Hazard Mitigation Plan

Gallatin County, Illinois

Adoption Date: -- ______________________ --

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Section 1 - Public Planning Process

1.1 Narrative Description

Hazard Mitigation is defined as any sustained action to reduce or eliminate long-term risk to human life and property from hazards. The Federal Emergency 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 a requirement in order to maintain eligibility for certain federal disaster assistance and hazard mitigation funding programs. In order for the National Flood Insurance Program (NFIP) communities to be eligible for future mitigation funds, they must adopt an MHMP.

The Southeastern Illinois Regional Planning & Development Commission was established in 1968 to provide professional quality service to the local governments and residents of our five-county region (Gallatin, Hamilton, Hardin, Pope, and Saline counties), and to promote and foster growth, economic diversification, and prosperity within the region by securing and administering grants for public works, housing rehabilitation, economic development projects, and operation of the Revolving Loan Fund. The Southeastern Illinois Regional Planning & Development Commission and Gallatin County have joined efforts to define and prioritize the risks in the county and to develop this mitigation plan to minimize both the risks and the consequences of the defined hazards. Southeastern Illinois Regional Planning & Development Commission and Gallatin County 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 has created HAZUS-MH (**Haz**ards **US**A **M**ulti-**H**azard) a powerful geographic information system (GIS)-based disaster risk assessment tool. This tool enables communities of all sizes to predict the estimated losses from floods, hurricanes, earthquakes, and other related phenomena and to measure the impact of various mitigation practices that might help reduce those losses. The Illinois Emergency Management Agency (IEMA) has determined that HAZUS-MH should play a critical role in the risk assessments in Illinois. Southern Illinois University at Carbondale (SIU) and The Polis Center at Indiana University Purdue University Indianapolis (IUPUI) are assisting Gallatin County planning staff with performing the hazard risk assessment.

1.2 Planning Team Information

The Gallatin County Multi-Hazard Mitigation Planning team is made up of representatives from each of the incorporated areas within the county. All municipalities are represented, as well as local business leaders, community leaders, and fire and police departments. The committee decided to hold six meetings to develop the plan. The meetings are as follows:

Meeting 1: Initial Meeting held on August 21, 2008 at Gallatin County Courthouse in Shawneetown to discuss the development of the plan and to identify key infrastructure and facilities within the county.

Meeting 2: Hazard Identification meeting was held on September 23, 2008 at the Ridgway Fire Department in the Village of Ridgway to prioritize and profile hazards for modeling.

Meeting 3: PUBLIC meeting was held on November 6, 2008 at the Gallatin County Courthouse in Shawneetown for a hazard presentation. A draft risk assessment was presented and mitigation actions were presented and prioritized.

Meeting 4: The planning team met on February 23, 2009 to develop the mitigation strategies for each of the hazards that they had previously determined. These strategies were then ranked by importance. These strategies will be the top priority for the plan.

Meeting 5: The planning team met on Tuesday, July 7, 2009 and did a final review of the plan prior to its submission to IEMA. The group made revisions to the plan and provided feedback for the plan to be submitted.

The Gallatin County Multi-Hazard Mitigation Planning Team is headed by Steve Galt, who is also the primary point of contact. Members of the planning team include representatives from Ridgway, Shawneetown, Junction, Village of Old Shawneetown, and Equality. 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
Steve Galt	Coordinator	Gallatin Co. ESDA	Gallatin County
Randy Drone	County Board Chairman	Gallatin County	Gallatin County
Terry Drone	County Board Member	Gallatin County	Gallatin County
Shannon Bradley	Deputy	Gallatin Co. Sheriff Dept.	Gallatin County
Terry Williams	Village President	City of Shawneetown	Shawneetown
Becky Mitchell	Village President	Village of Ridgway	Ridgway
Frank Sisk	Village President	Village of Equality	Equality
Jim Doyle	Village President	Village of Omaha	Omaha
Kevin Edmonds	Village President	Village of New Haven	New Haven
Melinda Robbins	Village President	Village of Junction	Junction
Mike Kitchens	Chief of Police	Ridgway Police Department	Ridgway
Radar Patton	Chief of Police	Shawneetown Police Department	Shawneetown
Billy Gene Taylor	Police	Old Shawneetown P.D.	Old Shawneetown
DJ McQuire	Fire Chief	New Haven Fire Dept.	New Haven
Terry Golden	Fire Chief	Shawneetown Fire Dept.	Shawneetown
John E. Hish	Fire Chief	Ridgway Fire Dept.	Ridgway

Name	Title	Organization	Jurisdiction
Jimmy Frohock	Fire Chief	Equality Fire Department	Equality
Sean Martin	Fire Chief	Omaha Fire Department	Omaha
Bill Watson	EHD - Gallatin County	Eldorado Health Department	Gallatin County
Lori Hise	County Assessor		Gallatin County
Mike Vickery	American Red Cross Coordinator		Southern IL Region
Les Oyler	Superintendent	Gallatin County School	Gallatin County
Larry Phelps	Manager	Saline Valley Conservancy District	Southern IL Region
Judy Jones	WADI	Wabash Area Development Inc.	Southern IL Region
Lawrence Bradley	Citizen		Junction
Jeff Jones	Volunteer	Equality Fire Department	Equality
Lawrence Randall	Village Resident	Village of Old Shawneetown	Old Shawneetown
Chad Pemberton		RIDES Mass Transit	Southern IL Region
Mark York	Village Resident	Village of Equality	Equality
Nadine York	Village Resident	Village of Equality	Equality
Donald Nave	Fire Fighter	Equality Fighter	Equality
Caroline Baltimore	Village Resident	Village of Ridgway	Ridgway
Harold Vaught	Village Resident	Village of Junction	Junction
Cody Martin	Village Resident	Village of Junction	Junction
Alene Carr	Economic Dev. Coordinator	SIRPDC	Gallatin County
Julie Patera	Executive Director	SIRPDC	Gallatin County

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

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

An MHMP kickoff meeting was held at the Gallatin County Courthouse on August 21, 2008. Representatives of Gallatin County attended the meeting. Julie Patera, Executive Director of SIRP&DC explained the rationale behind the MHMP program and answered questions from the participants. Nicholas Pinter from SIU, provided an introduction to hazards, and John Buechler, from The Polis Center, provided an overview of HAZUS-MH. Nicholas described the timeline and the process of the mitigation planning project and presented Gallatin County with a Memorandum of Understanding (MOU) for sharing data and information.

The Gallatin County Multi-Hazard Mitigation Planning Committee met on August 21, 2008, September 23, 2008, November 6, 2008, February 23, 2009, and July 7, 2009. These meetings one, three and five were held in Gallatin County Court House in Shawneetown. Meeting two was held in Ridgway at the Fire Department and meeting four was held at the Ohio River Visitors Center in Equality, Illinois. Each meeting was approximately two hours in length. The meeting agendas, minutes, and attendance sheets are included in Appendix A. During these meetings, the planning team successfully identified critical facilities, reviewed hazard data and maps, identified and assessed the effectiveness of existing mitigation measures, established mitigation projects, and assisted with preparation of the public participation information.

1.3 Public Involvement in Planning Process

An effort was made to solicit public input during the planning process and a public meeting was held during the formation of the plan on November 6, 2008 Appendix A contains the agendas and minutes from each of the public meetings. Appendix B contains articles published by the local newspaper throughout the public input process.

1.4 Neighboring Community Involvement

The Gallatin County planning team invited participation from various representatives of neighboring county and local city and town governments. Details of how neighboring stakeholders were involved are summarized in Table 1-2.

Table 1-2: Neighboring Community Participation

Person Participating	Neighboring Jurisdiction	Organization	Participation Description
Allen Ninness	Saline County	EMS Coordinator	Mailed draft copy and asked for suggestions
Kevin Carmen	Hardin County	EMS Coordinator	Mailed draft copy and asked for suggestions
Brent Hammel	White County	EMA Coordinator	Mailed draft copy and asked for suggestions

1.5 Review of Technical and Fiscal Resources

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

Table 1-3: Key Agency Resources Provided

Agency Name	Resources Provided
U.S. Census	County Profile Information such as Population and Physical Characteristics
Department of Commerce and Economic Opportunity	Community Profiles
Illinois Department of Employment Security	Industrial Employment by Sector
National Climatic Data Center	Climate Data
Illinois Emergency Management Agency	2007 Illinois Natural Hazard Mitigation Plan
Illinois Environmental Protection Agency	Illinois 2008 Section 303(d) Listed Waters and watershed maps
United States Geological Survey	Earthquakes Information, Landcover Data, Hydrologic Data, Mine Data, Geologic Data
Illinois State Geological Survey	Coal Mining Maps, Geological Maps, Karst Geology, Soil Amplification Maps, Municipal Boundaries
University of Memphis, Center for Earthquake Research and Information	Earthquake Data
Illinois Water Survey and Federal Emergency Management Agency	Flood Rate Information Maps
Illinois Department of Transportation	Roads, Highways, and Railroads

1.6 Review of Existing Plans

Gallatin County and its associated local communities utilized a variety of planning documents to direct community development. These documents include land use plans, master plans, emergency response plans, municipal ordinances, and building codes. The MHMP planning process 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
Southeastern Illinois Regional Planning & Development Commission	2007	Comprehensive Economic Development Strategy	CEDS for the five county region	Demographics, Development Trends, Employment
National Agricultural Statistics Service	2006–2007	Illinois County Estimates: Corn, Soybeans, and Wheat	This release contains official estimates of acreage, yield and production of corn, soybeans and wheat for counties in Illinois.	Land Use and Development Trends
Illinois Emergency Management Agency	2007	Illinois Natural Hazard Mitigation Plan	The Illinois Natural Hazard Mitigation Plan (INHMP) establishes a process for identifying and mitigating the effects of natural hazards in the State of Illinois as required under the Disaster Mitigation Act of 2000.	Topography and Background Information

Section 2 - Jurisdiction Participation Information

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

Table 2-1: Participating Jurisdictions

Jurisdiction Name
Gallatin County
Village of Shawneetown
Village of Ridgway
Village of New Haven
Village of Omaha
Village of Junction
Village of Old Shawneetown
Village of Equality

2.1 Adoption by local governing body

The draft plan was made available on April 20, 2009 to the planning team and other agencies county emergency services for review. The Gallatin County Hazard Mitigation Planning team presented and recommended the plan to *<the officials responsible for adopting>*, who adopted the Gallatin County Hazard Mitigation Plan on *<date adopted>.* Resolution adoptions are included in Appendix C of this plan.

2.2 Jurisdiction Participation

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

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

Table 2-2 Jurisdiction Participation

Jurisdiction Name	Planning Team Member	Position	Organization	Meeting 1 8/21/2008	Meeting 2 9/23/2008	Meeting 3 11/6/2009	Meeting 4 2/23/2009	Meeting 5 7/7/2009	Total Meetings Attended
Gallatin County	Steve Galt	EMS Director	Gallatin Co. EMS	X	X	X	X		4
Gallatin County	Lori Hise	Gallatin County Assessor		X	X	X	X	X	5
Village of Ridgway	Becky Mitchell	Village President		X	X	X	X	X	5
	Bill Watson		Egyptian Health Dept.	X		X		X	3
	Carolyn Baltimore	Village Resident			X				1
City of Shawneetown	Terry Golden	Fire Department Chief	Shawneetown Fire Dept.			X			1
	Gina Wargel	Gallatin Co. E-911			X	X	X	X	4
Village of Omaha	Judy Jones		Omaha Fire Department	X	X	X			3
	Karen Cathy	University of IL Extension						X	1
Village of Equality	Nadine York	Village Resident			X	X	X		3
	Mark York	Village Resident / Teacher			X				1
	Donald Nave	Equality Fire Dept.					X		1
Village of New Haven	DJ McQuire	Village Resident	Farm Services		X			X	2
Village of Old Shawneetown	Lawrence Randall	Village Resident		X	X				2
Village of Junction	Harold Vaught	Village Resident			X				1
	Cody Martin	Village Resident						X	1

Section 3 - Jurisdiction Information

Gallatin County is located in the U.S. state of Illinois. As of 2000, the population was 6,445. Its county seat is Shawneetown, Illinois.

