or garages, and the rest were houses. Five of the residences were moved off their foundation and considered total losses. In another 25 buildings, windows were blown out and roofs were damaged. For the remaining structures, the damage was relatively minor, consisting of porch damage or gutters blown off. Initial reports indicated there were some minor injuries, however, later investigation revealed no injuries.
Alexander	2/24/2001	Tstm Wind	0 kts.	0	0	4K	0	There were several reports of trees falling across roads.
Cairo	7/18/2001	Tstm Wind	50 kts.	0	0	0	0	Large tree limbs were blown down.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Tamms	10/24/2001	Tstm Wind	52 kts.	0	0	25K	0	In Miller City, sheds were blown down, and there was minor damage to roofs. In Tamms, there were some trees and wires down. A tree fell on a house in Urbandale.
Olive Branch	7/2/2002	Tstm Wind	50 kts.	0	0	5K	0	Several trees and a couple of power poles were blown down.
Olive Branch	11/10/2002	Tstm Wind	50 kts.	0	0	2K	0	Three trees were down, blocking roads in and near Olive Branch.
Cairo	5/1/2003	Tstm Wind	50 kts.	0	0	0	0	Thunderstorms produced several reports of dime to nickel size hail across southern Illinois. The thunderstorms began to organize into a squall line as they entered western Kentucky and southwest Indiana. A roof was peeled back off a business in Cairo, and some nearby trees were blown down.
Olive Branch	5/4/2003	Tstm Wind	52 kts.	0	0	0	0	A long-lived supercell thunderstorm crossed the Mississippi River about 10 miles northwest of Cairo, then moved east along the Ohio River. While crossing the southernmost tip of Illinois, this storm was responsible for three tornadoes, large hail up to the size of golf balls, and damaging winds.
Cairo	5/6/2003	Tstm Wind	55 kts.	0	0	0	0	A severe thunderstorm produced damaging winds in Cairo that downed numerous trees. Outside of Cairo, the storm produced a weak tornado and dime size hail.
Olive Branch	7/18/2003	Tstm Wind	50 kts.	0	0	0	0	Two to three trees were blown down between Olive Branch and Tamms. A cluster of thunderstorms became severe over the Carbondale area, producing wind gusts near 60 MPH. The storms continued to produce isolated reports of tree damage as they organized into a line and moved south.
Cairo	8/27/2003	Tstm Wind	50 kts.	0	0	0	0	About a half dozen trees were blown down.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	5/30/2004	Tstm Wind	55 kts.	0	0	10K	0	Widespread damaging winds raked all of southern Illinois. The storms were in the form of short lines or bows as they moved through Jefferson, Perry, and Jackson Counties, including Mount Vernon and Carbondale. A couple of tornadoes were spawned in those areas. As the storms moved east, they evolved into an intense squall line, producing widespread damaging gusts around 60 MPH with isolated higher gusts to 90 MPH. Numerous trees were blown down in nearly every county. Some of the trees fell on roads and power lines. In Wayne County, trees and utility poles were down in Sims, but the northwest part of the county from Orchardville to Johnsonville was hardest hit with utility damage. In Hamilton County, the whole city of Mcleansboro was without power after numerous trees fell. Several of the trees landed on houses, causing severe damage to at least one house. Trees fell on vehicles in Mount Carmel, where gusts were reported to 68 MPH. At least two occupied vehicles were struck by falling trees, one on Route 34 north of Harrisburg, and another north of Old Shawneetown. In both cases, the occupants were freed by rescue workers without being injured. In Harrisburg, trees fell on several houses and vehicles, and a radio tower used for fire dispatch operations was blown down. Two roofs were blown off of houses in Raleigh, just north of Harrisburg. A tree fell on a house in Thebes, near the Mississippi River in Alexander County. The most intense winds (estimated near 90 MPH) occurred in Massac County about 5 miles west of Round Knob, where a house lost portions of its roof and attic. At least 10 to 15 trees were reported down in Massac County. The storms produced very heavy rain that caused street flooding. The U.S. Highway

