Multi-Hazard Mitigation Plan
Richland County

2012


The Polis Center
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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 Management 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 required in order to maintain eligibility for certain federal disaster assistance and hazard mitigation funding programs. To be eligible for future mitigation funds, the National Flood Insurance Program (NFIP) communities must adopt an MHMP.

The Richland County Emergency Management Agency, the Greater Wabash Regional Planning Commission, Southern Illinois University at Carbondale (SIU) and The Polis Center (Polis) at Indiana University Purdue University-Indianapolis have joined efforts to develop this mitigation plan, realizing that the recognition of and the protection from hazards impacting the county and its residents contribute to future community and economic development. The team will continue to work together to develop and implement mitigation initiatives developed as part of this plan.

In recognition of the importance of planning in mitigation activities, FEMA created **Ha**zards **US**A **M**ulti-**H**azard (Hazus-MH), a powerful geographic information system (GIS)-based disaster risk assessment tool. This tool enables communities of all sizes to predict 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. SIU and Polis are assisting Richland County with performing the hazard risk assessment.

1.2 Planning Team Information

The Richland County Multi-Hazard Mitigation Planning Team is headed by Mike Buss, who is the primary point of contact. Members of the planning team include representatives from various county departments, cities and towns, and public and private utilities. Table 1-1 identifies the planning team individuals and the organizations they represent.

Table 1-1: Multi Hazard Mitigation Planning Team Members

Name	Title	Organization	Jurisdiction
Mike Buss	Director	Richland County EMA	Richland County
Randy Bukas/Larry Taylor	City Manager	City of Olney	City of Olney
Brandi Stennett	Director	Richland County Development Corporation	Richland County
Donna Brown		Richland Memorial Hospital	Richland County
Debra Lamb	Registered Nurse	Richland County Health	Richland County
Kristi Urfer	Interim Dean	Olney Central College	Richland County
Rodney Ranes	President	Olney Central College	Richland County
Gary Wachtel	Commissioner	Richland County Board	Richland County
Danny Colwell	Flood Plan Admin/Engineer	Richland County Engineer	Richland County
Tim Hahn	Supervisor of Assessments	Richland County Assessor	Richland County
Andrew Hires	Sheriff	Richland County Sheriff	Richland County
Alice Mullinax	County Clerk/Recorder	Richland County Board	Richland County
Larry Bussard		East Richland School Corp	City of Olney
Rusty Holmes		Olney Fire Dept	City of Olney
Ted Marshall			Village of Claremont
Richard Snyder			Village of Calhoun
Richard Clark	Mayor	Village of Noble	Village of Noble
Tom Hanna			Village of Parkersburg
Michael Lamb	Public	City of Olney	Richland County
Leo Ledker	Board Chairman	Richland County Board	Village of Parkersburg

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

- Attending the MHMP meetings
- Providing available 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 Sheriff's Annex in Olney, IL, on March 1, 2011. Representatives from Southern Illinois University explained the rationale behind the MHMP program and answered questions from the participants. The Polis Center also provided an overview of Hazus-MH, described the timeline and the process of the mitigation planning project, and presented Richland County with a Memorandum of Understanding (MOU) for sharing data and information.

The Richland County Multi-Hazard Mitigation Planning Committee met on March 1, 2011, April 19, 2011, June 8, 2011, September 15, 2011, and January 23, 2012. Each meeting was approximately two hours in length. The meeting minutes 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

An effort was made to solicit public input during the planning process, and a public meeting was held on June 8, 2011 to review the county's risk assessment. 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 Richland County planning team invited participation from various representatives of county government, local city and town governments, community groups, local businesses, and universities. The team also invited participation from adjacent counties to obtain their involvement in the planning process. Details of neighboring stakeholders' involvement are summarized in Table 1-2.

Table 1-2: Neighboring Community Participation

Person Participating	Neighboring Jurisdiction	Organization	Participation Description
Ken Proyer dkproyer@frontier.com	Crawford County	Crawford County EMA	Invited to participate in public meeting, reviewed the plan and provide comments.
Gerald Angel lcema@frontier.com	Lawrence County	Lawrence County EMA	Invited to participate in public meeting, reviewed the plan and provide comments.
Deborah Judge dizziemay@hotmail.com	Edwards County	Edwards County EMA	Invited to participate in public meeting, reviewed the plan and provide comments.

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
U.S. Census Bureau	County Profile Information
NOAA National Climatic Data Center	Climate Data
Illinois Emergency Management Agency	2007 Illinois Natural Hazard Mitigation Plan
Illinois Emergency Management Agency	Illinois Emergency Operations Plan
Richland County Assessor Office	Parcel Map, Tax and Structure Data
United States Geological Survey	Physiographic/Hill Shade Map, Earthquake Information, Hydrology
Illinois State Geological Survey	Geologic, Karst Train, Physiographic Division and Mining Maps

1.6 Review of Existing Plans

Richland County and its local communities utilized 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 planning process also incorporated the existing natural hazard mitigation elements from 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
FEMA	2010	Richland County Flood Insurance Study	Describes the NFIP program, which communities participates; provide flood maps	Sections 4 and 5
State of Illinois Emergency Management Plan	2007	2007 Illinois Natural Hazard Mitigation Plan	This plan provides an overview of the process for identifying and mitigating natural hazards in Illinois as require by the Disaster Mitigation Act of 2000.	Guidance on hazards and mitigation measures and background on historical disasters in Illinois.
Illinois Emergency Management Agency	2011	2011 Severe Weather Preparedness	This document provides facts and recommendations for severe weather.	Sections 3 and 4

Section 2 - Jurisdiction Participation Information

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

Table 2-1: Participating Jurisdictions

Jurisdiction Name
Richland County
City of Olney
Village of Calhoun
Village of Claremont
Village of Noble
Village of Parkersburg

2.1 Adoption by Local Governing Body

The draft plan was made available on January 24, 2012 to the planning team for review. Comments were then accepted. The Richland County hazard mitigation planning team presented and recommended the plan to the County Commissioners, who adopted it on <date adopted>. Resolution adoptions are included in Appendix F of this plan.

2.2 Jurisdiction Participation

It is required that each jurisdiction participates in the planning process. Table 2-2 lists each jurisdiction and describes its participation in the construction of this plan.

Table 2-2: Jurisdiction Participation

Jurisdiction Name	Participating Members	Participation Description
Richland County	Mike Buss	MHMP planning team member
City of Olney	Larry Taylor	MHMP planning team member
Town of Calhoun	Richard Snyder	MHMP planning team member
Town of Claremont	Ted Marshall	MHMP planning team member
Town of Noble	Richard Clark	MHMP planning team member
Town of Parkersburg	Leo Ledeker	MHMP planning team member

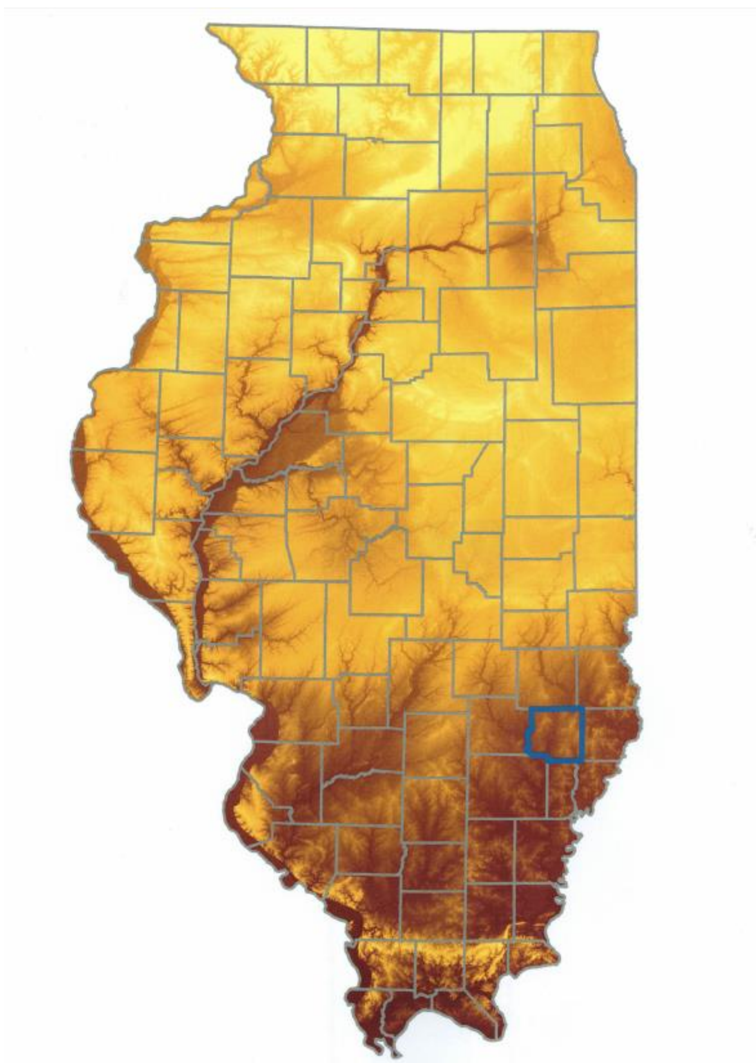
All members of the MHMP planning committee were actively involved in attending the MHMP meetings, providing available Geographic Information Systems (GIS) data and historical hazard information, reviewing and providing comments on the draft plans, coordinating and participating in the public input process, and coordinating the county's formal adoption of the plan.

Section 3 - Jurisdiction Information

Settlement of the Richland County area began around 1815, along a stagecoach route that ran from Vincennes, Indiana to St. Louis, Missouri. Richland County was organized as a county in 1841, named in honor of Col. Pierre Richland, a Frenchman who settled at Kaskaskia in 1790. There was some controversy regarding the location of the county seat; however, Olney was determined as the choice based on a donation of land and the central location.

Richland County is located in the eastern side of southern Illinois. The county's total land area is 362 square miles, of which 99.5% is land and 0.5% is water. It is bordered by Jasper County in the north, Lawrence County in the east, Wayne, Edwards, and Wabash counties in the south, and Clay County in the west. Figure 3-1 depicts Richland County's location.

Figure 3-1: Richland County, Illinois



3.1 Topography

Richland County is located in the eastern portion of southern Illinois, which is forested with oak, hickory, and maple. The surface of Richland County is generally rolling, with higher elevations primarily prairielands. This area can be distinguished by its warmer climate, different mix of crops, unglaciated topography, as well as small-scale oil deposits and coal mining.

3.2 Climate

Richland County climate, defined as temperate continental, is typical of southern Illinois. It is subject to both cold Arctic air and hot, humid tropical air from the Gulf of Mexico. The variables of temperature, precipitation, and snowfall can vary greatly from one year to the next. Winter temperatures can fall below freezing starting as early as October and extending as late as April. Based on data provided by the National Climatic Data Center (NCDC), the average winter low is 19° F and the average winter high is 44° F. In summer, the average low is 61.9° F and average high is 88° F. Average annual precipitation is approximately 43 inches. This area experiences about 104 days of the year with at least 0.01 inches of precipitation—March through July are the wettest months. Thunderstorms contribute over half of the annual precipitation. Severe droughts are infrequent, but prolonged dry periods during part of the growing season are not unusual. Such periods usually cause reduced crop yields.

3.3 Demographics

According to the 2010 U.S. Census, Richland County has a population of 16,233 with almost 50% living in rural areas of the county. According to American Fact Finder, Richland County's population has decreased by over 4% in the past decade. The population is spread throughout nine townships: Bonpas, Claremont, Decker, Denver, German, Madison, Noble, Olney, and Preston. The largest community in Richland County is Olney, which has over half of the total county population. The breakdown of population by jurisdiction is included in Table 3-1. The county has a population density of 43 persons per square mile, compared to an Illinois state average of 223 persons per square mile. The average household size is 2.4 persons.

Table 3-1: Population by Community

Community	2009 Population	% of County
Calhoun	212	1.4%
Claremont	203	1.3%
Noble	691	4.5%
Olney	8392	54%
Parkersburg	224	1.5%
Calhoun	212	1.4%

Source: http://factfinder.census.gov; http://www.city-data.com;

3.4 Economy

Richland County Development Corporation reported for 2009 that 6,254 of the residents are employed, with 78% of the workforce in Richland County in the private sector. The breakdown is included in Table 3-2. Educational, health, and social services represent the largest sector, employing approximately 20.3% of the workforce. The 2009 annual per capita income for Richland County is $22,842.

The main agricultural products of southern Illinois are crops such as corn and soybeans. Apples, peaches, and grapes are commonly found throughout the region in addition to the occasional sunflower, cotton, wheat, and hay fields.

Southern Illinois also has significant coal deposits; however, since the late 1980s, the coal industry has suffered considerable decline due to the decreased demand for high sulfur coal, which causes more pollution. The collapse of the coal industry has had profound and lasting impact on the region's economy.

The 2009 annual per capita income in Richland County is $28,444 compared to a state average of $49,400. Table 3-2 presents the employment of the county's workforce by sector.

Table 3-2: Industrial Employment by Sector

Industrial Sector	Number of Employees	Percent of Employees
Educational Health and Social Services	1560	20.3%
Transportation and Warehousing	1095	14.3%
Retail Trade	883	11.5%
Health Care	820	10.7%
Educational Services	705	9.2%
Manufacturing	525	6.8%
Accommodation and Food Services	490	6.4%
Other	1602	20.8%
Total Labor Force	**7680**	**100%**

Source: http://www.rcdc.com

3.5 Industry

Richland County's major employers and number of employees are listed in Table 3-3. The largest employer in the county is the Wal-Mart Distribution Center, which has approximately 765 employees. The local Wal-Mart Supercenter employs an additional 268 people. The Richland Memorial Hospital is the second largest employer with 450 full time workers. The service area includes portions of eight surrounding counties with a total patient population of about 60,000.

Table 3-3: Major Employers

Company Name	Location	Employees	Type of Business
Wal-Mart Distribution Center #6059	Olney	765	Manufacturing
Richland Memorial Hospital	Olney	450	Health Care
East Richland School District	Olney	295	Education
Wal-Mart Supercenter	Olney	268	Retail
Burgin Manor of Olney	Olney	190	Health Care
Schneider National Trucking	Olney	180	Transportation
Pacific Cycle	Olney	160	Retail
ARC Community Support	Olney	125	Health Care
Prairie Farms Dairy	Olney	96	Manufacturing
Weber Medical Clinic	Olney	90	Health Care
First National Bank	Olney	80	Banking
Richland Care and Rehab	Olney	75	Health Care
West Richland School District	Noble	66	Education
Olney Central College	Olney	290*	Education
City of Olney	Olney	152*	Government

Source: www.rcdc.com
** Includes part-time workers*

3.6 Commuter Patterns

According to Richland County Development Corporation, approximately 7,680 of the Richland County population are in the work force; 81.3% of county residents live and work in the county. The average travel time from home to work is 16.1 minutes, with 84% of the county population driving car (alone) to work. Table 3-4 depicts the commuting patterns for the Richland County labor force.

Table 3-4: Commuter Patterns from Richland County

Area Name	Workers
Clay County	350
Edwards County	214
Lawrence County	201
Jasper County	114
Crawford County	73
Wabash County	53
Wayne County	39
Effingham County	38
Madison County	12
Macoupin County	10

Source: http://www.city-data.com/county/Richland_County-IL.html

3.7 Land Use and Development Trends

Agriculture is the predominant land use in Richland County with an average farm size of 414 acres. Over 91% of the farms are family-owned. Significant crops include soybeans, corn, and wheat; 19 acres are dedicated orchards.

Major roadways passing through Richland County include U.S. Highways 50 and 525, and Illinois Routes 15, 130 and 250. The Olney-Noble Airport serves light aircraft and is located on the west side of Richland County. Additionally, the CSX rail line provides intermodal freight transport outside the county.
Sources: Richland County Development Corporation

3.8 Major Lakes, Rivers, and Watersheds

Richland County has a number of bodies of water including Montclare Lake, McCarthy Lake, Olney Lake (aka Vernor Lake), Hahn Lake, Millers Lake, Borah Lake, and the East Fork Lake. Additional waterways include Big Creek, Fox River, East Fork Fox River, Jesse Creek, Camp Branch, Calfkiller Creek, Buck Run, Rock Branch, Brown Creek, Coon Creek, Mash Creek, and Simmons Creek. According to the USGS, Richland County crosses three HUC 8 watersheds as described in Table 3-5.

Table 3-5: Watersheds

Watershed Name	HUC Code
Lower Wabash	05120113
Little Wabash	05120114
Embarras	05120112

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. A 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 plans identified in Table 1-3 did not contain a risk analysis. These local planning documents were reviewed to identify historical hazards and help identify risk. To facilitate the planning process, state flood data was used for the flood analysis.

4.1.2 National Hazard Records

4.1.2.1 National Climatic Data Center (NCDC) Records

To assist the planning team, historical storm event data was compiled from the National Climatic Data Center (NCDC). NCDC records are estimates of damage reported to 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 given weather events.

The NCDC data included 145 reported events in Richland County between January, 1961 and the December, 2011. A summary table of events related to each hazard type is included in the hazard profile sections that follow. A full table listing all events, including additional details, is included as Appendix C. 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. The list of NCDC hazards included in this plan is in Table 4-1. For the purpose of this report, severe thunderstorm will include hail, rain, lightening, and high winds; winter storms include ice and snow.

Table 4-1: Climatic Data Center Historical Hazards

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

4.1.2.2 FEMA Disaster Information

Since 1961 there have been 57 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). Richland County has received federal aid for both PA and IA funding for five declared disasters since 1961. Figure 4-1 depicts the disasters and emergencies that have been declared for Richland County since 2001. Table 4-2 lists more specific information for each declaration.

Figure 4-1: FEMA-Declared Emergencies and Disasters in Richland County (1961-present)

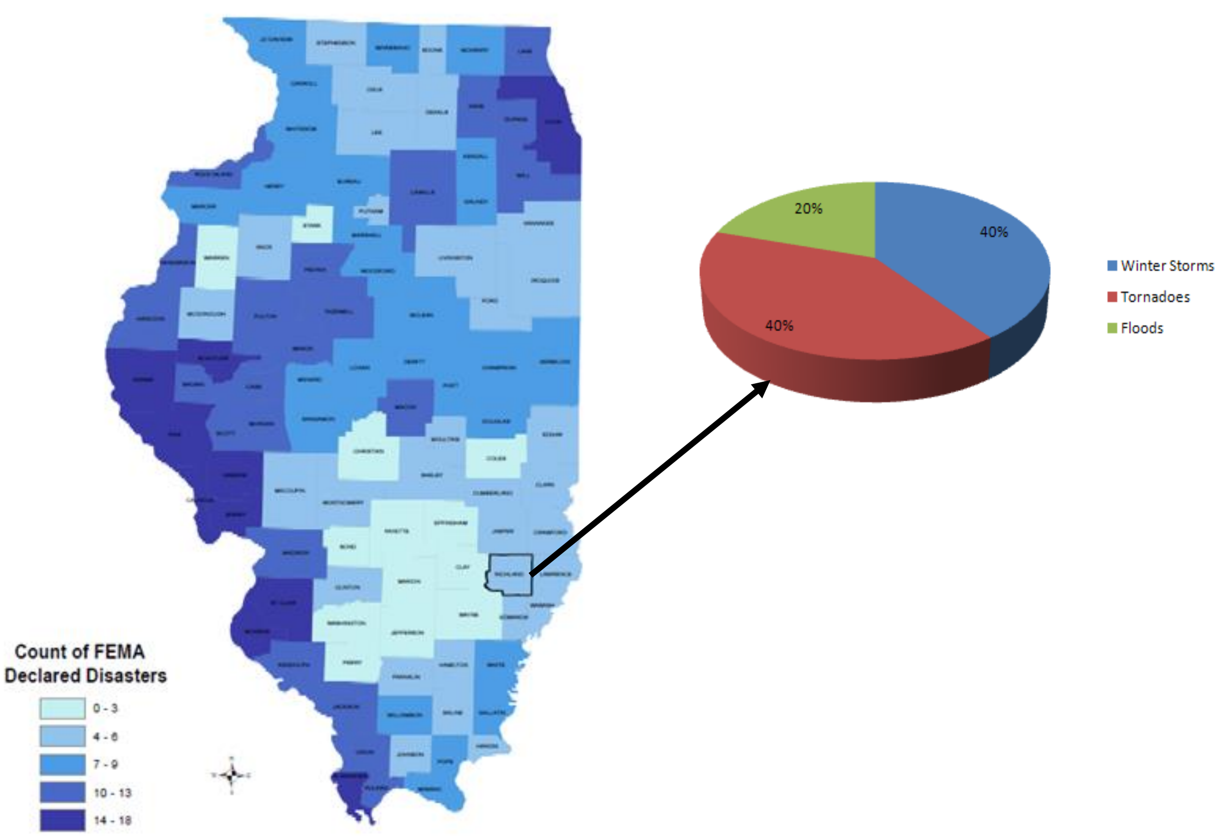


Table 4-2: FEMA-Declared Emergencies in Richland County (1961-2011)

Date of Incident	Date of Declaration	Disaster Description	Type of Assistance
May 15 – July 3, 1990	June 22, 1990	Severe Storms and Tornadoes,	Individual
April 28 – 17May, 1996	May 6, 1996	Severe Storms and Flooding	Public
April 21-May 23, 2002	May 21, 2002	Severe Storms, Tornadoes, and Flooding	Individual and Public
Dec 21 – Dec 23, 2004	February 1, 2005	Snow	Public
Jan 31-Feb 3, 2011	March 17, 2011	Severe Winter Storm and Snowstorm	Public

4.1.3 Hazard Ranking Methodology

During Meeting #2, held on April 19, 2011, the planning team reviewed historical hazards information and participated in a risk analysis, using a projector and Excel spreadsheet. The spreadsheet listed the compiled NCDC data for each community.

The spreadsheet calculated the probability rating (Low, Medium, High) of each hazard, based on the number of events that have occurred in the county within the past 50 years. Throughout the planning process, the MHMP team had the opportunity to update the NCDC data with more accurate local information. For example, the NCDC records often list the locations of hazards such as floods under the county, not accounting for how the individual communities were affected. In such situations, the probability rating assigned to the county was applied to all jurisdictions within the county.

Team consensus was also important in determining the probability of hazards not recorded by NCDC, for example dam and levee failure and hazardous materials spills. The probabilities for these hazardous events were determined by the planning team's estimation, derived from local experience and records, of the number of historical events within the past 50 years. The probability ratings are based on the following guidelines:

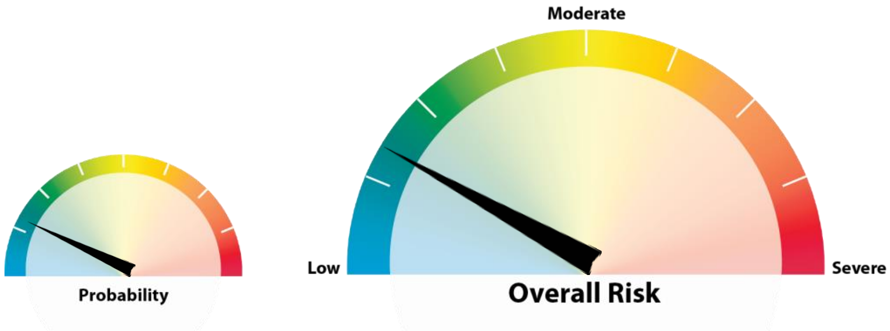
- Low = 0 - 5 events
- Medium = 6 - 15 events
- High = 16 + events

After improving the NCDC data with additional local data, the team determined each hazard's potential impact on the communities. The impact rating (Minimal, Moderate, or Significant) was based on the following guidelines.

- Minimal = Few injuries
Critical facilities shut down for 24 hours
Less than 15% of property damaged
- Moderate = Multiple injuries
Critical facilities shut down for 1 - 2 weeks
At least 30% of property damaged
- Significant = Multiple deaths
Critical facilities shut down for more than 1 month
More than 50% of property damaged

Finally, the overall hazard risk was determined by multiplying probability and impact. It is important to consider both probability and impact when determining risk. For example, if an asteroid were to collide with Earth, the impact would be extreme; but the probability of a catastrophic asteroid strike (has not happened in billions of years) is so small that the overall risk would be extremely low. In human history, there has never been a recorded fatality attributed to meteor collusion. In contrast, other potentially damaging events like tornados, thunderstorms and floods are relatively less severe but occur more frequently throughout Illinois and Richland County.

Each hazard addressed within the plan will use sliding scales to represent the probability, impact, and overall risk ratings. The dashboard will be depicted as follows:



The planning team identified winter weather, and severe thunderstorms, winter weather, hazardous materials spills, and flooding as the most significant hazards affecting Richland County. The hazard rankings are listed in Table 4-3.

Table 4-3: Richland County Hazards

HAZARD CATEGORIES	PROBABILITY	IMPACT	OVERALL RISK
	Low, Medium, High	*Minimal, Moderate, Significant*	*Low, Moderate, Severe*
RICHLAND COUNTY (ALL)			
Tornado	Medium	Moderate	Moderate
Flood	High	Moderate	Severe
Dam/Levee Failure	Low	Significant	Moderate
Earthquake	Medium	Significant	Moderate
Severe Thunderstorm	High	Significant	Severe
Winter Weather (snow & ice)	High	Significant	Severe
Drought/Extreme Heat	Medium	Minimal	Low
Hazardous Materials Release	High	Significant	Severe
Structural Failure & Fires	Medium	Moderate	Moderate
CALHOUN			
Tornado	Medium	Significant	Moderate
Flood	High	Moderate	Severe
Dam/Levee Failure	Low	Minimal	Low
Earthquake	Medium	Significant	Moderate
Severe Thunderstorm	High	Significant	Severe
Winter Weather (snow & ice)	High	Significant	Severe
Drought/Extreme Heat	Medium	Moderate	Moderate
Hazardous Materials Release	Low	Minimal	Low
Structural Failure & Fires	Medium	Minimal	Low
CLAREMONT			
Tornado	Medium	Significant	Moderate
Flood	High	Moderate	Severe
Dam/Levee Failure	Low	Minimal	Low
Earthquake	Medium	Significant	Moderate
Severe Thunderstorm	High	Significant	Severe

Winter Weather (snow & ice)	High	Significant	Severe
Drought/Extreme Heat	Medium	Moderate	Moderate
Hazardous Materials Release	Low	Significant	Moderate
Structural Failure & Fires	Medium	Minimal	Low
NOBLE			
Tornado	Medium	Significant	Moderate
Flood	High	Minimal	Low
Dam/Levee Failure	Low	Minimal	Low
Earthquake	Medium	Significant	Moderate
Severe Thunderstorm	High	Significant	Severe
Winter Weather (snow & ice)	High	Significant	Severe
Drought/Extreme Heat	Medium	Minimal	Low
Hazardous Materials Release	Low	Significant	Moderate
Structural Failure & Fires	Medium	Moderate	Moderate
OLNEY			
Tornado	Medium	Significant	Moderate
Flood	High	Significant	Severe
Dam/Levee Failure	Low	Moderate	Low
Earthquake	Medium	Significant	Moderate
Severe Thunderstorm	High	Significant	Severe
Winter Weather (snow & ice)	High	Significant	Severe
Drought/Extreme Heat	Medium	Moderate	Moderate
Hazardous Materials Release	Low	Significant	Moderate
Structural Failure & Fires	Medium	Significant	Moderate
PARKERSBURG			
Tornado	Medium	Significant	Moderate
Flood	High	Minimal	Low
Dam/Levee Failure	Low	Minimal	Low
Earthquake	Medium	Significant	Moderate
Severe Thunderstorm	High	Significant	Severe
Winter Weather (snow & ice)	High	Significant	Severe
Drought/Extreme Heat	Medium	Minimal	Low
Hazardous Materials Release	Low	Significant	Moderate
Structural Failure & Fires	Medium	Minimal	Low

4.1.4 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. This process improved 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 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 will fall into a structural class, and structures in each class will respond in a similar fashion to a specific depth of flooding or ground shaking. 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 through GIS, Hazus-MH, and historical information to predict which communities would be at risk.

Using Hazus-MH
1. 100-year overbank flooding
2. Earthquake scenarios

Using GIS
1. Tornado
2. Hazardous material release

Using Historical Information
1. Tornado
2. Flood and Dam/Levee
3. Earthquake
4. Thunderstorm
5. Drought
6. Winter Storm
7. Hazardous Materials
8. Fire

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 and Polis; verified the datasets using local knowledge, and allowed Polis to use their local GIS data for additional verification. 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 reflect a level 2 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 the 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.

The default aggregate building inventory tables have been replaced with the most recent Assessor records. Richland County provided the parcel boundaries to The Polis Center using the Richland County Assessor records. Records without improvements were deleted. The parcel boundaries were converted to parcel points located in the centroids of each parcel boundary. Each parcel point was linked to an Assessor record based upon matching parcel numbers. The generated building inventory points represent the approximate locations (within a parcel) of building exposure. The parcel points were aggregated by census block.

Parcel-matching results for Richland County are listed in Table 4-4.

Table 4-4: Parcel-Matching for Richland County

Data Source	Count
County Provided Parcels with Assessor Records	13,022
Assessor Records with Improvements	7,266

The following assumptions were made during the analysis:

- The building exposure is determined from the Assessor records. It is assumed that the population and the buildings are located at the centroid of the parcel.
- The results in this analysis reflect matched parcel records only. The parcel-matching results for Richland County are included in Table 4-4.

- Population counts are based upon 2.5 persons per household. Only residential occupancy classes are used to determine the impact on the local population. If the event were to occur at night, it would be assumed that people are at home (not school, work, or church).
- The analysis is restricted to the county boundaries. Events that occur near the county boundaries do not contain damage assessments from adjacent counties.

4.2.1.2 Facilities: Essential, Critical, Community Assets

For the purpose of this plan, ***essential facilities*** are defined as the core critical facilities that are vital to the county in the event of a hazard. These include Emergency Operations Centers, police departments, fire stations, schools, and care facilities.

Table 4-5 identifies the essential facilities that were added or updated for the analysis. Essential facilities are a subset of critical facilities. Names and locations of all essential and critical facilities, and community assets are documented in Appendix D.

Facility Categories

Essential: Core critical facilities; includes schools, fire departments, police departments, EOCs, and care facilities

Critical: Economically/socially viable facilities

Community Assets: Other important county facilities

Table 4-5: Essential Facilities List

Facility	Number of Facilities
Care Facilities	10
Emergency Operations Centers	1
Fire Stations	3
Police Stations	2
Schools	10

Critical facilities are additional entities that are deemed economically or socially viable to the county, including communication facilities, utilities, transportation facilities, infrastructure, and hazardous materials sites. Names of all critical facilities are documented in Appendix D.

The Richland County Mitigation Planning team has also identified facilities that are a significant component to the county; for example, historic landmarks or significant tourist attractions. Throughout this plan, these will be referred to as ***community assets***. Names of all community assets are documented in Appendix D.

4.2.1.3 Facility Replacement Costs

Facility replacement costs and total building exposure are identified in Table 4-6. The replacement costs have been updated by local data. Table 4-6 also includes the estimated number of buildings within each occupancy class.

The Assessor records often do not distinguish parcels by occupancy class when the parcels are not taxable; therefore, the total number of buildings and the building replacement costs for government, religious/non-profit, and education may be underestimated.

Table 4-6: Building Exposure

General Occupancy	Estimated Total Buildings	Total Building Exposure (X 1000)
Agricultural	986	$148,058
Commercial	538	$233,703
Education*	0	$0
Government*	334	$0
Industrial	34	$30,007
Religious/Non-Profit*	0	$0
Residential	5,374	$540,029
Total	**7,266**	**$951,797**

** Structure value and/or number of structures not available from Assessor data*

4.3 Future Development

As the county's population continues to grow, the residential and urban areas will extend further into the county, placing more pressure on existing transportation and utility infrastructure while increasing the rate of farmland conversion; Richland County will address specific mitigation strategies in Section 5 to alleviate such issues.

Because Richland County is vulnerable to a variety of natural and technological threats, the county government—in partnership with state government—must make a commitment to prepare for the management of these types of events. Richland County is committed to ensuring that county elected and appointed officials become informed leaders regarding community hazards so that they are better prepared to set and direct policies for emergency management and county response.