Gallatin County was formally organized in 1812 and consists of a largely rural population. The County was named for Albert Gallatin, who was Secretary of the Treasury at the time. The county has a population density of 20 people per square mile. The estimated population in 2006 was 6,159. This was a decrease of -4.4% from the 2000 census The average household size was 2.34 and the average family size was 2.90 compared to an average state family size of 2.63 persons.

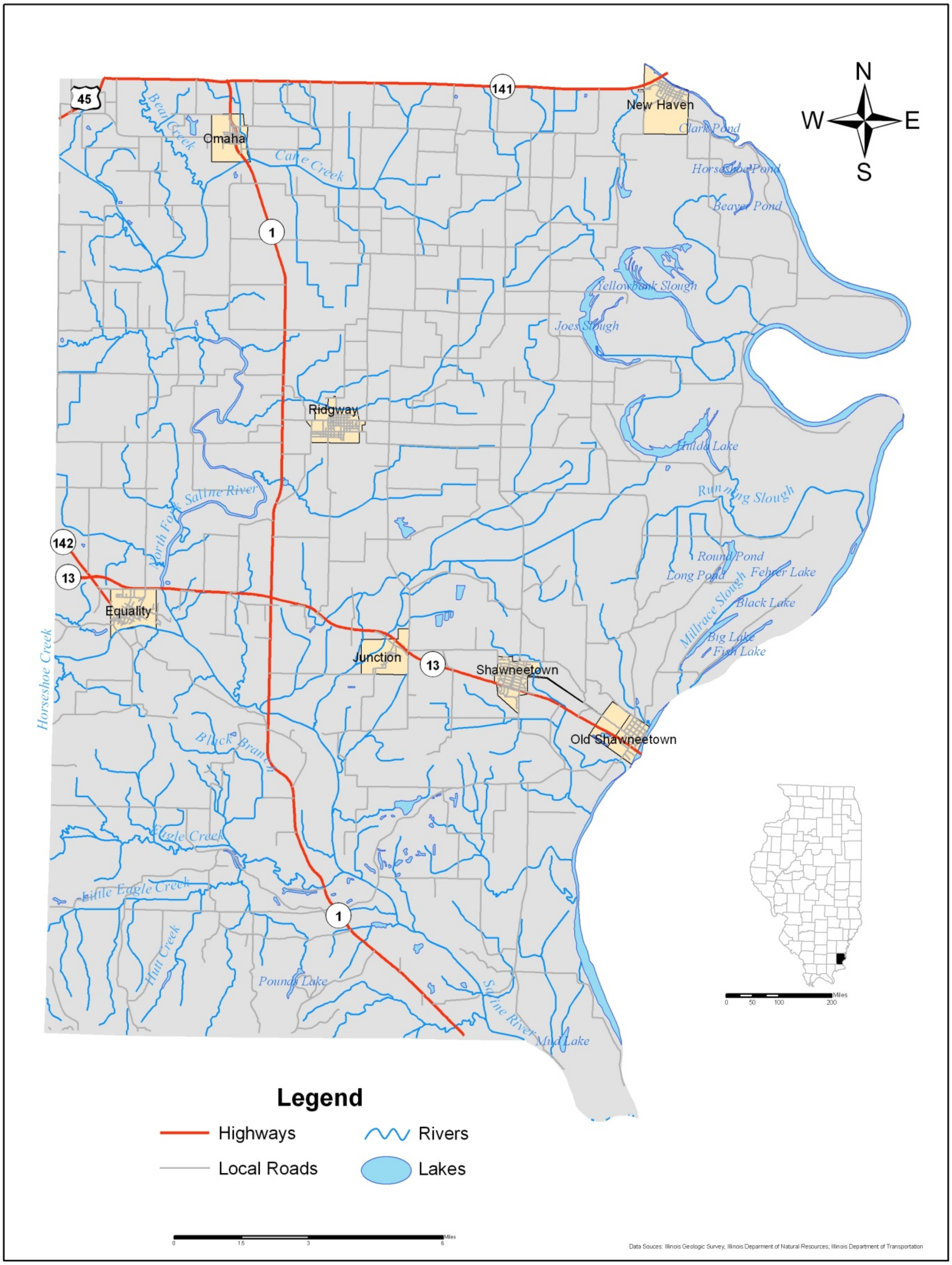
3.1 Topography

Gallatin County is situated in the southeastern corner of Illinois and approximately half of the county lies within the Shawnee National Forest. The northern half of Gallatin County is located within the Mt. Vernon Hill Country Division which is characterized by low rolling hills and broad alluvial valleys along the major streams. The southern half of county is with the Shawnee Hills Division which mixture of sandstone bluffs, steep-sided ridges and hills with broad valleys

Saline springs along the Saline River between Equality and Junction, Illinois played a big part in the County's early history. The springs are on State land along the south bank of the Saline River, just east of the bridge on Illinois Route 1. The Wabash and Ohio rivers join in the northeastern part of the county. The Saline River is a major drainage in the county, and it feeds into the Ohio River.

According to the U.S. Census Bureau, the county has a total area of 328 square miles (851 km^2), of which, 324 square miles (838 km^2) of it is land and 5 square miles (12 km^2) of it (1.43%) is water.

Figure 3-1: Gallatin County Map



3.2 Climate

Gallatin County climate is typical of Southern Illinois. 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 National Climatic Data Center (NCDC), normal from 1971 to 2000, in winter, on average the lowest winter temperature is 24.2° F and the average high is 45.3° F. In summer, the average low is 63.1° F and average high is 86.8° F. Average annual precipitation is 45.07 inches throughout the year.

Southeastern Illinois is prone to strong thunderstorms that can produce strong winds, lightning, hail, and sometimes tornadoes. Historically, these storms can occur at almost any time throughout the year, but are most common in the spring and summer months. On average, there are 201 sunny days per year in Gallatin County.

3.3 Demographics

Gallatin County has a population of 6,445. The estimated population in 2006 was 6,159. This was a decrease of -4.4% from the 2000 census. The population is spread throughout seven cities and villages including Shawneetown, Old Shawneetown, Rigdway, Junction, Omaha, Equality, and New Haven. The largest town in Gallatin County is Shawneetown, which has a population of approximately 1,410. The breakdown of population by incorporated areas is listed in Table 3-1.

Table 3-1: Population by Community

Community	2000 Population	% of County
City of Shawneetown	1,410	22
Old Shawneetown	278	4
Village of New Haven	477	7
Village of Omaha	263	4
Village of Junction	139	2
Village of Equality	721	11
Village of Ridgway	928	14

Source: American FactFinder*, 2008*

3.4 Economy

The US Census Bureau reported for 2000 that 43% of the workforce in Gallatin County was employed in the private sector. The breakdown is included in Table 3-2. Education, Health and Social Services represents the largest sector, employing approximately 24.2% of the workforce. The 2006 annual per capita income in Gallatin County is $21,769.00 compared to an Illinois average of $36,264.00.

Table 3-2: Industrial Employment by Sector

Industrial Sector	% of County Workforce 2006
Agriculture, forestry, fishing, hunting, and mining	13.8
Construction	5.3
Manufacturing	10.8
Wholesale trade	4.2
Retail trade	9.2
Transportation, warehousing and utilities	9.2
Information	1.3
Finance, insurance, real estate, and rental/leasing	4.6
Professional, scientific, management, administration and waste management services	3.5
Educational, health, and social services	24.2
Arts, entertainment, recreation, accommodation and food services	4.3
Other services(except public administration)	4.8
Public administration	4.7

Source: U.S. Census Bureau, 2000
Illinois MapStats, 2008

3.5 Industry

Gallatin County's major employers and number of employees are listed in Table 3-3. The largest employer is Gallatin County Unit School District #7. The Gallatin County High School started as three different high schools in the largest villages of Gallatin County: New Haven, Shawneetown, Ridgway, and Equality. The Gallatin County School is located in the middle of the county in Junction. The School brings the whole community together for Grade School, Junior High, and High School. The Gallatin County School has 67 employees.

Peabody Energy's Willow Lake Mine, an underground operation north of Equality, first shipped coal in 2002. In 2007, the mine sold 3.6 million tons of coal to Midwest utility customers. The mine has 64 million tons of recoverable coal reserves. The mine employs approximately 380 people, not all from Gallatin County but from the surrounding counties and states.

Although Education is listed as one of the largest industries, Agriculture is 13.8% of the industry market and plays a large role in the economy for Gallatin County with the average farm size being 825 acres.

Table 3-3: Major Employers

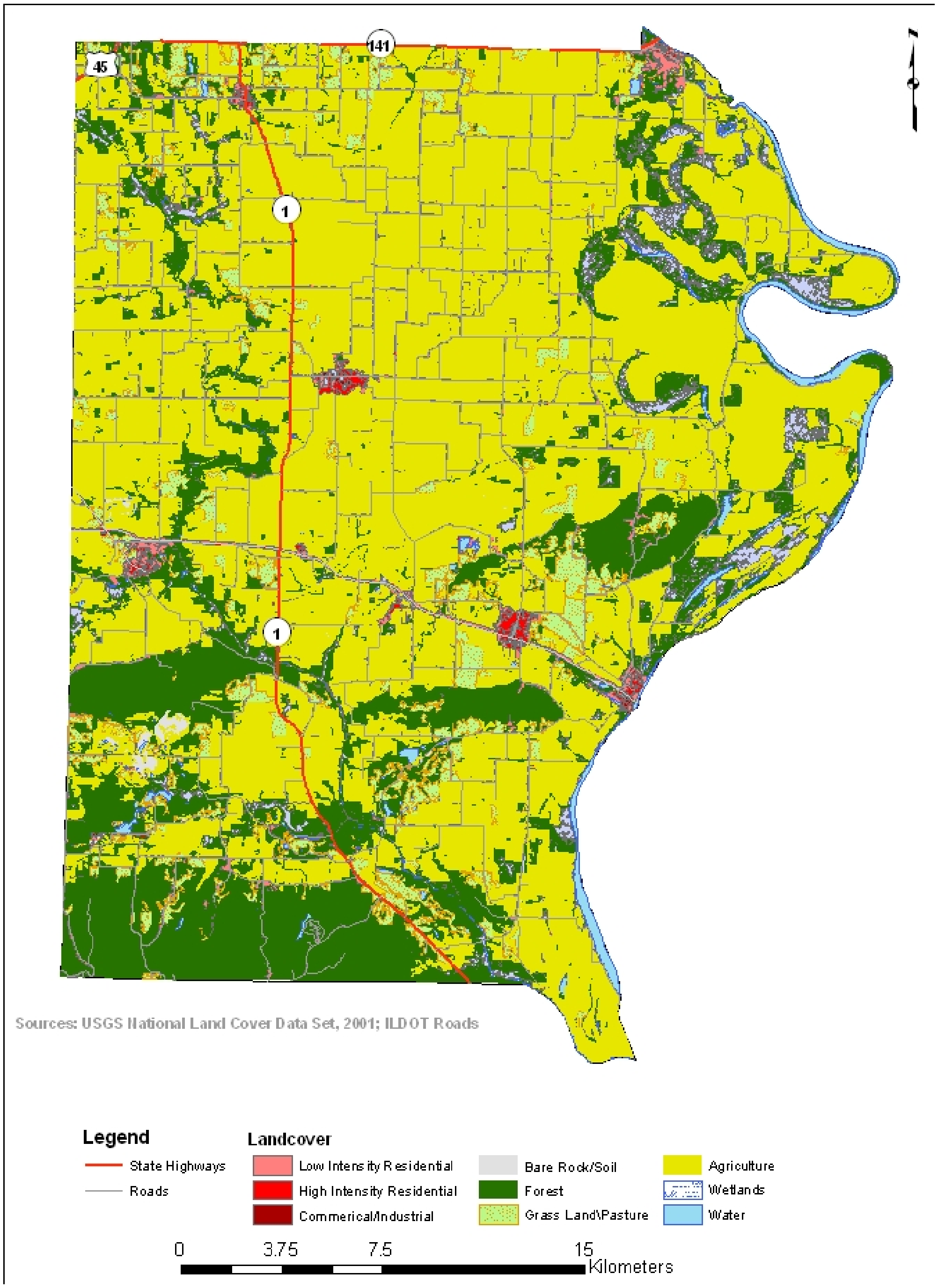
Company Name	Location	Established	Employees	Type of Business
Manufacturing / Mining				
Peabody Coal	Shawneetown	2002	380	Underground Coal Mining
Transportation				
RG Berry Trucking	Shawneetown	1965	48	Coal / Rock Hauling
Agriculture				
Scates Gardens, Inc. (Scates Farm)	Shawneetown	1962	Varies	Vegetable Production and Sales
Other				
Gallatin County Unit School District #7	Junction		67	Education