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
								51 overpass on the north side of Cairo was blocked by high water.
Cairo	6/9/2004	Tstm Wind	50 kts.	0	0	5K	0	Trees, wires, and poles were blown down. A large tree was uprooted.
Cairo	1/13/2005	Tstm Wind	50 kts.	0	0	0	0	A couple of trees and several limbs were blown down. Thunderstorms produced isolated wind damage and a tornado across southern Illinois. The tornado and most of the wind damage was produced by a thunderstorm cell that entered southern Illinois near Cairo, then tracked northeast across Pulaski and Johnson Counties.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Olive Branch	3/9/2006	Tstm Wind	74 kts.	0	0	100K	0	A survey of the damage indicated a microburst with peak winds to 85 MPH occurred. On the south side of town, 20 to 30 trees and power lines were down. Several homes received major roof damage. A tree fell on a mobile home, and a garage was blown off its foundation. A front porch was damaged. A roof was partially blown off a metal building. One small storage shed was destroyed, and another shed was blown off its foundation. The damage path was divergent from west to east. The damage path was about 750 yards wide and 600 yards long.
Cairo	3/9/2006	Tstm Wind	50 kts.	0	0	0	0	Several large tree limbs were downed.
Thebes	3/12/2006	Tstm Wind	52 kts.	0	0	8K	0	Trees and power lines were downed.
Olive Branch	7/21/2006	Tstm Wind	50 kts.	0	0	0	0	Trees were blown down.
Alexander	8/10/2006	Tstm Wind	50 kts.	0	0	8K	0	On the U.S. 51 bridge between Wickliffe, KY and Cairo, IL, a tractor-trailer rig was partially tipped by the wind onto passing vehicles. The rig landed back on its wheels. Only minor damage occurred, and all the vehicles were driven off the bridge. A number of trees and power lines were blown down across the county. In Cairo, a tree landed on power lines, pulling them from a house.
Cairo	9/22/2006	Tstm Wind	50 kts.	0	0	0	0	Several trees were blown down.
Alexander	12/1/1998	Unusual Warmth	N/A	0	0	0	0	Temperatures averaged 20 to 30 degrees above normal during the first week of the month. Highs were around 70 most of the week. The heating industry reported some loss of revenue as a result of the weather. A gas company reported the average customer's bill was down 27 percent from the same time last year. Other businesses, such as the outdoor construction industry, benefited from the extended period of warmer weather.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
East Cape Girardeau	12/18/2002	Urban/sml Stream Fld	N/A	0	0	0	0	A series of thunderstorms produced very heavy rainfall during the evening of the 18th. Minor flooding of poor drainage areas and flood-prone areas occurred. One lane of Illinois Route 146 was underwater in East Cape Girardeau near the Mississippi River bridge. Minor street and road flooding occurred, including numerous streets in Pinckneyville. Minor street flooding was reported in Harrisburg.
Alexander	4/20/2000	Wind	N/A	0	0	0	0	Strong gusty west winds in the wake of a cold front caused scattered reports of minor wind damage. Peak gusts were measured around 50 MPH. There were several reports of downed trees and power lines. In Albion in Edwards County, a large oak tree was uprooted and smashed onto a trailer. Although the trailer was badly dented, the roof did not collapse.
Alexander	3/9/2002	Wind	N/A	0	0	3K	0	Minor property damage was caused by strong west winds around the back side of an intense low pressure system. Winds gusted to around 45 MPH for several hours. Some exact wind measurements from automated observing sites included: 45 MPH at Harrisburg and Mount Vernon, and 42 MPH at Carbondale. Just west of Pinckneyville, gusts to 48 MPH occurred. A couple of power lines were blown down in Carmi.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	1/2/1996	Winter Storm	N/A	0	0	0	0	A major winter storm affected parts of southern Illinois. Snowfall amounts increased from south to north, with up to 8 inches reported at Mount Vernon. Warmer temperatures closer to the Kentucky border resulted in a mixture of precipitation types. Only an inch of snow was measured in northern Pope County, less than 20 miles from the Ohio River. Benton reported 5 inches, Anna had 3 inches, and Pinckneyville reported 4 inches. In the most affected areas, including Mount Vernon, hotels were booked with holiday travelers seeking to avoid dangerous travel conditions. In Jefferson County alone, 36 weather-related accidents occurred, none with serious injuries. A school bus carrying 30 students slid into a ditch, but nobody was hurt. Most schools cancelled classes the following day. Gusty winds and very cold temperatures hampered snow removal efforts. Winds gusted to 25 MPH with temperatures in the teens.
Alexander	1/6/1996	Winter Storm	N/A	0	0	0	0	A moderate snowfall, averaging 3 to 4 inches, affected all of southern Illinois. Strong gusty winds piled the dry, powdery snow into waist-high drifts in some spots. This contributed to dozens of auto accidents, including a van that slid into a guard rail on Interstate 57 near Mount Vernon. Several people were injured in this mishap. A man in Benton suffered a fatal heart attack while he was shovelling snow. Five people were treated for slip-and-fall injuries, including three fractures. The deep drifts were over car roofs in open farm country of one southeast Illinois county. Several vehicles became stuck. State Highway 161 was reduced to one lane of travel in spots due to drifts.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	1/8/1997	Winter Storm	N/A	0	0	0	0	A low pressure system moved northeast across the Tennessee River Valley, producing up to 7 inches of snow in southern Illinois. Generally 5 or 6 inches fell north of Marion and Carbondale to Mt. Vernon and Fairfield. South of the Marion-Carbondale area and in the Wabash River Valley, snowfall amounts were 3 to 4 inches. Most schools closed due to the storm.
Alexander	12/13/2000	Winter Storm	N/A	0	0	0	0	A major winter storm produced 4 to 7 inches of snow across southern Illinois, followed by 1/4 to 1/2 inch of ice. The snow began during the early morning hours, falling at rates near one inch per hour. By midday, the snow changed to freezing rain after a brief period of sleet. Light to occasionally moderate freezing rain fell during the afternoon and early evening hours. The heavy precipitation was caused by a strong upper level disturbance that tracked east-northeast from the southern Rockies, across the southern Plains, and then over the lower Mississippi Valley. A strong southerly flow of milder air just above ground level was unable to scour out very cold air right at the surface, which produced an extended period of snow and ice. The liquid equivalent of all the frozen and freezing precipitation was between three quarters of an inch and one inch. Numerous accidents occurred, most of which were minor. The most significant accident was at the junction of Interstates 57 and 64 near Mount Vernon, where a jack-knifed semi-trailer held up traffic for more than an hour. Schools were closed for up to a week following the storm, especially in rural counties with limited snow removal resources. Ice on trees and power lines contributed to scattered power outages. Stores quickly sold out of winter goods, such as ice melter and snow shovels.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	2/21/2001	Winter Storm	N/A	0	0	0	0	Several hours of moderate to heavy sleet and freezing rain occurred, sometimes accompanied by thunder and lightning. The precipitation was mainly in the form of sleet in most areas, with up to an inch of sleet accumulation. In the southernmost tip of Illinois, from Cairo to Metropolis, freezing rain was more prevalent. Freezing rain glazed some surfaces, mainly trees and power lines, with up to one quarter inch of ice. On the day following the storm, numerous schools were closed. The liquid equivalent of the precipitation ranged from one quarter inch at Carbondale to just under an inch over the southern tip of Illinois near Cairo.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	12/4/2002	Winter Storm	N/A	0	0	0	0	A major winter storm brought significant snow and ice accumulations to all of southern Illinois. The precipitation was mostly snow, except in counties bordering the Ohio River, where the snow changed to an extended period of freezing rain. Ice accumulations were around one quarter inch from Cairo to Metropolis and Golconda. Snow accumulations across southern Illinois were generally six to eight inches. Freezing rain kept amounts down to near 4 inches in counties bordering the Ohio River. From Pinckneyville and Mount Vernon to the Wabash Valley, the snow fell in two distinct bursts, with two to three inches during the midday hours, followed by another two or three inches during the late night hours. The spotty 8-inch snowfall amounts were reported in a band between Illinois Route 13 and the Shawnee National Forest. Travel was heavily impacted by the winter storm. Numerous vehicle accidents occurred. Schools were closed for the remainder of the week in some counties. The winter storm began during the early morning hours and ended late the following night.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	1/16/2003	Winter Storm	N/A	0	0	0	0	The storm hit during the morning commute time on a weekday, so it had a major impact on traffic. The snow fell at the rate of 1 to 2 inches per hour around the morning drive time. Many schools cancelled classes. By noon, most of the accumulating snow had ended, leaving a blanket of 3 to 4 inches in most places. Cold temperatures limited the effectiveness of salt used by road crews, and some minor blowing and drifting occurred. Temperatures were in the 20's during the snowstorm, and around 10 by the morning of the 17th. Refreezing of moisture occurred after dark, causing another round of accidents after the snow had ended. The snow was caused by a moderately strong upper level disturbance that moved east from the Plains, then across Tennessee. A weak low pressure system followed about the same path, passing just south of Missouri and Kentucky. Some specific snowfall amounts included: 4 inches at Cairo and Mound City, and 3 inches at Anna (Union County) and Eddyville (Pope County). Only the southern tip of Illinois received these heavier snow totals. Carbondale and points north received 2 inches or less.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	2/16/2003	Winter Storm	N/A	0	0	0	0	A long-lasting sleet storm affected southern Illinois. The precipitation was almost all sleet south of the Marion/Carbondale area, where an inch or two was reported. Along and north of a Carbondale to Harrisburg line, there was more snow, with total accumulations of sleet and snow in the 3 to 6 inch range. Specific reports included: 6 inches at Pinckneyville in Perry County, 5.5 inches near Mount Carmel in Wabash County, 4.5 inches at West Frankfort in Franklin County, 4 inches at Carbondale, and 2.4 inches at Harrisburg in Saline County. The storm occurred on the Presidents Day weekend. Most schools and businesses scheduled to be open on Presidents Day were closed. Franklin County officials reported about 25 accidents in that county alone, none of which involved injuries.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	12/22/2004	Winter Storm	N/A	1	1	100K	0	A major winter storm dumped from 10 to 20 inches of snow across most of southern Illinois, clogging interstates and shutting down most businesses near the peak of the Christmas shopping season. The heaviest snowfall, from 14 to 20 inches, occurred along an axis from Anna (Union County) through Harrisburg (Saline County) to the lower Wabash Valley. Snowfall was not quite as heavy from Fairfield (in Wayne County) west across Mount Vernon to Du Quoin (Perry County), where amounts were mostly from 6 to 9 inches. On the north side of Anna in Union County, a man was killed and another man was injured when an awning on a VFW Post collapsed on them. The two men were standing under the 12-by-30 foot awning when it collapsed. The weight of the compacted snow, which fell several days earlier, caused the metal roof to totally collapse over the men. The other end of the awning remained partially standing. A crew of 15 to 20 rescuers took about 30 minutes to extricate the men. In Johnson County, the roof of a hardware store and a horse arena collapsed under the weight of the snow and ice. Portions of Interstates 57, 64, and 24 were extremely difficult to travel. Numerous abandoned vehicles and jack-knifed semis blocked portions of these highways, however, none were officially closed. Interstate 64 was closed at the Indiana state line. The near blizzard conditions stranded many interstate travelers in hotels, and some hotels on Interstates 64 and 57 were totally filled. State police took some stranded motorists to an emergency shelter at the Marion Senior Citizens Center, where at least 8 people spent the night. Gusty north winds from 15 to 25 MPH with a few gusts to 35 MPH caused blowing and drifting. The snow fell in two