4.4 Hazard Profiles

4.4.1 Tornado Hazard

Hazard Definition for Tornado Hazard

Tornadoes pose a great risk to Illinois and its citizens. Although the majority of tornadoes occur between April and June, between 3PM and 10PM, they can occur at any time. Illinois averages 44 tornadoes per year. The unpredictability of tornadoes makes them one of the state's 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 miles per hour, but higher and lower values can occur. A wind velocity of 200 miles per hour 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 debris, it has reached the ground and is a tornado.

Tornadoes are classified according to the Enhanced Fujita tornado intensity scale. The tornado scale ranges from low intensity EF0 with effective wind speeds of 65 to 85 miles per hour to EF5 tornadoes with effective wind speeds of over 200 miles per hour. The Enhanced Fujita intensity scale is described in Table 4-7.

Table 4-7: Enhanced Fujita Tornado Rating

Enhanced Fujita Number	Estimated Wind Speed	Path Width	Path Length	Description of Destruction
EF0 *Gale*	65-85 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.
EF1 *Moderate*	86-110 mph	18-55 yards	1.0-3.1 miles	Moderate damage, roof surfaces peeled off, mobile homes pushed off foundations, attached garages damaged.
EF2 *Significant*	111-135 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.
EF3 *Severe*	136-165 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.
EF4 *Devastating*	166-200 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.
EF5 *Incredible*	Over 200 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.

Source: NOAA Storm Prediction Center

Previous Occurrences for Tornado Hazard

There have been a few occurrences of tornadoes within Richland County during the past few decades. The NCDC database reported six tornadoes/funnel clouds in Richland County since 1960. The most recent recorded event occurred on May 27, 2008, when a tornado briefly touched down southeast of Olney. The tornado briefly touched down in a field and reportedly caused no significant damage.

On June 02, 1990, an EF4 caused approximately $250,000 in damages. The following year on August 3, $2.5 million in property damage resulted when an EF1 touched down in Richland County.

Richland County NCDC recorded tornadoes are identified in Table 4-8. Additional details for NCDC events are included in Appendix C.

Table 4-8: Richland County Tornadoes*

Location or County	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Richland County	11/26/1965	Tornado	F2	0	5	25K	0
Richland County	3/15/1984	Tornado	F0	0	0	250K	0
Richland County	6/02/1990	Tornado	F4	0	0	250K	0
Richland County	8/03/1991	Tornado	F1	0	0	2.5M	0
Noble	4/15/1998	Tornado	F0	0	0	0	0
Olney	5/27/2008	Tornado	F0	0	0	0	0
Higgins	05/25/2011	Tornado	F0	0	0	0	0

** 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.*

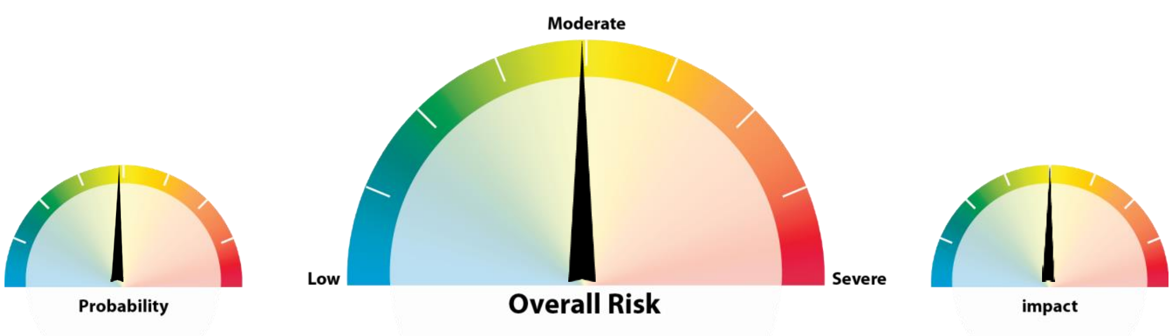
Geographic Location for Tornado Hazard

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 generally moved from southwest to northeast across the county, although other tracks are possible. The extent of the hazard varies both in terms of the extent of the path and the wind speed.

Risk Identification for Tornado Hazard



Based on historical information, the occurrence of future tornadoes in Richland County is medium. Tornadoes with varying magnitudes are expected to happen. In Meeting #2, the planning team determined that the potential impact of a tornado is moderate; therefore, the overall risk of a tornado hazard for Richland County is moderate.

Vulnerability Analysis for Tornado Hazard

Tornadoes can occur within any area in 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 Richland County are discussed in Table 4-6.

At-Risk Facilities

All essential and critical facilities and community assets are vulnerable to tornadoes. These facilities 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, damaging debris (trees or limbs), 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 4-5 lists the types and numbers of all of the essential facilities in the area. A comprehensive list of the Richland County essential and critical facilities and community assets is included as Appendix D.

Building Inventory

The building exposure in terms of types and numbers of buildings for the entire county is listed in Table 4-6. The buildings within the county can all expect the same impacts, similar to those discussed for essential and critical facilities and community assets. These impacts include structural failure, damaging debris (trees or limbs), roofs blown off or windows broken by hail or high winds, and loss of building function (e.g. 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 gauge the anticipated impact of tornadoes in the county, in terms of numbers and types of buildings and infrastructure.

Hazus-MH Tornado Analysis

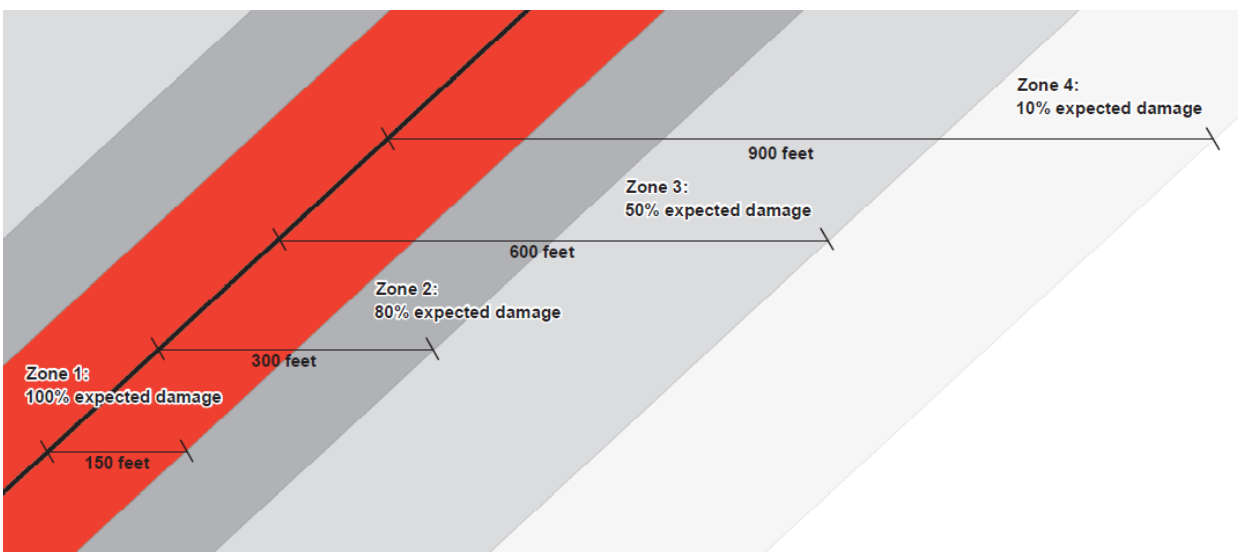
GIS overlay modeling was used to determine the potential impacts of an EF4 tornado. The analysis used a hypothetical path based upon the EF4 tornado event that ran for 18.4 miles through the towns of Noble and Olney. The selected widths were modeled after a recreation of the Enhanced Fujita-Scale guidelines 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. Table 4-9 depicts tornado damage curves as well as path widths.

Table 4-9: Tornado Path Widths and Damage Curves

Enhanced Fujita Scale	Path Width (feet)	Maximum Expected Damage
EF5	2400	100%
EF4	1800	100%
EF3	1200	80%
EF2	600	50%
EF1	300	10%
EF0	150	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 path. This natural process was modeled in GIS by adding damage zones around the tornado path. Figure 4-2 and Table 4-10 describe the tornado 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 EF4 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 4-10: EF4 Tornado Zones and Damage Curves

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

The selected hypothetical tornado path is depicted in Figure 4-3, and the damage curve buffers are shown in Figure 4-4.

Figure 4-3: Hypothetical EF4 Tornado Path in Richland County

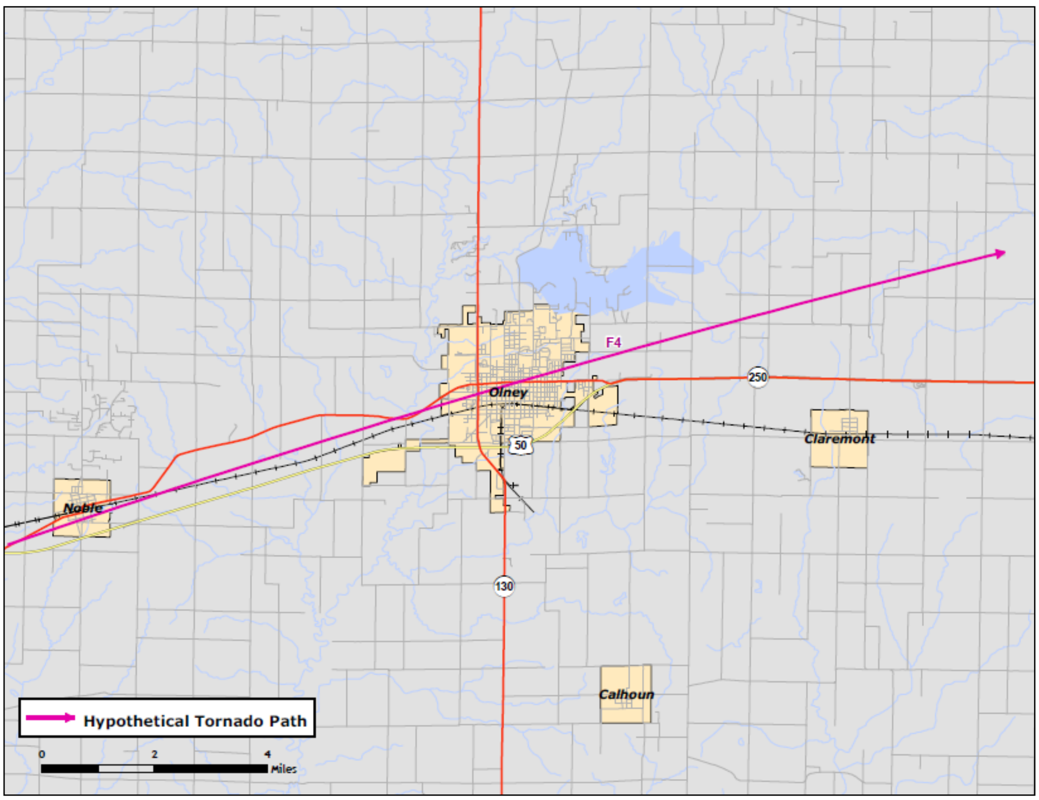
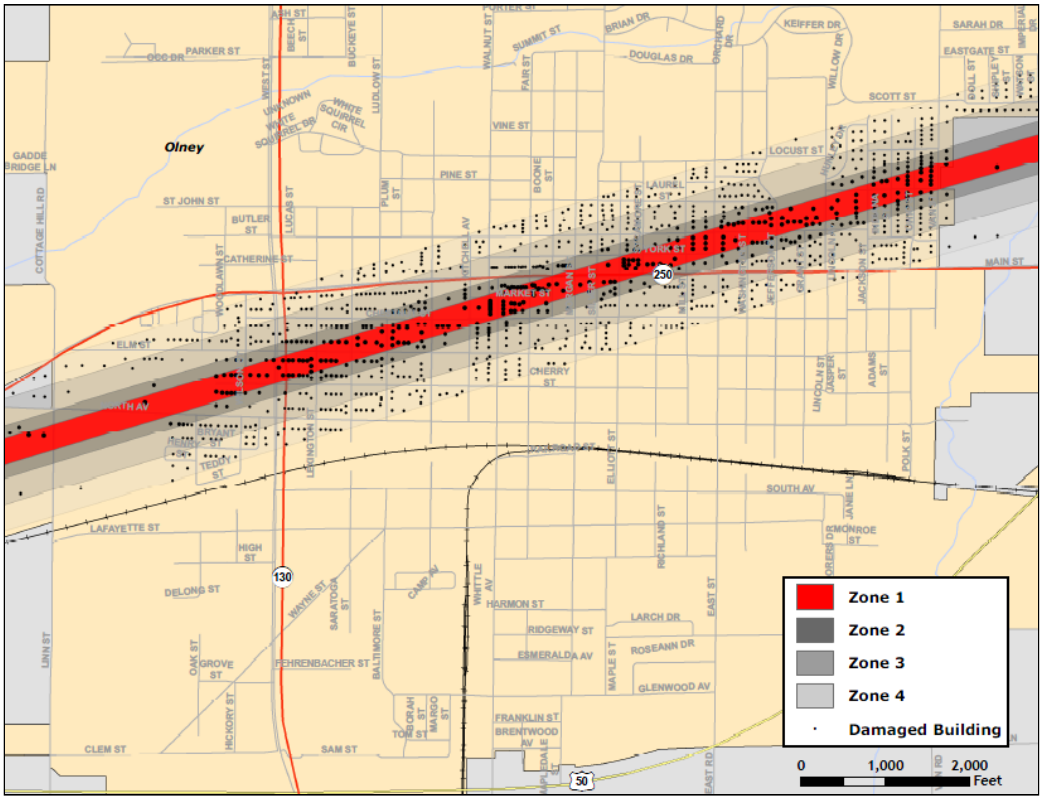


Figure 4-4: Modeled EF4 Tornado Damage Buffers in Richland County



The results of this analysis are depicted in Tables 4-11 and 4-12. The GIS analysis estimates that 1,336 buildings will be damaged. The estimated building losses were $65.6 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 Richland 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 building replacement costs for government, religious/non-profit, and education should be lumped together.

Table 4-11: Estimated Numbers of Buildings Damaged by Occupancy Type

Occupancy	Zone 1	Zone 2	Zone 3	Zone 4
Residential	158	174	343	321
Commercial	49	32	72	71
Industrial	3	3	0	3
Agriculture	4	5	8	10
Religious*	0	0	0	0
Government*	17	11	27	25
Education*	0	0	0	0
Total	**231**	**225**	**450**	**430**

**Number of structures not available from Assessor data*

Table 4-12: Estimated Building Losses by Occupancy Type (X 1000)

Occupancy	Zone 1	Zone 2	Zone 3	Zone 4
Residential	$9,048	$7,899	$11,120	$2,324
Commercial	$9,833	$10,751	$9,760	$1,718
Industrial	$247	$360	$0	$5
Agriculture	$738	$690	$905	$173
Religious*	$0	$0	$0	$0
Government*	$0	$0	$0	$0
Education*	$0	$0	$0	$0
Total	**$19,867**	**$19,700**	**$21,784**	**$4,219**

**Structure value available from Assessor data*

Essential, Critical, and Community Asset Facility Damage

An essential facility, critical facility, or community asset will encounter many of the same impacts as other buildings in the event of a tornado. There are 10 critical facilities located within 900 feet of the hypothetical tornado path. The model predicts that three schools, one medical care facility, two police station, three communication facilities and one wastewater facility would experience damage. The affected facilities are identified in Table 4-13, and Figures 4-5 and 4-6 shows the geographic location of some facilities.

Facility Categories

Essential: Core critical facilities; includes schools, fire departments, police departments, EOCs, and care facilities

Critical: Economically/socially viable facilities

Community Assets: Other important county facilities

Table 4-13: Estimated Facilities Affected

Name
East Richland High School
West Richland Elementary School
St Joseph Elementary School
Maple Wood (Rinker) (Care Facility)
Maple Wood (Rinker) (Police Station)
Olney Police Department
Sheriff's Department Tower
911 Tower
Judge, Don (Communication Facility)
Noble Wastewater

Figure 4-5: Facilities within Tornado Path

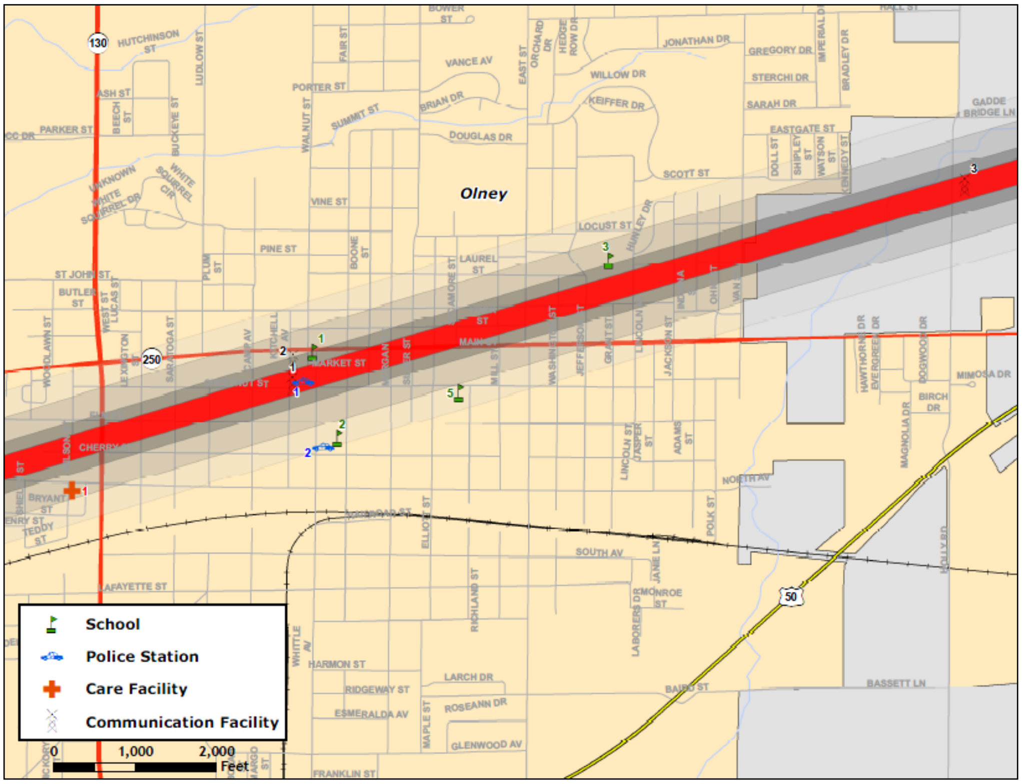
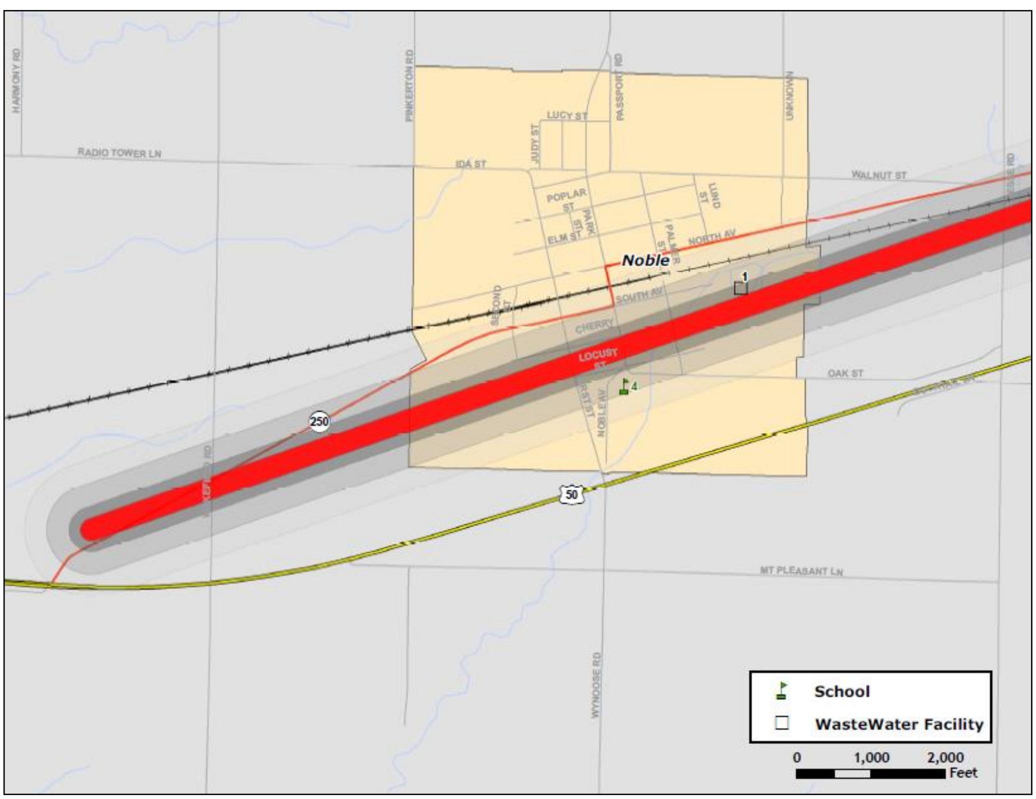


Figure 4-6: Additional Facilities within Tornado Path



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, 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 Richland County is included in Table 4-6.

All essential and critical facilities and community assets in the county and communities within the county are at risk. A list of all the facilities is included as Appendix D.

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 warnings of approaching storms are also vital to preventing the loss of property and ensuring the safety of Richland 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 the ground, the geometry 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, generally 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 18 inches might carry off a car. Generally, upstream floods cause damage over relatively localized areas, but they can be quite severe in the areas in which 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, 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 Flooding

Source: Olney Daily Mail

The NCDC database reported 19 flood events in Richland County since 1961. These flood events have been attributed with one injury and $76,000 in property damage. A recent flood event occurred on July 16, 2009 when nearly 2.5 inches of rain fell in an hour. Several rural roads in the area of Schnell were flooded and impassable.

Richland County NCDC recorded floods are identified in Table 4-14. Additional details for NCDC events are included in Appendix C.

Table 4-14: Richland County Previous Occurrences of Flooding*

Location or County	Date	Type	Deaths	Injuries	Property Damage	Crop Damage
Richland County	5/17/1995	Flash Flood	0	0	10K	0
Richland County	5/18/1995	Flash Flood	0	0	10K	0
Richland County	5/18/1995	Flash Flood	0	0	10K	0
Countywide	7/7/1998	Flash Flood	0	0	0	0
Olney	7/1/1999	Flash Flood	0	0	0	0
Countywide	7/5/2000	Flash Flood	0	0	0	0
Olney	8/23/2000	Flash Flood	0	0	0	0
Olney	6/5/2001	Flash Flood	0	0	0	0
Olney	5/1/2002	Flash Flood	0	0	0	0
Countywide	5/12/2002	Flood	0	1	0	0
Countywide	5/26/2004	Flash Flood	0	0	0	0
Countywide	5/27/2004	Flash Flood	0	0	0	0
Countywide	1/13/2005	Flash Flood	0	2	46K	0
Countywide	3/9/2006	Flash Flood	0	0	0	0
Nobel	2/6/2008	Flash Flood	0	0	0	0
Olney	5/27/2008	Flash Flood	0	0	0	0
Wakefield	5/14/2009	Flash Flood	0	0	0	0
Amity	5/25/2009	Flash Flood	0	0	0	0
Schnell	7/16/2009	Flash Flood	0	0	0	0
Wakefield	06/18/2011	Flash Flood	0	0	0	0
Wakefield	06/25/2011	Flash Flood	0	0	0	0
Amity	07/12/2011	Flash Flood	0	0	0	0

** 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 Dam and Levee Failure

According to the Richland County planning team, there are no records or local knowledge of any dam or 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 NFIP, which has suffered flood loss damage on two 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.

The Illinois Emergency Management Agency (IEMA) was contacted to determine the location of repetitive loss structures. IEMA reported no repetitive loss structure damage for Richland County.

Geographic Location for Flooding

Most river flooding occurs in the spring and is the result of excessive rainfall and/or the combination of rainfall and snowmelt. Severe thunderstorms may cause flooding during the summer or fall, but tend to be localized.

Flash floods, brief heavy flows in small streams or normally dry creek beds, also occur within the county. Flash flooding is typically characterized by high-velocity water, often carrying large amounts of debris. Urban flooding involves the overflow of storm drain systems and is typically the result of inadequate drainage following heavy rainfall or rapid snowmelt.

Source: National Inventory of Dams

DFIRM was used to identify specific stream reaches for analysis.

Geographic Location for Dam and Levee Failure

According to the NID, approximately one-third of the dams in the United States pose a high or significant hazard to life and property if failure occurs. According to the planning team, there are 13 dams in Richland County.

Table 4-15: Inventory of Dams

Dam Name	Location	Hazard	EAP
Vernor Lake Dam	Vernor Lake, Olney	L	N
Borah Lake Dam	Borah Lake, Dundas	L	N
East Fork Lake Dam	East Fork Lake, Olney	L	N
Hahn Lake Dam	Hahn LakeOlney	L	N
Bell Lake Dam	Bell Lake	L	N
Millers Lake Dam	Millers Lake, Olney	L	N
Hites Lake Dam	Hites Lake	L	N
Wilson Lake Dam	Wilson Lake	L	N
Montclare Lake Dam	Montclare Lake, Claremont	L	N
Buerster Lake Dam	Buerster Lake, Olney	L	N
Webber Lake Dam	Webber Lake, Olney	L	N
Jordan Lake Dam	Fox Creek	L	N
Nix Lake Dam	Nix Lake, Wakefield	L	N

A review of the Illinois Department of Natural Resource's files identified no levees in Richland County.

Hazard Extent for Flooding

The Hazus-MH flood model is designed to generate a flood depth grid and flood boundary polygon by deriving hydrologic and hydraulic information based on user-provided elevation data or by incorporating selected output from other flood models. Hazus-MH also has the ability to clip a Digital Elevation Model (DEM) with a user-provided flood boundary, thus creating a flood depth grid. For Richland County, Hazus-MH was used to extract flood depth by clipping the

DEM with the IDNR FIRMs Base Flood Elevation (BFE) boundary. The BFE is defined as the area that has a 1% chance of flooding in any given year.

Flood hazard scenarios were modeled using GIS analysis and Hazus-MH. The flood hazard modeling was based on historical occurrences and current threats. Existing flood maps were used to identify the areas of study. These digital files, although not official FIRMs, provided the boundary which was the basis for this analysis. Planning team input and a review of historical information provided additional information on specific flood events.

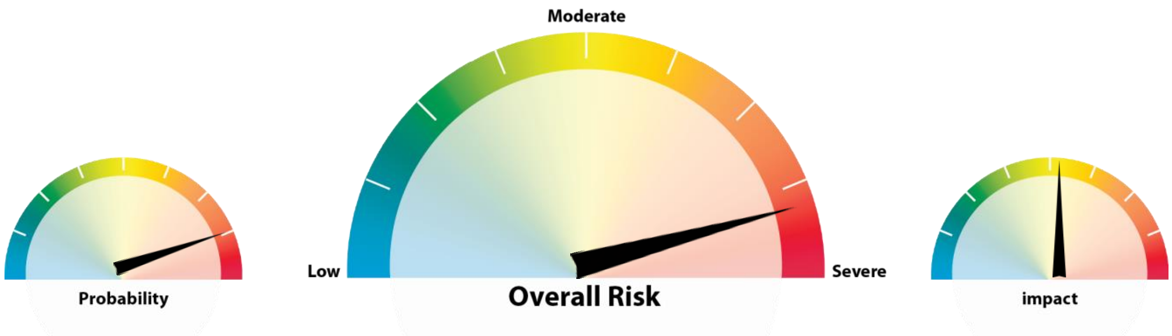
Hazard Extent for Dam and Levee Failure

When dams are assigned the low (L) hazard potential classification, it means that failure or incorrect operation of the dam will result in no human life losses and no economic or environmental losses. Losses are principally limited to the owner's property. Dams assigned the significant (S) hazard classification are those dams in which failure or incorrect operation results in no probable loss of human life; however it can cause economic loss, environment damage, and disruption of lifeline facilities. 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 in which failure or incorrect operation has the highest risk to cause loss of human life and significant damage to buildings and infrastructure.

According to default Hazus-MH data, one dam is classified as high hazard and three dams have Emergency Action Plans (EAP). An EAP is not required by the State of Illinois but is strongly recommended by the Illinois Department of Natural Resources.

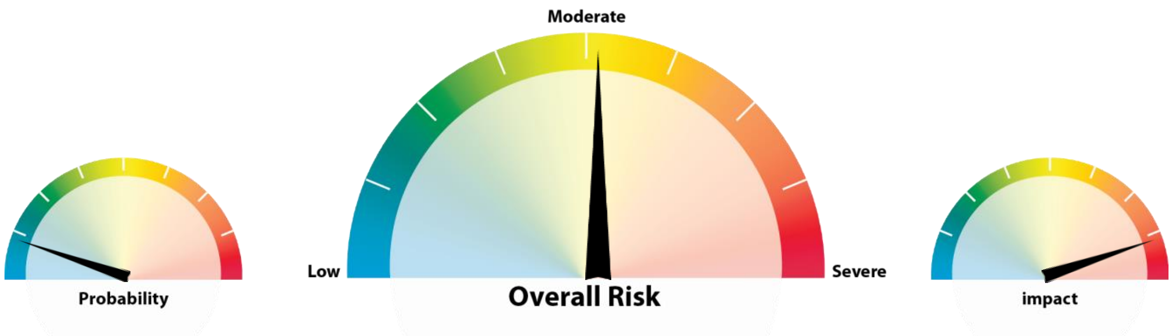
Accurate mapping of the risks of flooding behind levees depends on knowing the condition and level of protection the levees actually provide. FEMA and the U.S. Army Corps of Engineers are working together to make sure that flood hazard maps clearly reflect the flood protection capabilities of levees, and that the maps accurately represent the flood risks posed to areas situated behind them. Levee owners—usually states, communities, or in some cases private individuals or organizations—are responsible for ensuring that the levees they own are maintained according to their design. 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 one-percent-annual chance flood.

Risk Identification for Flood Hazard



Based on historical information, the probability of a flood is high. In Meeting #2, the planning team determined that the potential impact of a flood is moderate; therefore, the overall risk of a flood hazard for Richland County is severe.

Risk Identification for Dam/Levee Failure



Based on historical information, the probability of a dam failure is low. In Meeting #2, the planning team determined that the potential impact of a dam failure is significant; therefore, the overall risk of a flood hazard for Richland County is moderate.

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

Hazus-MH generated the flood depth grid for a 100-year return period by clipping the ISGS 1/3 ArcSecond (approximately 10 meters) Digital Elevation Model (DEM) to the Richland County flood boundary. Next, Hazus-MH utilized a user-defined analysis of Richland County with site-specific parcel data provided by the county.

Hazus-MH estimates the 100-year flood would damage 146 buildings at a replacement cost of $7.5 million. The total estimated numbers of damaged buildings are given in Table 4-16. Figure 4-7 depicts the Richland County parcel points that fall within the 100-year floodplain. Figures 4-8 and 4-9 highlight damaged buildings within the floodplain areas in Olney and Parkersburg.