Source: Southeastern Illinois Regional Planning & Development Commission – CEDS 2008

3.6 Land Uses and Development Trends

Agriculture is the predominant land use in Gallatin. Corn is the primary crop, followed by soybeans, winter wheat, hay, and oats. Other significant land uses are industrial and residential. Agriculture continues to decline due to farmland consolidation and new technology. Figure 3-1 depicts Gallatin County's land use.

Figure 3-1: Gallatin County Land Uses



3.7 Major Lakes, Rivers, and Watersheds

Within Gallatin County, the principal streams, besides the Ohio River which forms the northeastern border of the county, are Cane Creek, Crawford Creek, Cypress Ditch, Eagle Creek, and the Saline River. There are no significant lakes. The county crosses four HUC08 watersheds. A list of 14-digit Hydrologic Unit Code (HUC) watersheds is included in Table 3-4. Figure 3-1 depicts Gallatin County's lakes, rivers, and watersheds.

Table 3-4: Watersheds

Watershed Name	HUC Code
Saline	05140203
Lower Wabash	05120113
Little Wabash	05120114
Lower Ohio River	05140203

Source: U.S. Geological Survey HUC14 Watersheds, 2006

Section 4 - Risk Assessment

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

4.1 Hazard Identification/Profile

4.1.1 Existing Plans

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

4.1.2 Planning Team

During Meeting #2, which occurred on September 23, 2008, the planning team developed and ranked a list of hazards that affect the county: (1) severe thunderstorms with tornadoes; (2) earthquakes; (3) severe thunderstorms with high winds; (4) river flooding which occurs on an annual basis during the spring; (5) levee or dam failure; and (6) winter storms. The plan also identified Gallatin County's principal technological hazard as land transportation accidents involving hazardous materials.

4.1.3 National Hazard Records

In addition to these identified hazards, the MHMP planning committee reviewed the list of natural hazards prepared by FEMA. To assist the planning team, historical storm event data was compiled from the National Climatic Data Center (NCDC; http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll). This NCDC data included 241 reported events in Gallatin County between December 2, 1950 and April 2, 2008. 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 D. In addition to NCDC data, Storm Prediction Center (SPC) data associated with tornadoes, strong winds, and hail were plotted using SPC recorded latitude and longitude. These events are plotted and included as Appendix E. The list of NCDC hazards is included in Table 4-1.

Table 4-1: Climatic Data Center Historical Hazards

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

4.1.4 Hazard Ranking Methodology

Based on planning team input, national datasets, and existing plans, Table 4-2 lists the hazards Gallatin County will address in this multi-hazard mitigation plan. In addition, these hazards ranked the highest based on the Priority Risk Index discussed in section 4.1.5.

Table 4-2: Planning Team Hazard List

Hazard
Tornado
Earthquake
Thunderstorms/ High Winds/ Hail/ Lightning
Flooding
Dam or Levee Failure
Winter Storms
Transportation Hazardous Material Release
Drought/Extreme Heat
Ground Subsidence

4.1.5 Calculating the Risk Priority Index

The first step in determining the Risk Priority Index (RPI) was to have the planning team members generate a list of hazards which have befallen or could potentially befall their community. Next, the planning team members were asked to assign a likelihood rating based on the criteria and methods described in the following table. Table 4-3 displays the probability of the future occurrence ranking. This ranking was based upon previous history and the definition of hazard. Using the definitions given, the likelihood of future events is "Quantified" which results in the classification within one of the four "Ranges" of likelihood.

Table 4-3: Future Occurrence Ranking

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

1 - *Unlikely*	Event is possible within the next ten years. Event has up to 1 in 10 years chance of occurring. (1/10=10%) History of events is less than or equal to 10% likely per year.

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

Table 4-4: Hazard Magnitude

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

Finally, the RPI was calculated by multiplying the probability by the magnitude/severity of the hazard. Using these values, the planning team member where then asked to rank the hazards. Table 4-5 identifies the RPI and ranking for each hazard facing Gallatin County.

Table 4-5: Gallatin County Hazards (RPI)

Hazard	Probability	Magnitude/Severity	Risk Priority Index	Rank
Tornado	4+ - Highly Likely	4 - Critical	16	1
Earthquake	2 - Possible	8 - Catastrophic	16	2
Thunderstorms/ High Winds/Hail/ Lightning	4 - Highly Likely	2 - Limited	8	3
Flooding	3 - Likely	4 - Critical	12	4
Dam/Levee Failure	3 - Likely	2 - Limited	6	5
Winter Storms	3 - Likely	2 - Limited	6	6
Transportation of Hazardous Material Release	2 - Possible	2 - Limited	4	7
Drought/Extreme Heat	2 - Possible	2 - Limited	4	8
Ground Subsidence	3 - Likely	1 - Negligible	3	9

4.1.6 Jurisdictional Hazard Ranking

Because the jurisdictions in Gallatin County differ in their susceptibilities to certain hazards—for example, Old Shawneetown, located along the Ohio River is more likely to experience significant flooding than Shawneetown which is located on substantially higher ground outside of the Ohio River Floodplain—the hazards identified by the planning team were ranked by SIUC for each individual jurisdiction using the methodology outlined in Section 4.1.5. The SIUC rankings were based on input from the planning team members, available historical data, and the hazard modeling results described within this hazard mitigation plan. During the five-year review of the plan this table will be updated by the planning team to ensure these jurisdictional rankings accurately reflect each community's assessment of these hazards. Table 4-6 lists the jurisdictions and their respective hazard rankings (Ranking 1 being the highest concern).

Table 4-6: Hazard Rankings by Jurisdiction

Jurisdiction	Hazard								
	Tornado	HAZMAT	Earthquake	Thunder-storms	Flooding	Winter Storms	Dam / Levee Failure	Drought/ Extreme Heat	Ground Subsidence
Equality	1	6	2	3	4	5	NA	7	8
Junction	1	6	2	4	3	5	NA	7	NA
Old Shawneetown	1	7	2	6	3	5	4	8	NA
Omaha	1	6	2	3	4	5	NA	7	NA
New Haven	1	6	2	3	4	5	NA	7	NA
Ridgeway	1	6	2	3	5	4	NA	7	NA
Shawneetown	1	6	2	4	3	5	NA	7	8

Rankings: 1 being the highest concern to higher number which is a lesser concern.
NA = Not applicable

4.1.7 GIS and HAZUS-MH

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

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

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

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

Using HAZUS-MH

1. 100-year overbank flooding
2. Earthquake

Using GIS

1. Tornado
2. Hazardous Material Release

4.2 Vulnerability Assessment

4.2.1 Asset Inventory

4.2.1.1 Processes and Sources for Identifying Assets

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

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

- The HAZUS-MH defaults, critical facilities, and essential facilities have been updated based on most recent available data sources. Critical and essential point facilities have been reviewed, revised, and approved by local subject matter experts at each county.
- The essential facility updates (schools, medical care facilities, fire stations, police stations, and EOCs) have been applied to the HAZUS-MH model data. HAZUS-MH reports of essential facility losses reflect updated data.

- Parcels with assessment improvements (buildings) values were used to estimate the number of buildings in the flood-prone areas.
- The analysis is restricted to the county boundaries. Events that occur near the county boundary do not contain damage assessments from the adjacent county.

Essential Facilities List

Table 4-7 identifies the essential facilities that were added or updated for the analysis. A complete list of the critical facilities is included as Appendix F. A map of all the critical facilities is included as Appendix G.

Table 4-7: Essential Facilities List

Facility	Number of Facilities
Care Facilities	2
Emergency Centers	1
Fire Stations	6
Police Stations	3
Schools	6

Facility Replacement Costs

Default HAZUS-MH building stock data were used for the HAZUS-MH analyses. Facility replacement costs and total building exposure are identified in Table 4-8. Table 4-8 also includes the estimated numbers of buildings within each occupancy class.

Table 4-8: Building Exposure (default HAZUS-MH) for Gallatin County

General Occupancy	Estimated Total Buildings	Total Building Exposure (X 1000)
Agricultural	77	$14,237
Commercial	148	$47,868
Education	6	$8,753
Government	17	$4,458
Industrial	35	$5,573
Religious/Non-Profit	18	$12,203
Residential	4,318	$278,546
Total	**4,619**	**$371,638**

Gallatin County provided parcel boundaries with assessed values. The Assessors data did not contain building replacement cost information and other building characteristics, and thus could not be used for the census block aggregated HAZUS-MH analysis. The parcel data was used to estimate the actual number of buildings within the flood-prone areas. The parcel data identified parcels with building improvements, which were then converted into centroid point locations. The parcels with improvements are summarized by occupancy class in Table 4-9.

Table 4-9: Parcels with Improvements by Occupancy Class for Gallatin County

Occupancy Class	Count
Residential	1,729
Commercial	187
Industrial	34
Agriculture	628
Religious	1
Total	**2,624**

4.3 Future Development

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

4.4 Hazard Profiles

4.4.1 Tornado Hazard

Hazard Definition for Tornado Hazard

Tornadoes pose a great risk to the State of Illinois and its citizens. Tornadoes historically have occurred during any month of the year. The unpredictability of tornadoes makes them one of Illinois'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 mph, but higher and lower values can occur. A wind velocity of 200 mph will result in a wind pressure of 102.4 pounds per square foot of surface area, a load that exceeds the tolerance limits of most buildings. Considering these factors, it is easy to understand why tornadoes can be so devastating for the communities they hit.