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
								waves, the first during the late night and early morning, and the second from mid-afternoon through about midnight. The early morning burst produced an estimated 8 to 10 inches along an axis from Cape Girardeau, MO northeastward across Marion to Harrisburg. The second and more prolonged period of heavy snow dumped an additional 8 to 10 inches at Harrisburg. A state of emergency was declared in Gallatin and Edwards Counties, where non-essential travel was banned. There were reports of plows and other snow removal equipment stuck in drifts. Most travel, including that by police and other emergency workers, was done in four-wheel drive vehicles. Five-foot drifts in open, rural areas made roads impassable even to some off-road vehicles. Mail delivery was suspended in most areas for at least one day. For a few days, many stores were out of certain items due to delayed deliveries. A state disaster declaration was issued for those counties generally from the Marion/Carbondale area east and south, including the Wabash Valley. Those areas received more snow than is normal for the entire winter. Specific preliminary snowfall reports from co-operative observers included: 14 inches at Anna, 13 inches at Carbondale and Shawneetown, 10 inches at Cairo, and 6 inches at Mount Vernon and Dix. Recovery efforts were slowed by gusty winds and bitterly cold arctic air, as low as 10 below zero on Christmas morning. M64LS

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	2/11/2008	Winter Storm	N/A	0	0	1.0M	0K	Low pressure developed over the southern Plains, spreading widespread heavy precipitation across southern Illinois. At the same time, high pressure over the upper Ohio Valley produced a cold easterly wind flow. The result was a crippling ice storm. Around one inch of ice caused extensive damage across far southern Illinois, along and south of a line from Carbondale and Marion to Harrisburg and Carmi. Many of those same areas received three to six inches of sleet and snow. The most destructive icing occurred in an east to west band across Union, Johnson, Massac, and Pope Counties. The state designated most counties in southern Illinois as a disaster area. Numerous trees and power lines were brought down, knocking out power to many thousands of homes. Power outages lasted up to a week. An indirect fatality occurred in Carbondale, where an elderly man died of carbon monoxide poisoning while operating a gasoline generator in his garage. Three carbon monoxide poisonings were reported in Christopher. All three victims, who were from the same family, were not seriously injured. Emergency shelters were established for those without power for extended periods. Schools were closed for a week in some counties. Trees and tree limbs fell across roads, complicating recovery efforts. A number of houses and other structures were damaged by falling trees. The roof of a bakery and bread store in Herrin collapsed under the weight of the ice and snow. The walls of the store bowed out due to the collapse, and the structure was deemed a total loss. Ferne Clyffe State Park, Tunnel Hill State Bike Trail, and the Trail of Tears State Forest were closed for the remainder of the month due to widespread tree damage. Minor damage