Table 4-16: Richland County Hazus-MH Building Damage

General Occupancy	Number of Buildings Damaged	Total Building Damage (x1000)
Residential	48	1,578
Commercial	0	0
Industrial	0	0
Agricultural	90	6,018
Religious/Non Profit*	0	0
Government*	8	0
Education*	0	0
Total	**146**	**7,596**

**Structure value and/or number of structures not available from Assessor data*

Figure 4-7: Richland County Buildings in Floodplain (100-Year Flood)

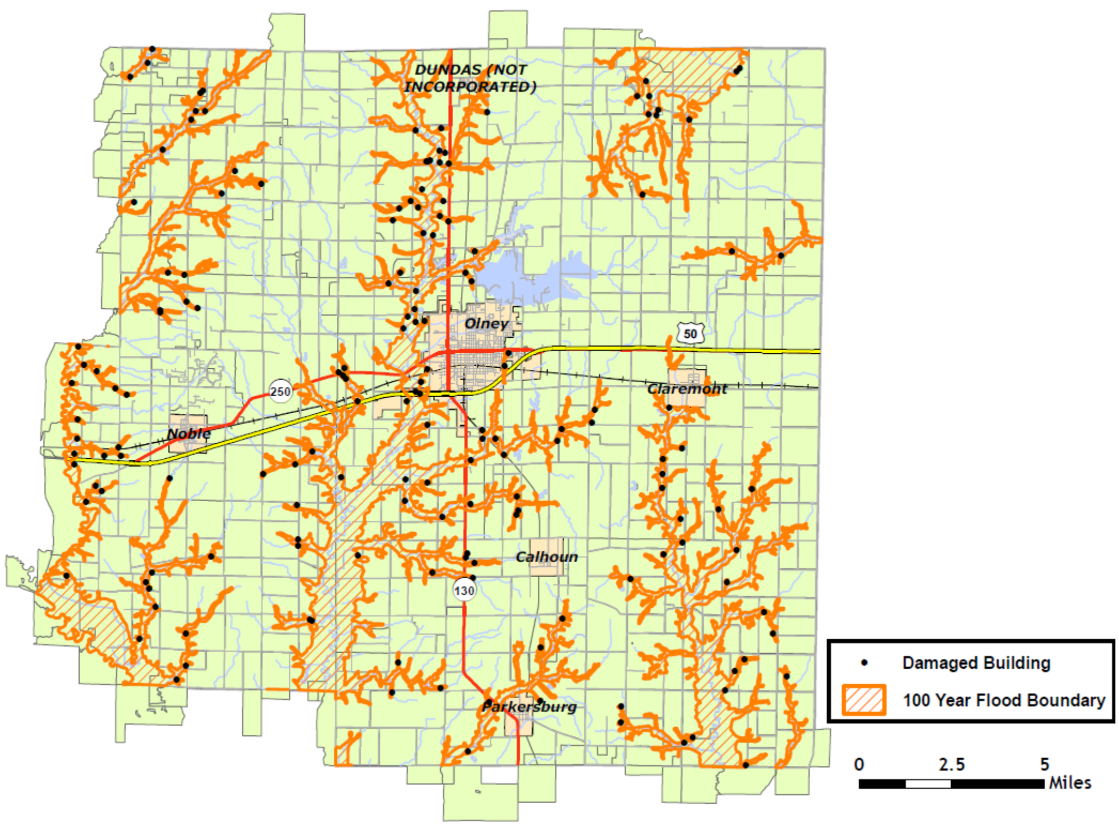


Figure 4-8: Richland County Urban Flood-Prone Areas (100-Year) Olney

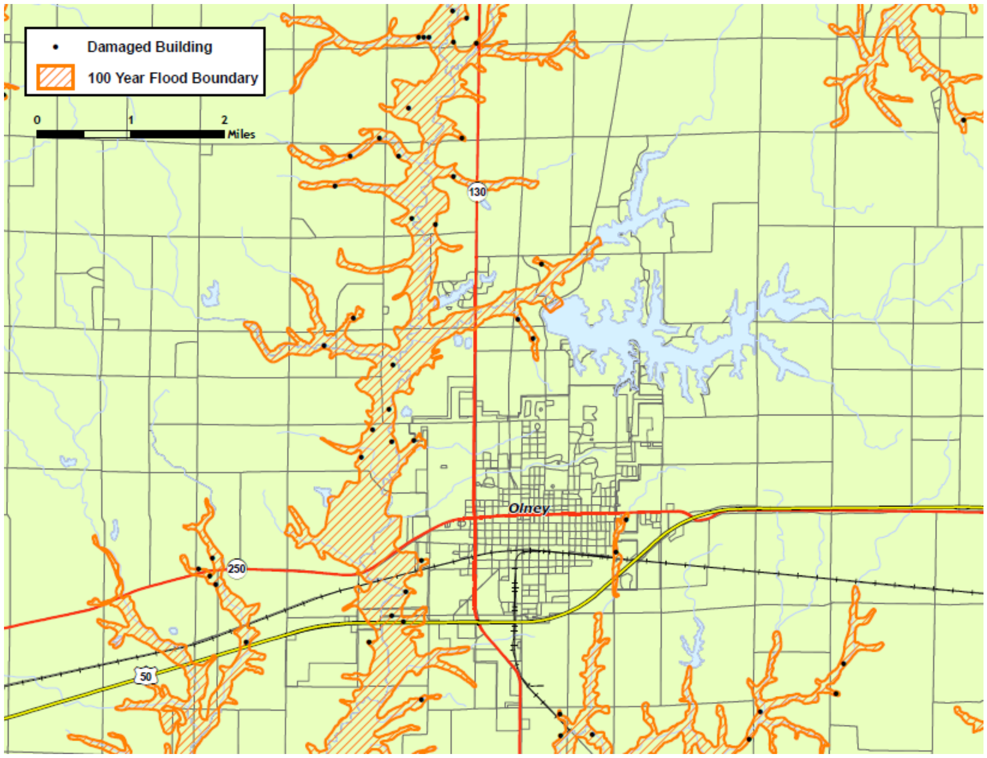
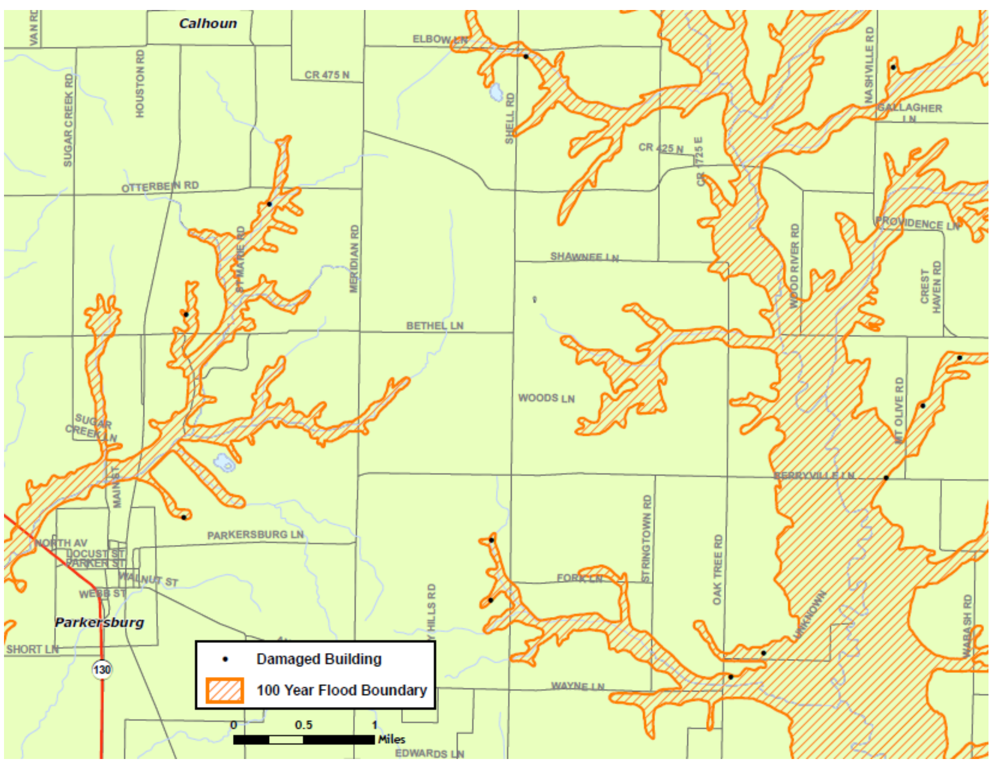


Figure 4-9 Richland County Urban Flood-Prone Areas (100-Year) Parkersburg



Essential, Critical, and Community Asset Facility Damage

An essential facility, critical facility, or community asset 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 essential and critical facilities and community assets is included in Appendix D.

Facility Categories

Essential: Core critical facilities; includes schools, fire departments, police departments, EOCs, and care facilities

Critical: Economically/socially viable facilities

Community Assets: Other important county 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 also fail or become impassable, causing traffic risks.

Vulnerability Analysis for Flash Flooding

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

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 "one-percent-annual chance" flood.

Vulnerability to Future Assets/Infrastructure for Flooding

Flash flooding could affect any low lying location within this jurisdiction; therefore, a significant portion of county's population and buildings are vulnerable to a flash flood. Currently, the Richland County Board reviews new development for compliance with the local zoning ordinance. 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

The Richland County Board reviews new development for compliance with the local zoning ordinance.

Analysis of Community Development Trends

Controlling floodplain development is the key to reducing flood-related damages. Areas with recent development within the county may be more vulnerable to drainage issues. Storm drains and sewer systems are usually most susceptible. Damage to these 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.

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, the forces of plate tectonics have shaped Earth as the huge plates that form the earth's surface move slowly over, under, and past each other. Sometimes the movement is gradual. At other times, the plates are locked together unable to release the accumulating energy. When the accumulated energy grows strong enough, the plates break free causing 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 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 shows 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 huge destructive ocean waves (tsunamis). Buildings with foundations resting on unconsolidated landfill 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.

The possibility of the occurrence of a catastrophic earthquake in the central and eastern United States is real as evidenced by history and described throughout this section. The impacts of significant earthquakes affect large areas, terminating public services and systems needed to aid the suffering and displaced. These impaired systems are interrelated in the hardest struck zones. Power lines, water and sanitary lines, and public communication may be lost; and highways, railways, rivers, and ports may not allow transportation to the affected region. Furthermore, essential facilities, such as fire and police departments and hospitals, may be disrupted if not previously improved to resist earthquakes.

As with hurricanes, mass relocation may be necessary, but the residents who are suffering from the earthquake can neither leave the heavily impacted areas nor receive aid or even communication in the aftermath of a significant event.

Magnitude, which is determined from measurements on seismographs, measures the energy released at the source of the earthquake. Intensity measures the strength of shaking produced by the earthquake at a certain location and is determined from effects on people, human structures, and the natural environment. Table 4-17 and Table 4-18 list the earthquake magnitudes and their corresponding intensities.
Source: http://earthquake.usgs.gov/learning/topics/mag_vs_int.php

Table 4-17: 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.
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 4-17: 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

Previous Occurrences for Earthquake Hazard

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 eastern Illinois, as of the date of this report, occurred on April 24, 2010 at 9:05:33 local time about 7 km (4 miles) east-northeast of Mt. Carmel, IL and measured 2.5 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 mainly in Southern Illinois.

Seismic activity on the New Madrid Seismic Zone of southeastern Missouri is very significant both historically and at present. 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 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 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.

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 Olmsted, 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. These occurred in 1968, 1987, and 2008 and were widely felt throughout southern Illinois and the midcontinent.

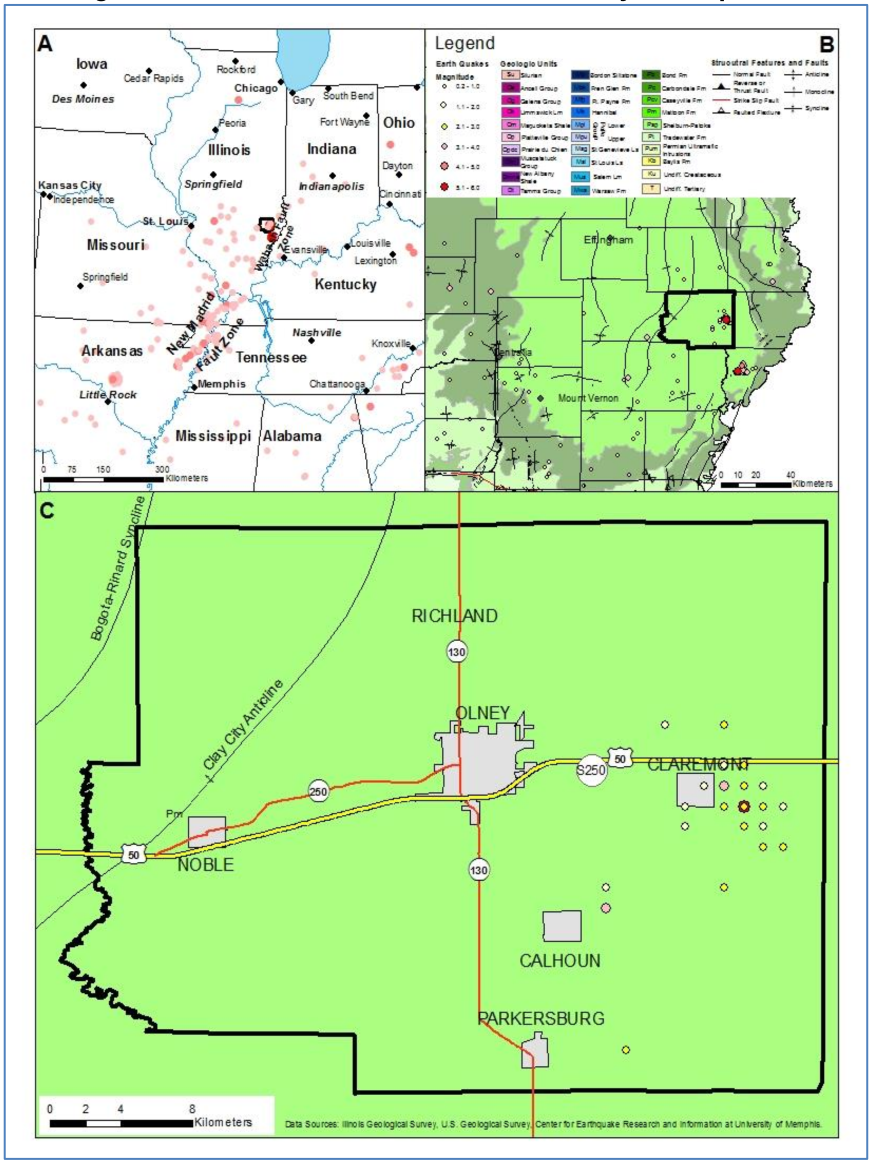
Above text adapted from http://earthquake.usgs.gov/regional/states/illinois/history.php and from Seismicity of the United States, 1568-1989 (Revised), C.W. Stover and J.L. Coffman, U.S. Geological Survey Professional Paper 1527, United States Government Printing Office, Washington: 1993.

Geographic Location for Earthquake Hazard

Richland County occupies a region susceptible to earthquakes. Regionally, the two most significant zones of seismic activity are the Wabash Valley Fault System and the New Madrid Seismic Zone. The epicenters of one moderate, M5.2, on June 10, 1987 and 30 smaller earthquakes ranging from M1.3 to M3.0 have been recorded in Richland County. The geologic mechanism related to 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. The Wabash Valley Fault System extends the 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.

Figure 4-10 depicts the following: A) Location of notable earthquakes in the Illinois region with inset of Richland County; B) Generalized geologic bedrock map with earthquake epicenters, geologic structures, and inset of Richland County; C) Geologic and earthquake epicenter map of Richland County.

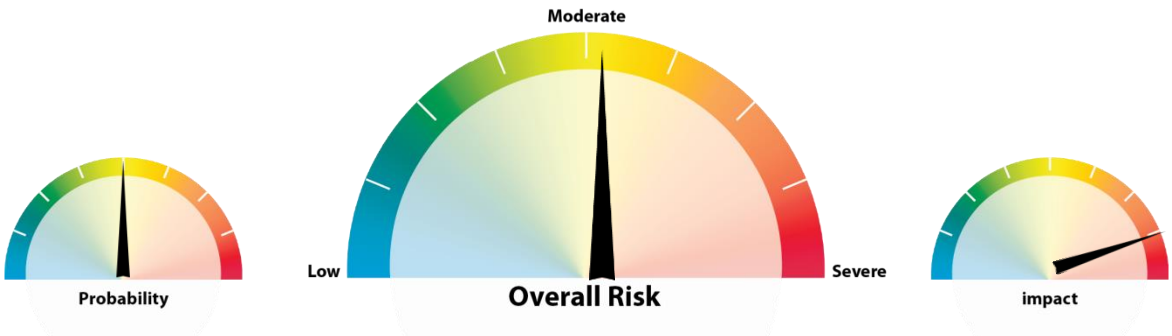
Figure 4-10A, 4-10B, 4-10C: Richland County Earthquakes



Hazard Extent for Earthquake Hazard

The extent of the earthquake is countywide. One of the most critical sources of information that is required for accurate assessment of earthquake risk is soils data. A National Earthquake Hazards Reduction Program (NEHRP) compliant soils map was used for the analysis which was provided by the Illinois State Geologic Survey, ISGS. The map identifies the soils most susceptible to amplification and ground failure.

Risk Identification for Earthquake Hazard



Based on historical information, the probability of an earthquake is low; however, USGS and ISGS research and studies attest that future earthquakes in Richland County are possible. In Meeting #2, the planning team determined that the potential impact of an earthquake is significant; therefore, the overall risk of an earthquake hazard for Richland County is moderate.

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.

At-Risk Facilities

All essential and critical facilities and community assets are vulnerable to earthquakes. These facilities would encounter many of the same impacts as any other building within the county. The impacts include structural failure 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 essential and critical facilities, and community assets, along with their location, is in Appendix D.

Facility Categories

Essential: Core critical facilities; includes schools, fire departments, police departments, EOCs, and care facilities

Critical: Economically/socially viable facilities

Community Assets: Other important county facilities

Building Inventory

A table of the building exposure in terms of types and numbers of buildings for the entire county is listed in Table 4-6. The buildings within the county can all expect the same impacts, similar to those discussed for essential and 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 residents to seek shelter).

Infrastructure

During an earthquake, the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, and bridges. Since an extensive inventory of the infrastructure is not available to this plan, it is important to emphasize that any number of these structures could become damaged in the event of an earthquake. The impacts to these structures 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 also fail or become impassable causing traffic risks. Typical scenarios are described to gauge the anticipated impacts of earthquakes in the county in terms of numbers and types of buildings and infrastructure.

Hazus-MH Earthquake Analysis

The SIU-Polis team reviewed existing geological information and recommendations for earthquake scenarios. A deterministic and a probabilistic earthquake scenario were developed to provide a reasonable basis for earthquake planning in Richland County. The deterministic scenario was a moment magnitude of 5.5 with the epicenter near the City of Olney in Richland County. This represents a realistic scenario for planning purposes.

Additionally, the earthquake loss analysis included a probabilistic scenario based on ground shaking parameters derived from U.S. Geological Survey probabilistic seismic hazard curves for the earthquake with the 500-year return period. This scenario evaluates the average impacts of a multitude of possible earthquake epicenters with a magnitude that would be typical of that expected for a 500-year return period.

The following earthquake hazard modeling scenarios were performed:

- 7.1 magnitude Wabash Valley scenario
- 5.5 magnitude earthquake local epicenter
- 500-year return period event

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. Fortunately, a National Earthquake Hazards Reduction Program (NEHRP) soil classification map exists for Illinois. NEHRP soil classifications portray the degree of shear-wave amplification that can occur during ground shaking. FEMA provided a soils map and liquefaction potential map that was used by Hazus-MH.

Earthquake hypocenter depths in Illinois range from less than 1.0 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 broken 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 M7.1 Magnitude Earthquake Wabash Valley Scenario

The results of the M7.1 Wabash Valley earthquake are depicted in Table 4-19, Table 4-20, and Figure 4-11. Hazus-MH estimates that approximately 5,754 buildings will be at least moderately damaged. This is more than 79% of the total number of buildings in the region. It is estimated that 760 buildings will be damaged beyond repair.

The total building related losses totaled $519.66 million; 14% 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 41% of the total loss.

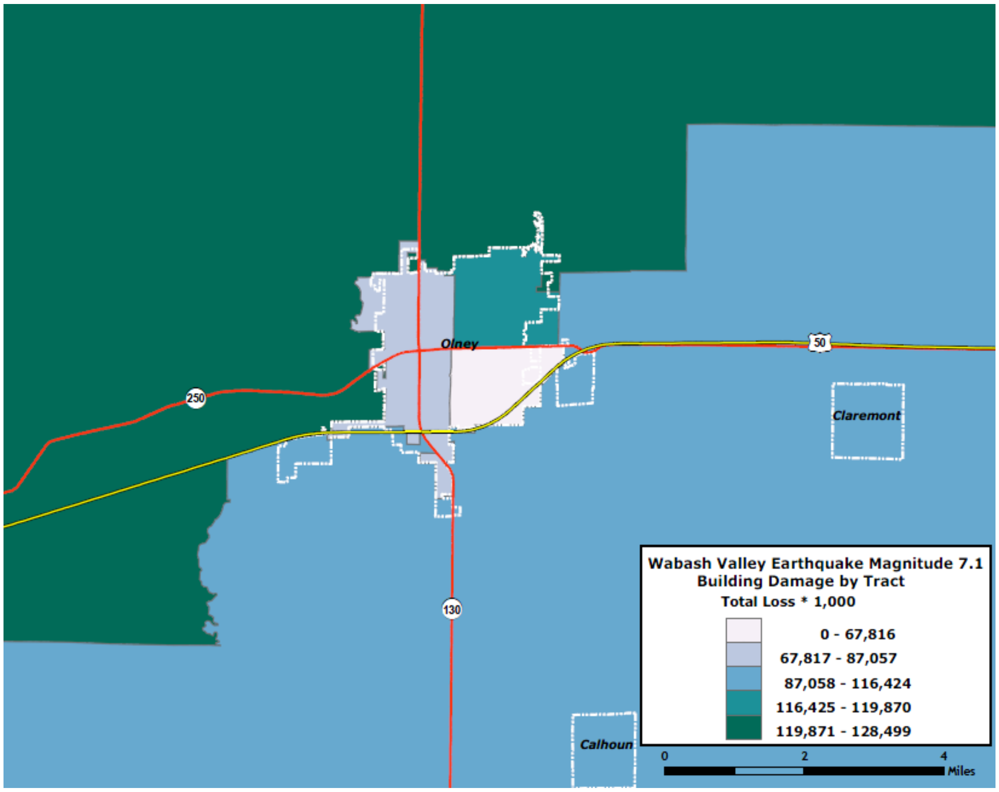
Table 4-19: Wabash Valley Scenario-Damage Counts by Building Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	2	1.63	25	1.75	234	7.19	460	26.51	265	34.91
Commercial	1	1.27	24	1.67	177	5.43	221	12.73	115	15.14
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	1	0.74	11	0.75	95	2.93	158	9.08	70	9.16
Industrial	0	0.04	0	0.03	5	0.17	17	0.97	11	1.49
Other Residential	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Single Family	96	96.32	1,353	95.81	2,745	84.28	881	50.72	299	39.31
Total	100		1,412		3,257		1,737		760	

Table 4-20: Wabash Valley Scenario-Building Economic losses in Millions of Dollars

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.00	0.00	5.18	0.71	0.42	6.31
	Capital-Related	0.00	0.00	1.48	0.43	1.07	2.98
	Rental	6.42	0.00	11.10	0.22	0.13	17.87
	Relocation	23.87	0.00	16.49	0.65	3.71	44.70
	Subtotal	30.29	0.00	34.25	2.00	5.32	71.85
Capital Stock Losses							
	Structural	24.43	0.00	31.12	2.81	36.07	94.43
	Non_Structural	111.03	0.00	65.00	11.18	32.36	219.57
	Content	46.91	0.00	40.93	8.43	26.26	122.53
	Inventory	0.00	0.00	3.95	2.62	4.72	11.29
	Subtotal	182.37	0.00	140.99	25.03	99.42	447.81
	Total	212.66	0.00	175.24	27.03	104.73	519.66

Figure 4-11: Wabash Valley Scenario-Building Economic Losses in Thousands of Dollars



Wabash Valley Scenario—Essential Facility Losses

Before the earthquake, the region had 1,414 care beds available for use. On the day of the earthquake, the model estimates that only no care beds are available for use by patients already in medical care facilities and those injured by the earthquake. After one week, 1% of the beds will be back in service. By day 30, 8% will be operational.

Results for 5.5 Magnitude Earthquake in Richland County

The results of the initial analysis, the 5.5 magnitude earthquake with an epicenter in Olney of Richland County, are depicted in Table 4-21 and 4-22 and Figure 4-12. Hazus estimates that approximately 1,273 buildings will be at least moderately damaged. This is more than 18% of the total number of buildings in the region. It is estimated that 64 buildings will be damaged beyond repair.

The total building related losses totaled $101.47 million; 14% 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 45% of the total loss.

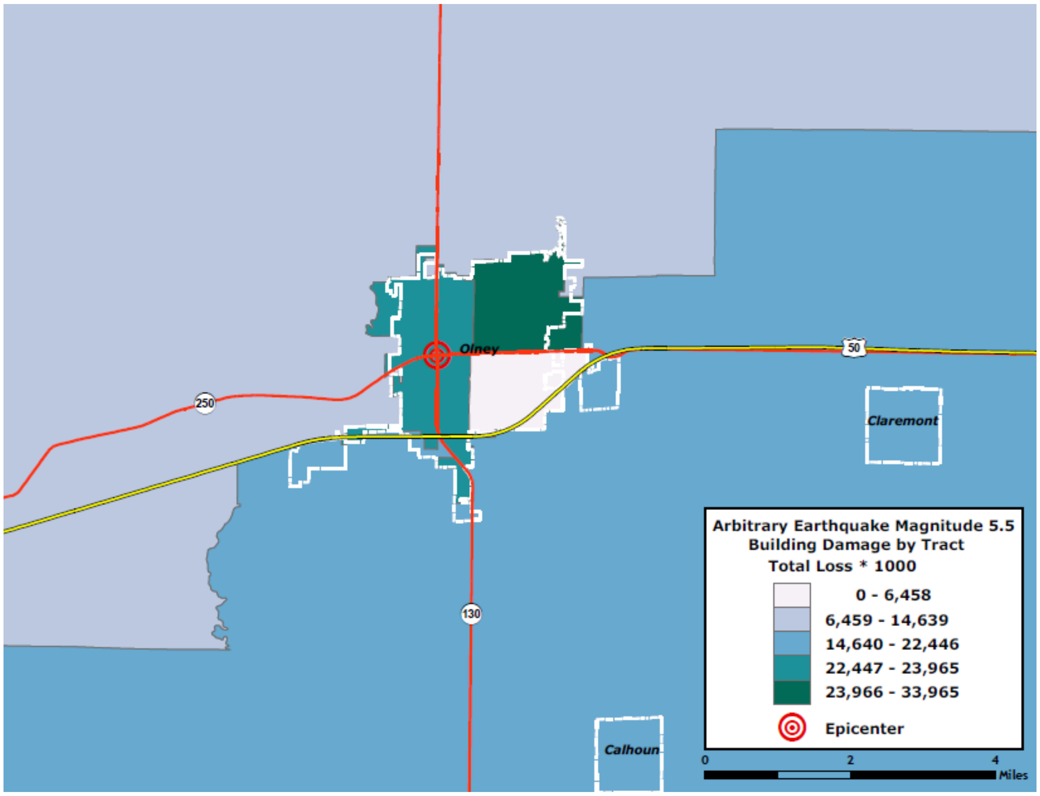
Table 4-21: Richland County 5.5M Scenario-Damage Counts by Building Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	575	13.07	179	11.28	162	17.35	60	21.67	9	14.66
Commercial	288	6.55	109	6.83	96	10.23	37	13.36	9	13.30
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	202	4.60	59	3.72	52	5.57	16	5.85	4	6.66
Industrial	15	0.35	6	0.39	8	0.88	4	1.38	1	0.83
Other Residential	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Single Family	3,320	75.43	1,237	77.78	616	65.96	159	57.74	41	64.56
Total	4,402		1,591		933		276		64	

Table 4-22: Richland County 5.5M Scenario-Building Economic Losses in Millions of Dollars

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.00	0.00	0.81	0.15	0.03	0.99
	Capital-Related	0.00	0.00	0.23	0.09	0.08	0.40
	Rental	1.26	0.00	2.32	0.05	0.02	3.64
	Relocation	4.66	0.00	3.57	0.13	0.59	8.95
	Subtotal	5.92	0.00	6.92	0.42	0.72	13.98
Capital Stock Losses							
	Structural	5.00	0.00	5.34	0.45	3.95	14.73
	Non_Structural	23.62	0.00	12.37	1.88	5.27	43.14
	Content	11.27	0.00	9.47	1.62	4.96	27.32
	Inventory	0.00	0.00	0.91	0.50	0.89	2.31
	Subtotal	39.89	0.00	28.08	4.44	15.08	87.49
	Total	45.80	0.00	35.00	4.86	15.81	101.47

Figure 4-12: Richland County 5.5M Scenario-Building Economic Losses in Thousands of Dollars



Richland County 5.5M Scenario—Essential Facility Losses

Before the earthquake, the region had 1,414 care beds available for use. On the day of the earthquake, the model estimates that only 40 care beds (3%) are available for use by patients already in medical care facilities and those injured by the earthquake. After one week, 43% of the beds will be back in service. By day 30, 72% will be operational.

Results 5.0 Magnitude 500-Year Probabilistic Scenario

The results of the 500-year probabilistic analysis are depicted in Table 4-23 and 4-24 and Figure 4-13. Hazus-MH estimates that approximately 596 buildings will be at least moderately damaged. This is more than 8% of the total number of buildings in the region. It is estimated that 15 buildings will be damaged beyond repair. The total building-related losses totaled $30.1 million; 21% 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 37% of the total loss.

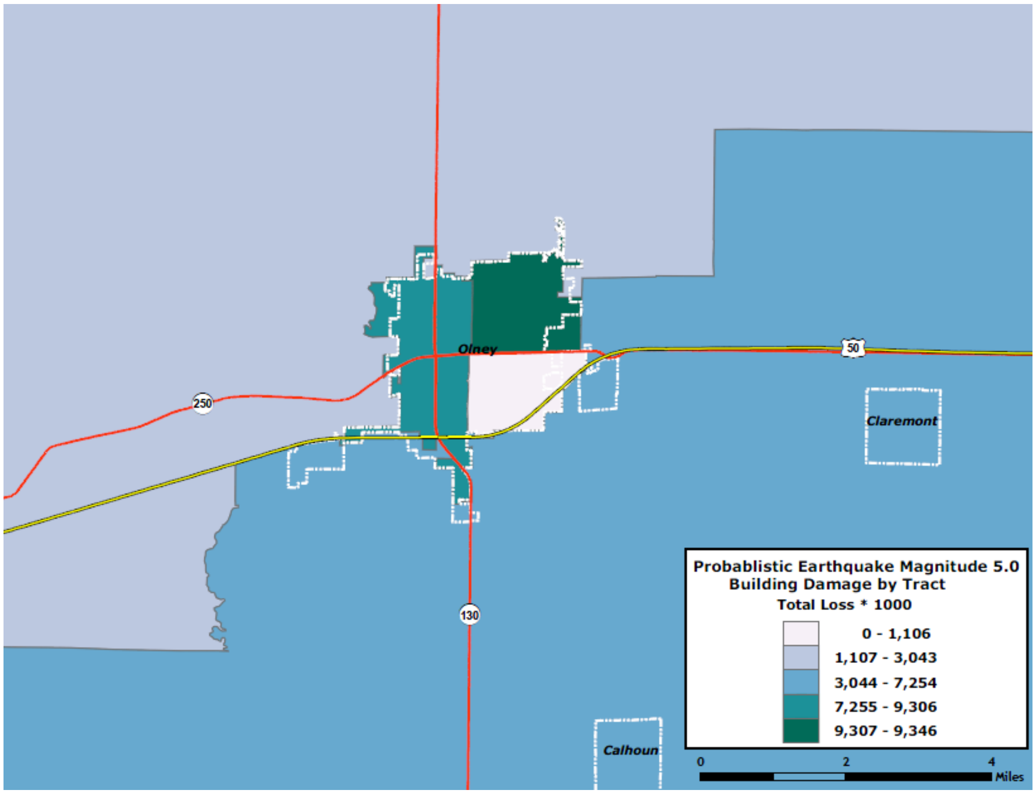
Table 4-23: 500-Year Probabilistic Scenario-Damage Counts by Building Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	659	11.59	157	16.01	126	27.06	40	34.56	4	25.88
Commercial	369	6.48	90	9.20	60	12.96	17	14.84	2	12.86
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	240	4.22	50	5.07	35	7.58	7	6.51	1	8.01
Industrial	19	0.33	6	0.60	7	1.40	2	2.08	0	1.27
Other Residential	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Single Family	4,403	77.38	677	69.12	238	51.01	48	42.02	8	51.98
Total	5,691		979		466		115		16	

Table 4-24: 500-Year Probabilistic Scenario-Building Economic Losses in Millions of Dollars

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.00	0.00	0.35	0.11	0.02	0.48
	Capital-Related	0.00	0.00	0.10	0.07	0.05	0.22
	Rental	0.42	0.00	1.16	0.04	0.01	1.62
	Relocation	1.54	0.00	1.79	0.10	0.42	3.85
	Subtotal	1.96	0.00	3.40	0.32	0.50	6.17
Capital Stock Losses							
	Structural	1.69	0.00	2.46	0.34	2.63	7.11
	Non_Structural	5.54	0.00	3.30	0.69	1.41	10.94
	Content	1.86	0.00	1.84	0.48	1.11	5.29
	Inventory	0.00	0.00	0.18	0.15	0.20	0.53
	Subtotal	9.09	0.00	7.78	1.66	5.35	23.88
	Total	11.05	0.00	11.18	1.98	5.84	30.05

Figure 4-13: Richland County 5.0 M Scenario-Building Economic Losses in Thousands of Dollars



500-Year Probabilistic Scenario—Essential Facility Losses

Before the earthquake, the region had 1,414 care beds available for use. On the day of the earthquake, the model estimates that only 159 care beds (11%) are available for use by patients already in medical care facilities and those injured by the earthquake. After one week, 72% of the beds will be back in service. By day 30, 92% will be operational.