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

Tornadoes are classified according to the Fujita tornado intensity scale. The tornado scale ranges from low intensity F0, with effective wind speeds of 40 to 70 mph, to F5 tornadoes with effective wind speeds of over 260 mph. The Fujita intensity scale is included in Table 4-10.

Table 4-10: Fujita Tornado Rating

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

Previous Occurrences for Tornado Hazard

There have been several occurrences of tornadoes within Gallatin County during the past few decades. The NCDC database reported six tornadoes/funnel clouds in Gallatin County since 1950. These tornadoes have resulted in $70,000 of property damage in the county. The most recent of which was reported on April 24, 2002: a supercell thunderstorm produced large hail and a funnel cloud. A confirmed funnel cloud sighting was along Route 13, approximately three miles west of Shawneetown.

Gallatin County tornadoes recorded in the NCDC database are identified in Table 4-11. Additional details for NCDC events are included in Appendix D.

Table 4-11: Gallatin County Tornadoes*

Location or County	Date	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Gallatin	3/16/1963	Tornado	F3	0	0	25K	0
Gallatin	4/21/1972	Tornado	F1	0	0	25K	0
Gallatin	1/10/1975	Tornado	F1	0	0	3K	0
Gallatin	4/3/1989	Tornado	F0	0	0	0K	0
Junction	11/10/1998	Tornado	F0	0	0	20K	0
Equality	4/24/2002	Tornado	N/A	0	0	0	0

Source: NCDC

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

Geographic Location for Tornado Hazard

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

Hazard Extent for Tornado Hazard

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

Calculated Risk Priority Index for Tornado Hazard

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

RPI = Probability x Magnitude/Severity.

Probability	x	Magnitude /Severity	=	RPI
4	x	4	=	16

Vulnerability Analysis for Tornado Hazard

Tornadoes can occur within any area of the county; therefore, the entire county population and all buildings are vulnerable to tornadoes. To accommodate this risk, this plan will consider all buildings located within the county as vulnerable. The existing buildings and infrastructure in Gallatin County are discussed in types and numbers in Table 4-8.

Critical Facilities

All critical facilities are vulnerable to tornadoes. A critical facility will encounter many of the same impacts as any other building within the jurisdiction. These impacts will vary based on the magnitude of the tornado, but can include structural failure, debris (trees or limbs) causing damage, roofs blown off or windows broken by hail or high winds, and loss of facility functionality (e.g. a damaged police station will no longer be able to serve the community). Table 4-7 lists the types and numbers of all of the essential facilities in the area. Critical facility information, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

Building Inventory

A table of the building exposure for the entire county is listed in Table 4-8. The buildings within the county can all expect the same impacts, similar to those discussed for critical facilities. These impacts include structural failure, debris (trees or limbs) causing damage, roofs blown off or windows broken by hail or high winds, and loss of building function (e.g. a damaged home will no longer be habitable causing residents to seek shelter).

Infrastructure

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

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

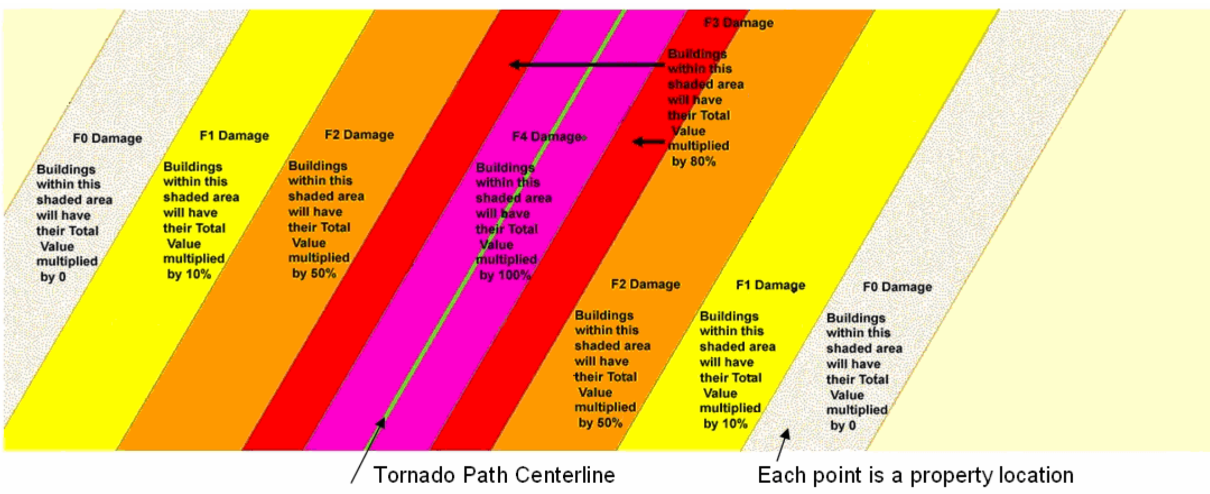
GIS overlay modeling was used to determine the potential impacts of an F4 tornado. The analysis used a hypothetical path based an F4 tornado event that would run for 19 miles northwest through the towns of Equality, Ridgway, and New Haven. The selected widths were modeled after a recreation of the Fujita-Scale guidelines based on conceptual wind speeds, path widths, and path lengths. There is no guarantee that every tornado will fit exactly into one of these six categories. Table 4-12 depicts tornado damage curves as well as path widths.

Table 4-12: Tornado Path Widths and Damage Curves

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

Within any given tornado path there are degrees of damage. The most intense damage occurs within the center of the damage path with a decreasing amount of damage away from the center of the path. This natural process was modeled in GIS by adding damage zones around the tornado path. Figure 4-1 and Table 4-13 describe the zone analysis.

Figure 4-1: GIS Analysis Using Tornado Buffers



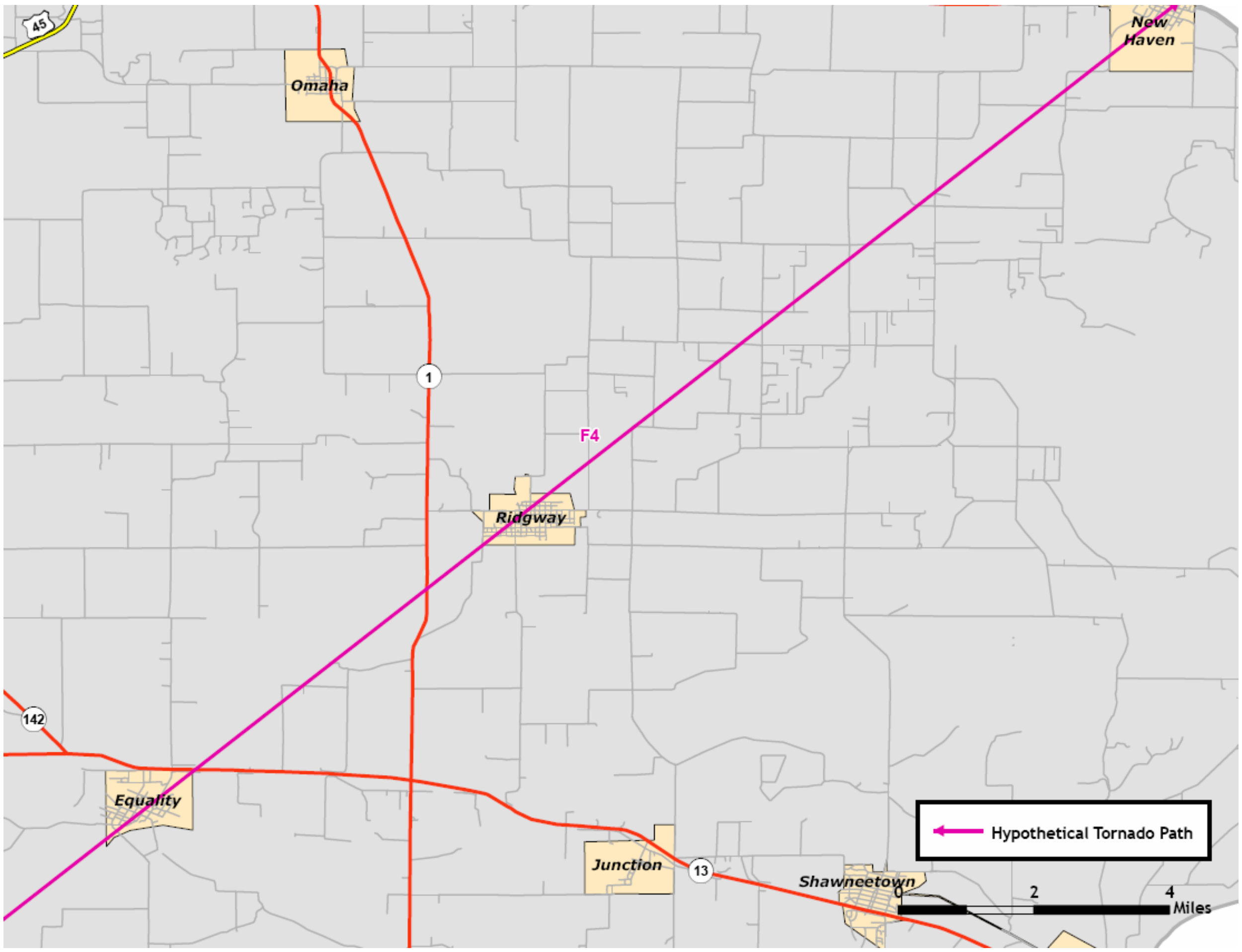
An F4 tornado has four damage zones. Total devastation is estimated within 150 feet of the tornado path (the darker colored Zone 1). The outer buffer is 900 feet from the tornado path (the lightest colored Zone 4), within which 10% of the buildings will be damaged.

Table 4-13: Tornado Zones and Damage Curves

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

Once the hypothetical route is digitized on the map, several buffers are created to model the damage functions within each zone. The selected hypothetical tornado path is depicted in Figure 4-2.

Figure 4-2: Historical F1 Tornado Path in Gallatin County



Results

The GIS analysis estimates that 502 buildings will be damaged. The estimated building losses were $8.7 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 Gallatin County that were joined with Assessor records showing property improvement. The results of the analysis are depicted in Tables 4-14 and 4-15; Figures 4-3, 4-4, and 4-5 display the damage curve buffers and the buildings that would experience damage.