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
								occurred to facilities and buildings in Ferne Clyffe State Park. To the north of the Marion, Carbondale, and Harrisburg areas, one to three inches of sleet and snow, and up to one-half inch of freezing rain occurred.
Alexander	2/3/2007	Winter Weather	N/A	0	0	0K	0K	An upper level storm system swept southeast from Missouri across the Tennessee Valley. A very dry and powdery inch of snow fell across the southern tip of Illinois, mostly south and southeast of the Marion/Carbondale area. Roads were snow-covered and slick.
Alexander	1/22/2003	Winter Weather/mix	N/A	0	0	0	0	One to three inches of snow fell across southern Illinois during the afternoon and early evening. Roads became very slick and hazardous.

Location or County	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Description
Alexander	12/8/2005	Winter Weather/mix	N/A	0	0	0	0	One to three inches of snow fell across much of southern Illinois. The lowest amounts were about an inch near Metropolis, along the Ohio River. The three-inch amounts extended from Pinckneyville eastward to Benton and Harrisburg. Amounts were even higher along the Interstate 64 corridor and in the Lower Wabash Valley. The precipitation started as sleet and freezing rain, especially along and east of a Cairo to Harrisburg line. Roads were very slippery, resulting in numerous accidents. Over 50 accidents occurred in Franklin County in just a few hours. Traffic on Interstate 57 was partially blocked by a jackknifed semi-trailer in Franklin County south of Benton. At the Benton interchange of I-57, a northbound exit ramp was shut down. Some of the accidents on Interstate 57 involved injuries.
Alexander	2/18/2006	Winter Weather/mix	N/A	0	0	0	0	One to two inches of snow fell across southern Illinois. Isolated amounts of 3 inches occurred in Fairfield (Wayne County), Pinckneyville (Perry County), and Mount Carmel (Wabash County). Roads were snow-covered and slippery.
Alexander	2/19/2006	Winter Weather/mix	N/A	0	0	0	0	Two inches of snow fell over far southern Illinois, mainly south of the Marion/Carbondale area and in counties bordering the Ohio River. Roads were initially wet, then became ice and snow-covered as the precipitation continued.
			TOTALS:	9	98	12.069M	53.071M	

Appendix E: Historical Hazard Maps

Please See PDF Files on Disk or Attached Maps

Appendix F: Critical Facilities

Airport Facilities Report

ID	Name	Address	City	Class	Function	Capacity	Year Built	Replacement Cost*
1	CAIRO RGNL		CAIRO	ADFLT	Public		1949	15000
2	HUNTER RAFFETY ELEVATORS INC		CAIRO	ADFLT	Private			500
3	EAST CAPE GIRARDEAU		MC CLURE	ADFLT	Private			500

***** Replacement costs are in thousands of dollars

Communication Facilities Report

ID	Name	Address	City	Class	Owner	Function	ReplaCost
1	WLY-734	Honey School Lookout off of Diswood		CDFLT	GALAXY CABLE,		
2	WLY-734	Next to community water tank		CDFLT	GALAXY CABLE,		
3	WLY-734	1/4 miles South of Hwy 146 on Iroquis St		CDFLT	GALAXY CABLE,		
4	E950167		ALEXAN	CDFLT	Galaxy Cable Inc.		
5	WPYH862	CAIRO REGIONAL AIRPORT	CAIRO	CDFLT	ALEXANDER		
6	WRLB2440	CAIRO MUNICIPAL AIRPORT	CAIRO	CDFLT	ALEXANDER		
7	WPJZ455	BEANRIDGE RD 4 MI E	THEBES	CDFLT	ALEXANDER		
8	WPJZ455	ILLINOIS ST RT 3	OLIVE	CDFLT	ALEXANDER		
9	WPJZ455	2000 WASHINGTON AVE	CAIRO	CDFLT	ALEXANDER		
10	WPJZ455		THEBES	CDFLT	ALEXANDER		
11	WPSH865	BEANRIDGE ROAD 6KM EAST OF	THEBES	CDFLT	ALEXANDER		
12	WPSH865	1501 WASHINGTON STREET	CAIRO	CDFLT	ALEXANDER		
13	WPSH865		THEBES	CDFLT	ALEXANDER		
14	KKL969	3102 SYCAMORE	CAIRO	CDFLT	ALEXANDER		
15	KKL969		CAIRO	CDFLT	ALEXANDER		
16	KNBP848	2000 WASHINGTON AVE	CAIRO	CDFLT	ALEXANDER		
17	WPIF992	2000 WASHINGTON AVE	CAIRO	CDFLT	ALEXANDER		
18	WPIF992	Mobiles	CAIRO	CDFLT	ALEXANDER		
19	WPMM421	BEAN RIDGE RD 8 KM NNW	OLIVE	CDFLT	ALEXANDER		
20	WPMM421	State Rt 3	OLIVE	CDFLT	ALEXANDER		
21	WPTV464	ON BEAN RIDGE ROAD, 8KM NNW OF	OLIVE	CDFLT	ALEXANDER		