Vulnerability to Future Assets/Infrastructure for Earthquake Hazard

New construction, especially essential and critical facilities, should accommodate earthquake mitigation design standards.

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 that is susceptible to liquefaction.

In Meeting #4, the MHMP team discussed specific mitigation strategies for potential earthquake hazards. The discussion included strategies to harden and protect future, as well as existing, structures against the possible termination of public services and systems including power lines, water and sanitary lines, and public communication.

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, or frequent lightning. Severe thunderstorms most frequently occur in Illinois during the spring and summer months, 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 or 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 miles per hour

Hail

Hail is 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 damage in other areas near the storm. 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 27 hail storms in Richland County since 1961. Hail storms occur nearly every year in the late spring and early summer months. The most recent reported occurrence was in May of 2010 when an upper level disturbance triggered a large cluster of thunderstorms, resulting in hail in Richland County.

Richland County hail storms are identified in Table 4-25. Additional details for NCDC events are included in Appendix C.

Table 4-25: Richland County Hail Storms*

Location or County	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Richland County	05/21/1982	Hail	1.75 in.	0	0	0	0
Richland County	06/24/1985	Hail	2.00 in.	0	0	0	0
Richland County	07/10/1987	Hail	0.75 in.	0	0	0	0
Richland County	07/14/1988	Hail	0.75 in	0	0	0	0
Richland County	04/28/1989	Hail	0.75 in	0	0	0	0
Richland County	09/28/1990	Hail	0.75 in	0	0	0	0
Richland County	08/14/1991	Hail	0.80 in.	0	0	0	0
Richland County	06/23/1992	Hail	1.75 in.	0	0	0	0
Richland County	10/01/1993	Hail	1.75 in.	0	0	0	0
Olney	04/27/1994	Hail	0.75 in.	0	0	0	0
Olney	07/02/1994	Hail	0.75 in.	0	0	0	0
Nobel	07/02/1996	Hail	1.75 in.	0	0	0	0
Olney	05/01/2002	Hail	1.75 in.	0	0	0	0
Claremont	05/25/2002	Hail	1.75 in.	0	0	0	0
Olney	04/24/2003	Hail	0.75 in.	0	0	0	0
Nobel	05/19/2005	Hail	1.00 in.	0	0	0	0
Calhoun	05/19/2005	Hail	0.75 in.	0	0	0	0
Olney	05/19/2005	Hail	0.75 in.	0	0	0	0
Olney	06/30/2005	Hail	1.00 in.	0	0	0	0
Claremont	06/20/2006	Hail	0.88 in.	0	0	0	0
Calhoun	06/26/2006	Hail	1.25 in.	0	0	0	0
Nobel	06/26/2006	Hail	0.75 in.	0	0	0	0
Nobel	06/09/2008	Hail	1.00 in.	0	0	0	0
Olney	06/09/2008	Hail	0.88 in.	0	0	0	0
Olney	04/05/2009	Hail	0.75 in.	0	0	0	0
Olney	05/12/2010	Hail	0.75 in.	0	0	0	0
Olney	05/23/2011	Hail	1.75 in.	0	0	0	0

** 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.*

Source: www.crh.noaa.gov

The NCDC database reported one significant lightning strike in Richland County since 1961. The event occurred on May 07, 2008, when lightning struck a 60 foot brick chimney in downtown Olney. Sixteen autos were damaged and three people were injured as bricks were scattered for a radius of one block.

The NCDC database identified 75 thunderstorm winds reported since 1961, the most recent of which was reported in July 2010 when several large trees and power lines were downed near Olney.

As shown in Table 4-26, wind storms have historically occurred year-round with the greatest frequency and damage between May and July. The following table includes available top wind speeds for Richland County.

Table 4-26: Richland County Thunderstorms Storms

Location or County	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Richland	06/06/1961	Tstm Wind	0 kts.	0	0	0	0
Richland	06/14/1970	Tstm Wind	0 kts.	0	0	0	0
Richland	04/02/1977	Tstm Wind	0 kts.	0	0	0	0
Richland	07/07/1978	Tstm Wind	0 kts.	0	0	0	0
Richland	07/13/1979	Tstm Wind	61 kts.	0	0	0	0
Richland	09/22/1980	Tstm Wind	87 kts.	0	0	0	0
Richland	07/20/1981	Tstm Wind	0 kts.	0	0	0	0
Richland	07/20/1981	Tstm Wind	0 kts.	0	0	0	0
Richland	06/15/1982	Tstm Wind	0 kts.	0	0	0	0
Richland	06/15/1982	Tstm Wind	0 kts.	0	0	0	0
Richland	07/19/1982	Tstm Wind	0 kts.	0	0	0	0
Richland	05/13/1984	Tstm Wind	67 kts.	0	0	0	0
Richland	07/31/1986	Tstm Wind	0 kts.	0	0	0	0
Richland	07/10/1987	Tstm Wind	0 kts.	0	0	0	0
Richland	05/09/1990	Tstm Wind	0 kts.	0	0	0	0
Richland	05/09/1990	Tstm Wind	0 kts.	0	0	0	0
Richland	07/05/1992	Tstm Wind	0 kts.	0	0	0	0
Noble	04/15/1994	Tstm Wind	0 kts.	0	0	50K	0
Olney	07/02/1994	Tstm Wind	0 kts.	0	0	5K	0
Richland	05/18/1995	Tstm Wind	0 kts.	0	0	100K	0
Richland	04/19/1996	Tstm Wind	0 kts.	0	0	0	0
Olney	04/21/1996	Tstm Wind	0 kts.	0	0	0	0
Berryville	04/21/1996	Tstm Wind	0 kts.	0	0	0	0
Calhoun	09/07/1996	Tstm Wind	0 kts.	0	0	0	0
Olney	04/30/1997	Tstm Wind	52 kts	0	0	0	0
Olney	07/14/1997	Tstm Wind	0 kts.	0	0	0	0
Parkersburg	06/12/1998	Tstm Wind	0 kts.	0	0	0	0
Parkersburg	06/22/1998	Tstm Wind	0 kts.	0	0	0	0
Richland	06/29/1998	Tstm Wind	0 kts.	0	0	0	0
Olney	07/07/1998	Tstm Wind	0 kts.	0	0	0	0
Olney	11/10/1998	High Wind	0 kts.	1	0	0	0
Olney	02/27/1999	Tstm Wind	0 kts.	0	0	0	0
Olney	05/05/1999	High Wind	0 kts.	0	0	10K	0
Noble	6/1/1999	Tstm Wind	0 kts	0	0	0	0
Noble	06/01/1999	Tstm Wind	61 kts..	0	0	0	0
Calhoun	06/04/1999	Tstm Wind	0 kts	0	0	0	0
Olney	08/23/2000	Tstm Wind	0 kts	0	0	0	0
Olney	08/26/2000	Tstm Wind	52 kts	0	0	0	0
Olney	10/24/2001	Tstm Wind	50 kts	0	0	0	0
Noble	05/01/2002	Tstm Wind	50 kts	0	0	0	0
Olney	05/09/2002	Tstm Wind	50 kts	0	0	0	0
Dundas	07/09/2002	Tstm Wind	50 kts.	0	0	0	0
Olney	08/03/2003	Tstm Wind	55 kts.	0	0	0	0
Olney	09/26/2003	Tstm Wind	60 kts.	0	0	0	0

Richland	05/27/2004	Tstm Wind	50 kts.	0	0	0	0
Richland	05/30/2004	Tstm Wind	55 kts.	0	1	0	0
Olney	07/22/2004	Tstm Wind	50 kts.	0	0	0	0
Olney	04/22/2005	High Wind	50 kts.	0	0	0	0
Olney	04/22/2005	Tstm Wind	50 kts.	0	0	0	0
Olney	05/19/2005	Tstm Wind	50 kts.	0	0	0	0
Noble	04/02/2006	Tstm Wind	60 kts.	0	0	0	0
Dundas	04/19/2006	Tstm Wind	50 kts.	0	0	0	0
Dundas	05/24/2006	Tstm Wind	52 kts.	0	0	0	0
Olney	08/10/2006	Tstm Wind	52 kts.	0	0	0	0
Olney	10/18/2007	Tstm Wind	56 kts.	0	0	20K	0
Olney	01/29/2008	Tstm Wind	52 kts.	0	0	20K	0
Noble	02/05/2008	Tstm Wind	61 kts.	0	0	20K	0
Olney	06/15/2008	Tstm Wind	61 kts.	0	0	35K	0
Olney	06/27/2008	Tstm Wind	52 kts.	0	0	2K	0
Claremont	06/27/2008	Tstm Wind	52 kts.	0	0	0	0
Parkersburg	03/08/2009	Tstm Wind	52 kts.	0	0	35K	0
Olney	06/18/2009	Tstm Wind	52 kts.	0	0	25K	0
Claremont	05/27/2010	Tstm Wind	52 kts.	0	0	4K	0
Olney	06/14/2010	Tstm Wind	52 kts.	0	0	2K	0
Olney	06/14/2010	Tstm Wind	52 kts.	0	0	23K	0
Olney	06/15/2010	Tstm Wind	52 kts.	0	0	50K	0
Olney	06/27/2010	Tstm Wind	52 kts.	0	0	2K	0
Olney	07/19/2010	Tstm Wind	61 kts.	0	0	22K	0
Noble	04/19/2011	Tstm Wind	52 kts.	0	0	20K	0
Olney	05/23/2011	Tstm Wind	52 kts.	0	0	50K	0
Calhoun	06/21/2011	Tstm Wind	52 kts.	0	0	10K	0
Olney	06/21/2011	Tstm Wind	52 kts.	0	0	0	0
Calhoun	06/21/2011	Tstm Wind	52 kts.	0	0	12K	0
Olney	06/21/2011	Tstm Wind	52 kts.	0	0	0	0
Olney	07/12/2011	Tstm Wind	52 kts.	0	0	0	0

** 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.*

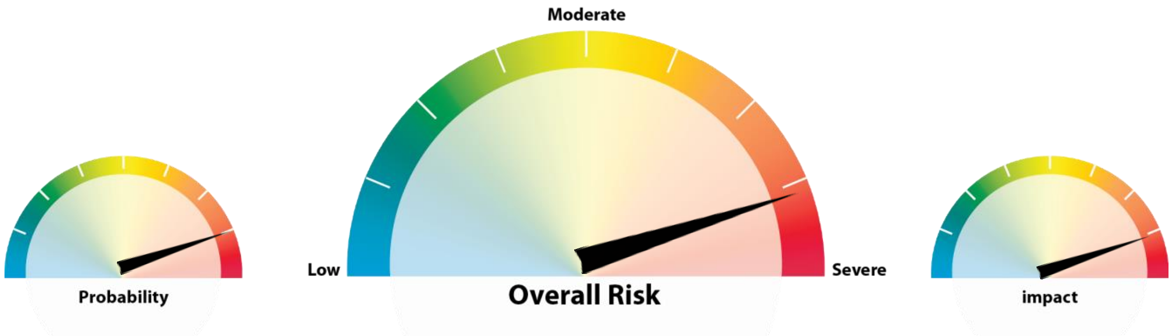
Geographic Location for Thunderstorm Hazard

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 varies in terms of the extent of the storm, the wind speed, and the size of hail stones. Thunderstorms can occur at any location within the county.

Risk Identification for Thunderstorm Hazard



Based on historical information, the probability of a thunderstorm is high. In Meeting #2, the planning team determined that the potential impact of a thunderstorm is significant; therefore, the overall risk of a thunderstorm hazard for Richland County is severe.

Vulnerability Analysis for Thunderstorm Hazard

Severe thunderstorms are an equally distributed threat across the entire jurisdiction; therefore, the entire county's population and all buildings are vulnerable to a severe thunderstorm and can expect the same impacts within the affected area. This plan will therefore consider all buildings located within the county as vulnerable. The existing buildings and infrastructure in Richland County are discussed in Appendix D.

At-Risk Facilities

Essential and critical facilities and community assets are vulnerable to severe thunderstorms. These facilities will encounter many of the same impacts as any other building within the jurisdiction. The impacts include structural failure, damaging debris (trees or limbs), roofs blown off or windows broken by hail or high winds, fires caused by lightning, and loss of building functionality (e.g. a damaged police station will no longer be able to serve the community). Table 4-5 lists the types and numbers of all of the essential facilities in the area. A complete list of all essential facilities, critical facilities, and community assets, including location, is in Appendix D.

Facility Categories

Essential: Core critical facilities; includes schools, fire departments, police departments, EOCs, and care facilities

Critical: Economically/socially viable facilities

Community Assets: Other important county facilities

Building Inventory

A table of the building exposure in terms of types and numbers of buildings for the entire county is provided in Table 4-6. The buildings within the county can all expect the same impacts, similar to those discussed for essential and critical facilities. These impacts include structural failure, damaging debris (trees or limbs), 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 residents to seek shelter).

Infrastructure

During a severe thunderstorm, the types of infrastructure that could be impacted include roadways, utility lines, utility 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.

Potential Dollar Losses for Thunderstorm Hazard

A deterministic loss analysis was not completed for thunderstorms because the widespread extent of such a hazard makes it difficult to accurately model outcomes.

To determine dollar losses for a thunderstorm hazard, the available NCDC hazard information was condensed to include only thunderstorm hazards that occurred within the past ten years. Richland County's MHMP team then reviewed the property damages reported to NCDC and made any applicable updates.

It was determined that since 2001, Richland County has incurred $352,000 in damages relating to thunderstorms, including hail, lightning, and high winds. The resulting information is listed in Table 4-27.

Table 4-27: Richland County Property Damage (2001–Present)

Location or County	Date	Type	Property Damage
Olney	10/18/2007	Tstm Wind	$ 20,000
		2000-2007 Subtotal	**$ 20,000**
Olney	1/29/2008	Tstm Wind	$ 20,000
Nobel	02/05/2008	Tstm Wind	$ 20,000
Olney	6/15/2008	Tstm Wind	$ 35,000
Olney	6/27/2008	Tstm Wind	$ 2,000
		2008 Subtotal	**$ 77,000**
Parkersburg	03/08/2009	Tstm Wind	$ 35,000
Olney	6/18/2009	Tstm Wind	$ 25,000
		2009 Subtotal	**$ 60,000**
Claremont	5/27/2010	Tstm Wind	$ 4,000
Olney	6/14/2010	Tstm Wind	$ 2,000
Olney	6/14/2010	Tstm Wind	$ 23,000
Olney	6/15/2010	Tstm Wind	$ 50,000
Olney	6/27/2010	Tstm Wind	$ 2,000
Olney	7/19/2010	Tstm Wind	$ 22,000
		2010 Subtotal	**$ 103,000**
Noble	04/19/2011	Tstm Wind	$20,000
Olney	05/23/2011	Tstm Wind	$50,000
Calhoun	06/21/2011	Tstm Wind	$10,000
Calhoun	06/21/2011	Tstm Wind	$12,000

Location or County	Date	Type	Property Damage
		2011 Subtotal	$92,000
		Total Property Damage	**$ 352,000**

The historical data has not been collected systematically and may not fully document all losses. As a result, potential dollar losses for a future event cannot be precisely calculated; however, based on averages in the last decade, it can be determined that Richland County incurs an annualized loss of approximately $35,200 per year attributable to severe thunderstorms.

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 Richland County residents.

4.4.5 Drought and Extreme Heat Hazard

Hazard Definition for Drought Hazard

Drought is a climatic phenomenon that occurs in Richland County. The meteorological condition that creates a drought is below normal rainfall. However, excessive heat can lead to increased evaporation, which will enhance drought conditions. Droughts can occur in any month. Drought differs from normal arid conditions found in low rainfall areas. Drought is the consequence of a reduction in the amount of precipitation over an undetermined length of time (usually a growing season or more).

In the past decade, the U.S. has continued to consistently experience drought events with economic impacts greater than $1 billion; FEMA estimates that the nation's average annual drought loss is $6 billion to $8 billion. For Illinois, the National Drought Mitigation Center reports significant drought impacts since August of 2011 ranging from water shortage warnings to reduced crop yields and wild fires.

The severity of a drought depends on location, duration, and geographical extent. Additionally, drought severity depends on the water supply, usage demands made by human activities, vegetation, and agricultural operations. Drought brings several different problems that must be addressed. The quality and quantity of crops, livestock, and other agricultural assets will be affected during a drought. Drought can adversely impact forested areas leading to an increased potential for extremely destructive forest and woodland fires that could threaten residential, commercial, and recreational structures.

Hazard Definition for Extreme Heat Hazard

Drought conditions are often accompanied by extreme heat, which is defined as temperatures that hover 10°F or more above the average high for the area and last for several weeks. Extreme heat can occur in humid conditions when high atmospheric pressure traps the damp air near the ground or in dry conditions, which often provoke dust storms.

Common Terms Associated with Extreme Heat

Heat Wave: Prolonged period of excessive heat, often combined with excessive humidity

Heat Index: A number in degrees Fahrenheit that tells how hot it feels when relative humidity is added to air temperature. Exposure to full sunshine can increase the heat index by 15°F.

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

Heat Exhaustion: Typically occurs when people exercise heavily or work in a hot, humid place where body fluids are lost through heavy sweating. Blood flow to the skin increases, causing blood flow to decrease to the vital organs, resulting in a form of mild shock. If left untreated, the victim's condition will worsen. Body temperature will continue to rise and the victim may suffer heat stroke.

Heat and Sun Stroke: A life-threatening condition. The victim's temperature control system, which produces sweat to cool the body, stops working. The body's temperature can rise so high that brain damage and death may result if the body is not cooled quickly.
Source: FEMA

Previous Occurrences for Drought and Extreme Heat Hazard

The NCDC database reported two drought/heat wave events in Richland County since 1960. Each event impacted most of central and southeastern Illinois. In 2007 the severe drought conditions continued through October.

NCDC records of drought/heat waves are identified in Table 4-28. Additional details for NCDC events are included in Appendix C.

Table 4-28: Richland County Drought/Heat Wave Events*

Location or County	Date	Type	Deaths	Injuries	Property Damage	Crop Damage
Statewide	07/30/2006	Heat	1	0	0	0
Statewide	09/01/2007	Drought	0	0	0	0
Piatt County	06/06/2011	Heat	1	0	0	0

** 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.*

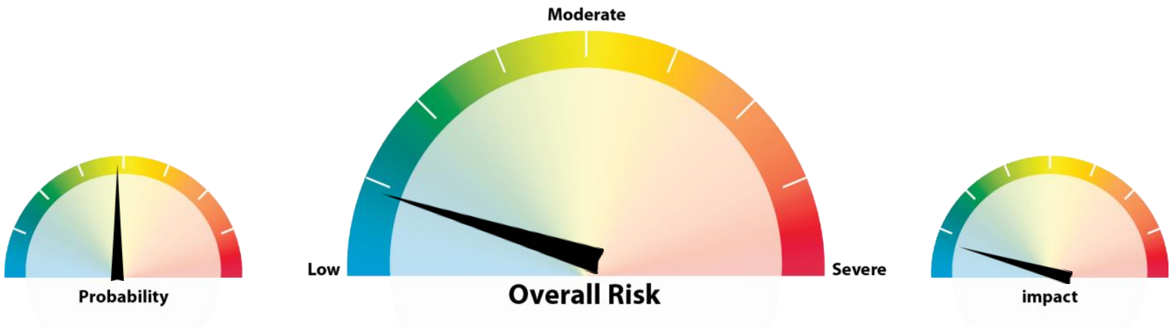
Geographic Location for Drought and Extreme Heat Hazard

Droughts are regional in nature. All areas of the United States are vulnerable to the risk of drought and extreme heat.

Hazard Extent for Drought and Extreme Heat Hazard

Droughts and extreme heat can be widespread or localized events. The extent of the droughts varies both in terms of the extent of the heat and the range of precipitation.

Risk Identification for Drought/Extreme Heat Hazard



Based on historical information, the probability of a drought is medium. In Meeting #2, the planning team determined that the potential impact of a drought or an extended period of extreme heat is minimal; therefore, the overall risk of a drought/extreme heat hazard for Richland County is low.

Vulnerability Analysis for Drought and Extreme Heat Hazard

Drought and extreme heat impacts are an equally distributed threat across the entire jurisdiction; therefore, the county is vulnerable to this hazard and can expect the same impacts within the affected area. According to FEMA, approximately 175 Americans die each year from extreme heat. Young children, elderly, and infirmed populations have the greatest risk.

The entire population and all buildings have been identified as at risk. The building exposure for Richland County, as determined from the building inventory is included in Table 4-6.

At-Risk Facilities

Essential and critical facilities are equally vulnerable to drought. These facilities will encounter many of the same impacts as any other building within the jurisdiction, which should involve only minor damage. The impacts include water shortages, fires as a result of drought conditions, and residents in need of medical care from the heat and dry weather. Table 4-5 lists the types and

Facility Categories

Essential: Core critical facilities; includes schools, fire departments, police departments, EOCs, and care facilities

Critical: Economically/socially viable facilities

Community Assets: Other important county facilities numbers of all of the essential facilities in the area. A list of all essential and critical facilities and community assets, along with their location, is included as Appendix D.

Building Inventory

A table of the building exposure in terms of types and numbers of buildings for the entire county is listed in Table 4-6. The buildings within the county can all expect the same impacts similar to those discussed for essential and critical facilities. These impacts include water shortages, fires as a result of drought conditions, and residents in need of medical care from the heat and dry weather.

Infrastructure

During a drought the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, and bridges. The risk to these structures is primarily associated with a fire that could result from the hot, dry conditions. 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 heat wave. 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 Drought/Extreme Heat Hazard

Future development will remain vulnerable to these events. Typically, some urban and rural areas are more susceptible than others. For example, urban areas are subject to water shortages during periods of drought. Excessive demands of the populated area place a limit on water resources. In rural areas, crops and livestock may suffer from extended periods of heat and drought. Dry conditions can lead to the ignition of wildfires that could threaten residential, commercial, and recreational areas.

Analysis of Community Development Trends

Because droughts and extreme heat are regional in nature, future development will be impacted across the county. Although urban and rural areas are equally vulnerable to this hazard, those living in urban areas may have a greater risk from the effects of a prolonged heat wave. The atmospheric conditions that create extreme heat tend to trap pollutants in urban areas, adding contaminated air to the excessively hot temperatures and creating increased health problems. Furthermore, asphalt and concrete store heat longer, gradually releasing it at night and producing high nighttime temperatures. This phenomenon is known as the "urban heat island effect."
Source: FEMA

Local officials should address drought and extreme heat hazards by educating the public on steps to take before and during the event—for example, temporary window reflectors to direct heat back outside, staying indoors as much as possible, and avoiding strenuous work during the warmest part of the day.

4.4.6 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: 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 central and southeastern 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 numerous ice storm events have occurred in central and southeastern Illinois.

Snowstorms

Significant snowstorms are characterized by the rapid accumulation of snow, often accompanied by high winds, cold temperatures, and low visibility. A blizzard is categorized as a snowstorm with winds of 35 miles per hour or greater and/or visibility of less than one-quarter mile for three or more hours. The strong winds during a blizzard blow about falling and already existing snow, creating poor visibility and impassable roadways. Blizzards have the potential to result in property damage.

Source: www.crh.noaa.gov

Illinois has repeatedly been struck by blizzards. Blizzard conditions cannot only cause power outages and loss of communication, but also make transportation difficult. The blowing of snow can reduce visibility to less than one-quarter mile, and the resulting disorientation makes even travel by foot dangerous if not deadly.

Severe Cold

Severe cold is characterized by the ambient air temperature dropping to around 0°F or below. These extreme temperatures can increase the likelihood of frostbite and hypothermia. 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). As a result, the time it takes for frostbite and hypothermia to affect a person's body will decrease.

Previous Occurrences for Winter Storm Hazard

The NCDC database identified 14 winter storm and extreme cold events for Richland County since 1961. In March of 2000, heavy snowfall occurred in southeastern portion of Illinois, killing one and seriously injuring nine people. The most recent reported event occurred in January 2009. A powerful winter storm swept through central and southeast Illinois, bringing heavy snow accumulation of approximately 8-12 inches.

The NCDC winter storms are listed in Table 4-29. Additional details for NCDC events are included in Appendix C.

Table 4-29: Winter Storm Events*

Location or County	Date	Type	Deaths	Injuries	Property Damage	Crop Damage
Southern Illinois	03/08/1994	Heavy Snow	0	0	500K	0
Central Illinois	01/02/1996	Winter Storm	0	4	0	0
Central Illinois	1/4/1996	Winter Storm	0	0	0	0
Central Illinois	1/18/1996	Winter Storm	0	2	0	0
Central Illinois	3/19/1996	Winter Storm	1	0	0	0
Central Illinois	1/8/1997	Heavy Snow	0	6	0	0
Central Illinois	1/15/1997	Winter Storm	1	7	0	0
Central Illinois	1/26/1997	Winter Storm	0	9	0	0
Central Illinois	11/13/1997	Winter Storm	0	1	0	0
Central Illinois	01/01/1999	Winter Storm	1	0	1K	0
Central Illinois	03/11/2000	Heavy Snow	1	9	0	0
Central Illinois	12/13/2000	Winter Storm	1	1	0	0
Central Illinois	01/25/2004	Ice Storm	0	0	0	0
Central Illinois	12/22/2004	Winter Storm	0	0	0	0
Central Illinois	2/1/2011	Winter Storm	0	0	0	0

** 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.*

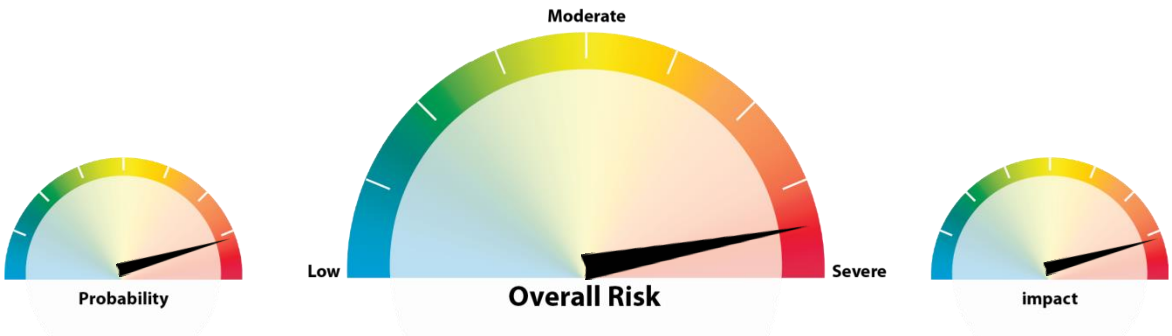
Geographic Location for Winter Storm Hazard

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 varies in terms of storm location, temperature, and ice or snowfall. A severe winter storm can occur anywhere in the jurisdiction.

Risk Identification for Winter Storm Hazard



Based on historical information, the probability of a winter storm is high. In Meeting #2, the planning team determined that the potential impact of a winter storm is significant; therefore, the overall risk of a winter storm hazard for Richland County is severe.

Vulnerability Analysis for Winter Storm Hazard

Winter storm impacts are equally distributed across the entire jurisdiction; therefore, the entire county is vulnerable to a winter storm and can expect the same impacts within the affected area. The building exposure for Richland County, as determined from the building inventory, is included in Table 4-6.

At-Risk Facilities

Essential and critical facilities and community assets are equally vulnerable to winter storms. These facilities will encounter many of the same impacts as other buildings within the jurisdiction. The impacts include loss of gas or electricity from broken or damaged utility lines, damaged or impassable roads and railways, broken water pipes, and roof collapse from heavy snow. Table 4-5 lists the types and numbers of the essential facilities in the area. A list of all essential and critical facilities and community assets, along with their location, is included as Appendix D.

> **Facility Categories**
>
> **Essential**: Core critical facilities; includes schools, fire departments, police departments, EOCs, and care facilities
>
> **Critical**: Economically/socially viable facilities
>
> **Community Assets**: Other important county facilities

Building Inventory

A table of the building exposure in terms of types and numbers of buildings for the entire county is listed in Table 4-6. The impacts to the general buildings within the county are similar to the damages expected to the essential and critical facilities. These include loss of gas or electricity from broken or damaged utility lines, damaged or impassable roads and railways, 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.

Potential Dollar Losses for Winter Storm Hazard

A Hazus-MH analysis was not completed for winter storms because the widespread extent of such a hazard makes it difficult to accurately model outcomes.

To determine dollar losses for a winter storm hazard, the available NCDC hazard information was condensed to include only winter storm hazards that occurred within the past ten years. Richland County's MHMP team then reviewed the property damages reported to NCDC and made any applicable updates.

Since 1994, Richland County has incurred $501,000 in property damages relating to winter storms, including sleet/ice and heavy snow. This historical data has not been collected systematically and may not fully document all losses. As a result, potential dollar losses for a future event cannot be precisely calculated.

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 equally impacted across the county.

4.4.7 Hazardous Materials Storage and Transport Hazard

Hazard Definition for Hazardous Materials Storage and Transport Hazard

Illinois has numerous active transportation lines that run through many of its counties. Active railways transport harmful and volatile substances between our borders every day. The transportation of chemicals and substances along interstate routes is commonplace in Illinois. The rural areas of Illinois have considerable agricultural commerce creating a demand for fertilizers, herbicides, and pesticides to be transported along rural roads. These factors increase the chance of hazardous material releases and spills throughout the state of Illinois.

The release or spill of certain substances can cause an explosion. Explosions result from the ignition of volatile products such as petroleum products, natural and other flammable gases, hazardous materials/chemicals, dust, and bombs. 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

Richland County has experienced several significant large-scale hazardous material incidents at a fixed site and during transport resulting in deaths or injuries, Additionally, there have been many minor releases that have put local firefighters, hazardous materials teams, emergency management, and local law enforcement into action to try to stabilize these incidents and prevent or lessen harm to Richland County residents.

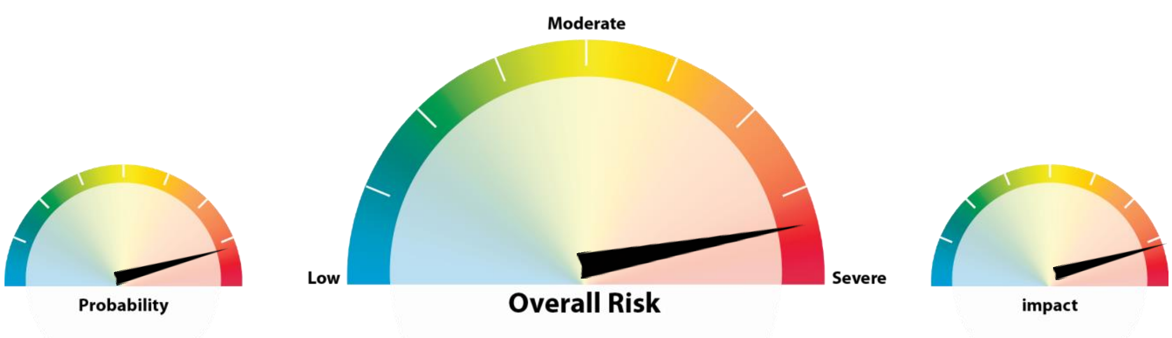
Geographic Location for Hazardous Materials Storage and Transport Hazard

The hazardous material hazards are countywide and are primarily associated with the transport of materials via highway, railroad, and/or river barge.

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.

Risk Identification for Hazardous Materials Release



Based on historical information, the probability of a hazmat hazard is high. In Meeting #2, the planning team determined that the potential impact of a hazmat release is significant; therefore, the overall risk of a hazmat hazard for Richland County is severe. Due to the potentially significant risk, the Richland County Multi-Hazard Mitigation Planning Team chose to simulate two hazardous material spills in the county.