Figure 4-3: Modeled F4 Tornado Damage Buffers in Gallatin County (Equality)

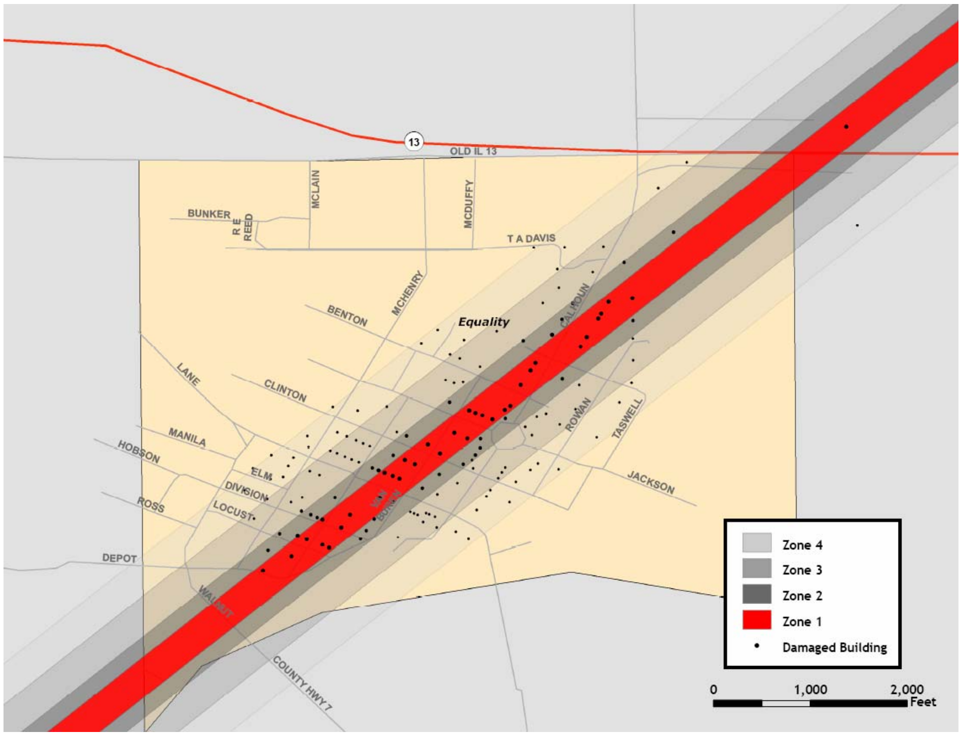


Figure 4-4: Modeled F4 Tornado Damage Buffers in Gallatin County (Ridgway)

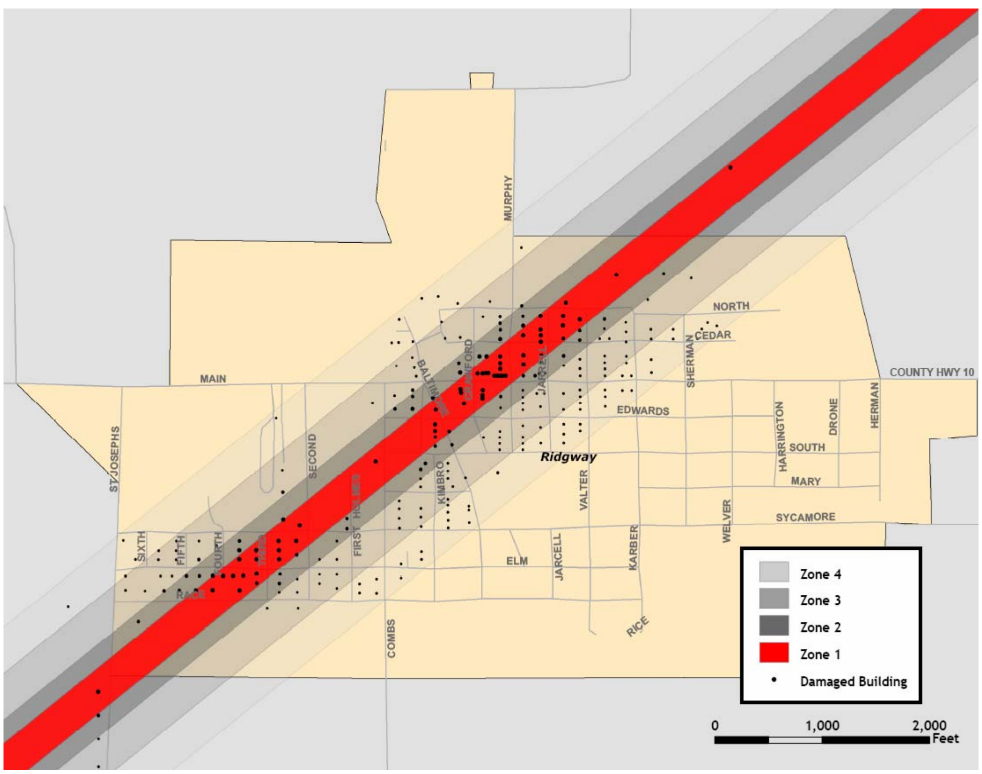


Figure 4-5: Modeled F4 Tornado Damage Buffers in Gallatin County (New Haven)

Table 4-14: Estimated Numbers of Buildings Damaged by Occupancy Type

Occupancy	Zone 1	Zone 2	Zone 3	Zone 4
Residential	84	76	148	110
Commercial	21	9	21	10
Industrial	0	0	2	0
Agriculture	2	1	3	6
Religious	0	0	1	0
Total	**107**	**86**	**175**	**126**

Table 4-15: Estimated Building Losses by Occupancy Type

Occupancy	Zone 1	Zone 2	Zone 3	Zone 4
Residential	$2,467,578	$1,865,782	$2,141,756	$360,686
Commercial	$614,214	$640,411	$317,343	$34,018
Industrial	$0	$0	$41,883	$0
Agriculture	$83,082	$39,768	$47,403	$23,212
Religious	$0	$0	$573	$0
Total	**$3,164,874**	**$2,545,961**	**$2,548,958**	**$417,916**

Essential Facilities Damage

There are seven essential facilities located within 900 feet of the hypothetical tornado path. The model predicts that one medical care facility, five fire stations and one police station would experience damage. The affected facilities are identified in Table 4-16, and their geographic locations are shown in Figure 4-6.

Table 4-16: Estimated Essential Facilities Affected

Name
The Willow of Ridgway
Equality Fire Department
New Haven Fire Department
Ridgway Ambulance

Figure 4-6: Essential 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 of Illinois, at any time of the day, and during any month of the year. Furthermore, any future development in terms of new construction within the county will be at risk. The building exposure for Gallatin County is included in Table 4-8.

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

Analysis of Community Development Trends

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

4.4.2 Flood Hazard

Hazard Definition for Flooding

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

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

Hazard Definition for Dam and Levee Failure

Dams are structures that retain or detain water behind a large barrier. When full or partially full, the difference in elevation between the water above the dam and below creates large amounts of potential energy, creating the potential for failure. The same potential exists for levees when they serve their purpose, which is to confine flood waters within the channel area of a river and exclude that water from land or communities land-ward of the levee. Dams and levees can fail due to either: 1) water heights or flows above the capacity for which the structure was designed; or 2) deficiencies in the structure such that it can not hold back the potential energy of the water. If a dam or levee fails, issues of primary concern include loss of human life/injury, downstream property damage, lifeline disruption (of concern would be transportation routes and utility lines required to maintain or protect life), and environmental damage.

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

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

Previous Occurrences for Riverine and Flash Flooding

The NCDC database reported 80 flood events in Gallatin County since 1995. These flood events have resulted in more than $5.4 million in property damage in Gallatin and adjacent counties. For example in March of 1997, a massive flood crest moved down the Ohio River during the first few weeks of March. Approximately 10 inches of rain fell in the middle Ohio River Valley from the Louisville area to Cincinnati within one to three days. This resulted in the worst river flood in 30 years along the Illinois shore, and one of the five worst on record. A voluntary evacuation of Old Shawneetown was conducted. The levee protecting the town developed a few seeps, but no major leaks were observed. A total of approximately 50 families were displaced by flooding in

Gallatin County, mainly from the towns of Junction, Equality, and New Haven. Numerous county roads were closed near the river, including 52 just in Gallatin County alone. All but one road into the town of Junction was flooded. A few state highways, such as Illinois Route 1 in Gallatin County, were closed by high water. The following are specific river crest heights and the flood stages for various points: Shawneetown crested at 54.40 (flood stage 33 feet), Brookport crested at 53.60 feet (flood stage is 37 feet), and Cairo crested at 56.20 feet (flood stage is 40 feet). The crest occurred on the 11th or 12th at all points.

Significant Gallatin County floods recorded by the NCDC are shown in Table 4-17. A complete list of flood events and additional information about the significant flood events are included in Appendix D. Historical flood crests and discharges at hydrologic monitoring stations are summarized in Appendix H.

Table 4-17: Gallatin County Previous Occurrences of Flooding*

Location or County	Date	Type	Deaths	Injuries	Property Damage	Crop Damage
Gallatin	5/17/1995	Flash Flood	0	0	10K	0
Gallatin	5/17/1995	Flash Flood	0	0	10K	0
Gallatin	5/17/1995	Flash Flood	0	0	10K	0
Gallatin	5/18/1995	Flash Flood	0	0	10K	0
Gallatin	2/1/1996	Flood	0	0	0	0
Gallatin	4/26/1996	Flood	0	0	40K	20K
Shawneetown	4/28/1996	Flash Flood	0	0	100K	0
Gallatin	5/1/1996	Flood	0	0	80K	0
Shawneetown	5/5/1996	Flash Flood	0	0	0	0
Shawneetown	5/10/1996	Flash Flood	0	0	100K	0
Gallatin	6/1/1996	Flood	0	0	0	0
Gallatin	12/4/1996	Flood	0	0	0	0
Gallatin	12/19/1996	Flood	0	0	0	0
Gallatin	1/30/1997	Flood	0	0	0	0
Gallatin	2/1/1997	Flood	0	0	0	0
Gallatin	3/1/1997	Flood	0	0	2.5M	0
Gallatin	6/1/1997	Flood	0	0	0	0
Gallatin	1/11/1998	Flood	0	0	0	0
Gallatin	3/22/1998	Flood	0	0	0	0
Gallatin	4/1/1998	Flood	0	0	0	0
Gallatin	5/1/1998	Flood	0	0	0	0
Gallatin	6/15/1998	Flood	0	0	0	0
Shawneetown	6/29/1998	Flash Flood	0	0	10K	0
Gallatin	7/1/1998	Flood	0	0	0	0
Gallatin	1/22/1999	Flood	0	0	0	0
Gallatin	2/1/1999	Flood	0	0	30K	0
Gallatin	3/9/1999	Flood	0	0	0	0
Gibsonia	4/28/1999	Urban/sml Stream Fld	0	0	0	0
Gallatin	2/18/2000	Flash Flood	0	0	0	0
Gallatin	3/1/2000	Flood	0	0	0	0
Gallatin	4/11/2000	Flood	0	0	0	0
Shawneetown	6/17/2000	Flash Flood	0	0	0	0
Shawneetown	6/18/2000	Flash Flood	0	0	0	0
Gallatin	12/21/2000	Flood	0	0	0	0
Gallatin	2/19/2001	Flood	0	0	0	0
Gallatin	12/17/2001	Flash Flood	0	0	0	0
Gallatin	12/17/2001	Flood	0	0	8K	0
Gallatin	12/18/2001	Flood	0	0	0	0
Gallatin	3/20/2002	Flood	0	0	3K	0
Gallatin	4/1/2002	Flood	0	0	0	0
Gallatin	4/24/2002	Flood	0	0	0	0