ID	Name	Address	City	Class	Owner	Function	ReplaCost
22	WPTV464		OLIVE	CDFLT	ALEXANDER		
23	WPVJ684	BEANRIDGE RD 6KM E	THEBES	CDFLT	ALEXANDER		
24	WPVJ684	1501 WASHINGTON ST	CAIRO	CDFLT	ALEXANDER		
25	WPVJ684		THEBES	CDFLT	ALEXANDER		
26	WPVJ694	BEANRIDGE RD 6KM E	THEBES	CDFLT	ALEXANDER		
27	WPVJ694	1501 WASHINGTON ST	CAIRO	CDFLT	ALEXANDER		
28	WPVJ694		THEBES	CDFLT	ALEXANDER		
29	WQIV788	26620 ST RT 3 South	McClure	CDFLT	Ameren Services		
30	KEB432	RT 1 BOX 170 URBANDALE RAMP	CAIRO	CDFLT	AMERICAN		
31	KNKK555	200 EAST SUPERMAX ROAD	TAMMS	CDFLT	Arch Wireless		
32	WPCT562	1.5 MI S ON HWY 3	OLIVE	CDFLT	BENCHMARK		
33	WPCT562		OLIVE	CDFLT	BENCHMARK		
34	WLK808	200 FT N OF HONEY SCHOOL	OLIVE	CDFLT	BIG RIVER		
35	WQET961	APPROX 1 1/2 MI E OF WILLARD	MILLER	CDFLT	BILLINGS,		
36	WQET961		MILLER	CDFLT	BILLINGS,		
37	WEE811	3.1mi WNW of	ELCO	CDFLT	Microwave Bass		
38	WZU405	BASS HILL 3.1 MI WNW	ELCO	CDFLT	Radio Bass Hill		
39	WZU405		ELCO	CDFLT	BNSF Railway		
40	WNUD374	1201 WASHINGTON ST	CAIRO	CDFLT	BODE DRUG INC		
41	KKT218	34TH AND COMMERCIAL	CAIRO	CDFLT	Bunge North		
42	KKT218		CAIRO	CDFLT	Bunge North		
43	WPEY787			CDFLT	Bunge North		
44	WNZU930	RT 51 N .5 MI N OF RT 3	CAIRO	CDFLT	CAIRO DRY		

ID	Name	Address	City	Class	Owner	Function	ReplaCost
45	WNZU930		CAIRO	CDFLT	CAIRO DRY		
46	WQDH356	1501 WASHINGTON	CAIRO	CDFLT	CAIRO FIRE		
47	WQDH356		CAIRO	CDFLT	CAIRO FIRE		
48	KNHN513	1501 WASHINGTON	CAIRO	CDFLT	CAIRO, CITY OF		
49	KNHN513	11720 BORMAN	CAIRO	CDFLT	CAIRO, CITY OF		
50	KNHN513		CAIRO	CDFLT	CAIRO, CITY OF		
51	KYI833	1501 WASHINGTON AVE	CAIRO	CDFLT	CAIRO, CITY OF		
52	KYI833		CAIRO	CDFLT	CAIRO, CITY OF		
53	WPDD598	RT 1 BOX 12 2.5 MI S	MILLER	CDFLT	CARL WILLIS		
54	WPDD598		MILLER	CDFLT	CARL WILLIS		
55	KNKN477	RTE. 3, 2 MI SE OF THEBES	THEBES	CDFLT	Cellco Partnership		
56	KNKN477	RET 3, 0.5 MI N OF OLIVE BRANCH	OLIVE	CDFLT	Cellco Partnership		
57	KNKN477	316 33RD STREET	CAIRO	CDFLT	Cellco Partnership		
58	KNKN477	1.5 mi SE of East Cape Girardeau	East	CDFLT	Cellco Partnership		
59	WPON599	316 33rd Street	CAIRO	CDFLT	Cellco Partnership		
60	WPQL719	ON WEAVER RD, .8 MI NW OF OLIVE	OLIVE	CDFLT	Cellco Partnership		
61	WPQN999	1 MI OFF RT. 146, 1.5 MI SE OF	EAST	CDFLT	Cellco Partnership		
62	WNXZ585			CDFLT	CENTRAL		
63	WPPH362	600 WEST STREET	TAMMS	CDFLT	CRISLER,		
64	WPPH362		TAMMS	CDFLT	CRISLER,		
65	WQGK536	20023 DISWOOD ROAD	TAMMS	CDFLT	EGYPTIAN		
66	WQGK536		TAMMS	CDFLT	EGYPTIAN		
67	WQGK536		TAMMS	CDFLT	EGYPTIAN		

ID	Name	Address	City	Class	Owner	Function	ReplaCost
68	KYL625	19TH & WASHINGTON	CAIRO	CDFLT	First Student, Inc.		
69	WPMX235	R.R. 1	OLIVE	CDFLT	GRACE, WALT L		
70	WPMX235		OLIVE	CDFLT	GRACE, WALT L		
71	KNBY939	2 MI NNW INT RT 3 & 127 ON OLIVE	UNITY	CDFLT	HONEY FARM		
72	WPGW496	HWY 3 CENTER OF CITY	OLIVE	CDFLT	HORSESHOE		
73	WPGW496		OLIVE	CDFLT	HORSESHOE		
74	WLT388	221 15TH STREET	CAIRO	CDFLT	ILLINOIS BELL		
75	WLU435	3 1/2 MI N OF Olive Branch	OLIVE	CDFLT	ILLINOIS BELL		
76	WLU437	FRONT ST N OF RUSSELL	TAMMS	CDFLT	Illinois Bell		
77	WLU438	HWY 3 & RAILROAD STREET	OLIVE	CDFLT	Illinois Bell		
78	WLU439	POPULAR ST. AT 7TH. ST.	THEBES	CDFLT	ILLINOIS BELL		
79	WNRU844	5.4 MI WSW OF TAMMS AND 3.6 MI	OLIVE	CDFLT	ILLINOIS BELL		
80	KRR916	2 KM NNW	CAIRO	CDFLT	ILLINOIS		
81	WPGY534	2 KM NNW	CAIRO	CDFLT	ILLINOIS		
82	WPGY535	2 KM NNW	CAIRO	CDFLT	ILLINOIS		
83	KNNN204	200 E SUPERMAX RD	TAMMS	CDFLT	ILLINOIS, STATE		
84	KNNN204		TAMMS	CDFLT	ILLINOIS, STATE		
85	KQW403	HORSESHOE LAKE CONSERVATION	MILLER	CDFLT	ILLINOIS, STATE		
86	WNJW291	15TH ST AND WASHINGTON AVE	CAIRO	CDFLT	ILLINOIS, STATE		
87	WPIW533	200 E SUPERMAX RD	TAMMS	CDFLT	ILLINOIS, STATE		
88	WPLT988	200 E SUPERMAX RD	TAMMS	CDFLT	ILLINOIS, STATE		
89	WPLT988		TAMMS	CDFLT	ILLINOIS, STATE		
90	WQDG893	26620 ST. RT 3 SOUTH	MCCLURE		CDFLT	ILLINOIS, STATE	