Vulnerability Analysis for Hazardous Materials Storage and Transport Hazard

Hazardous material impacts are an equally distributed threat across the entire jurisdiction; therefore, the entire county is vulnerable to a hazardous material release and can expect the same impacts within the affected area. The main concern during a release or spill is the population affected. The building exposure for Richland County, as determined from building inventory, is included in Table 4-6. This plan will therefore consider all buildings located within the county as vulnerable.

At-Risk Facilities

Essential and critical facilities and community assets are equally at risk. These facilities will encounter many of the same impacts as any other building within the jurisdiction. The 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 4-5 lists the types and numbers of all essential facilities in the area. A list of all essential and critical facilities and community assets, along with their location, is included as Appendix D.

Facility Categories

Essential: Core critical facilities; includes schools, fire departments, police departments, EOCs, and care facilities

Critical: Economically/socially viable facilities

Community Assets: Other important county facilities

Building Inventory

A table of the building exposure in terms of types and numbers of buildings for the entire county is listed in Table 4-6. The buildings within the county can all expect the same impacts, similar to those discussed for essential or 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 residents to seek shelter).

Infrastructure

During a hazardous material release the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, and bridges. Since an extensive inventory of the infrastructure is not available to 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.

Since the probability for a hazardous material release in Richland County is high, the planning team elected to model two such events. Example scenarios are described as follows to gauge the anticipated impact of a hazardous material spill in the county, in terms of numbers and types of buildings and infrastructure.

Due to the significant risk of a hazardous material spill in Richland County, the MHMP planning team determined it appropriate to model two different hazardous materials accidents.

Hazardous Material Release – *Scenario #1*

The U.S. EPA's ALOHA (Areal Locations of Hazardous Atmospheres) model was utilized to assess the area of impact for an anhydrous ammonia release at the intersection of State Road 130 and CSX railroad in Olney.

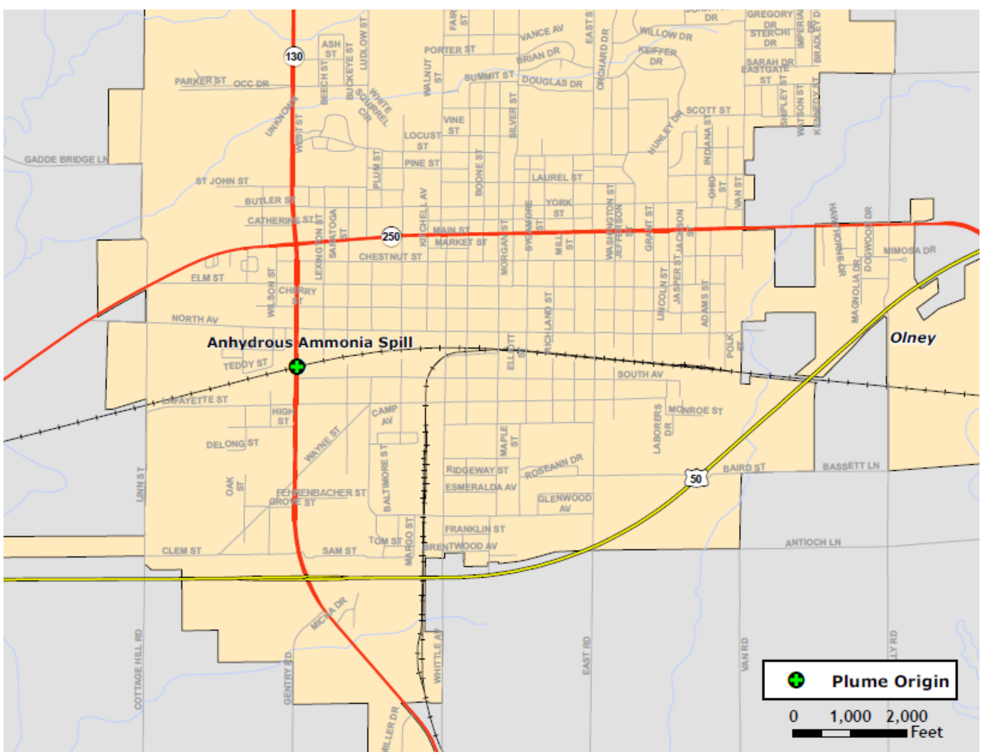
Anhydrous ammonia is a clear colorless gas with a strong odor. Contact with the unconfined liquid can cause frostbite. Though the gas is generally regarded as nonflammable, it can burn within certain vapor concentration limits with strong ignition. The fire hazard increases in the presence of oil or other combustible materials. Vapors from an anhydrous ammonia leak initially hug the ground, and prolonged exposure of containers to fire or heat may cause violent rupturing and rocketing. Long-term inhalation of low concentrations of the vapors or short-term inhalation of high concentrations has adverse health effects. Anhydrous ammonia is generally used as a fertilizer, a refrigerant, and in the manufacture of other chemicals.
Source: CAMEO

ALOHA is a computer program designed especially for use by people responding to chemical accidents, as well as for emergency planning and training. Anhydrous ammonia is a common chemical used in industrial operations and can be found in either liquid or gas form. Rail and truck tankers commonly haul anhydrous ammonia to and from facilities.

For this scenario, moderate atmospheric and climatic conditions with a slight breeze from the west were assumed. The target area was chosen due to its proximity to residential, commercial and critical facility locations.

The geographic area covered in this analysis is depicted in Figure 4-14.

Figure 4-14: Location of Chemical Release



Analysis

The ALOHA atmospheric modeling parameters, depicted in Figure 4-15, were based upon a western wind speed of 5 mph. The temperature was 68°F with 75% humidity and partly cloudy skies.

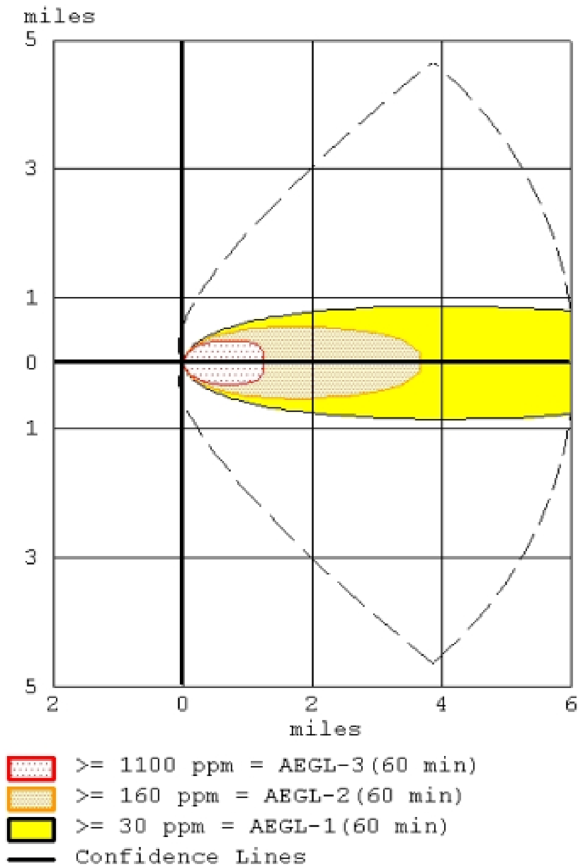
The source of the chemical spill is a horizontal, cylindrical-shaped tank. The diameter of the tank was set to 10 feet and the length set to 53 feet (31,138 gallons). At the time of its release, it was estimated that the tank was 85% full. The anhydrous ammonia in this tank is in its liquid state.

This release was based on a leak from a 2.5 inch-diameter hole, 12 inches above the bottom of the tank. According to the ALOHA parameters, approximately 7,740 pounds of material would be released per minute. The image in Figure 4-16 depicts the plume footprint generated by ALOHA.

Figure 4-15: ALOHA Plume Modeling Parameters

```
SITE DATA:
  Location: OLNEY, ILLINOIS
  Building Air Exchanges Per Hour: 0.30 (sheltered single storied)
  Time: June 1, 2011  1013 hours CDT (using computer's clock)

CHEMICAL DATA:
  Chemical Name: AMMONIA                 Molecular Weight: 17.03 g/mol
  AEGL-1(60 min): 30 ppm   AEGL-2(60 min): 160 ppm   AEGL-3(60 min): 1100 ppm
  IDLH: 300 ppm      LEL: 160000 ppm     UEL: 250000 ppm
  Ambient Boiling Point: -28.8° 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 W at 10 meters
  Ground Roughness: open country         Cloud Cover: 5 tenths
  Air Temperature: 68° F                 Stability Class: B
  No Inversion Height                    Relative Humidity: 75%

SOURCE STRENGTH:
  Leak from hole in horizontal cylindrical tank
  Flammable chemical escaping from tank (not burning)
  Tank Diameter: 10 feet                 Tank Length: 53 feet
  Tank Volume: 31,138 gallons
  Tank contains liquid                   Internal Temperature: 68° F
  Chemical Mass in Tank: 67.4 tons       Tank is 85% full
  Circular Opening Diameter: 2.5 inches
  Opening is 12 inches from tank bottom
  Release Duration: 38 minutes
  Max Average Sustained Release Rate: 7,740 pounds/min
     (averaged over a minute or more)
  Total Amount Released: 129,408 pounds
  Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

THREAT ZONE:
  Model Run: Heavy Gas
  Red   : 1.2 miles --- (1100 ppm = AEGL-3(60 min))
  Orange: 3.4 miles --- (160 ppm = AEGL-2(60 min))
  Yellow: greater than 6 miles --- (30 ppm = AEGL-1(60 min))
```

Figure 4-16 Plume Footprint Generated by ALOHA



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Acute Exposure Guideline Levels (AEGLs) are intended to describe the health effects on humans due to once-in-a-lifetime or rare exposure to airborne chemicals. The National Advisory Committee for AEGLs is developing these guidelines to help both national and local authorities, as well as private companies, deal with emergencies involving spills or other catastrophic exposures. 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). The image in Figure 4-17 depicts the plume footprint generated by ALOHA in ArcGIS.

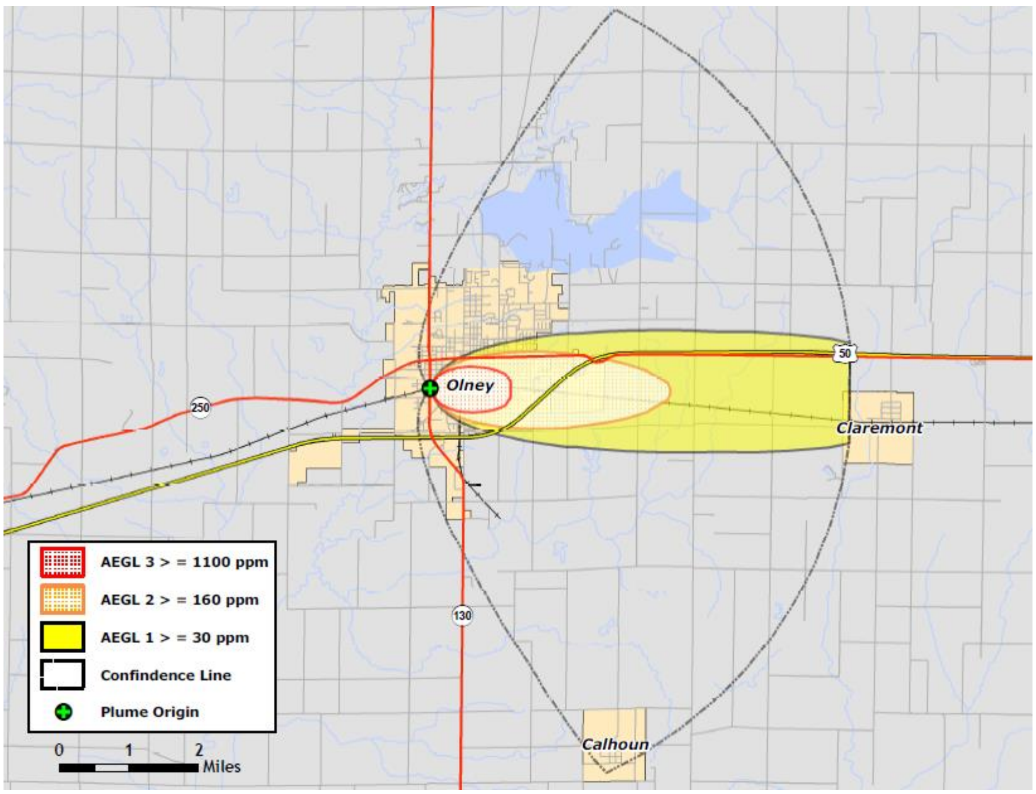
- **AEGL 3:** Above this airborne concentration of a substance, it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death. The red buffer (>=1,100 ppm) extends no more than 1 miles from the point of release after one hour.

- **AEGL 2:** Above this airborne concentration of a substance, it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape. The orange buffer (>=160 ppm) extends no more than 3 miles from the point of release after one hour.

- **AEGL 1:** Above this airborne concentration of a substance, it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure. The yellow buffer (>=30 ppm) extends more than 6 miles from the point of release after one hour.

- **Confidence Lines:** The dashed lines depict the level of confidence in which the exposure levels will be contained. The ALOHA model is 95% confident that the release will stay within this boundary

Figure 4-17: ALOHA Plume Footprint Overlaid in ArcGIS



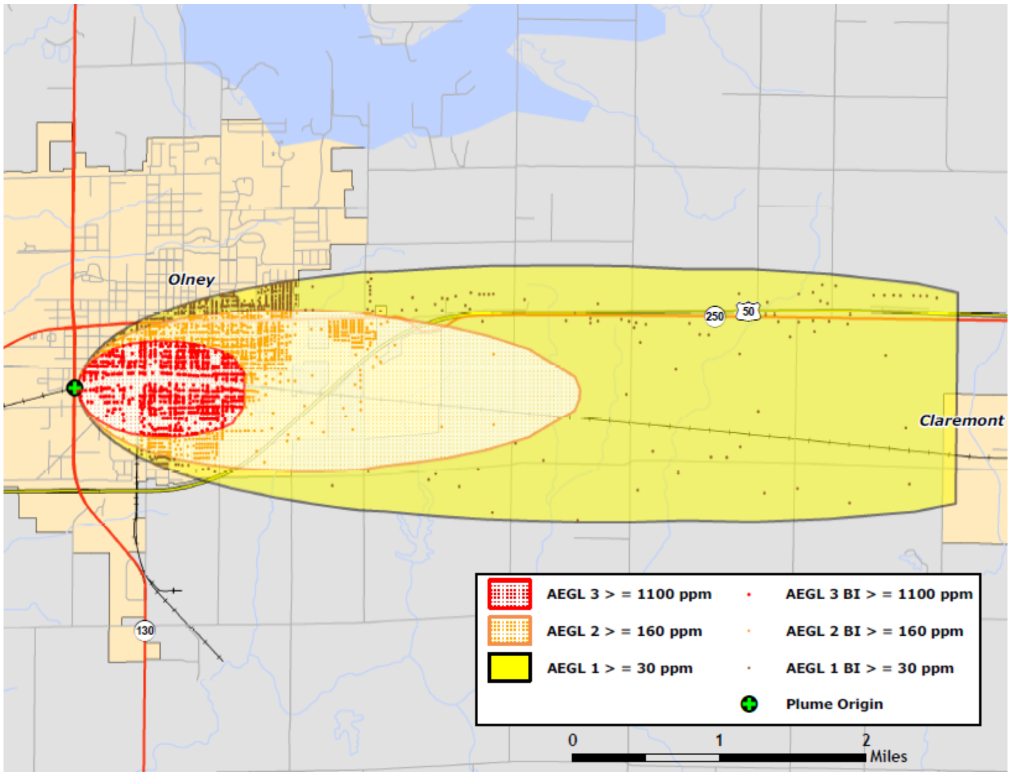
The Richland County building inventory was added to ArcMap and overlaid with the plume footprint. The building inventory was then intersected with each of the four footprint areas to classify each point based upon the plume footprint in which it is located. Figure 4-18 depicts the Richland County building inventory after the intersect process.

Results

By summing the building inventory within all AEGL exposure levels (Level 3: >=1,100 ppm, Level 2: >=160 ppm and Level 1: >=30 ppm.), the GIS overlay analysis predicts that as many as 1,949 buildings could be exposed at a replacement cost of $187 million. The overlay was performed against parcels provided by Richland County that were joined with Assessor records showing property improvement. If this event were to occur, approximately 3,968 people would be affected.

The Assessor records often do not distinguish parcels by occupancy class when the parcels are not taxable; therefore, the total number of buildings and the building replacement costs for government, religious/non-profit, and education may be underestimated.

Figure 4-18: Richland County Building Inventory Classified By Plume Footprint



Building Inventory Damage

The results of the analysis against the Building Inventory points are depicted in Tables 4-30 through 4-33. Table 4-30 summarizes the results of the chemical spill by combining all AEGL levels. Tables 4-31 through 4-33 summarize the results of the chemical spill for each level separately.

Table 4-30: Estimated Exposure for all AEGL Levels (all ppm)

Occupancy	Population	Building Counts	Building Exposure (thousands)
Residential	3,968	1,587	$114,924
Commercial	0	228	$66,757
Industrial	0	8	$1,199
Agriculture	0	28	$4,244
Religious/Non Profit*	0	0	$0
Government*	0	98	$0
Education*	0	0	$0
Total	**3,968**	**1,949**	**$187,125**

**Structure value and/or number of structures not available from Assessors data*

Table 4-31: Estimated Exposure for AEGL Level 3 (>=1100 ppm)

Occupancy	Population	Building Counts	Building Exposure (thousands)
Residential	20	8	$211
Commercial	0	1	$370
Industrial	0	0	$0
Agriculture	0	0	$0
Religious/Non Profit*	0	0	$0
Government*	0	1	$0
Education*	0	0	$0
Total	**20**	**10**	**$580**

**Structure value and/or number of structures not available from Assessors data*

Table 4-32: Estimated Exposure for AEGL Level 2 (>=160 ppm)

Occupancy	Population	Building Counts	Building Exposure (thousands)
Residential	3,113	1,245	$88,493
Commercial	0	182	$57,602
Industrial	0	7	$798
Agriculture	0	6	$722
Religious/Non Profit*	0	0	$0
Government*	0	73	$0
Education*	0	0	$0
Total	**3,113**	**1,513**	**$147,615**

**Structure value and/or number of structures not available from Assessors data*

Table 4-33: Estimated Exposure for AEGL Level 1 (>=30 ppm)

Occupancy	Population	Building Counts	Building Exposure (thousands)
Residential	835	334	$26,221
Commercial	0	45	$8,786
Industrial	0	1	$402
Agriculture	0	22	$3,522
Religious/Non Profit*	0	0	$0
Government*	0	24	$0
Education*	0	0	$0
Total	**835**	**426**	**$38,930**

**Structure value and/or number of structures not available from Assessors data*

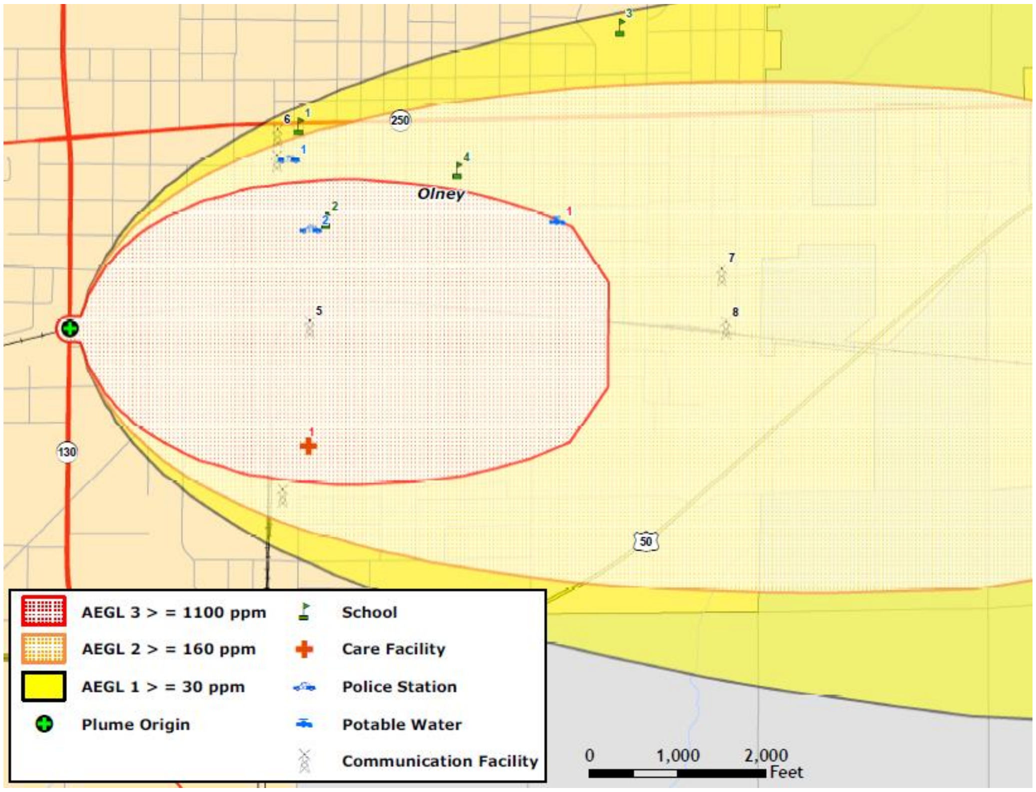
At-Risk Facilities Damage

There are 16 critical facilities within the limits of the chemical spill plume. Five schools, one care facility, two police stations, eight communication facilities, and one potable water facility are identified in Table 4-34. Their location is depicted in Figure 4-19.

Table 4-34: Facilities within Plume Footprint

Name
Truant Alternative Optional Education
Safe School Program Roe 12
East Richland High School
St Joseph Elementary School
Marks Manor
Richland County Sheriff
Olney Police Department
Scherer (Dan Kuhligs Mobile Radio)
Sherriff's Department Tower
Deimel, Charles (Communication Facility)
Schwartz (Communication Facility)
Tolliver Cell Tower
911 Tower A
911 Tower B
Dolls (Communication facility)
Washington Water Tower

Figure 4-19: Critical Facilities within Plume Footprint



Hazardous Material Release – *Model #2*

The U.S. EPA's ALOHA (Areal Locations of Hazardous Atmospheres) model was also utilized to assess the area of impact for an anhydrous ammonia release at the railroad north of US Highway 50 in Olney

Anhydrous ammonia is a clear colorless gas with a strong odor. Contact with the unconfined liquid can cause frostbite. Though the gas is generally regarded as nonflammable, it can burn within certain vapor concentration limits with strong ignition. The fire hazard increases in the presence of oil or other combustible materials. Vapors from an anhydrous ammonia leak initially hug the ground, and prolonged exposure of containers to fire or heat may cause violent rupturing and rocketing. Long-term inhalation of low concentrations of the vapors or short-term inhalation of high concentrations has adverse health effects. Anhydrous ammonia is generally used as a fertilizer, a refrigerant, and in the manufacture of other chemicals.
Source: CAMEO

ALOHA is a computer program designed especially for use by people responding to chemical accidents, as well as for emergency planning and training. Anhydrous ammonia is a common chemical used in industrial operations and can be found in either liquid or gas form. Rail and truck tankers commonly haul anhydrous ammonia to and from facilities.

For this scenario, moderate atmospheric and climatic conditions with a slight breeze from the west were assumed. The target area was chosen due to its proximity to residential, commercial and critical facility locations.

The geographic area covered in this analysis is depicted in Figure 4-20.

Figure 4-20: Location of Chemical Release

Analysis

The ALOHA atmospheric modeling parameters, depicted in Figure 4-21, were based upon a western wind speed of 10 mph. The temperature was 68°F with 75% humidity and partly cloudy skies.

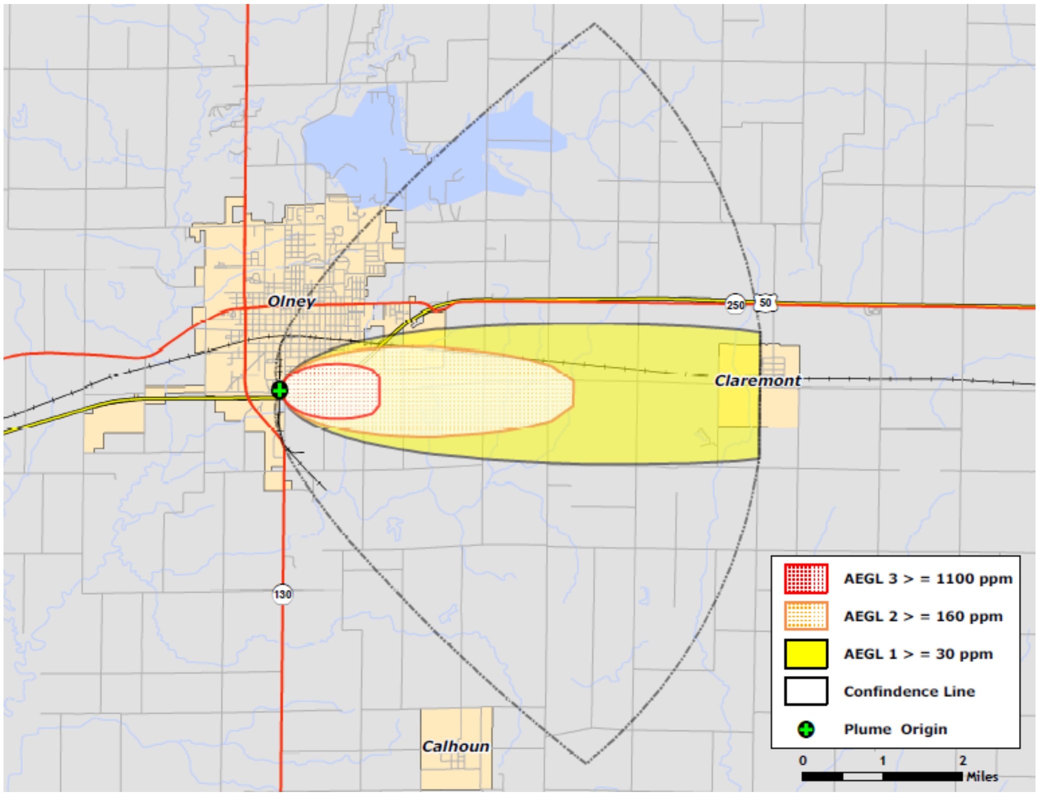
The source of the chemical spill is a horizontal, cylindrical-shaped tank. The diameter of the tank was set to 10 feet and the length set to 53 feet (31,138 gallons). At the time of its release, it was estimated that the tank was 85% full. The anhydrous ammonia in this tank is in its liquid state.

This release was based on a leak from a 2.5 inch-diameter hole, 12 inches above the bottom of the tank. According to the ALOHA parameters, approximately 7,740 pounds of material would be released per minute. The image in Figure 4-22 depicts the plume footprint generated by ALOHA.

Figure 4-21: ALOHA Plume Modeling Parameters

```
SITE DATA:
  Location: OLNEY, ILLINOIS
  Building Air Exchanges Per Hour: 0.29 (sheltered single storied)
  Time: June 2, 2011  0733 hours CDT (using computer's clock)

CHEMICAL DATA:
  Chemical Name: AMMONIA                 Molecular Weight: 17.03 g/mol
  AEGL-1(60 min): 30 ppm   AEGL-2(60 min): 160 ppm   AEGL-3(60 min): 1100 ppm
  IDLH: 300 ppm      LEL: 160000 ppm     UEL: 250000 ppm
  Ambient Boiling Point: -28.8° 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 W at 10 meters
  Ground Roughness: open country         Cloud Cover: 5 tenths
  Air Temperature: 68° F                 Stability Class: C
  No Inversion Height                    Relative Humidity: 75%

SOURCE STRENGTH:
  Leak from hole in horizontal cylindrical tank
  Flammable chemical escaping from tank (not burning)
  Tank Diameter: 10 feet                 Tank Length: 53 feet
  Tank Volume: 31,138 gallons
  Tank contains liquid                   Internal Temperature: 68° F
  Chemical Mass in Tank: 67.4 tons       Tank is 85% full
  Circular Opening Diameter: 2.5 inches
  Opening is 12 inches from tank bottom
  Release Duration: 38 minutes
  Max Average Sustained Release Rate: 7,740 pounds/min
     (averaged over a minute or more)
  Total Amount Released: 129,408 pounds
  Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

THREAT ZONE:
  Model Run: Heavy Gas
  Red   : 1.3 miles --- (1100 ppm = AEGL-3(60 min))
  Orange: 3.7 miles --- (160 ppm = AEGL-2(60 min))
  Yellow: greater than 6 miles --- (30 ppm = AEGL-1(60 min))
```

Figure 4-22: ALOHA Plume Footprint Overlaid in ArcGIS

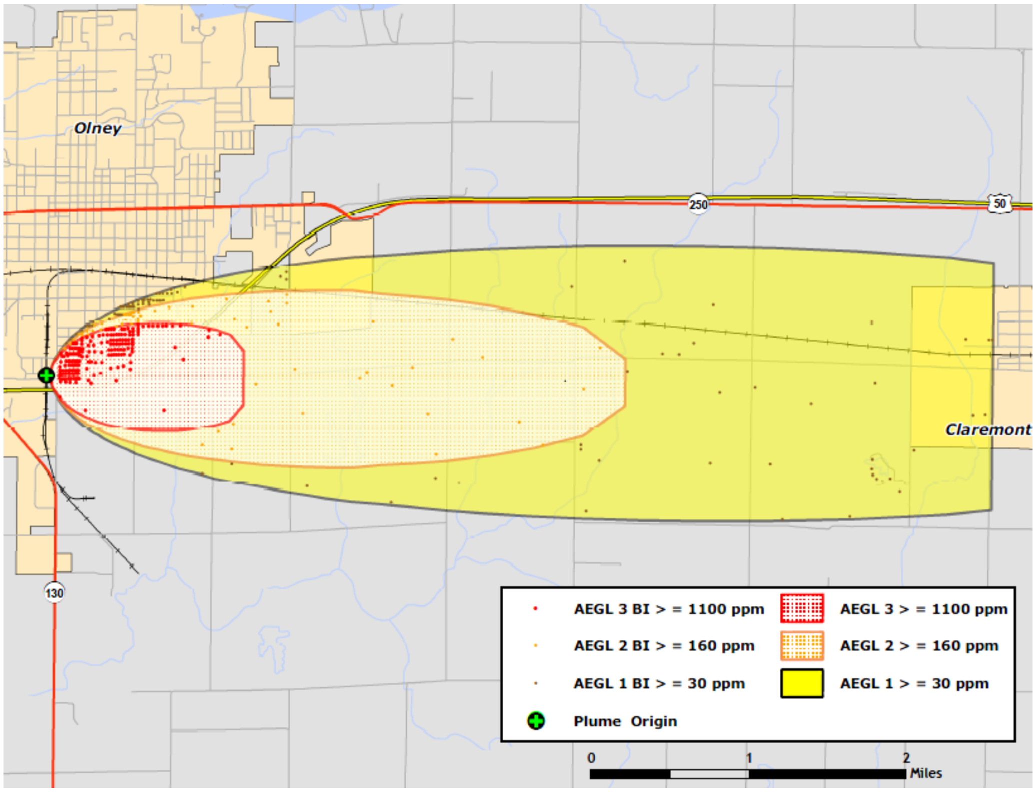


Results

By summing the building inventory within all AEGL exposure levels (Level 3: >=1,100 ppm, Level 2: >=160 ppm and Level 1: >=30 ppm.), the GIS overlay analysis predicts that as many as 342 buildings could be exposed at a replacement cost of $40.9 million. The overlay was performed against parcels provided by Richland County that were joined with Assessor records showing property improvement. If this event were to occur, approximately 708 people would be affected.

The Assessor records often do not distinguish parcels by occupancy class when the parcels are not taxable; therefore, the total number of buildings and the building replacement costs for government, religious/non-profit, and education may be underestimated.

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



Building Inventory Damage

The results of the analysis against the building inventory points are depicted in Tables 4-35 through 4-38. Table 4-35 summarizes the results of the chemical spill by combining all AEGL levels. Tables 4-36 through 4-38 summarize the results of the chemical spill for each level separately.