Location or County	Date	Type	Deaths	Injuries	Property Damage	Crop Damage
Gallatin	5/1/2002	Flood	0	0	762K	0
Gallatin	11/10/2002	Flash Flood	0	0	0	0
Gallatin	1/7/2003	Flood	0	0	0	0
Gallatin	2/18/2003	Flood	0	0	0	0
Gallatin	3/1/2003	Flood	0	0	0	0
Gallatin	4/15/2003	Flood	0	0	0	0
Gallatin	5/7/2003	Flood	0	0	0	0
Gallatin	5/10/2003	Flood	0	0	0	0
Gallatin	6/19/2003	Flood	0	0	0	0
Gallatin	11/24/2003	Flood	0	0	0	0
Gallatin	12/1/2003	Flood	0	0	0	0
Gallatin	1/5/2004	Flood	0	0	0	0
Gallatin	2/8/2004	Flood	0	0	0	0
Gallatin	3/9/2004	Flood	0	0	0	0
Gallatin	4/19/2004	Flood	0	0	0	0
Gallatin	5/28/2004	Flood	0	0	0	0
Junction	6/1/2004	Flash Flood	0	0	0	0
Gallatin	6/1/2004	Flood	0	0	0	0
Gallatin	9/23/2004	Flood	0	0	0	0
Gallatin	12/3/2004	Flood	0	0	0	0
Gallatin	1/5/2005	Flood	0	0	1.0M	0
Gallatin	1/5/2005	Flood	0	0	700K	0
Gallatin	2/15/2005	Flood	0	0	0	0
Gallatin	2/18/2005	Flood	0	0	0	0
Gallatin	3/30/2005	Flood	0	0	0	0
Gallatin	4/1/2005	Flood	0	0	0	0
Ridgway	11/15/2005	Flash Flood	0	0	0	0
Gallatin	11/15/2005	Flash Flood	0	0	50K	0
Gallatin	1/27/2006	Flood	0	0	0	0
Gallatin	3/9/2006	Flash Flood	0	0	0	0
Shawneetown	3/14/2006	Flood	0	0	0	0
Shawneetown	1/11/2007	Flood	0	0	0K	0K
Shawneetown	3/3/2007	Flood	0	0	0K	0K
Shawneetown	3/22/2007	Flood	0	0	0K	0K
Shawneetown	4/1/2007	Flood	0	0	0K	0K
Shawneetown	4/20/2007	Flood	0	0	0K	0K
Shawneetown	12/16/2007	Flood	0	0	0K	0K
Shawneetown	1/16/2008	Flood	0	0	0K	0K
Shawneetown	2/9/2008	Flood	0	0	0K	0K

Source: NCDC

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

Previous Occurrences for Dam and Levee Dam Failure

According to the Gallatin County EMA, there are no records or local knowledge of any dam or certified levee failure in the county. However, the levee protecting Old Shawneetown along the Ohio River is known to be in poor condition.

Repetitive Loss Properties

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

Illinois Emergency Management was contacted to determine the location of repetitive loss structures. Gallatin County has two repetitive loss structures within the county. The total amount paid for building replacement and building contents for damages to these repetitive loss structures is $74,206.07. Table 4-18 describes the loss structures in terms of occupancy and jurisdiction.

Table 4-18: Gallatin County Repetitive Loss Structures

Jurisdiction	Occupancy Type	Number of Structures	Number of Losses	Total Paid
Equality	Single-Family	2	4	$74,206.07

Geographic Location for Flooding

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

Nearly 50% of Gallatin County is within the 100-year floodplain. The primary sources of river flooding in Gallatin County are the Ohio River, the Saline River, and the major tributaries to the Saline River (North, Middle and South Forks of the Saline River). These rivers and their major tributaries can potentially inundate all of Old Shawneetown and have inundated large portions of Junction and New Haven during floods in March of 1997. Smaller portions of the remaining incorporate community (Equality, Omaha, New Haven, Ridgeway and Shawneetown) in Gallatin County can also flooded by these rivers. State Route 1 can flood and become impassible south of Omaha, east of Ridgeway and several locations south of State Route 13. State Route 13 can flood between Old Shawneetown and Shawneetown, between Shawneetown and State Route 1 in the area of Junction, and just west of Equality. Many county roads can also become impassible during flood events in Gallatin County. In general, riverene flooding impacts agricultural areas however, flooding from these rivers can severely impact major transportation routes potentially isolating several incorporated community in Gallatin County for prolonged periods of time.

Flash flooding in Gallatin County typically occurs or is best documented in urban/developed areas. For example, flash flooding has been reported in the villages of Junction, Ridgeway, and Shawneetown. This flooding generally impact secondary roads however, flashing flooding along Crawford Creek has caused the closer of State Route 1 just outside of Ridgeway.

A digital file of the FIRM maps was used to identify specific stream reaches for analysis. The areas of riverine flooding are depicted on the map in Appendix E.

In Meeting #4, held on February 23, 2009, the planning team members listed a voluntary buyout option as a mitigation strategy to for areas not protected by federally constructed levees (i.e., Old Shawneetown) to alleviate damage to structures within the county's floodplains. The planning team identified potential hazard areas and with the County's assessor data we identified 108 properties in which this program may prove as a useful mitigation strategy (Table 4-19).

Table 4-19: Potential Voluntary Buyout Properties

Jurisdiction	Number of Structures	Location
Equality	3	Saline River Floodplain
Junction	24	Cypress Ditch/ Ohio River Floodplain
New Haven	3	Wabash River Floodplain
Omaha	12	Cane Creek Floodplain
Ridgeway	6	Tributary to North Fork of the Saline River
Gallatin County	30	Cypress Ditch / Ohio River / Wabash River Floodplain
Gallatin County	30	Saline River and Tributaries to the Saline River Floodplain

Geographic Location for Dam and Levee Failure

The National Inventory of Dams identified 32 dams in Gallatin County. The map in Appendix E illustrates the location of Gallatin County dams. Table 4-20 summarizes the National Inventory of Dams information.

Table 4-20: National Inventory of Dams

Name	River	Hazard	EAP*
PEABODY/EAGLE 2/LAKE DAM	TRIB CYPRESS DITCH	S	
PEABODY/EAGLE1/FRESH WATER LAKE DAM	TRIB SALINE RIVER	L	
OMAHA CITY RESERVOIR DAM	TRIB BEAR CREEK	L	
GRINDSTAFF HOLLOW CLUB LAKE DAM	HUTT CREEK	L	
OMAHA TOWNSHIP CIVIC CENTER DAM	TRIB BEAR CREEK	S	
PEABODY/EAGLE 2/SLURRY POND 3 DAM	TRIB CYPRESS CREEK	L	
PEABODY/FRESH WATER LAKE DAM	TRIB CYPRESS DITCH	S	
PEABODY/POND DAM	TRIB CYPRESS DITCH	S	
POUNDS HOLLOW	ROBINETTE	S	
EAGLE NO.2 MINE		L	
EAGLE NO.2 MINE		L	
EAGLE NO.2 MINE		L	
EAGLE NO.2 MINE		L	
EAGLE NO.2 MINE		L	
EAGLE SURFACE		L	
SCHNIDER'S POND DAM #1	BEAVER CREEK	L	
PEABODY/EAGLE 2/LAKE DAM	TRIB CYPRESS DITCH	S	
PEABODY/EAGLE1/FRESH WATER LAKE DAM	TRIB SALINE RIVER	L	
OMAHA CITY RESERVOIR DAM	TRIB BEAR CREEK	L	
GRINDSTAFF HOLLOW CLUB LAKE DAM	HUTT CREEK	L	
OMAHA TOWNSHIP CIVIC CENTER DAM	TRIB BEAR CREEK	S	
PEABODY/EAGLE 2/SLURRY POND 3 DAM	TRIB CYPRESS CREEK	L	
PEABODY/FRESH WATER LAKE DAM	TRIB CYPRESS DITCH	S	

Name	River	Hazard	EAP*
PEABODY/POND DAM	TRIB CYPRESS DITCH	S	
POUNDS HOLLOW	ROBINETTE	S	
EAGLE NO.2 MINE		L	
EAGLE NO.2 MINE		L	
EAGLE NO.2 MINE		L	
EAGLE NO.2 MINE		L	
EAGLE NO.2 MINE		L	
EAGLE SURFACE		L	
SCHNIDER'S POND DAM #1	BEAVER CREEK	L	

** Could not determine if any of Gallatin County's dams have EAP.*

A review of the United States Army Corps of Engineers and ILDNR files identified one levee in Gallatin County. This levee protects Old Shawnee Town from inundation by the Ohio River.

Hazard Extent for Flooding

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

Hazard Extent for Dam and Levee Failure

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

According to the ILDNR and the National Inventory of Dams, no dams are classified as high hazard dams. SIU could not determine if any the dams in Gallatin County have an Emergency Action Plan (EAP). An EAP is not required by the State of Illinois but is recommended in Title 17 of the Illinois Administrative Code, chapter I, section 3702, "Construction and Maintenance of Dams."

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

Calculated Risk Priority Index for Flooding

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

RPI = Probability x Magnitude/Severity.

Probability	x	Magnitude /Severity	=	RPI
3	x	4	=	12

Calculated Priority Risk Index for Dam and Levee Failure

Based on operation and maintenance requirements and local knowledge of the dams in Gallatin County, the probability of failure is likely. If a high hazard dam were to fail, the magnitude and severity of the damage could be great. The warning time and duration of the dam failure event would be very short. According to the Risk Priority Index (RPI), dam and levee failure ranked as the number five hazard in Gallatin County.

RPI = Probability x Magnitude/Severity.

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

Vulnerability Analysis for Flooding (HAZUS-MH Analysis Using 100-Year FIRM Boundary and Default Building Inventory)

HAZUS-MH generated the flood depth grid for a 100-year return period and made calculations by clipping the USGS 30-m DEM to the FIRM boundary. Next, HAZUS-MH estimated the damages for Gallatin County by utilizing default aggregate building inventory census data.

Building Inventory

A table of the building replacement costs (types and numbers of buildings) for the facilities identified in the FIRM flood areas are listed in Table 4-21. These buildings can expect impacts similar to those discussed for the critical facilities. These include structural failure, extensive water damage to the facility, and loss of facility functionality (e.g. residential buildings may no longer be able to provide shelter to their inhabitants).