ID	Name	Address	City	Class	Owner	Function	Replacement Cost
91	WQDG893		MCCLURE		CDFLT	ILLINOIS, STATE	
92	WQDY915	BASS HILL ROAD	ELCO	CDFLT	ILLINOIS, STATE		
93	WQDY915		ELCO	CDFLT	ILLINOIS, STATE		
94	WQGN908	Bass Hill Rd	Elco	CDFLT	Illinois, State of		
95	WQGN908		Elco	CDFLT	Illinois, State of		
96	WNKW502	325 22ND ST	CAIRO	CDFLT	Illinois-American		
97	WNKW502		CAIRO	CDFLT	Illinois-American		
98	KNIC988	ON RT 127 2 MI N	TAMMS	CDFLT	JORDAN, DONALD		
99	KNIC988		TAMMS	CDFLT	JORDAN, DONALD		
100	WNRQ987	RT 146 PURPLE CRACKLE	EAST	CDFLT	MC CLURE Fire		
101	WNRQ987		EAST	CDFLT	MC CLURE,		
102	WQHK793		MCCLURE		CDFLT	MCCLURE- EAST	
103	WQAF830	6 KM EAST OF BEANRIDGE ROAD	THEBES	CDFLT	MCCLURE-EAST		
104	WQAF830		THEBES	CDFLT	MCCLURE-EAST		
105	WQGS446	BASS HILL ROAD	ELCO	CDFLT	MOTOROLA, INC.		
106	KPH914	146 BADER LANE	EAST	CDFLT	MRR LICENSE LLC		
107	KNBZ516	BASS HILL 3 MI W	ELCO	CDFLT	NovaCom Inc		
108	KNBZ516		ELCO	CDFLT	NovaCom Inc		
109	WPLV660	4 MI S OF OLIVE BRANCH	MILLER	CDFLT	RIVER DELTA		
110	WPLV660		MILLER	CDFLT	RIVER DELTA		
111	WPUA219	OFF DELTA RD.	DRY	CDFLT	ROY WALKER		
112	WPUA219		DRY	CDFLT	ROY WALKER		
113	WQAR383	1 MI W	ELCO	CDFLT	SHAWNEE		

ID	Name	Address	City	Class	Owner	Function	ReplaCost
114	WQAR383		ELCO	CDFLT	SHAWNEE		
115	WPRT240	38 & COMMERCIAL AVE	CAIRO	CDFLT	SHAWNEE		
116	WPRT240		CAIRO	CDFLT	SHAWNEE		
117	WPMX695	2 KM OF CR 4 & GRAPEVINE TRL	TAMMS	CDFLT	SOUTH WATER		
118	WPMX695	0.5 KM SW OF GRAPEVINE TRL &	TAMMS	CDFLT	SOUTH WATER		
119	WPMX695	0.3 KM OFF OF GRAPEVINE TRL IN	MILL	CDFLT	SOUTH WATER		
120	WPMX696	0.3 KM NE OF CR 4 & SR 3	OLIVE	CDFLT	SOUTH WATER		
121	WPMX696	0.2 KM NE OF CR 4 & LEVEE RD	CAPE	CDFLT	SOUTH WATER		
122	WPMX696	0.1 KM NW OF SEMINOLE &	E CAPE	CDFLT	SOUTH WATER		
123	KOL260	.32MI ENE OF WHITNEY HOLLOW RD	ELCO	CDFLT	SOUTHERN		
124	KOL260		ELCO	CDFLT	SOUTHERN		
125	WPIK611	1/4 MI S OF RT 3 THEN 1/2 MI SE	OLIVE	CDFLT	SPAGNA, JAMES		
126	WPIK611		OLIVE	CDFLT	SPAGNA, JAMES		
127	WPIC502	RT 3 W OF RT 51	CAIRO	CDFLT	State of Illinois		
128	WSF593	4 MI W OF RT 3 ON MILLER CITY RD	CACHE	CDFLT	TAFLINGER,		
129	WSM242	APPROX 4 MI W OF RT 3 ON MILLER RD	CACHE	CDFLT	TAFLINGER,		
130	WPKG741	4TH AND MULBERY STREET	THEBES	CDFLT	THEBES Fire		
131	WPKG741		THEBES	CDFLT	THEBES, CITY		
132	WQAG279	WATER PLANT-THEBES SPUR ST	THEBES	CDFLT	THEBES,		
133	WQAG279	ELEVATED TANK--8TH ST	THEBES	CDFLT	THEBES,		
134	WQAG279		THEBES	CDFLT	THEBES,		
135	KNDS483	MILLER CITY RD ACROSS FROM	MILLER	CDFLT	THOMAS FARMS		
136	WNEX439	1700' SW OF INT OF HWY 3 & BEAN	THEBES	CDFLT	UNION PACIFIC		

ID	Name	Address	City	Class	Owner	Function	ReplaCost
137	KNJA272	MP 119.8 CHE SUB 1.1 MI N	THEBES	CDFLT	UNION PACIFIC		
138	WNKH642	MP 117.0 CHE SUB 1.4 MI NE	GALE	CDFLT	UNION PACIFIC		
139	KWB468	CORNER 4TH & OHIO STS	CAIRO	CDFLT	WATERFRONT		
140	WYU344	HWY 3 1 MI WNW	OLIVE	CDFLT	WILLIAMS,		