Table 4-35: Estimated Exposure for all AEGL Levels (all ppm)

Occupancy	Population	Building Counts	Building Exposure (thousands)
Residential	708	283	$30,384
Commercial	0	13	$5,225
Industrial	0	1	$281
Agriculture	0	33	$4,992
Religious/Non Profit*	0	0	$0
Government*	0	12	$0
Education*	0	0	$0
Total	**708**	**342**	**$40,883**

**Structure value and/or number of structures not available from Assessors data*

Table 4-36 Estimated Exposure for AEGL Level 3 (>=1100 ppm)

Occupancy	Population	Building Counts	Building Exposure (thousands)
Residential	23	9	$1,184
Commercial	0	0	$0
Industrial	0	0	$0
Agriculture	0	0	$0
Religious/Non Profit*	0	0	$0
Government*	0	1	$0
Education*	0	0	$0
Total	**23**	**10**	**$1,184**

**Structure value and/or number of structures not available from Assessors data*

Table 4-37: Estimated Exposure for AEGL Level 2 (>=160 ppm)

Occupancy	Population	Building Counts	Building Exposure (thousands)
Residential	508	203	$22,314
Commercial	0	10	$3,591
Industrial	0	1	$281
Agriculture	0	14	$2,188
Religious/Non Profit*	0	0	$0
Government*	0	11	$0
Education*	0	0	$0
Total	**508**	**239**	**$28,374**

**Structure value and/or number of structures not available from Assessors data*

Table 4-38: Estimated Exposure for AEGL Level 1 (>=30 ppm)

Occupancy	Population	Building Counts	Building Exposure (thousands)
Residential	178	71	$6,886
Commercial	0	3	$1,634
Industrial	0	0	$0
Agriculture	0	19	$2,804
Religious/Non Profit*	0	0	$0
Government*	0	0	$0
Education*	0	0	$0
Total	**178**	**93**	**$11,324**

**Structure value and/or number of structures not available from Assessors data*

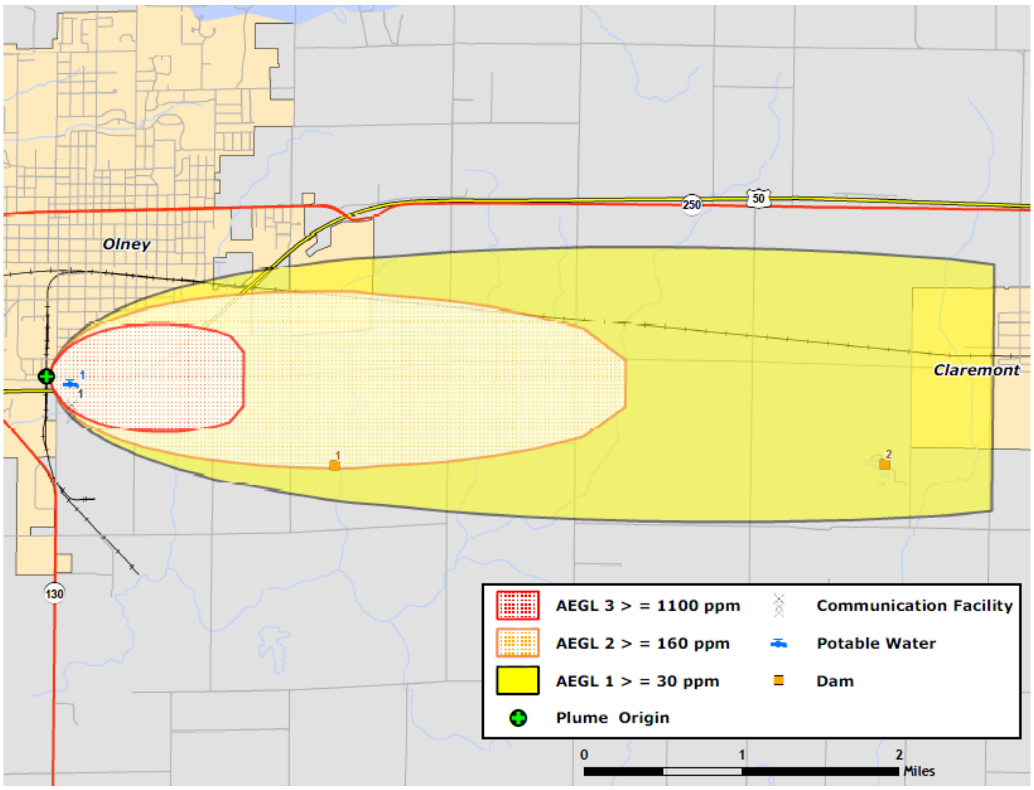
At-Risk Facilities Damage

There are four critical facilities within the limits of the chemical spill plume. One potable water facility, two dams and one communication facility are identified in Table 4-39. Their geographic locations are depicted in Figures 4-24.

Table 4-39: Critical Facilities within Plume Footprint

Name
Brentwood Tower (Potable Water Facility)
Millers Lake Dam
Montclare Lake Dam
Version North (Communication Facility)

Figure 4-24: Critical Facilities within Plume Footprint



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

Any new development within the county will be vulnerable to these events, especially development along major roadways.

Analysis of Community Development Trends

Because the hazardous material hazard events may occur anywhere within the county, future development will be impacted. The major transportation routes and the industries located in Richland County pose a threat of dangerous chemicals and hazardous materials release.

4.4.8 Fire Hazard

Hazard Definition for Fire Hazard

This plan will address three major categories of fires for Richland County: 1) tire/scrap fires; 2) structural fires; and 3) wildfires.

Tire Fires

The state of Illinois generates thousands of scrap tires annually. Many of those scrap tires end up in approved storage sites that are carefully regulated and controlled by federal and state officials. However, scrap tires are sometimes intentionally dumped in unapproved locations throughout the state. The number of unapproved locations cannot be readily determined. These illegal sites are owned by private residents who have been continually dumping waste and refuse, including scrap tires, at those locations for many years.

Tire disposal sites can be fire hazards, in large part, because of the enormous number of scrap tires typically present at one site. This large amount of fuel renders standard firefighting practices nearly useless. Flowing and burning oil released by the scrap tires can spread the fire to adjacent areas. Tire fires differ from conventional fires in the following ways:

- Relatively small tire fires can require significant fire resources to control and extinguish.
- Those resources often cost much more than Richland County government can absorb compared to standard fire responses.
- There may be significant environmental consequences of a major tire fire. Extreme heat can convert a standard vehicle tire into approximately two gallons of oily residue that may leak into the soil or migrate to streams and waterways.

Structural Fires

Lightning strikes, poor building construction, and building condition are the main causes for most structural fires in Illinois. Richland County has a few structural fires each year countywide.

Wildfires

When hot and dry conditions develop, forests may become vulnerable to devastating wildfires. In the past few decades an increased commercial and residential development near forested areas has dramatically changed the nature and scope of the wildfire hazard. In addition, the increase in structures resulting from new development strains the effectiveness of the fire service personnel in the county.

Previous Occurrences for Fire Hazard

Richland 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. The planning team reports several industrial fires in Richland County within the past ten years.

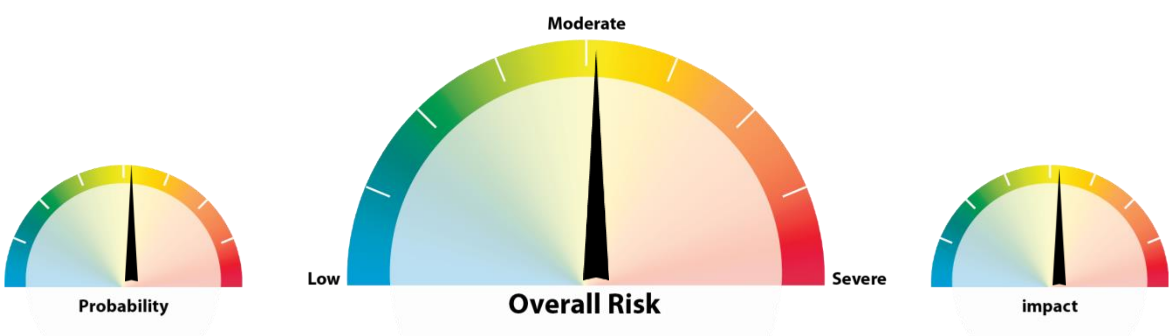
Geographic Location for Fire Hazard

Fire hazards occur countywide and therefore affect the entire county. The forested areas in the county have a higher chance of widespread fire hazard.

Hazard Extent for Fire Hazard

The extent of the fire hazard varies both in terms of the severity of the fire and the type of material being ignited. All communities in Richland County are affected by fire equally.

Risk Identification for Fire Hazard



Based on historical information, the probability of a fire is medium. In Meeting #2, the planning team determined that the potential impact of a fire is moderate; therefore, the overall risk of a fire hazard for Richland County is moderate.

Vulnerability Analysis for Fire Hazard

This hazard impacts the entire jurisdiction equally; therefore, the entire population and all buildings within the county are vulnerable to fires and can expect the same impacts within the affected area.

Table 4-5 lists the types and numbers of all essential facilities in the area. A list of all essential facilities, critical facilities, and community assets is included as Appendix D.

The building exposure for Richland County, as determined from the building inventory, is included in Table 4-6. Because of the difficulty predicting which communities are at risk, the entire population and all buildings have been identified at risk.

At-Risk Facilities

Essential and critical facilities and community assets are equally vulnerable to fire hazards. These facilities will encounter many of the same impacts as any other building within the jurisdiction. The impacts include structural damage from fire and water damage from efforts extinguishing fire. Table 4-5 lists the types and numbers of essential facilities in the area. Additional facility information is included as Appendix D.

Building Inventory

A table of the building exposure in terms of types and numbers of buildings for the entire county is provided in Table 4-6. Impacts to the general buildings within the county are similar to the damages expected to the essential or critical facilities. These impacts include structural damage from fire and water damage from efforts to extinguish the fire.

Infrastructure

During a fire 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 fire. Potential impacts include structural damage resulting in impassable roadways and power outages.

Vulnerability to Future Assets/Infrastructure for Fire Hazard

Any future development will be vulnerable to these events.

Analysis of Community Development Trends

Fire hazard events may occur anywhere within the county, because of this future development will be impacted.

Section 5 - Mitigation Strategy

The goal of mitigation is to reduce the future impacts of a hazard 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, provided in Section 4 of this plan. Mitigation should be an ongoing process adapting over time to accommodate a 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)

In Richland County, only the City of Olney has become a member of the National Flood Insurance Program. Calhoun, Claremont, Noble, and Parkersburg, have chosen not to participate in the program. Richland County does have an identified flood area but has chosen not to participate. Richland County will continue to educate these jurisdictions on the benefits of the program.

Hazus-MH identified approximately 146 households located within the Richland County Special Flood Hazard Area; four households paid flood insurance, insuring $654,300 in property value. The total premiums collected amounted to $2,071.

The county and incorporated areas do not participate in the NFIP'S 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 actions 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	FIRM Date	CRS Date	CRS Rating	Floodplain Ordinance
Richland County	06/08/79	1984	N/A	N/A	N/A
City of Olney	09/04/85	1985	N/A	N/A	N/A
Village of Calhoun	N/A	N/A	N/A	N/A	N/A
Village of Claremont	N/A	N/A	N/A	N/A	N/A
Village of Noble	N/A	N/A	N/A	N/A	N/A
Village of Parkersburg	N/A	N/A	N/A	N/A	N/A

5.1.2 Stormwater Management Stream Maintenance Ordinance

Neither Richland County nor its cities or villages have a storm water management plan or ordinances.

5.1.3 Zoning Management Ordinance

Unincorporated Richland County does not have zoning regulations, but the City of Olney regulates all aspects of zoning including types of land use, building regulations, and procedures for construction approval. Table 5-2 lists the adoption dates of plans and ordinances within the county.

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Table 5-2: Description of Zoning Plans/Ordinances

Community	Comp Plan	Zoning Ord	Subd Control Ord	Erosion Control	Storm Water Mgmt	Burning Ord	Seismic Ord	Bldg. Stndrds
Richland County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
City of Olney	2000	1969	1976	N/A	N/A	N/A	N/A	2006
Village of Calhoun	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Village of Claremont	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Village of Noble	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Village of Parkersburg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

5.1.4 Erosion Management Program/ Policy

Richland County does not have an erosion management program.

5.1.5 Fire Insurance Rating Programs/ Policy

Table 5-3 lists Richland County's fire departments and respective information.

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

Fire Department	Fire Insurance Rating	Number of Firefighters
Olney Fire Department	5	5 Full Time + 30 Volunteer
Noble FPD	9	15 Volunteer
Claremont-Bonpas Fire Department	7	12 Volunteer

5.1.6 Land Use Plan

Richland County does not have a land use plan.

5.1.7 Building Codes

Richland County uses the Illinois State Building Code as their guide for building standards. The City of Olney has adopted the ICC 2006 building codes.

5.2 Mitigation Goals

In Section 4 of this plan, the risk assessment identified Richland County as prone to eight hazards. The MHMP planning team members understand that although hazards cannot be eliminated altogether, Richland County can work toward building disaster-resistant communities. Following are a list of goals, objectives, and actions. 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 that will assist the communities in attaining the listed goals.

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 community.

(e) Objective: Improve emergency sheltering in the community.

Goal 2: Create new or revise existing plans/maps for the community

(a) Objective: Support compliance with the NFIP.

(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 community 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 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 8, 2011, 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 on September 15, 2011. 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?

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 first. 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, permitting, and 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 5-5. The factors were the STAPLE+E (Social, Technical, Administrative, Political, Legal, Economic, and Environmental) criteria listed in Table 5-4.

Table 5-4: 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 implementations of any mitigation actions. Table 5-5 presents mitigation projects developed by the planning committee, as well as actions that are ongoing or already completed. Since this is the first mitigation plan developed for Richland County, there are no deleted or deferred mitigation items.

Table 5-5: Mitigation Strategies for Richland County

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Jurisdictions Covered	Priority	Comments
Distribute weather radios to critical facilities and schools	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, Earthquake, Drought, Winter Storm	Richland County	Ongoing	Critical facilities throughout the county have been equipped with weather radios.
Trim trees to minimize the amount/duration of power outages	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards.	Winter Storm	Richland County	Ongoing	This is an ongoing practice in Richland County.
Conduct a siren coverage study and purchase additional sirens throughout the county as necessary	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	Richland County	High	The county's existing sirens are not sufficient. Funding has not been secured as of 2011, but the PDM program and community grants are an option. If funding is available, implementation will begin within one year.
Implement new plans for public education including distribution of literature regarding family safety measures	Goal: Develop long-term strategies to educate the community residents on the hazards affecting their county Objective: Raise public awareness on hazard mitigation.	Tornado, Flood, Earthquake, Thunderstorm, Drought, Winter Storm, Hazmat	Richland County	High	The County EMA will work with area schools, healthcare facilities, and businesses to implement this project. Funding will be sought from local sources. Implementation, if funding is available, will begin within one year.
Improve drainage relating to storm water system in order to protect new and existing structures	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards.	Flood	Olney	High	The EMA director will work with ILDOT and IDNR to evaluate the current conditions of the county's waterways and drainage and develop a plan. Funding has not been secured as of 2011, but county, state, and federal funding will be sought. Implementation will begin within one year.
Institute mass notification system (reverse 911/Nixel) countywide	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, Flood, Hazmat	Richland County	High	Funding has not been secured as of 2011, but the pre-disaster mitigation program and community development grants are possible funding sources. Implementation. If funding is available, will begin within one year.
Conduct a study to determine shelter capacity; establish new shelters as necessary; equip with generator and necessary supplies	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Improve emergency sheltering in the community.	Tornado, Flood, Earthquake, Thunderstorm, Winter Storm, Hazmat, Fire	Calhoun, Claremont, Noble, Olney, Parkersburg, Richland County	High	The County EMA will work with local authorities and the American Red Cross to establish the new shelters. Funding will be sought from local businesses and healthcare facilities. If funding is available, implementation will begin within one year.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Jurisdictions Covered	Priority	Comments
Increase public awareness of the benefits of the NFIP program	Goal: Support compliance with the NFIP Objective: Create new or revise existing plans/maps for the community.	Flood	Calhoun, Claremont, Noble, Olney, Parkersburg, Richland County	High	The county will continue to develop public education programs to instruct the public on the benefits of joining the NFIP. Funding for public education materials will be sought from FEMA. Implementation will begin within one year.
Elevate roads that are underwater when Fox River floods: Mt Gillead Rd, Dean Farm Lane, Tank Farm Lane	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.	Flood	Olney, Noble	Medium	The County EMA will oversee the implementation of this project. Funding has not been secured as of 2011, but the pre-disaster mitigation program, local resources, ILDOT, and USACE are possible funding sources. If funding is available, this project is forecasted to begin within three years.
Install inertial valves	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.	Earthquake	Calhoun, Claremont, Noble, Olney, Parkersburg	Medium	The County EMA will oversee implementation of this project and determine which facilities do not currently have inertial valves. Funding has not been secured as of 2011, but the PDM program and community grants are an option. If funding is available, implementation will begin within three years.
Purchase transfer switches to provide back-up power to medical care facilities	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Improve emergency sheltering in the community.	Flood, Tornado, Earthquake, Thunderstorm, Winter Storm, Hazmat	Olney	Medium	The County and other jurisdictions will oversee the implementation of this project. Local resources will be used to determine which facilities should receive equipment. Funding has not been secured as of 2011, but the pre-disaster mitigation program and community development grants are possible funding sources. If funding is available, this project is forecasted to begin within three years.
Establish mutual aid agreements with neighboring jurisdictions	Goal: Develop long-term strategies to educate the community residents on the hazards affecting their county Objective: Improve education and training of emergency personnel and public officials	Tornado, Flood, Earthquake, Thunderstorm, Winter Storm, Hazmat	Richland County	Medium	The County EMA oversees the implementation of the project. Funding has not been secured as of 2011 but will be sought from funding sources such as IDOT. Implementation, if funding is available, is forecasted to begin within three years.
Harden essential facilities, including fire stations	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.	Tornado, Earthquake	Calhoun, Claremont, Noble, Olney, Parkersburg	Medium	The County EMA will oversee the implementation of this project. Local resources will be used to identify the required structures to be hardened. Funding has not been secured as of 2011, but the pre-disaster mitigation program and community development grants are possible funding sources. Implementation, if funding is available, will begin within three years.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Jurisdictions Covered	Priority	Comments
Improve and enforce floodplain ordinances to ensure that new construction does not occur in floodplains	Goal: Create new or revise existing plans/maps for the community Objective: Review and update existing, or create new, community plans and ordinances to support hazard mitigation.	Flood	Richland County	Medium	The County EMA will work with the local planning commission to review floodplain ordinances. The MHMP planning committee will develop public education options to re-affirm the ordinances in the communities. If local, state, and federal resources are available, implementation of this project will begin within three years.
Conduct a commodity flow study	Goal: Create new or revise existing plans/maps for the community Objective: Conduct new studies/research to profile hazards and follow up with mitigation strategies.	Hazmat	Richland County	Medium	The County EMA oversees the implementation of the project. Funding has not been secured as of 2011 but will be sought from funding sources such as IDOT. Implementation, if funding is available, is forecasted to begin within three years.
Conduct an engineering study to improve safety at the Elmdale Road railroad crossing	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards.	Hazmat	Olney	Medium	The County EMA will work with DNR and USACE on this project. Funding has not been secured as of 2011, but federal, state, and local agencies are possible sources. Implementation will begin within three years.
Improve rural water supply for fire response	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards.	Fire, Hazmat	Richland County	Low	The County EMA will work with the dam owner to oversee the implementation of this project. Local resources will be used to develop the plans. Recommendations may be sought from DNR. Implementation is forecasted to begin within five years.
Provide cooling\warming shelters	Goal: Create new or revise existing plans for the community Objective: Improve emergency sheltering in the community.	Drought	Calhoun, Claremont, Noble, Olney, Parkersburg	Low	The County EMA will oversee this project. Local resources will be used to identify shelter areas. Funding has not been secured as of 2011, but the PDM program and community development grants are possible sources. If funding is available, implementation will begin within five years.
Establish a database to identify and educate special needs population	Goal: Create new or revise existing plans/maps for the community Objective: Evaluate and strengthen the communication and transportation abilities of emergency services throughout the county.	Tornado, Flood, Earthquake, Thunderstorm, Drought, Winter Storm, Hazmat, Fire	Richland County	Low	Funding has not been secured as of 2011, but the pre-disaster mitigation program is a possible funding source. If funding is available, this project is forecasted to begin within five years.
Develop redundant public water systems	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.	Drought, Fire	Richland County	Low	Local resources will be used to research options. Funding has not been secured as of 2011, but the pre-disaster mitigation program is a possible funding source. If funding is available, this project is forecasted to begin within five years.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Jurisdictions Covered	Priority	Comments
Bury new power lines	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards.	Tornado, Earthquake, Thunderstorm, Winter Storm	Calhoun, Claremont, Noble, Olney, Parkersburg, Richland County	Low	The County EMA, municipalities, and utility companies will oversee the implementation of this project. Local and corporate resources will be used to prioritize power lines and bury them. The project is forecasted to implement within approximately five years.

The Richland County Emergency Management will be the local champions for the mitigation actions. The Richland 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.

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 five incorporated communities within and including Richland County was 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 Richland County Emergency Management Agency will reconvene the MHMP planning committee to monitor, evaluate, and update the plan on an annual basis. Additionally, a meeting will be held during November, 2016 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, due to new developments or a declared disaster occurs in the county, the team will meet 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 since many of the mitigation projects identified as part of this planning process are ongoing. Richland County and its incorporated jurisdictions will update the zoning plans and ordinances listed in Table 5-2 as necessary and as part of regularly scheduled updates. Each community will be responsible for updating its own plans and ordinances.

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 the EMA director and forwarded to the MHMP planning committee for discussion. Education efforts for hazard mitigation will be ongoing through the EMA. The public will be notified of periodic planning meetings through notices in the local newspaper. Once adopted, a copy of this plan will be maintained in each jurisdiction and in the County EMA Office.

Glossary of Terms

A

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

B

BFE – Base Flood Elevation

C

CEMA – County Emergency Management Agency
CRS – Community Rating System

D

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

E

EAP – Emergency Action Plan
EMA – Emergency Management Agency

F

FEMA – Federal Emergency Management Agency
FIRM – Flood Insurance Rate Maps

G

GIS – Geographic Information System

H

Hazus-MH – **Ha**zards **U**S**A** **M**ulti-**H**azard
HUC – Hydrologic Unit Code

I

IEMA-Illinois Emergency Management Agency
IDNR – Illinois Department of Natural Resources
IEMA-Illinois Emergency Management Agency
ISGS – Illinois State Geological Survey

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

S

SPC – Storm Prediction Center

U

USGS – United States Geological Survey

Appendix A: Multi-Hazard Mitigation Plan Meeting Minutes

Meeting Minutes
Richland County
Pre-Disaster Mitigation Planning Meeting #1
10:00 a.m. January 19, 2011

1. Introductions

The planning meeting was attended by the following:

Name	Phone	Address	Email	Representing
Richard Clark	723-2212		richclark@bspeedy.com	Village of Noble
Leo Ledeker	442-7754	651 Remington Rd. Parkersburg, IL 62452	ledeker@hughes.net	Parkersburg
Randy Bukas	395-7302	300 S. Whittle Ave. Olney, IL 62450	rbukas@wabash.net	City of Olney
Donna Brown	395-6006	800 E. Locust St. Olney, IL 62450	dbrown@richlandmemorial.com	Richland Memorial Hospital
Debra Lamb, RN	392-6241	501 S. Whittle Ave. Olney, IL 62450	rcho@wabash.net	Richland Co. Health
Kristi Urfer	395-7777	4682 E. Miller Grove, Olney, IL 62450	urferk@iecc.edu	Olney Central College
Brandi Stennett	392-2305	503 E. Main St., Olney, IL 62450	bstennett@rcdc.com	Richland Co. Development
Jonathan Remo	453-7370	SIUC	diamict@siu.edu	SIUC
Gary Wachtel	395-3552	111 E. Locust Olney, IL 62450	gabewac@frontier.com	Richland Co. Board
Andrew Hires	395-7481	211 W. Market Olney, IL 62450	sheriffhires@frontier.com	Richland Co. Sheriff
Mike Buss	392-7600		mikebuzzrema@wabash.net	Richland Co. EMA
Chris Schmitz	317-278-4915	Polis Center	schmitzc@iupui.edu	Polis Center
Beth Ellison		SIUC	beth.ellison@siu.edu	SIU
David Jordan	445-3612	PO Box 209 Albion, Il 62806	davidjordan@gwrpc.com	GWRPC
John Buechler	317-278-2433	1200 Waterway Blvd. Indianapolis, IN 46202	jobuechl@iupui.edu	Polis Center

John Buechler with The Polis Center IUPUI and Dr. Jonathan Remo from SIUC, co-coordinators for the Richland County Pre-Disaster Mitigation Plan were present to give an overview of the development of the plan. A power point was presented to discuss the planning process and public input. The idea of the plan is to be able to apply for FEMA Hazard Mitigation funds. The only way to be eligible for funding is to have a PDMP in place.

2. Richland Co. PDMP team will need to identify major facilities in the county:
    1. Fire Stations
    2. Police Stations
    3. Schools
    4. Nursing Homes
    5. Hospitals

   6. Emergency Operations Centers
   7. Etc.
3. Team will identify areas of the county for models to be developed showing the effects of:
   1. Earthquakes
   2. Tornados
   3. Chemical spills
   4. Other specified disasters
4. Meetings
   1. 5 -6 meetings
   2. 1 must be public meeting, usually meeting #3
   3. Meeting 5 to approve draft plan
5. Match is 'in-kind', time sheets will be used to track Richland Co. contribution.
6. Adoption of plan – plan must be adopted by every in-cooperated community and the Richland County Board.
   1. Richland County Board
   2. Village of Calhoun
   3. Village of Claremont
   4. Village of Noble
   5. City of Noble
   6. Village of Parkersburg
7. Every in-cooperated community must participate in the plan process.
8. Next meeting is scheduled for March 1, 2011 at 10:00 a.m. in the Sheriff's Annex Building.

Pre-Disaster Mitigation Planning Meeting 2
Meeting Minutes
Richland County
10:00 a.m.
April 19, 2011

The 2nd meeting was attended by the following:

Name	Phone	Address	Email	Representing
Tom Hanna	442-5106	213 E. Parker Parkersburg, IL 62452	5xhanna@gmail.com	Village of Parkersburg
Randy Bukas	395-7302	300 S. Whittle Ave. Olney, IL 62450	rbukas@wabash.net	City of Olney
Chris Schmitz	317-278-4915	Polis Center	schmitzc@iupui.edu	Polis Center
Mike Buss	392-7600	210 Mimosa Dr. Olney, IL 62450	mikebuzzrema@wabash.net	Richland Co. EMA
Donna Brown	395-6006	800 E. Locust St. Olney, IL 62450	dbrown@richlandmemorial.com	Richland Memorial Hospital
Debra Lamb, RN	392-6241	501 S. Whittle Ave. Olney, IL 62450	rcho@wabash.net	Richland Co. Health
Rodney Ranes	395-7777	305 N. West St. Olney, Il 62450	ranesr@iecc.edu	Olney Central College
Gary Wachtel	395-3552	111 E. Locust Olney, IL 62450	gabewac@frontier.com	Richland Co. Board
Rusty Holmes	392-2494	302 Holly Rd. Olney, IL 62450	Rholmes@olneyfd.com	Olney Fire Dept.
Leo Ledeker	442-7754	651 Remington Rd. Parkersburg, IL 62452	ledeker@hughes.net	Parkersburg
Tim Hahn	395-4387	103 W. Main St. Olney, IL 62450	assessor@richlandcogov.com	Supervisor of Assessments/GIS
Danny Colwell	392-3141	4334 N. Meridian Rd. Olney, IL 62450	Richland@shawneelink.net	Richland Co. Engineer
Larry Bussard	395-2324	1100 E. Laurel Olney, IL 62450	lbussard@ercu1.net	ERCU #1 Schools
Brandi Stennett	392-2305	503 E. Main St., Olney, IL 62450	bstennett@rcdc.com	Richland Co. Development
Richard Clark	839-2356		richclark@bspeedy.com	Village of Noble
David Jordan	445-3612	PO Box 209 Albion, Il 62806	davidjordan@gwrpc.com	GWRPC
John Buechler	317-278-2433	1200 Waterway Blvd. Indianapolis, IN 46202	jobuechl@iupui.edu	Polis Center

John Buechler and Chris Schmitz with The Polis Center IUPUI, co-coordinators for the Richland County Pre-Disaster Mitigation Plan were present to give an overview of the development of the plan.

The majority of the second meeting was devoted to discussing the risk factor of hazards and the impact that each would have on Richland County and in each of the jurisdictions. The following chart was developed for Richland County:

Hazard	Probability	Impact
Tornado	Medium	Moderate
Floods	Highly likely	Moderate
Dam/Levee Failures	Not likely	Significant
Thunder storms	Highly likely	Significant
Winter Storm	Highly likely	Significant
Drought	Medium	Minor
Major Structure fires	Medium	Moderate
Earthquakes	Medium	Significant
Hazardous Material release	Highly likely	Significant

The same format was used to identify the same factors in each of the following communities: Olney, Calhoun, Claremont, Noble and Parkersburg.

The Planning Team discussed the next meeting which will be the Public Informational Meeting. The Public meeting is scheduled for June 8th at 7:00p.m. in the Sheriff's Annex.

Pre-Disaster Hazard Mitigation Plan Meeting #3
Richland County, IL
June 8, 2011
Sheriff's Annex, Olney, IL

Meeting #3 of the Richland County Hazard Mitigation Planning Team was held on June 8, 2011, at the Olney, Illinois Sheriff's Annex. Attending were:

Attendees	Jurisdiction Represented
Randy Bukas	City of Olney
Richard Clark	Village of Noble
Gary Wachtel	Richland County, Board
Michael Lamb	Public
Deborah Lamb	Richland County Health
Tom Hanne	Parkersburg
Leo Ledecker	Richland County
Andrew Hires	Richland County Sheriff Office
Chris Schmitz	The Polis Center, Indianapolis
Jonathan Remo	Southern Illinois University, Carbondale
Jack Schmitz	The Polis Center, Indianapolis

The Polis Center opened the meeting and introduced new attendees. Draft copies of Section 4 of the Richland County Multi-Hazard Mitigation plan were distributed to those in attendance. SIU provided a hazard overview. The presentation instructed attendees on local historical hazards and potential threats to Richland County.

After the presentation the Polis Center handed out typical mitigation strategies that have been employed by various other counties to be considered for the next meeting. Each jurisdiction in the county was encouraged to consider several actions that could or should be taken in their communities to lessen the impact of these hazards.

The next meeting was not scheduled at this time. RPC, David Jordan, will contact team members regarding the date of the next meeting.

Pre-Disaster Mitigation Planning Meeting 4
Meeting Minutes
Richland County
10:00 a.m.
September 15, 2011

The 4th meeting was attended by the following:

Name	Phone	Address	Email	Representing
Richard Snyder	863-2601	308 E. Hall St.		Calhoun
Richard E. Clark	723-2212		richclark@bspeedy.com	Noble
Ted Marshall	843-6683	165 E. Newman		Claremont
Donna Brown	395-6006	800 E. Locust St, Olney	dbrown@richlandmemorial.com	Richland Memorial Hospital
Alice Mullinax	392-3111	PO Box 111 Parkersburg	Countyclerk@richlandcogov.com	County Board
Leo Ledeker	395-7481	651 Remington Rd, Parkersburg	ledker@hughes.net	County Board
David Jordan	445-3612	10 W. Main, Albion	davidjordan@gwrpc.com	GWRPC
Jon Remo				SIU
Dave Coats				IUPUI

Jon Remo SIUC and Dave Coats with IUPUI conducted meeting 4.

Mitigation items were addressed along with how each strategy would impact each community and the county:

Tornados:

- Warning devices or study to determine ideal placement for the sirens.
- Storm shelters – especially for trailer parks
- Public education
- Weather radios
- Nixel – system for police modification

Hazmat/Fire/Structure:

- Community flow study
- Mutual aid issue with other state agencies
- Railroad crossings
- Fire hydrant improvement in rural areas

Floods:

- Olney – storm water drainage system
- Fox Creek Road
- Tank Farm Lane
- Mt. Gillead Road
- Deer Farm Lane

Winter Storms:

- Harden Fire Stations

Earthquakes:

- Removal of debris
- Generators or transfer switches for electrical systems
- Values to shut of gas
- Redundant water system

Each member in attendance were them given colored dots to vote on items of greatest importance.

Appendix B: Locally Published Articles and Photographs

Olney Daily Mail

Posted Apr 19, 2011 @ 11:21 PM

Olney, Ill. —

A storm that pounded the area Tuesday night has so far resulted in widespread reports of trees and power lines down throughout the county in addition to some possible power outages.