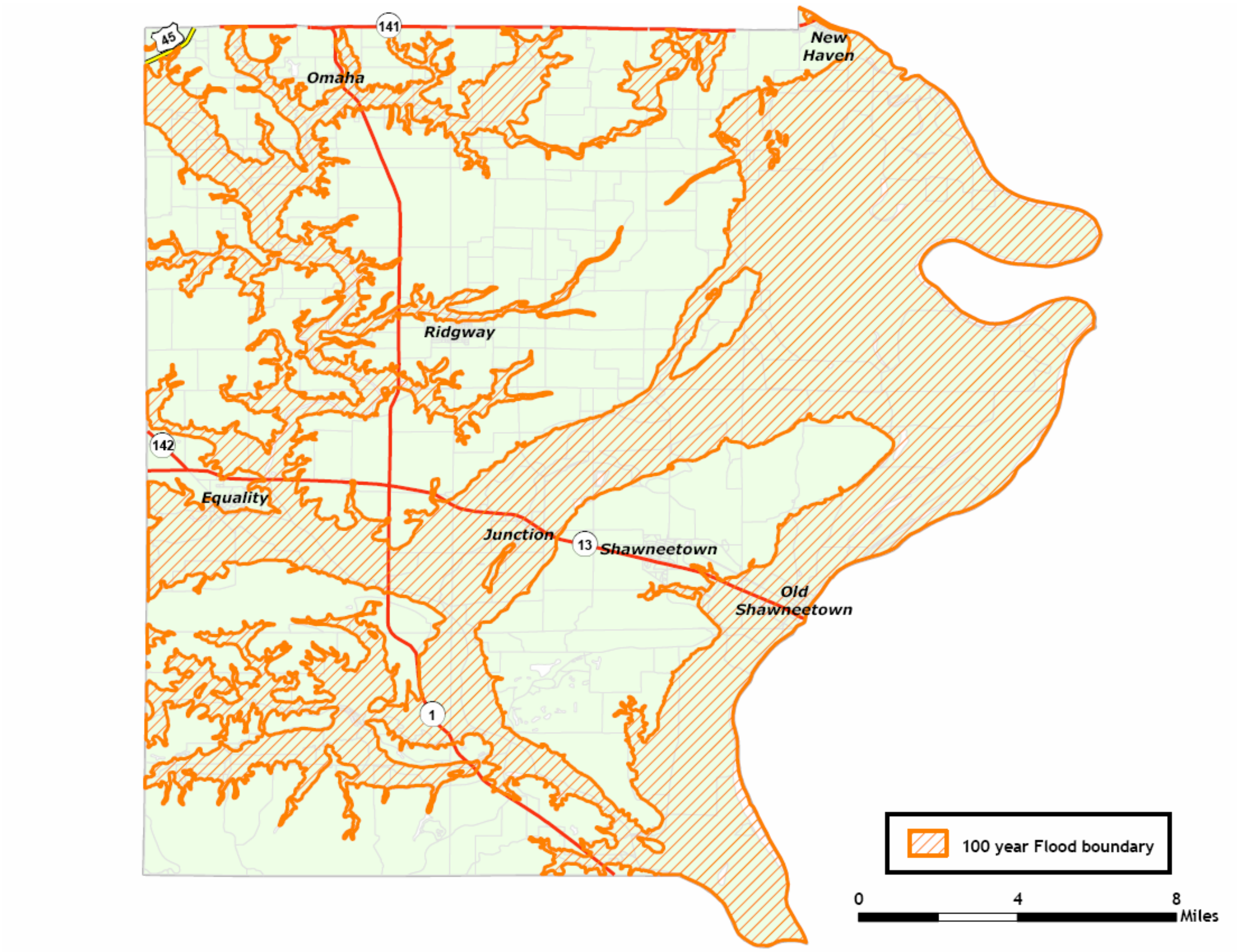
Table 4-21: Gallatin County HAZUS-MH Analysis Total Economic Loss (100-Year Flood)

General Occupancy	Total Damaged Buildings	Building Loss (X 1000)	Total Economic Loss (X 1000)
Agricultural	0	$722	$2,748
Commercial	0	$2,703	$10,617
Education	0	$0	$6
Government	0	$147	$1,251
Industrial	0	$523	$1,598
Religious/Non-Profit	1	$220	$1,584
Residential	43	$11,016	$17,548
Total	**44**	**$15,331**	**$35,352**

The reported building counts should be interpreted as degrees of loss rather than exact numbers of buildings exposed to flooding. These numbers were derived from aggregate building inventories, which were assumed to be dispersed evenly across census blocks. HAZUS-MH requires that a predetermined amount of square footage of a typical building sustains damage in order to produce a damaged building count. If only a minimal amount of building damage is predicted, it is possible to see no damaged building counts, even while seeing economic losses.

Figure 4-7 depicts the flood boundary from the HAZUS-MH analysis. HAZUS-MH estimates that the 100-year flood would damage 44 buildings, totaling $15.3 million in building losses and $35.4 million in economic losses.

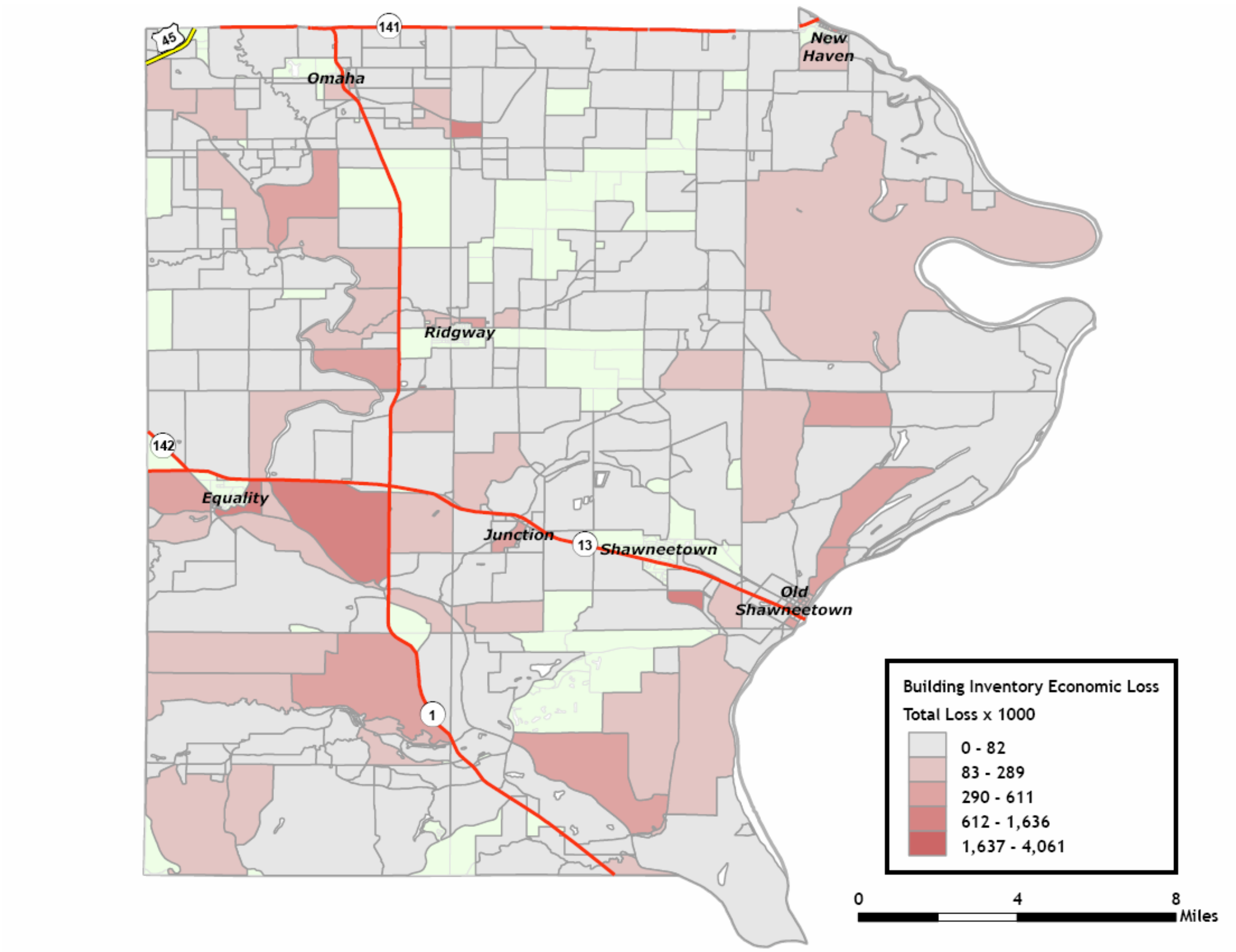
Figure 4-7: Gallatin County HAZUS-MH Analysis (100-Year Flood)



HAZUS-MH estimates seven census blocks affected by the modeled flood event, with losses exceeding $1 million. The distribution of losses is shown in Figure 4-8.

HAZUS-MH aggregate loss analysis is evenly distributed across a census block. Census blocks of concern should be reviewed in more detail to determine the actual percentage of facilities that fall within the flood hazard areas. The aggregate losses reported in this study may be overstated.

Figure 4-8: Gallatin County Total Economic Loss (100-Year Flood)



Essential Facilities

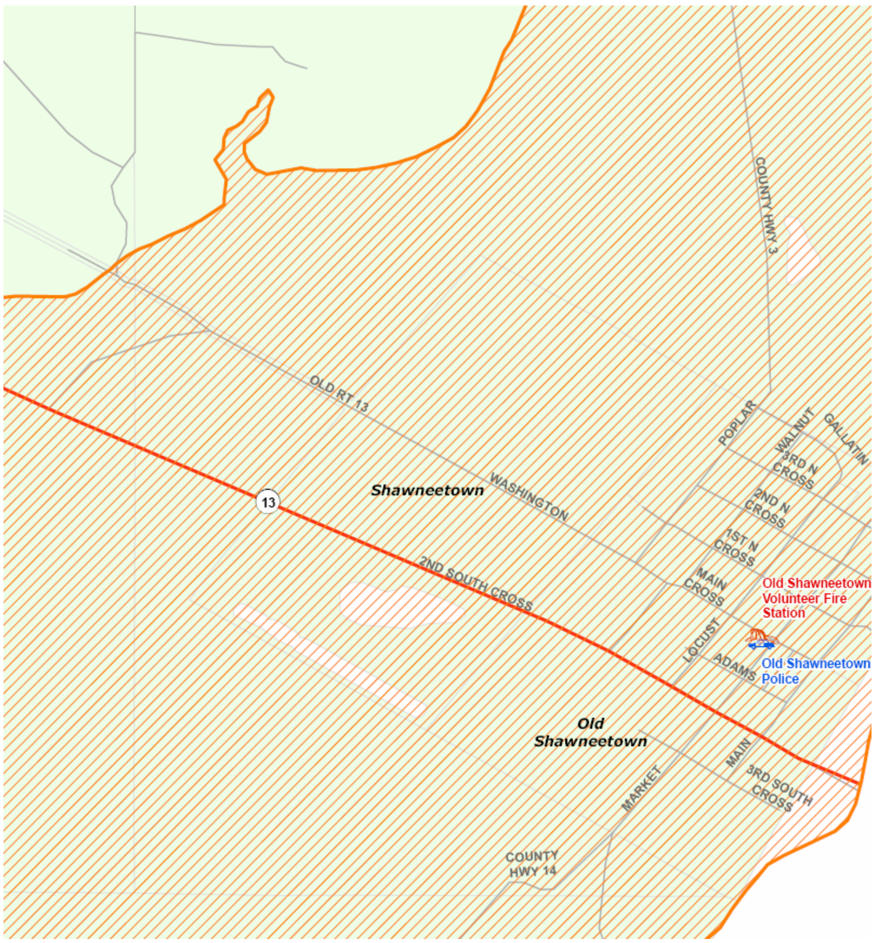
An essential facility will encounter many of the same impacts as other buildings within the flood boundary. These impacts can include structural failure, extensive water damage to the facility and loss of facility functionality (e.g. a damaged police station will no longer be able to serve the community).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

The HAZUS-MH analysis identified one fire station and one police station that may be subject to flooding. A list of the essential facilities within Gallatin County is given in Table 4-22. A map of essential facilities potentially at risk to flooding is shown in Figures 4-9.

Table 4-22: Gallatin County Damaged Essential Facilities

Facility Name
Old Shawneetown Volunteer Fire Department
Old Shawneetown Police Department

Figure 4-9: Boundary of 100-Year Flood Overlaid with Essential Facilities



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

HAZUS-MH generated the flood depth grid for a 100-year return period and made calculations by clipping the USGS 30-m DEM to the FIRM boundary. Next, HAZUS-MH utilized a user-defined analysis of Gallatin County with site-specific parcel data provided by the county.

HAZUS-MH estimates the 100-year flood would damage 383 buildings. The total estimated numbers of damaged buildings are given in Table 4-23. Figure 4-11 depicts the Gallatin County parcel points that fall within the 100-year FIRM floodplain. Figures 4-12 and 4-13 highlight damaged buildings within the FIRM floodplain areas in Old Shawneetown and Junction.