Dams Report

ID	Name	River	City	Owner	Purpose	Height (ft)	ReplaCost
1	HORSESHOE LAKE DAM	LAKE CREEK	MILLER CITY	Illinois Department	R	10	
2	CENTRAL ALEXANDER COUNTY	TRIB PIGEON ROOST CREEK		Central Alexander	O	7	

EOC Facilities Report

ID	Name	Address	City	Class	Year Built	Shelter Capacity	Stories	Replacement Cost*
1	Cairo Auxiliary Fire Station	3104 Sycamore St	Cairo	EFEO				$1,110

***** Replacement costs are in thousands of dollars

Fire Station Facilities Report

ID	Name	Address	City	Class	Stories	Year Built	Replacement Costs*
1	Cairo Fire Dept	1513 Washington Ave	Cairo	EFFS			666
2	Thebes Fire Dept	101 Old Route 3	Thebes	EFFS			666
3	Mc Clure East Cape Fire Dept	1 Main Street	Mc Clure	EFFS			666
4	Tamms Fire Dept	190 Railroad Street	Tamms	EFFS			666
5	Horseshoe Lake Fire Dept	27405 State Highway 3	Olive Branch	EFFS			666
6	Cairo Aux Fire Dept	3104 Sycamore	Cairo	FDFLT			

***** Replacement costs are in thousands of dollars

Hazardous Materials

ID	Name	Address	City	Class	EPAID	Chemical Name
1	BUNGE CORP.	203 34TH ST.	CAIRO	HDFLT	ILD024982951	N-HEXANE
2	BUNGE CORP.	203 34TH ST.	CAIRO	HDFLT	ILD024982951	"HYDROCHLORIC
3	BURKART FOAM INC.	36TH & SYCAMORE	CAIRO	HDFLT	ILD001787050	DICHLOROMETHA
4	BURKART FOAM INC.	36TH & SYCAMORE	CAIRO	HDFLT	ILD001787050	TOLUENE
5	BURKART FOAM INC.	36TH & SYCAMORE	CAIRO	HDFLT	ILD001787050	DIISOCYANATES
6	SERVICEMASTER CO.	1210 COMMERCIAL AVE.	CAIRO	HDFLT	ILD041882671	CERTAIN GLYCOL

Medical Care Facilities Report

ID	Name	Address	City	Class	Function	Beds	Stories	Replacement Cost*
1	Community Health &	13245 Kessler Rd	Cairo	MDFLT	Hospital	0	1	2500
2	Daystar Care Center	2001 Cedar St	Cairo	MDFLT	Nursing Ho	83	1	
3	H & S Care Center	310 Third St	Tamms	MDFLT	Nursing Ho	26	1	350
4	Pilot House	111 Washington Avenue	Cairo	MDFLT	Nursing Ho	16	1	400
5	Tamms Health Center	500 2nd St	Tamms	MDFLT	Hospital		1	350
6	Delta House	2107 Pine St	Cairo	MDFLT	Mental Health	10	2	150
7	Stinger Building	1207 Commercial Ave	Cairo	MDFLT	Mental Health	10	1	1000

***** Replacement costs are in thousands of dollars.

Police Station Facilities Report

ID	Name	Address	City	Class	Stories	Shelter Capacity	Year Built	Replacement Cost*
1	Cairo Police Records Station	1501 Washington Ave	Cairo	EFPS				1554
2	Alexander County Sheriff's Office	2000 Washington Ave	Cairo	EFPS				1554
3	Tamms Police Dept	425 Front Street	Tamms	EFPS				1554

***** Replacement costs are in thousands of dollars.

Port Facilities Report

ID	Name	Address	City	Class	Function	Berths	Year Built	Replacement Cost*
1	Waterfront Services Co., Fleet	315 Ohio Street	Wickliffe	PDFLT				2245.4
2	J. D. Streett and Co., Mound City	Mound City Road	Mound City	PDFLT	31			2245.4
3	Louisiana Dock Co., Mound City		Mound City	PDFLT				2245.4
4	Waterfront Services Co., Fleet	315 Ohio Street.	Cairo	PDFLT				2245.4
5	Cairo Municipal Landing.		Cairo	PDFLT				2245.4
6	Waterfront Services Co., Cairo Dock.	315 Ohio Street.	Cairo	PDFLT				2245.4

***** Replacement costs are in thousands of dollars.

Potable Water Facilities Report

ID	Name	Address	City	Class	Function	Stories	Year Built	Replacement Cost*
1	IL American Water Company	4100 Ohio St	Cairo		Water	1	1886	10000
2	IL American Water Company	4100 Ohio St	Cairo		Tank 52500			3000
3	IL American Water Company	22nd St	Cairo		Tank 20000		1954	1500
4	Thebes	N 8th St	Thebs		Tank 15000		2003	1000
5	Tamms	190 Railroad St	Tamms		Tank 15000		1951	2000
6	Tamms	Box Mill Rd	Tamms		Tank 50000		1997	2000
7	Tamms	Grapevine trail	Tamms		Tank 75000		1998	3000
8	Tamms	27183 Sandy Creek Rd	Tamms		Tank 100003		1998	3000
9	Tamms	Grapevine trail	Tamms		Tank 15000		1998	1000

***** Replacement costs are in thousands of dollars.

Rail Facilities Report

ID	Name	Address	City	Class	Function	DailyTraffic	YearBuilt	ReplaCost
1	J D Streett Mounds			RDF	Cargo			2419.8