Dispatchers with Olney Police Department and Richland County Sheriff's Department began reporting trees and power lines in streets and on various properties shortly after the storm hit just before 10 p.m.

Barricades were placed on several streets, including Main and Mill streets, where a tree and power lines had fallen.

Some of the other reports included a tree on fire near Burgin Manor in Olney, a tree down on Ste. Marie Road, a tree on a mobile home on Bryant Street and reports of power lines and a boat in the road near West Richland High School on Ill. 250.

An officer could be heard on the police frequency saying that it appeared the northwest part of Olney had no power.

OlneyDailyMail.com
Home of the white squirrels

City, county far from prepared for emergency

Dear Editor,

The recent failure of the warning system, available only to the Olney residents of Richland County, compounded with the failure of sections of the Public Service communications system brings to light a situation I have spoken to many people about for the last couple of years. That is that this Olney and Richland County as a whole are NOT prepared nor do they have systems and/or contingencies in place in the event of a disaster either natural or man made. The ongoing (now resolved I hope) tug of war over joint dispatch and it's associated 911 system are evidence that our leaders more interested in "empire building" than the managing of the vital systems to alert, protect, and direct the population of the community at large.

It is also painfully evident that the users and managers of these systems are not aware of the proper procedures and practices to maintain them. If I may, as briefly as I can;

Having the the city/county communications "repeaters" clustered at the Ludlow St. location is fine. That appears to be the highest point (with the tower) in the Olney vicinity. I "eyeballed" that location over the weekend. I am concerned that it does not appear to be maintained well. It needs to have the growth cleared and kept cleared. I question the condition of the air conditioner in the building. I question the overall condition of the inside of the building. Varmints, moisture, access to the equipment for service, etc. The siren units should be able to be equipped with backup (auto type) batteries for their electronics. Are they? If they are, are the batteries properly maintained? Is the triggering signal for the sirens a radio link or is it hardwired? Is a hardwire "backup" trigger installed ? Returning to the tower site for a moment. A backup generator of "modest capacity could be installed fairly easily given the power needed for this use. Auto start units of less than 10kw are readily available nowadays. It should be liquid fuel powered as a contingency against a disruption in a piped in service.

Several of the key people involved with this situation are familiar with me as I have been attending many of the meetings held concerning joint dispatch, 911, and the like. As an amateur radio operator involved in emergency communications preparedness, a former Chief Broadcast Engineer responsible for emergency alert coordination in 13 counties in Alabama and Tennessee and a former telecommunications technician I would be happy to (and have to some) offer my assistance in the planning, repair and review of any/all service and maintenance programs involved in seeing that this situation is addressed properly.

Concerned for our safety

Bill Shrode
Parkersburg

Fair Board hopes to have roof repaired before fair

Olney, Ill. —

Richland County Fair Board is seeking estimates on the grandstand at Olney City Park after sections of the roof were ripped off the structure Tuesday night during a powerful line of storms.
Fair Board President Bill Jennings said Friday afternoon that the grandstand has been inspected and that all of the metal sections that were strewn about the park has been placed under the grandstand and will eventually be hauled away and salvaged.
He said that structurally the grandstand is fine, but that the roof will need to be replaced and added that two 40-foot high beams may also need to be replaced.
There are no monetary estimates of the damage.
In the past, there have been grants available from the state for assistance with damage from natural disasters.
"I don't expect it," Jennings said.
A rebuilding program through insurance has also been cut.
If grants are not available, it will be a cost borne by the board.
However, the board has a contingency fund available, Jennings said.
The worst-case scenario would be to fix half of the roof until the rest could be replaced, he said, but the board is seeking bids.

Source:olneydailymail.com

Jennings said he anticipates the roof to be fixed by the time the fair starts in July. "If the price is right and we can do it, it's not a time issue of getting it done at all," he said.

Source:olneydailymail.com

County takes part in drill

County, city and school employees will drop, cover and hold on Thursday

Olney, Ill. —

Richland County is one of many counties throughout the state taking part Thursday morning in a brief earthquake drill.

All county employees will "drop, cover and hold on" at 10:15 a.m. during the Great Central U.S. ShakeOut.

A resolution was passed by Richland County Board in March to have the county participate in the drill. At the designated time, employees will drop to the ground, take cover under a desk or sturdy table and hold on for a couple minutes until the "shaking" stops.

City of Olney, Olney Central College and East Richland School District will also be participating.

Assistant Superintendent Larry Bussard said only East Richland Elementary School and East Richland Middle School will be taking part in the drill around the designated time.

Students at East Richland High School are taking the Prairie State Achievement Exam (PSAE) this week. Another date will be set for an earthquake drill, perhaps next week, Bussard said.

West Richland School District is not participating in the exercise.

The event is meant to bring awareness to earthquake preparedness and involves eight states, including Alabama, Arkansas, Illinois, Indiana (which conducted its drill April 19), Kentucky, Mississippi, Missouri and Tennessee.

These states are considered to be most at risk from damaging earthquakes along the New Madrid Seismic Zone.

Richland County last experienced an earthquake around 4:37 a.m. April 18, 2008, when a 5.2-magnitude temblor hit the area. It originated in the Wabash Valley Fault Zone and included multiple aftershocks.

The Great Central U.S. ShakeOut is being organized and coordinated by the Central U.S. Earthquake Consortium, its member states, Federal Emergency Management Agency (FEMA) and the U.S. Geological Survey.

Appendix C: NCDC Historical Hazards

Location	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage	Description
Richland	6/6/1961	Tstm Wind	0 kts.	0	0	0	0	None Reported
Richland	11/26/1965	Tornado	F2	0	5	25K	0	None Reported
Richland	6/14/1970	Tstm Wind	0 kts.	0	0	0	0	None Reported
Richland	4/2/1977	Tstm Wind	0 kts.	0	0	0	0	None Reported
Richland	7/7/1978	Tstm Wind	0 kts.	0	0	0	0	None Reported
Richland	7/13/1979	Tstm Wind	61 kts.	0	0	0	0	None Reported
Richland	9/22/1980	Tstm Wind	87 kts.	0	0	0	0	None Reported
Richland	7/20/1981	Tstm Wind	0 kts.	0	0	0	0	None Reported
Richland	7/20/1981	Tstm Wind	0 kts.	0	0	0	0	None Reported
Richland	5/21/1982	Hail	1.75 in.	0	0	0	0	None Reported
Richland	6/15/1982	Tstm Wind	0 kts.	0	0	0	0	None Reported
Richland	6/15/1982	Tstm Wind	0 kts.	0	0	0	0	None Reported
Richland	7/19/1982	Tstm Wind	0 kts.	0	0	0	0	None Reported
Richland	3/15/1984	Tornado	F0	0	0	250K	0	None Reported
Richland	5/13/1984	Tstm Wind	67 kts.	0	0	0	0	None Reported
Richland	6/24/1985	Hail	2.00 in.	0	0	0	0	None Reported
Richland	7/31/1986	Tstm Wind	0 kts.	0	0	0	0	None Reported
Richland	7/10/1987	Hail	0.75 in.	0	0	0	0	None Reported
Richland	7/10/1987	Tstm Wind	0 kts.	0	0	0	0	None Reported
Richland	7/14/1988	Hail	0.75 in.	0	0	0	0	None Reported
Richland	4/28/1989	Hail	0.75 in.	0	0	0	0	None Reported
Richland	5/9/1990	Tstm Wind	0 kts.	0	0	0	0	None Reported
Richland	5/9/1990	Tstm Wind	0 kts.	0	0	0	0	None Reported
Richland	6/2/1990	Tornado	F4	0	0	250K	0	None Reported
Richland	9/28/1990	Hail	0.75 in.	0	0	0	0	None Reported
Richland	8/3/1991	Tornado	F1	0	0	2.5M	0	None Reported
Richland	8/14/1991	Hail	0.80 in.	0	0	0	0	None Reported
Richland	6/23/1992	Hail	1.75 in.	0	0	0	0	None Reported

Location	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage	Description
Richland	7/5/1992	Tstm Wind	0 kts.	0	0	0	0	None Reported
Richland	10/1/1993	Hail	1.75 in.	0	0	0	0	None Reported
Richland	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.
Noble	4/15/1994	Thunderstorm Winds	0 kts.	0	0	50K	0	A mobile home was overturned. The Noble High School roof was partially peeled off. Trees and branches were blown down on the north side of town.
Olney	4/27/1994	Hail	0.75 in.	0	0	0K	0	None Reported
Olney	7/2/1994	Hail	0.75 in.	0	0	0K	0	None Reported
Olney	7/2/1994	Thunderstorm Winds	0 kts.	0	0	5K	0	Several trees were blown down in Olney and the surrounding area.
Richland	5/17/1995	Flash Flood	N/A	0	0	10K	0	None Reported
Richland	5/18/1995	Flash Flood	N/A	0	0	10K	0	None Reported
Richland	5/18/1995	Flash Flood	N/A	0	0	10K	0	None Reported
Richland	5/18/1995	Thunderstorm Winds	0 kts.	0	0	100K	0	Numerous trees were blown down across the county.
Richland	1/2/1996	Winter Storm	N/A	0	4	0	0	The second major winter storm of the season moved through Central Illinois January 2nd and 3rd. The storm dumped up to 8 inches of snow across the area. Also, gusty northwest winds from 30 to 40 mph accompanied the storm, creating near whiteout conditions, making travel hazardous, and closing numerous roads. There were numerous minor accidents, though only two accidents resulted in 4 serious injuries.
Richland	1/4/1996	Winter Storm	N/A	0	0	0	0	Following the January 2nd/3rd storm, another winter storm moved through Central Illinois on January 4th. Snowfall ranged from 2 to 7 inches. Numerous minor accidents were reported across the area, though no major injuries were reported.
Richland	1/18/1996	Winter Storm	N/A	0	2	0	0	A major winter storm moved through Central Illinois January 18th and 19th. Severe thunderstorms moved through the area during the late morning and early afternoon hours. Afterward, temperatures began to drop quickly. Most locations recorded a 60 degree drop over a 12 hour period. The rain changed to ice than snow causing numerous power outages and minor accidents. Two people were injured when the driver of the RV lost control of the vehicle when a strong gust of wind moved through the Farmer City area in DeWitt county. Gusty winds of 25 to 35 mph created winds chills near 40 below zero across most of Central Illinois.

Location	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage	Description
Richland	2/2/1996	Extreme Cold	N/A	2	0	0	0	Bitterly cold weather took hold of Central Illinois on the 2nd, 3rd, and 4th of this month. New record low temperatures were made with a low of minus 19 in both Peoria and Springfield on February 3rd. Also, new record low high temperatures were made when the temperatures at Peoria and Springfield never went above zero on the 2nd and 3rd. Many people experienced problems with cars and frozen pipes. However, two deaths were reported due to the extreme cold. A 78 year old man in Springfield froze to death within a few feet of his own front door. He reportedly could not find his house keys and fell. His wife could not help him and they were not found for several hours. She was treated for exposure and released. In Peoria, a 79-year-old woman froze to death on her front porch. Apparently she mistakenly thought she was locked out of her home. F79PH, M78PH
Richland	3/19/1996	Winter Storm	N/A	1	0	0	0	A winter storm moved into southeastern Illinois early on March 19th. The storm dumped up to 11 inches of snow across the area. There was considerable blow and drifting of snow which temporarily closed some roads in the area. Several schools, a nursing home, and several businesses in the area were evacuated because the truck was carrying some type of chlorine compound, which emitted dense smoke and a bleach-like smell through the area. The buildings were evacuated as a precaution. Otherwise, there were numerous minor accidents which did not result in any serious injuries.
Richland	3/25/1996	High Wind	0 kts.	1	0	0	0	Strong gradient winds caused minor damage across Central Illinois and caused a bizzare accident which killed one person. Winds gusting to between 40 and 55 mph caused a bedliner and a concrete block to be blown from the bed of the pickup truck. The concrete block was thrown through the windshield of a car travelling in the opposite direction. The block hit the driver's chest killing him. The winds blew down numerous power lines, tore off the roof of a building in Rushville, and metal shething and insulation from the roof of a mobile home was blown off in Bloomington.
Richland	4/19/1996	Tstm Wind	0 kts.	0	0	0	0	Thunderstorm winds blew apart a trailer 3 miles northwest of Olney and its contents were strung out along the roadway. No injuries were reported. Also, numerous trees and power lines were blown down throughout the county. No damage estimate was available.
Olney	4/21/1996	Tstm Wind	0 kts.	0	0	0	0	Thunderstorm winds blew down several large trees in Olney.
Berryville	4/21/1996	Tstm Wind	0 kts.	0	0	0	0	Thunderstorm winds blew down several trees in Barryville.
Noble	7/2/1996	Hail	1.75 in.	0	0	0	0	None Reported
Calhoun	9/7/1996	Tstm Wind	0 kts.	0	0	0	0	Thunderstorm winds blew down several trees in Calhoun. No injuries or damage were reported.
Richland	1/8/1997	Heavy Snow	N/A	0	6	0	0	A winter storm developed over the southern Plains and tracked to the northeast across southern Illinois. The storm dumped between 3 and 11 inches of snow over central Illinois. The heaviest snow fell in a corridor just north of I-70. Charleston in Coles County reported the most snow with 11 inches. Numerous accidents were reported throughout central Illinois. However, only 6 minor injuries were reported.

Location	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage	Description
Richland	1/15/1997	Winter Storm	N/A	1	7	0	0	A winter storm developed over the central Rockies and moved east into the Midwest. The storm brought between 4 and 6 inches of snow to a large part of central Illinois north of I-70. South of I-70 a mixture of freezing rain, sleet, and snow occurred with snow totals of 1 to 3 inches. After the snow stopped, the winds picked up to between 20 and 30 mph with higher gusts, causing near whiteout conditions. Also, temperatures fell below zero across the entire area, so with the strong winds and cold temperatures, wind chill readings dipped well below minus 40 degrees in many locations. Numerous accidents were reported though only 6 minor injuries and one person with serious injuries was reported. A 78 year old man died of exposure after apparently trying to walk a short distance to his brother's house and his body was not discovered for over 24 hours.
Richland	1/26/1997	Winter Storm	N/A	0	9	0	0	A winter storm developed over the southern Plains and moved east, to the south of Illinois. One area of snow moved through central Illinois on the 26th with snow amounts ranging from 1 to 4 inches. Then the snow let up around 4 pm on the 26th. A mixed bag of precipitation began to fall over the southern areas of central Illinois around 4 am on the 27th and spread north into the rest of central Illinois. By the time the precipitation ended in the evening of the 27th, another 1 to 5 inches of snow had fallen. Numerous accidents were reported, especially in the morning hours on
Richland	4/30/1997	High Wind	61 kts.	0	1	38K	0	Strong gradient winds in excess of 50 mph with gusts to around 70 mph followed behind a line of severe thunderstorms across Central Illinois. The gradient winds lagged behind the thunderstorms by about 20 to 30 minutes and continued during the night finally letting up the next day. Thousands of people across Central Illinois lost power as hundreds of power lines were blown down. Several semis were blown over, with one trucker sustaining minor injuries when his semi was overturned near Jacksonville. Also, numerous trees and tree limbs were blown down and widespread structural damage was reported. Homes in Manito (Mason County), Leroy (McLean County), Georgetown (Vermilion County), Effingham (Effingham County), and Olney (Richland County) sustained some damage due to trees falling on them. Numerous sheds, grain bins, and machine sheds were either blown over, damaged, or destroyed by the gradient winds.
Olney	4/30/1997	Tstm Wind	52 kts.	0	0	0	0	Thunderstorm winds blew down several trees in Olney. Two trees fell onto cars, causing damage but no injuries. Also, numerous tree limbs and power lines were blown down. No damage estimate was available. As a strong area of low pressure moved into the Midwest, severe thunderstorms developed along and ahead of a cold front which moved through Central Illinois during the afternoon and early evening hours. There were numerous reports of trees, tree limbs, and power lines knocked down. Also, 6 tornadoes were reported across the area. Fortunately, only a few minor injuries were reported and no deaths occurred with these tornadoes.
Olney	7/14/1997	Tstm Wind	0 kts.	0	0	0	0	Thunderstorms blew down several trees, tree limbs, and power lines in Olney. No injuries were reported and no damage estimate was available.

Location	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage	Description
Richland	7/26/1997	Excessive Heat	N/A	2	0	0	0	A brief heat wave hit Central Illinois persisting for a little less than 48 hours from July 26the to July 27th. Temperatures ranged from 95 to 100 degrees both days with heat index values ranging from 105 to 115 degrees. One man died while working in farm fields near Danville (Vermilion County) and an elderly woman died in her home in Bloomington (McLean County). There were numerous reports of heat related injuries in most area hospitals. Also, there were numerous reports of roads buckling due to the high temperatures.
Richland	11/13/1997	Winter Storm	N/A	0	1	0	0	A mixture of snow, sleet and freezing rain moved into portions of southeast Illinois late in the afternoon on November 13. Some glazing was reported in Lawrence County at the onset of the event. The activity changed over to all snow soon after the event began. A band of 3 to 5 inch snowfall occurred across this entire area. The event had tapered off by early morning on November 14.
Noble	4/15/1998	Tornado	F0	0	0	0	0	A severe thunderstorm, which originated in eastern Missouri, travelled to the east across southern Illinois. It produced numerous tornadoes. Two miles northwest of Clay City, the tornado overturned a mobile home before lifting. At about the same time, half a mile to the north of the first tornado, another tornado formed and touched down. It destroyed a mobile home (F2 intensity) and then travelled to the northeast causing spotty damage, mainly to trees. It destroyed a shed 5 miles north of Olney (Richland County) before lifting and dissipating. In total 8 people sustained minor injuries. Damage in Clay County was estimated around $2.2 million and no damage estimate was available for Richland County.
Parkersburg	6/12/1998	Tstm Wind	0 kts.	0	0	0	0	Thunderstorm winds destroyed a barn near Parkersburg, as well as, blowing down several trees and power lines in the Parkersburg and Berryville areas. One tree fell onto a trailer in Bonpas, though no injuries were reported. No damage estimate was available.
Parkersburg	6/22/1998	Tstm Wind	0 kts.	0	0	0	0	Several power lines were blown down one mile north of Parkersburg.
Richland	6/26/1998	Excessive Heat	N/A	1	0	0	0	A hot and humid airmass built in across Central Illinois late in June. High temperatures on June 26th and 27th climbed into the middle and upper 90s. This combined with the high humidity values produced heat indicies of 105 to 110 degrees at times. Several heat related illnesses were reported in area hospitals due to the heat. One death was reported in Peoria and was confirmed to be heat related as a woman died in her home on June 27th. Also, several highways in the area had sections of roadway buckle due to the excessive heat.

Location	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage	Description
Richland	6/29/1998	Tstm Wind	0 kts.	0	0	0	0	A large bow echo system developed over eastern Iowa and moved rapidly to the southeast into Illinois. Damage was reported in all 35 counties with this system. The general area of wind damage was produced by the passage of the bow echo's "gust front" on the leading edge of the line of thunderstorms. Wind speeds were estimated to be between 60 to 80 mph, blowing down or uprooting thousands of trees, tree limbs, power poles, and power lines. Hundreds of trees fell onto structures causing damage ranging from just torn guttering to major roof and structural damage. Also, hundreds of vehicles sustained damage from fallen trees and numerous outbuildings, sheds, and silos were either damaged or destroyed. Considerable crop damage was sustained in most areas. In some areas, more intense damage was observed, caused by stronger wind speeds. Speeds were estimated in these areas at 100 to 110 mph. In these areas significant structural damage occurred, such as peeling off roofs, blowing over freight railroad cars, bending steel power poles, and other structural damage. A third phenomena that occurred with this event were spin-up tornadoes along the leading edge of the bow echo structure. These tornadoes caused significant damage in narrow swaths along the bow echo's path and were often masked by the microburst damage occurring adjacent to them. The existence of these tornadoes was validated. Overall, approximately twelve people sustained injuries and damage was estimated around $16 million.
Richland	7/7/1998	Flash Flood	N/A	0	0	0	0	A series of thunderstorms moved across Richland and Lawrence counties over a three hour period. Between 3 to 6 inches of rain fell causing isolated flash flooding in both counties. Water was over numerous roads, including Highway 130 in Richland county. No property damage was reported.
Olney	7/7/1998	Tstm Wind	0 kts.	0	0	0	0	Thunderstorm winds blew down several power lines 1 mile west of Olney.
Olney	11/10/1998	Tstm Wind	0 kts.	0	0	0	0	Thunderstorm winds blew off part of the roof of the old railroad depot in Olney. Numerous trees and power lines were blown down throughout the county. Also, the city park building in Olney sustained minor roof damage when a 40 foot tall tree fell onto it. No damage estimate was available.
Richland	1/1/1999	Winter Storm	N/A	0	0	1K	0	A major winter storm paralyzed much of the region during the first few days of 1999. Snow began falling across portions of Central Illinois before noon and continued to fall, moderate to heavy at times for most of the following 24-hour period. After the snowfall and precipitation diminished, winds increased from the northwest and temperatures dropped, causing dangerous wind chills and treacherous driving conditions with extensive blowing and drifting snow through the third day of the year. Total snow accumulations topped 6 inches mainly along and north of Interstate 70. Lesser amounts fell to the south, where more freezing precipitation was reported. The heaviest snow band in Central Illinois was found west and north of a line from Quincy to Virginia (Cass County) to Peoria to Bloomington to Champaign where reports of 14 or more inches of snow were common. The weight of the heavy snow and ice caused many roofs and porches to collapse, resulting in one death and an injury. Many locations sustained temporary or extended power outages during the storm.

Location	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage	Description
Richland	1/5/1999	Extreme Cold	N/A	0	0	0	0	A clear sky, light winds and thick snow cover set the stage for record cold morning temperatures across the region. A new state record low was set at Congerville, where the mercury plunged to 36 degrees below zero. Other bitterly cold record readings came from: Champaign and Lincoln both with 25 degrees below zero, Springfield with 21 below and Peoria with 19 degrees below zero.
Olney	2/27/1999	Tstm Wind	0 kts.	0	0	0	0	Several large trees were blown down in Olney. One mile north of Parkersburg, a trailer home sustained minor damage and a shed was destroyed.
Olney	5/5/1999	Tstm Wind	0 kts.	0	0	10K	0	A severe thunderstorm moved across Richland county. As it moved into Olney winds blew down the roof over a hotel swimming pool and meeting room area. The debris from the roof damaged several vehicles in the hotel parking lot. As the storm moved to the northeast it blew down numerous trees and power lines. One mile south of Stringtown, a barn and a silo were destroyed. No injuries were reported and damage to the hotel was estimated around $10,000.
Noble	5/17/1999	Tstm Wind	0 kts.	0	0	0	0	Numerous trees, power poles, and power lines downed throughout the county. One vehicle sustained moderate damage when a tree fell onto it in Olney. Just west of Olney a tree fell onto a mobile home causing minor damage.
Noble	6/1/1999	Tstm Wind	61 kts.	0	0	0	0	A line of severe thunderstorms moved through Richland County. Numerous trees, tree limbs, and power lines were blown down in Noble, Olney, and 4 miles north northeast of Claremont. In Noble, a shed was destroyed and a tree fell onto a house causing minor damage.
Calhoun	6/4/1999	Tstm Wind	0 kts.	0	0	0	0	Several power lines were blown down in Calhoun.
Olney	7/1/1999	Flash Flood	N/A	0	0	0	0	Strong thunderstorms producing heavy rainfall trained across the area for several hours. Some NWS cooperative observer reports include Clay City, 6.00 inches; Olney, 4.17 inches; and Lawrenceville with 3.57 inches. This heavy rainfall occurred within 4 hours. Numerous county roads were reported underwater across southern portions of Clay, Richland and Lawrence Counties. The most structural damage occurred in Lawrence County. Fifty homes and 5 businesses were damaged. Most of which occurred in the town of Bridgeport. Two persons were also rescued from their vehicles in Richland County.
Richland	7/20/1999	Excessive Heat	N/A	4	0	0	0	The excessive heat wave began on the 20th of July and continued for most of the area through the 26th. Temperatures were in the lower to middle 90s with heat index values in the 105 to 110 degree range each day. During this time period four heat related deaths were reported in Central Illinois. In Logan County, two young boys (2 1/2 and 1 1/2 years old) wandered away on the afternoon of the 20th and were found about an hour later in their parent's car. Both were reported dead shortly thereafter. In Peoria County, an elderly woman was found in her apartment on the 24th. All of the windows were closed and the air conditioner was broken. In Springfield (Sangamon County), a 62 year old woman was found in her home on the 25th.

Location	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage	Description
Richland	7/28/1999	Excessive Heat	N/A	1	0	0	0	The heat returned to Central Illinois after a two day break. Temperatures rose into the lower to middle 90s again with heat index values in the 105 to 110 degree range. One heat related death occurred during this time. A 50 year old woman in Danville (Vermilion County) died on the 30th. She was found in her apartment. By the 30th a cold front began to move through the area, so the heat advisory was cancelled for northern sections of the area, but the excessive heat persisted in the rest of Central Illinois through the 31st.
Richland	3/11/2000	Heavy Snow	N/A	1	9	0	0	Heavy snowfall of 6 to 10 inches, accompanied by blowing and drifting, occurred in parts of central and southeast Illinois from the morning into the early evening of March 11, 2000. Several weather related traffic accidents resulted in nine serious injuries and one fatality. A second, but smaller band of heavy snow, occurred from eastern Morgan county into northern Sangamon county, where 6 to 8 inches was reported.
Richland	7/5/2000	Flash Flood	N/A	0	0	0	0	Thunderstorms occurred during the evening hours of the 4th across the county. Some minor flooding was reported in a few locations. As the rain persisted into the morning hours of the 5th, more significant thunderstorms dropped heavy rainfall on the already saturated ground. Radar estimates and surface reports indicated that 3 to 5 inches of rain fell mainly during the morning. Several roads across the county were flooded. A road north of Noble collapsed, causing a vehicle to get stuck in the area. No injuries were reported and no damage estimates were available.
Olney	8/23/2000	Flash Flood	N/A	0	0	0	0	Severe thunderstorms across the county dropped heavy rainfall onto already saturated ground. Radar estimates indicated 3 to 4 inches of rain fell during the evening hours. As a result, numerous roads in the Olney area were reported underwater and impassable through the evening. No injuries were reported and no damage estimates were available.
Olney	8/23/2000	Tstm Wind	0 kts.	0	0	0	0	Several power lines and a large tree were blown down in Olney.
Olney	8/26/2000	Tstm Wind	52 kts.	0	0	0	0	None Reported
Richland	12/13/2000	Winter Storm	N/A	1	1	0	0	Between 6 and 8 inches of snow accumulated along and east of a Bloomington to Decatur to Taylorville line with a light ice coating on top of the heavy snow. The snow started between 8 and 10 am, with 6 inches accumulating by 5 pm, and ending by 10 pm. Freezing rain and sleet mixed in with the snow after 3 PM. This was the second winter storm to strike Central IL during the 2000-2001 winter season, with the first one occurring just 2 days prior.
Olney	6/5/2001	Flash Flood	N/A	0	0	0	0	The Fox River went out of its banks during the event, roughly 1 mile north of Olney, resulting in water across portions of Illinois Route 130.
Olney	10/24/2001	Tstm Wind	50 kts.	0	0	0	0	Several tree limbs and power lines were blown down. Also, a couple of grain bins were blown over in Calhoun.
Olney	5/1/2002	Flash Flood	N/A	0	0	0	0	Numerous streets in town were flooded for around half an hour due to heavy rains. One street had a section collapse that was over a 48 inch drainage pipe. Also, several basements were flooded and one Olney Central College building suffered water damage from the flooding.

Location	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage	Description
Olney	5/1/2002	Hail	1.75 in.	0	0	0	0	None Reported
Noble	5/1/2002	Tstm Wind	50 kts.	0	0	0	0	Thunderstorm winds blew down several trees in Noble, Olney, and Parkersburg.
Olney	5/9/2002	Tstm Wind	50 kts.	0	0	0	0	Several large trees were blown down around town. Some homes sustained minor damage from the fallen trees.
Richland	5/12/2002	Flood	N/A	0	1	0	0	Although the rain had ended, runoff from the storms continued to aggravate the flooding situation across Central Illinois. The runoff continued to cause flooding problems on numerous county roads and basements. Illinois Route 130 between Jasper and Richland counties remained flooded.
Claremont	5/25/2002	Hail	1.75 in.	0	0	0	0	None Reported
Dundas	7/9/2002	Tstm Wind	50 kts.	0	0	0	0	Several trees blown down.
Richland	2/16/2003	Sleet Storm	N/A	0	0	0	0	Between 1 and 2 inches of sleet accumulated along and south of a Flora to Robinson line between 9 AM and 9 PM on the 16th. A mixture of sleet and snow occurred north of this line up to Interstate 70, with sleet accumulations staying less than a half inch, and snowfall accumulations between 1 and 3 inches.
Olney	4/24/2003	Hail	0.75 in.	0	0	0	0	None Reported
Olney	8/3/2003	Tstm Wind	55 kts.	0	0	0	0	Thunderstorm winds blew down several power lines and trees. One tree fell down on a house causing minor damage.
Olney	9/26/2003	Tstm Wind	60 kts.	0	0	0	0	Numerous tree limbs and several trees were blown down around town. No injuries were reported.
Richland	1/25/2004	Ice Storm	N/A	0	0	0	0	Strong winter storm moved out of Southern Plains and into the Ohio River Valley. This system brought significant icing to the southeastern portions of Central Illinois on January 25th. Also, significant sleet accumulation was reported in numerous locations along and south of Interstate 70. There were numerous reports of power outages, downed tree limbs and traffic accidents in all of these counties.
Richland	5/26/2004	Flash Flood	N/A	0	0	0	0	Heavy rain caused several roads in Richland County to become flooded, including IL Route 130 in Olney and IL Route 250 between Olney and Noble.
Richland	5/27/2004	Flash Flood	N/A	0	0	0	0	Very heavy rain fell over the county in a short amount of time. Numerous roads become flooded, including IL Route 130 near Olney. The Fox River rose out of its banks.
Richland	5/27/2004	Tstm Wind	50 kts.	0	0	0	0	Numerous trees were blown down, especially in the Olney, Dundas and Claremont areas.
Richland	5/30/2004	Tstm Wind	55 kts.	0	1	0	0	Numerous trees, tree limbs, power poles and power lines were blown down countywide. Several homes sustained minor to moderate roof damage after trees fell on them. One tree fell on an occupied vehicle trapping the driver for a time. She sustained minor injuries. The roof of a barn was blown off 3 miles west southwest of Olney.
Olney	7/22/2004	Tstm Wind	50 kts.	0	0	0	0	Several trees were blown down in Olney.