***** Replacement costs are in thousands of dollars.

School Facilities Report

ID	Name	Address	City	Class	Students	Stories	Year Built	Replacement Cost*
1	BENNETT ELEMENTARY	434 18TH ST & WALNUT	CAIRO	EFS1	211			555
2	CAIRO HIGH SCHOOL	4201 SYCAMORE ST	CAIRO	EFS1	197			555
3	CAIRO JR HIGH SCHOOL	4201 SYCAMORE ST	CAIRO	EFS1	183			555
4	EMERSON ELEMENTARY	3101 ELM ST	CAIRO	EFS1	326			555
5	Egyptian High School	20023 Diswood Rd	TAMMS	SDFLT	190	1		500
6	Egyptian Middle School	20023 Diswood Rd	TAMMS	SDFLT	111	1		500
7	Egyptian Elementary	20023 Diswood Rd	TAMMS	SDFLT	257	1		500
8	Egyptian Pre-K	20023 Diswood Rd	TAMMS	SDFLT	50	1		500
9	Shawnee Elementary-S	40842 State Hwy 3	McClure	SDFLT	108	2		800
10	McClure Pre-School	40842 State Hwy 3	McClure	SDFLT	15	1		80
11	Olive Branch Cristian Academy	22461 Railroad St	Olive Branch	SDFLT	29	2		555
12	Sandusky Christian Academy	25447 Big Bend Rd	Sandusky	SDFLT				150

***** Replacement costs are in thousands of dollars.

WasteWater Facilities Report

ID	Name	Address	City	Function	Class	Stories	Year Built	Replacement Cost
1	CITY OF CAIRO	OHIO STREET	CAIRO	SEWAGE	CDFLT	1	1962	8000
2	CENTRAL ALEXANDER	CLANK ROAD	OLIVE BRANCH	SEWAGE	CDFLT		1998	1000
3	EAST CAPE	1 MILE SOUTHEAST OF VILLAGE	EAST CAPE	SEWAGE	CDFLT			1000
4	TAMMS STP, VILLAGE	PUMP HOUSE ROAD	TAMMS	SEWAGE	CDFLT		1963	1000
5	THEBES STP	ROUTE 3	THEBES	SEWAGE	CDFLT		1998	1000
6	Thebes Water	Poplar St	Thebes	Water Trea	CDFLT		1983	2000
7	Tamms Water	190 Railroad St	Tamms	Water Trea	CDFLT		1951	1000
8	Tamms Water treatment	27183 Sandy Creek Rd	Tamms	Water Trea	CDFLT		1998	6000

Appendix G: Critical Facilities Maps

Please See PDF Files on Disk or Attached Maps

Appendix H - NOAA Flood Data: USGS Stream Gauge Data

Top ten flood flows from the USGS Stream Gauge Data

County	Alexander County		Alexander County		McCracken County	
Station	Creek Near Fayville, IL		Thebes, IL		Paducah, KY	
River	Orchard Creek		Mississippi River		Ohio River	
Period of Record	1961-1972		1933-2007		1867-2009	
Latitude	37.19306		37.21647		37.08900	
Longitude	89.40972		89.46758		88.59400	
Rank	**Year**	**Discharge (cfs)**	**Year**	**Discharge (cfs)**	**Date**	**Historical Crests (ft)**
1	1961	148	1993	996,000	02/02/1937	60.00
2	1971	138	1943	893,000	04/07/1913	54.30
3	1972	118	1973	886,000	03/23/1884	54.30
4	1966	93	1995	875,000	02/13/1950	53.30
5	1964	70	1983	846,000	03/21/1867	52.00
6	1969	60	2002	838,000	03/11/1997	51.79
7	1970	49	1947	837,000	04/03/1975	51.40
8	1965	46	1944	812,000	03/25/1897	50.90
9	1963	41	1951	805,000	02/25/1883	50.70
10	1962	33	1979	791,000	04/17/1886	50.40

County	Massac County		Pulaski county		Pope County	
Station	Brookport Lock & Dam, IL		Grand Chain Lock & Dam, IL		Smithland Lock & Dam, IL	
River	Ohio River		Ohio River		Ohio River	
Period of Record	1936-2009		1927-2009		1983-2009	
Latitude	37.13300		37.20400		37.16700	
Longitude	88.65000		89.04200		88.43300	
Rank	**Date**	**Historical Crests (ft)**	**Date**	**Historical Crests (ft)**	**Date**	**Historical Crests (ft)**
1	02/02/1937	62.30	02/02/1937	64.00	03/12/1997	51.44
2	01/13/1950	55.10	03/15/1997	57.80	01/08/1991	49.80
3	03/12/1997	53.60	04/03/1975	57.60	01/16/2005	47.20
4	04/02/1975	53.30	04/19/1927	56.40	05/14/1984	47.10
5	02/15/1950	53.20	03/11/1945	56.30	05/25/1983	46.40
6	03/10/1945	52.30	03/09/1979	55.40	02/24/1989	46.10
7	01/07/1991	51.60	03/26/1973	55.40	02/19/1990	45.80
8	03/19/1963	51.60	05/28/1995	55.10	04/23/1994	45.20
9	03/17/1979	51.20	05/14/1984	55.00	03/28/2008	45.17
10	04/15/1936	50.90	01/02/1991	54.90	04/11/2008	44.93

County	Alexander County		Alexander County		Cape Girardeau County	
Station	Cairo, IL		Thebes, IL		Cape Girardeau, MO	
River	Ohio River		Mississippi River		Mississippi River	
Period of Record	1913-2009		1844-2009		1943-2009	
Latitude	37.00000		37.21700		37.30200	
Longitude	89.16200		89.46400		89.51800	
Rank	**Date**	**Historical Crests (ft)**	**Date**	**Historical Crests (ft)**	**Date**	**Historical Crests (ft)**
1	02/03/1937	59.50	05/23/1995	45.91	08/08/1993	48.49
2	04/03/1975	56.50	08/07/1993	45.51	05/24/1995	47.00
3	04/20/1927	56.40	07/04/1844	45.15	08/03/1993	46.90
4	03/11/1997	56.20	05/18/2002	44.31	05/18/2002	45.70
5	02/15/1950	55.90	04/30/1973	43.43	05/01/1973	45.50
6	05/28/1995	55.70	10/14/1987	41.52	04/17/1979	44.10
7	05/19/2002	54.95	07/03/2008	40.95	05/27/1943	42.40
8	04/04/1913	54.70	10/02/1993	40.82	07/03/2008	42.35
9	04/17/1994	54.20	03/01/1985	40.46	07/05/1947	41.90
10	05/16/1984	54.00	03/24/2008	40.37	06/24/2008	41.37