Location	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage	Description
Richland	12/22/2004	Winter Storm	N/A	0	0	0	0	A major winter storm developed over the southern plains early on December 22nd and lifted into the eastern Great Lakes region by the morning of December 23rd. This storm brought heavy snow to much of southeast Illinois, with 8 to 12 inch snowfall totals common across Clark, Jasper, Crawford, Clay, Richland and Lawrence counties. The heaviest snowfall came in two bursts, the first during the early morning hours of the 22nd and the second during late evening hours on the 22nd and early morning hours of the 23rd. In addition to the heavy snowfall, winds gusting to 25 mph late on the 22nd and early on the 23rd caused considerable blowing and drifting snow. Snow drifts in excess of 3 feet were reported in spots. No fatalities or major injuries were reported, though there were numerous automobile accidents due to snow covered and slippery roads.
Richland	1/13/2005	Flash Flood	N/A	0	0	46K	0	Many roads along the Fox River had water flowing across them. In addition, numerous streets in Olney were flooded.
Olney	4/22/2005	Tstm Wind	50 kts.	0	0	0	0	Trees and power lines down.
Olney	4/22/2005	Tstm Wind	50 kts.	0	0	0	0	Trees and power lines down.
Noble	5/19/2005	Hail	1.00 in.	0	0	0	0	None Reported
Calhoun	5/19/2005	Hail	0.75 in.	0	0	0	0	None Reported
Olney	5/19/2005	Hail	0.75 in.	0	0	0	0	None Reported
Olney	5/19/2005	Tstm Wind	50 kts.	0	0	0	0	Few trees blown down.
Olney	6/30/2005	Hail	1.00 in.	0	0	0	0	None Reported
Richland	7/22/2005	Excessive Heat	N/A	1	0	0	0	A period of excessive heat and humidity developed across all of central and southeast Illinois from July 22nd through the 25th. Daytime high temperatures ranged from the middle 90s to around 100 degrees daily, with overnight low temperatures only falling into the middle and upper 70s. The high humidity values pushed afternoon and early evening heat indices into the 105 to 115 degree range. The heat wave resulted in one direct fatality. An elderly woman was found dead in Springfield in her mobile home with malfunctioning air conditioning.
Richland	3/9/2006	Flash Flood	N/A	0	0	0	0	None Reported
Noble	4/2/2006	Tstm Wind	60 kts.	0	0	0	0	Modular home shifted off its foundation and pole barn damaged in Noble. House lost its roof near Olney.
Dundas	4/19/2006	Tstm Wind	50 kts.	0	0	0	0	Large tree blown down across road.
Dundas	5/24/2006	Tstm Wind	52 kts.	0	0	0	0	Several trees and power lines were blown down.
Claremont	6/20/2006	Hail	0.88 in.	0	0	0	0	None Reported
Calhoun	6/26/2006	Hail	1.25 in.	0	0	0	0	Hail caused corn crop damage.
Noble	6/26/2006	Hail	0.75 in.	0	0	0	0	None Reported

Location	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage	Description
Richland	7/30/2006	Heat	N/A	1	0	0	0	An extended period of heat and humidity occurred across central and southeast Illinois from July 30th to August 2nd. Afternoon high temperatures ranged from 94 to 100 degrees most afternoons, with afternoon heat indices ranging from 105 to 110. Overnight lows only fell into the mid 70s. A 39 year old male from Mapleton (Peoria County) suffered a heart attack and died in his mobile home. The death was attributed to the heat.
Richland	8/1/2006	Heat	N/A	0	0	0	0	An extended period of heat and humidity occurred across central and southeast Illinois from July 30th to August 2nd. Afternoon high temperatures ranged from 94 to 100 degrees most afternoons, with afternoon heat indices ranging from 105 to 110. Overnight lows only fell into the mid 70s.
Olney	8/10/2006	Tstm Wind	52 kts.	0	0	0	0	Power lines were blown down.
Richland	9/1/2007	Drought	N/A	0	0	0	0	Severe drought conditions developed across much of southeast Illinois during September 2007. The combination of extended precipitation deficits and unseasonably hot conditions in August and much of September started to impact crop health. The severe drought conditions extended into October 2007.
Olney	10/18/2007	Thunderstorm Wind	56 kts.	0	0	20K	0	Numerous tree limbs and power lines were blown down. A thunderstorm complex moved across portions of central Illinois, during the overnight hours. These storms produced numerous reports of tree and power line damage.
Olney	1/29/2008	Thunderstorm Wind	52 kts.	0	0	20K	0	Numerous trees and power lines were blown down in the county. EPISODE NARRATIVE: A strong cold front raced across Illinois during the afternoon hours of January 29th. Severe thunderstorms developed ahead of the front, producing damaging wind gusts and large hail.
Noble	2/5/2008	Thunderstorm Wind	61 kts.	0	0	20K	0	Numerous trees and power lines were blown down. Thunderstorms developed in the vicinity of a warm front over east central and southeast Illinois during the afternoon hours of February 5th. Many of the thunderstorms on either side of the front produced heavy rains and flooding. The storms to the south of the warm front also produced damaging winds and hail, especially along and south of the I-70 corridor. The flooding produced numerous road closures across the region, while the winds produced primarily tree, power line and power pole damage. However, several structures received minor, mainly roofing damage and one mobile home was destroyed.
Noble	2/6/2008	Flash Flood	N/A	0	0	0	0	Several roads were flooded across Richland county. Thunderstorms developed in the vicinity of a warm front over east central and southeast Illinois during the afternoon hours of February 5th. Many of the thunderstorms on either side of the front produced heavy rains and flooding. The storms to the south of the warm front also produced damaging winds and hail, especially along and south of the I-70 corridor. The flooding produced numerous road closures across the region, while the winds produced primarily tree, power line and power pole damage. However, several structures received minor, mainly roofing damage and one mobile home was destroyed.

Location	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage	Description
Olney	5/7/2008	Lightning	N/A	0	0	62K	0	A lightning strike to a 60 foot tall brick chimney in downtown Olney resulted in damage to 16 autos and the roof of the building. Bricks were thrown as far as one block away. Three people were indirectly injured by falling bricks and debris. The three injuries were minor, and the people were treated and released at a local hospital. A lightning strike in Olney, from scattered thunderstorms in southeast Illinois, did damage to a building and several autos. The falling debris indirectly injured 3 people.
Olney	5/27/2008	Flash Flood	N/A	0	0	0	0	Heavy rains caused many roads to flood to the south and east of Olney. EPISODE NARRATIVE: A land spout tornado developed over Richland County, 5 miles south southeast of Olney. The tornado briefly touched down in a field. No damage was reported. In addition, heavy rains caused flash flooding southeast of Olney.
Olney	5/27/2008	Tornado	F0	0	0	0	0	A land spout tornado briefly touched down in a field. No damage was reported. A land spout tornado developed over Richland County, 5 miles south southeast of Olney. The tornado briefly touched down in a field. No damage was reported. In addition, heavy rains caused flash flooding southeast of Olney.
Noble	6/9/2008	Hail	1.00 in.	0	0	0	0	Two rounds of scattered thunderstorms moved through southeast Illinois on the 9th. The first round occurred during the early afternoon hours, while the second round occurred during the evening hours. Several of the thunderstorms produced severe hail, ranging up to golf ball size.
Olney	6/9/2008	Hail	0.88 in.	0	0	0	0	Two rounds of scattered thunderstorms moved through southeast Illinois on the 9th. The first round occurred during the early afternoon hours, while the second round occurred during the evening hours. Several of the thunderstorms produced severe hail, ranging up to golf ball size.
Olney	6/15/2008	Thunderstorm Wind	61 kts.	0	0	35K	0	Numerous trees and power lines were blown down. A line of severe thunderstorms moved across central and southeast Illinois during the afternoon and early evening hours of the 15th. The storms produced widespread wind damage. A few of the storms produced large hail and one produced a weak tornado.
Olney	6/27/2008	Thunderstorm Wind	52 kts.	0	0	2K	0	A large tree was blown down across Highway 130. A line of strong to severe thunderstorms moved across east central and southeast Illinois during the afternoon and early evening hours of the 27th. The storms blew down numerous trees and power lines. Several structures, mainly outbuildings, also sustained wind damage.
Claremont	6/27/2008	Thunderstorm Wind	52 kts.	0	0	0	0	A line of strong to severe thunderstorms moved across east central and southeast Illinois during the afternoon and early evening hours of the 27th. The storms blew down numerous trees and power lines. Several structures, mainly outbuildings, also sustained wind damage.
Parkersburg	3/8/2009	Thunderstorm Wind	52 kts.	0	0	35K	0	A roof was torn off a trailer in Parkersburg, and a pole barn was destroyed 3 miles east of Claremont. A cold front raced through the region during the afternoon of March 8th, producing strong to severe thunderstorms. The storms spawned three tornadoes across central and southeast Illinois, as well as numerous reports of wind damage.

Location	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage	Description
Olney	4/5/2009	Hail	0.75 in.	0	0	0	0	Low pressure tracked from Missouri across north-central Illinois on April 5th. Scattered thunderstorms developed in advance of this feature...with a few of the storms producing marginally severe hail.
Wakefield	5/14/2009	Flash Flood	N/A	0	0	0	0	Heavy rain of 2.00 to 3.00 inches within two hours produced significant flash flooding of most roads across Richland County. Many rural roads were closed to traffic due to high water, especially in the vicinity of Olney. An impressive upper-level wave tracking across the Northern Plains helped push a strong cold front toward the Mississippi River by the evening of May 13th. An increasingly unstable and sheared airmass across central Illinois allowed severe thunderstorms to develop in advance of the front. Widespread wind damage occurred with the storms, with 4 tornadoes touching down around the area as well. The thunderstorms also produced torrential rainfall, with widespread 2 to 4 inch amounts reported. This produced flash flooding in much of central and southeast Illinois.
Amity	5/25/2009	Flash Flood	N/A	0	0	0	0	Multiple county roads were closed due to high water. Low pressure moving along a stationary frontal boundary draped along the Ohio River brought locally heavy rainfall to southeast Illinois on May 25th. Rain amounts of 3.00 to 5.00 inches fell in many locations south of I-70, with flash flooding reported mainly east of a line from Marshall, IL to Olney, IL.
Olney	6/18/2009	Thunderstorm Wind	52 kts.	0	0	25K	0	Local law enforcement reported several trees blown down across Richland County. A line of severe thunderstorms produced wind gusts of 60 to 85 mph, large hail, torrential rainfall, and nearly continuous lightning across much of central and southeast Illinois during the early morning of June 18th. The high winds resulted in multiple power outages, downed trees and power lines, and damage to light poles, outbuildings, and several homes.
Schnell	7/16/2009	Flash Flood	N/A	0	0	0	0	Nearly 2.50 inches of rain in one hour produced flash flooding in rural parts of extreme southwest Richland County. Several rural roads near Schnell and in the vicinity of the Little Wabash River were inundated. A cold front dropping southward through the region triggered a supercell thunderstorm over south-central Illinois during the evening of July 16th. This cell tracked east-southeast and grazed the southern section of Clay County and extreme southwest Richland County with strong winds and heavy rainfall.
Olney	5/12/2010	Hail	0.75 in.	0	0	0	0	A stationary frontal boundary draped along the Ohio River served as the focus for showers and thunderstorms across southeast Illinois on May 12th. An upper-level wave moving along the boundary helped trigger a large cluster of thunderstorms during the early morning, one of the storms produced small hail in Richland County.
Claremont	5/27/2010	Thunderstorm Wind	52 kts.	0	0	4K	0	A few trees were blown down in Claremont. Widely scattered thunderstorms developed along a departing cold front across southeast Illinois during the afternoon of May 27th. One cell produced wind damage in Richland County.
Olney	6/14/2010	Thunderstorm Wind	52 kts.	0	0	2K	0	A tree was blown down 1 mile south of Olney. Thunderstorms initiated along a stationary frontal boundary during the afternoon of June 14th. Many of the storms produced damaging wind gusts of 60 to 70 mph. In addition, torrential downpours led to localized flash-flooding across parts of east central Illinois.

Location	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage	Description
Olney	6/14/2010	Thunderstorm Wind	52 kts.	0	0	23K	0	A large oak tree was snapped off at its base and landed on a house on East Street. Roofing from an old garage along Route 130 was blown onto the roadway. Thunderstorms initiated along a stationary frontal boundary during the afternoon of June 14th. Many of the storms produced damaging wind gusts of 60 to 70 mph. In addition, torrential downpours led to localized flash-flooding across parts of east central Illinois.
Olney	6/15/2010	Thunderstorm Wind	52 kts.	0	0	50K	0	Roofing material was blown off a garage onto Route 130. In addition, numerous trees, tree limbs and power lines were blown down around. One tree was blown onto a home and another tree was blown onto a garage. Thunderstorms formed ahead of a cold front. These storms produced damaging wind gusts of 60 to 70 mph and isolated severe hail. The storms also produced very heavy rainfall and some flash flooding.
Olney	6/27/2010	Thunderstorm Wind	52 kts.	0	0	2K	0	A tree was blown down across Silver Street in Olney. Scattered showers and thunderstorms developed ahead of a cold front during the afternoon of June 27th. Damaging wind wind gusts and heavy rainfall accompanied the stronger storms. In addition, lightning strikes caused a structure fire in Shelby County and damaged power poles in Jasper County.
Olney	7/19/2010	Thunderstorm Wind	61 kts.	0	0	22K	0	A large tree was blown down in a park in Olney. Numerous large trees and power lines were downed just west of town.: A potent upper-level disturbance interacting with a slow-moving cold front triggered clusters of severe thunderstorms across central Illinois during the afternoon of July 19th. Many of the storms produced large hail and damaging wind gusts...mainly along and south of a Rushville...to Lincoln...to Paris line. The most intense wind damage caused by downburts occurred across parts of Christian, Shelby, and Moultrie counties...from Taylorville eastward to Sullivan. Widespread wind damage was reported along this path.
Noble	04/19/2011	Thunderstorm Wind	52 kts.	0	0	20K	0	The steeple of a church was torn off in West Salem. Numerous large tree limbs were blown down in Olney. A deepening area of low pressure tracked along the I-72 corridor during the evening of April 19th. A very sharp temperature gradient existed across central Illinois at the time, with readings ranging from the middle 40s north of the low track to around 80 degrees to the south. Severe thunderstorms developed along this strong frontal boundary in advance of the approaching low, producing widespread wind damage and large hail. In addition, 6 tornadoes touched down from Christian County east-northeast into Vermilion and Edgar counties.
Olney	05/23/2011	Hail	1.75 in.	0	0	0	0	Low pressure tracking along a nearly stationary frontal boundary brought severe thunderstorms into southeast Illinois during the afternoon of May 23rd. The storms originated in southwest Missouri, then moved northeastward in the form of a bow echo into east-central and southeast Illinois. Widespread winds of 60 to 70 mph downed numerous trees and power lines along and southeast of an Effingham to Danville line.

Location	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage	Description
Olney	05/23/2011	Thunderstorm Wind	52 kts.	0	0	50K	0	Numerous tree limbs and power lines were blown down across Olney. Low pressure tracking along a nearly stationary frontal boundary brought severe thunderstorms into southeast Illinois during the afternoon of May 23rd. The storms originated in southwest Missouri, then moved northeastward in the form of a bow echo into east-central and southeast Illinois. Widespread winds of 60 to 70 mph downed numerous trees and power lines along and southeast of an Effingham to Danville line.
Higgins	05/25/2011	Tornado	F0	0	0	0	0	A tornado briefly touched down in a field, causing no damage. A deep area of low pressure lifting from the Plains into the Upper Midwest pulled a strong cold front eastward toward the Mississippi River during the afternoon of May 25th. Severe thunderstorms developed ahead of the cold front, as well as along a warm front lifting northward through the area. Many of the storms produced large hail up to the size of golf balls and damaging winds in excess of 60 mph. In addition, 6 tornadoes touched down across central Illinois, including an EF2 tornado that caused significant damage south of Robinson in Crawford County.
Piatt County	06/06/2011	Heat	N/A	1	0	0	0	A 59 year-old Bloomington woman died on June 7th as a result of extreme heat inside her home. The woman had pre-existing medical conditions that were made worse by the heat. Outside temperatures topped out in the lower to middle 90s: however, readings inside her un-air conditioned home likely rose well above 100 degrees. A period of hot and humid conditions developed across central Illinois from June 6th through June 8th. Afternoon high temperatures each day reached the lower to middle 90s, while heat index values climbed to around 100 degrees. The hot conditions resulted in the deaths of a 59 year-old woman in Bloomington on June 7th, and a 19 month child in Noble on June 8th
Wakefield	06/18/2011	Flash Flood	N/A	0	0	0	0	Thunderstorms produced 4.00 to 9.00 of rain in much of Richland County during the early morning hours of June 18th. U.S. Highway 50 was inundated in several locations, streets were flooded in a large part of Olney, and almost all rural roads were impassable due to the high water. Due to a strong low-level jet flowing into the area, the storms continually re-developed and tracked across the same locations, producing between 5 and 10 inches of rain across parts of Morgan and western Sangamon counties through the morning of June 18th. As a result, widespread flash flooding occurred from the Jacksonville area eastward to the Sangamon County border. Significant flash flooding also occurred in a large part of southeast Illinois where 3 to 9 inches of rain was reported. A few of the storms also produced gusty winds and small hail.
Calhoun	06/21/2011	Thunderstorm Wind	52 kts.	0	0	10K	0	Trees were blown down onto Meridian Road southeast of Olney. Severe thunderstorms developed along an advancing cold front during the late afternoon and evening of June 21st. Wind gusts of 60 to 70 mph brought numerous trees and power lines down across much of the area. In addition, heavy rainfall created flash flooding.

Location	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage	Description
Calhoun	06/21/2011	Thunderstorm Wind	52 kts.	0	0	12K	0	Several trees were blown down onto Sunnybrook Road southwest of Olney. Severe thunderstorms developed along an advancing cold front during the late afternoon and evening of June 21st. Wind gusts of 60 to 70 mph brought numerous trees and power lines down across much of the area. In addition, heavy rainfall created flash flooding.
Olney	06/21/2011	Thunderstorm Wind	52 kts.	0	0	0	0	Several trees were blown down onto Holly Road just southeast of Olney. Severe thunderstorms developed along an advancing cold front during the late afternoon and evening of June 21st. Wind gusts of 60 to 70 mph brought numerous trees and power lines down across much of the area. In addition, heavy rainfall created flash flooding across Tazewell County and Woodford County.
Wakefield	06/25/2011	Flash Flood	N/A	0	0	0	0	Thunderstorms during the late evening hours produced 2.50 to 4.00 of rain on extremely saturated ground and in locations which experienced flash flooding the previous week. This resulted in rapid flash flooding of creeks and roads across almost all of Richland County. Streets in Olney and Noble were flooded and U.S. Highway 50, Illinois Route 130 and Route 250 had standing water in spots. Nearly all rural roads were flooded and closed due to the flooding. Clusters of thunderstorms developed along an advancing warm front during the evening of June 25th. Rainfall amounts ranging from 2 to 5 inches created widespread flash flooding in areas that were extremely saturated and where flash flooding had occurred at times during the previous week across west central and southeast Illinois. In addition, some of the storms produced damaging wind gusts and hail as large as quarters...mainly along and southwest of a Rushville...to Decatur...to Robinson line.
Olney	07/12/2011	Thunderstorm Wind	52 kts.	0	0	0	0	Numerous tree branches and power lines were blown down in Olney. A stationary frontal boundary served as the focusing mechanism for scattered thunderstorms during the late afternoon and early evening hours of July 12th. Most of the storms occurred along and southwest of a Springfield to Robinson line. Isolated wind damage was reported, as well as localized flash flooding across parts of southeast Illinois.
Amity	07/12/2011	Flash Flood	N/A	0	0	0	0	Heavy rain of 3.00 to 4.00 inches in a two hour period during the early evening produced flash flooding in southeast Richland County. Many rural roads around Claremont were inundated with water flowing over them, and U.S. Highway 50 was impassable in spots. A stationary frontal boundary served as the focusing mechanism for scattered thunderstorms during the late afternoon and early evening hours of July 12th. Most of the storms occurred along and southwest of a Springfield to Robinson line. Isolated wind damage was reported, as well as localized flash flooding across parts of southeast Illinois.

Appendix D: Facilities – Essential, Critical, and Community Assets

ESSENTIAL FACILITIES OF RICHLAND COUNTY

Essential Facility Name	Facility Type	Location
Brookstone Estates	Care Facility	Olney
Bergin Manor	Care Facility	Olney
Emerald Glen	Care Facility	Olney
Fox River Apartments	Care Facility	Olney
Marks Sunset Manor	Care Facility	Olney
Maple Wood	Care Facility	Olney
Richland Care and Rehabilitation	Care Facility	Olney
Richland Manor	Care Facility	Olney
Richland Memorial Hospital	Care Facility	Olney
Timber Oaks	Care Facility	Olney
Emergency Management Agency	Emergency Center	Olney
Noble Fire Department	Fire Station	Noble
Claremont-Bonpas Fire Dept	Fire Station	Claremont
Olney Fire Department	Fire Station	Olney
Richland County Sheriff	Police Station	Olney
Olney Police Dept	Police Station	Olney
Truant Alternative Optional School	School	Olney
Safe School Program Roe	School	Olney
East Richland Elementary School	School	Olney
East Richland Middle School	School	Olney
East Richland High School	School	Olney
West Richland Junior High School	School	Noble
West Richland High School	School	Noble
West Richland Elementary School	School	Noble
St Joseph Elementary School	School	Olney
Olney Central College	School	Olney

CRITICAL FACILITIES OF RICHLAND COUNTY

Critical Facility Name	Facility Type	Location
Olney-Noble Airport	Airport	Olney/Noble
WUSI – TV CH 16	Communication	Olney
WVLN – 740	Communication	Olney
WPTH – TV CH 201	Communication	Olney
Keen Irvin	Communication	Claremont
Comcast Cable	Communication	Olney
RSA Tower	Communication	Olney
Scherer (Mobil Radio)	Communication	Noble
Richland Sheriff Dept Tower	Communication	Olney
Westchester Services	Communication	Olney
Verison North	Communication	Olney
Amerin CIPS	Communication	Olney
Tolliver Cell Tower	Communication	Olney
911 Tower	Communication	Olney
Mid Illinois Concrete	Communication	Olney
American Towers	Communication	Noble
Vernor Lake Dam	Dam	Olney
Borah Lake Dam	Dam	Avon
East Fork Lake Dam	Dam	Olney
Hahn Lake Dam	Dam	Blood
Bell Lake Dam	Dam	Blood
Millers Lake Dam	Dam	Blood
Hites Lake Dam	Dam	Olney
Wilson Lake Dam	Dam	Bennington
Monteclare Lake Dam	Dam	Claremont
Buester Lake Dam	Dam	Olney
Norris Electric	Electric Power Facility	Olney
Brunswick Bicycles	Hazardous Materials Facility	Olney
Brentwood Tower	Potable Water	Olney
Taylor Drive Tower	Potable Water	Olney
Industrial Park Water Tower	Potable Water	Olney
Washington Water Tower	Potable Water	Noble
Noble Water Tower	Potable Water	Noble
RE Water	Potable Water	Parkersburg
RE Water Angle Road	Potable Water	Parkersburg
Dundas West Liberty Water	Potable Water	Dundas
Parkersburg Tower	Potable Water	Parkersburg
Calhoun Water Storage	Potable Water	Calhoun

Critical Facility Name	Facility Type	Location
Claremont Water Tower	Potable Water	Claremont
Claremont Wastewater	Wastewater Facility	Claremont
Noble Wastewater	Wastewater Facility	Noble
Olney Sewage Disposal Plant	Wastewater Facility	Olney
Parkersburg Wastewate	Wastewater Facility	Parkersburg
Calhoun Wastewate	Wastewater Facility	Calhoun

COMMUNITY ASSETS OF RICHLAND COUNTY

Community Asset Facility Name	Facility Type	Location
Bonapas Town Hall	Government	Olney
Calhoun Community Center	Recreational	Calhoun
Calhoun Equipment Building	Government	Calhoun
Calhoun Town Hall	Government	Calhoun
Claremont Community Center	Recreational	Claremont
Housing Authority	Government	Olney
Noble Town Hall	Government	Noble
Parkersburg Town Hall	Government	Parkersburg
Richland Country Club	Recreational	Olney
Richland Co Highway Dept	Government	Olney
Weber Medical Clinic	Care Facility	Olney
Willow Grove Rinker	Care Facility	Olney

Appendix E: Historical Hazard Maps

The following map shows historical natural hazard events that occurred in Richland County. Figures A, B, C, and D on the following pages depict magnified views of the demarcated regions on the county map.

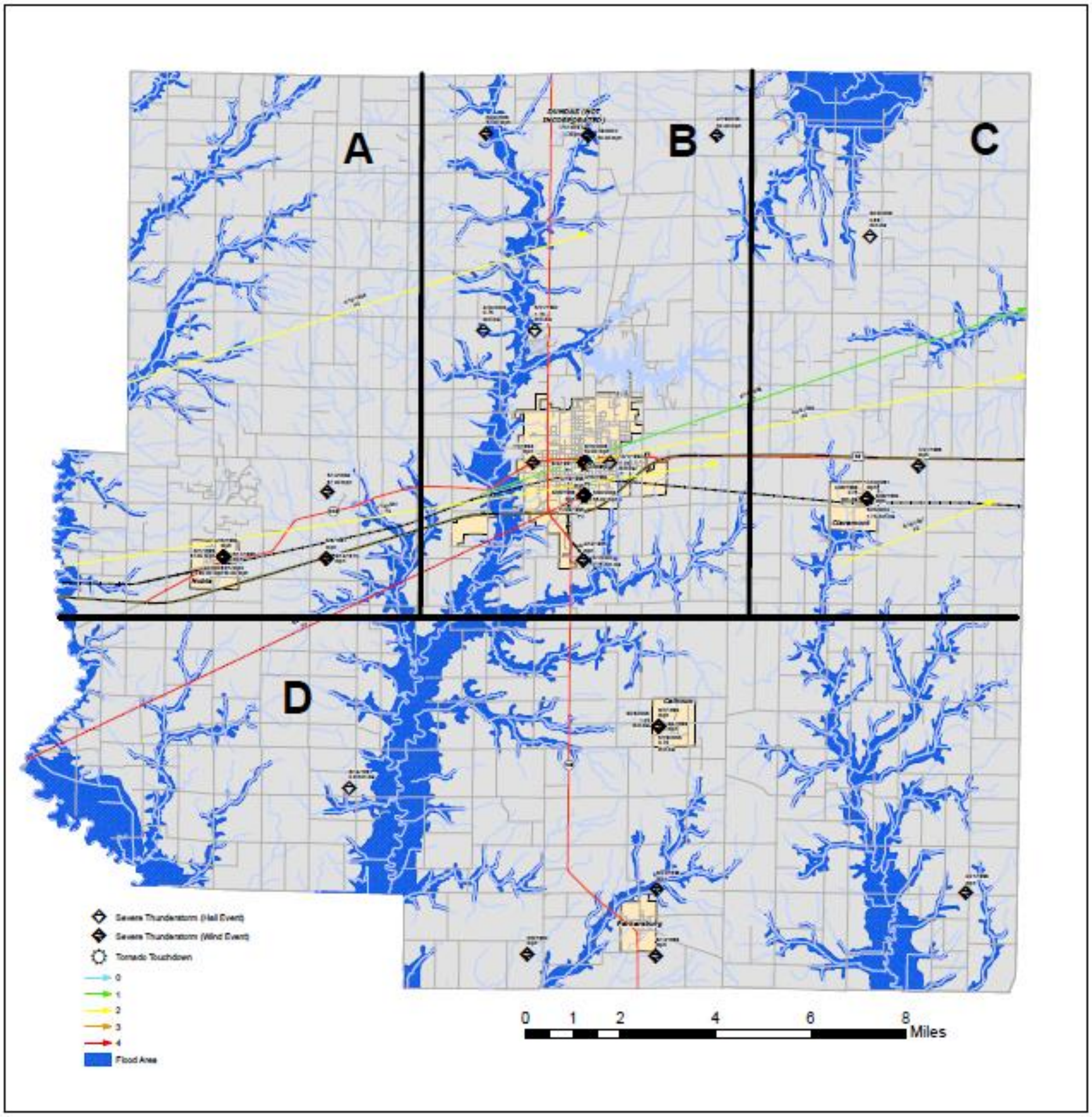
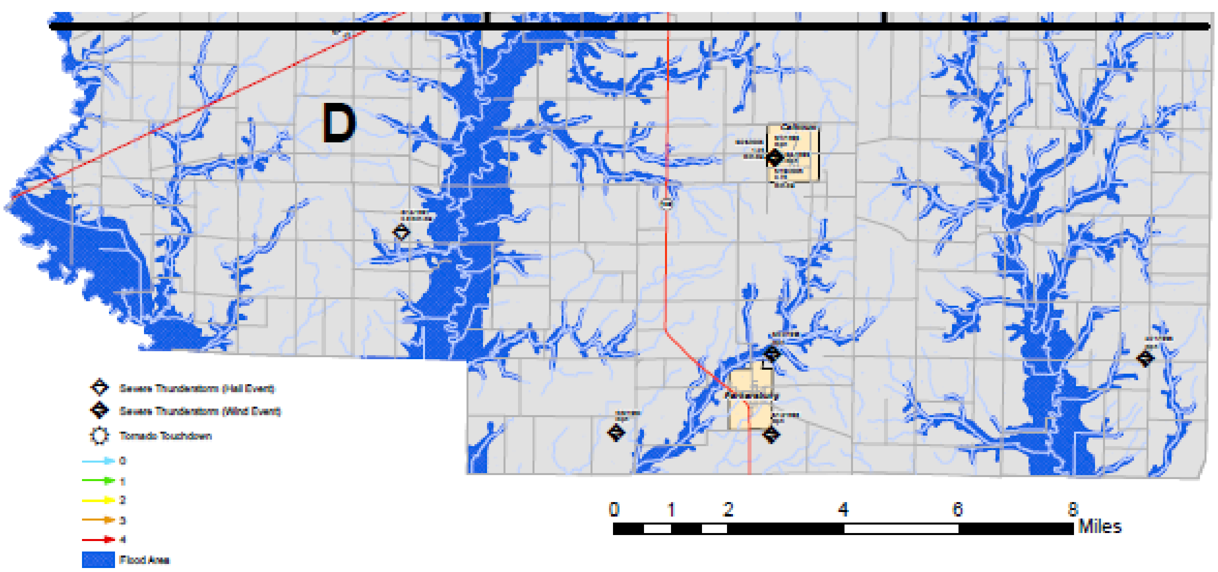


Figure A: Northwest Portion of Richland County

Figure B: North Central Portion of Richland County

Figure C: Northeast Portion of Richland County

Figure D: Southern Portion of Richland County



Appendix F: Adopting Resolutions

Resolution #____________

ADOPTING THE RICHLAND COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, Richland 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, Richland 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 Richland County Commissioners hereby adopt the Richland County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Richland County Emergency Management Agency 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.

~~BE IT FURTHER RESOLVED that the Richland County Emergency Management Agency will submit on behalf of the participating municipalities the adopted Multi-Hazard Mitigation Plan to the Federal Emergency Management Agency for final review and approval.~~

ADOPTED THIS ____________ Day of ________________, 2012.

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County Commissioner Chairman

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County Commissioner

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County Commissioner

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County Commissioner

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County Commissioner

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Attested by: County Clerk

Resolution #_____________

ADOPTING THE RICHLAND COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the Town of Claremont 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 Town of Claremont 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 Town of Claremont hereby adopts the Richland County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Richland County Emergency Management Agency 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.
~~BE IT FURTHER RESOLVED, that the Richland County Emergency Management Agency will submit on behalf of the participating municipalities the adopted Multi-Hazard Mitigation Plan to the Federal Emergency Management Agency for final review and approval.~~

ADOPTED THIS ______________ Day of __________________, 2012.

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Town President

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Town Council Member

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Town Council Member

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Town Council Member

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Town Council Member

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Attested by: Town Clerk

Resolution #_____________

ADOPTING THE RICHLAND COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the Town of Calhoun 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 Town of Calhoun 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 Town of Calhoun hereby adopts the Richland County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Richland County Emergency Management Agency 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.
~~BE IT FURTHER RESOLVED, that the Richland County Emergency Management Agency will submit on behalf of the participating municipalities the adopted Multi-Hazard Mitigation Plan to the Federal Emergency Management Agency for final review and approval.~~

ADOPTED THIS ______________ Day of __________________, 2012.

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Town President

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Town Council Member

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Town Council Member

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Town Council Member

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Town Council Member

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Attested by: Town Clerk

Resolution #_____________

ADOPTING THE RICHLAND COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the Town of Noble 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 Town of Noble 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 Town of Noble hereby adopts the Richland County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Richland County Emergency Management Agency 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.

~~BE IT FURTHER RESOLVED, that the Richland County Emergency Management Agency will submit on behalf of the participating municipalities the adopted Multi-Hazard Mitigation Plan to the Federal Emergency Management Agency for final review and approval.~~

ADOPTED THIS _____________ Day of _________________, 2012.

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Town President

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Town Council Member

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Town Council Member

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Town Council Member

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Town Council Member

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Attested by: Town Clerk

Resolution #_____________

ADOPTING THE RICHLAND COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the City of Olney 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 Olney 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 Olney hereby adopts the Richland County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Richland County Emergency Management Agency 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.
~~BE IT FURTHER RESOLVED, that the Richland County Emergency Management Agency will submit on behalf of the participating municipalities the adopted Multi-Hazard Mitigation Plan to the Federal Emergency Management Agency for final review and approval.~~

ADOPTED THIS _____________ Day of _________________, 2012

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City Mayor

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City Council Member

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City Council Member

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City Council Member

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City Council Member

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Attested by: City Clerk

Resolution #_____________

ADOPTING THE RICHLAND COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the Town of Parkersburg 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 Town of Parkersburg 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 Town of Parkersburg hereby adopts the Richland County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Richland County Emergency Management Agency 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 __________________, 2012.

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Town President

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Town Council Member

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Town Council Member

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Town Council Member

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Town Council Member

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Attested by: Town Clerk