Table 4-23: Gallatin County Potential Flood-Prone Buildings

General Occupancy	Total Damaged Buildings	Building Loss
Residential	187	$952,365
Commercial	26	$187,333
Industrial	15	$1,622,657
Agricultural	155	$1,001,257
Total	**383**	**$3,763,611**

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

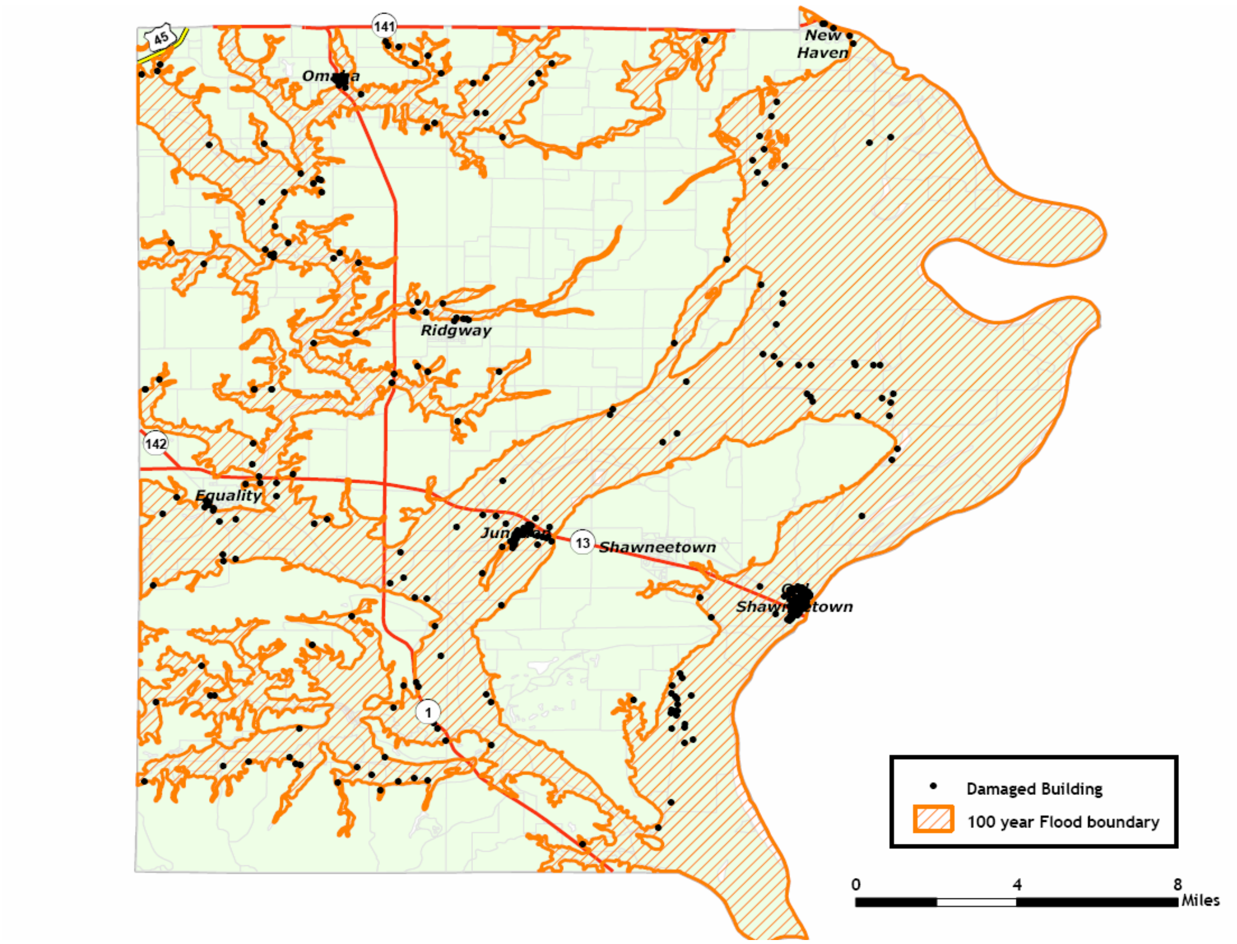


Figure 4-12: Gallatin County Urban Areas (Old Shawneetown) Flood-Prone Areas (100-Year Flood)

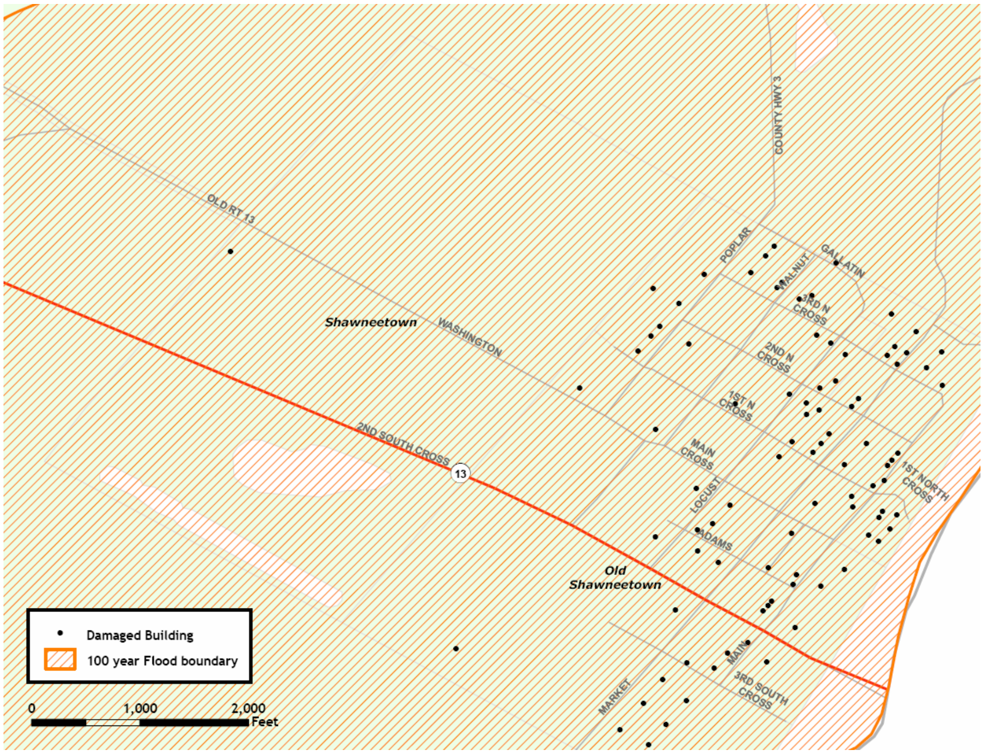
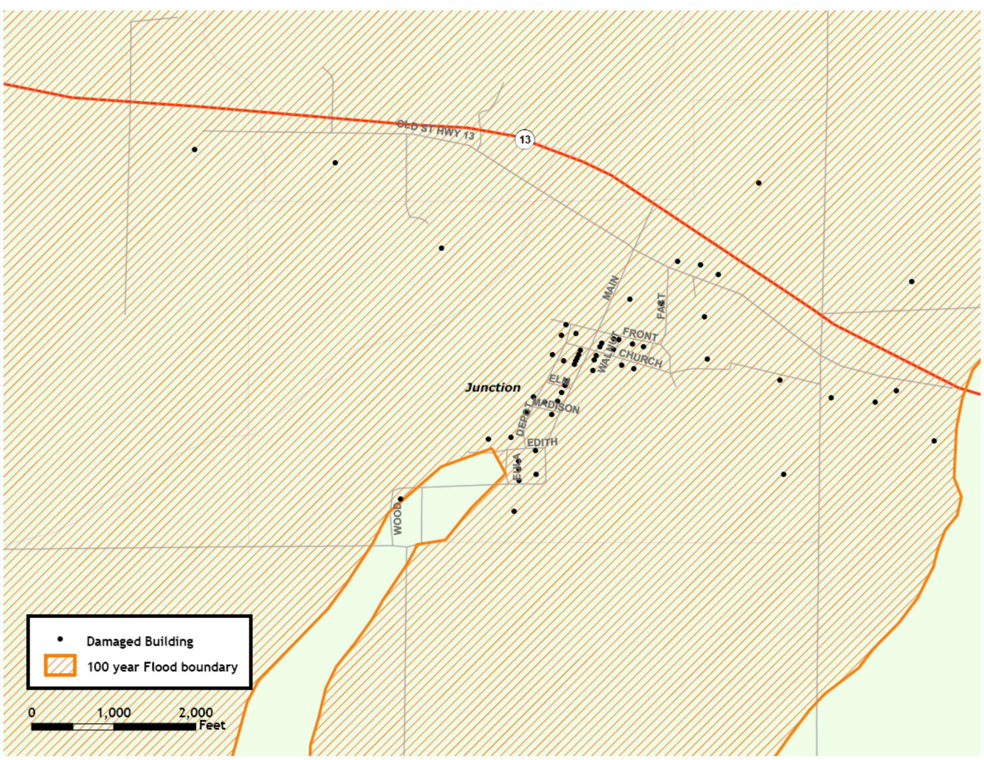


Figure 4-13: Gallatin County Urban Areas (Junction) Flood-Prone Areas (100-Year Flood)



Infrastructure

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

Vulnerability Analysis for Flash Flooding

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

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

Vulnerability Analysis for Dam and Levee Failure

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

Vulnerability to Future Assets/Infrastructure for Flooding

Flash flooding may affect nearly any low lying location within the county; therefore all buildings and infrastructure are vulnerable to flash flooding. Currently, the Gallatin County planning commission 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 Gallatin County Planning Commission reviews new development for compliance with local zoning ordinances.

Analysis of Community Development Trends

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

4.4.3 Earthquake Hazard

Hazard Definition for Earthquake Hazard

An earthquake is a sudden, rapid shaking of the Earth caused by the breaking and shifting of rock beneath the Earth's surface. For hundreds of millions of years, plate tectonics has shaped the Earth as the huge plates that form the Earth's surface move slowly over, under, and past each other. At their boundaries, the plates typically are locked together and unable to release the accumulating energy. When this energy grows strong enough, the plate boundary breaks free and causes the ground to shake. Most earthquakes occur at the boundaries where the plates meet; however, some earthquakes occur in the middle of plates, as is the case for seismic zones in the Midwestern United States. The most seismically active area in the Midwest U.S. is the New Madrid Seismic Zone. Scientists have learned that the New Madrid fault system may not be the only fault system in the Central U.S. capable of producing damaging earthquakes. The Wabash Valley fault system in Illinois and Indiana manifests evidence of large earthquakes in its geologic history, and there may be other, as yet unidentified, faults that could produce strong earthquakes.

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

Historical Earthquakes that have Affected Gallatin County

Numerous instrumentally measured earthquakes have occurred in Illinois. In the past few decades, with many precise seismographs positioned across Illinois, measured earthquakes have varied in magnitude from very low microseismic events of M=1-3 to larger events up to M=5.4. Microseismic events are usually only detectable by seismographs and rarely felt by anyone. The most recent earthquake in Illinois—as of the date of this report—occurred on June 1, 2008 at 8:56:12 local time about 35 km (25 miles) southeast of Olney, IL and measured 1.6 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.

Table 4-24 is a description of earthquake intensity using an abbreviated Modified Mercalli Intensity scale, and Table 4-25 lists earthquake magnitudes and their corresponding intensities. (Source: *http://earthquake.usgs.gov/learning/topics/mag_vs_int.php*)

Table 4-24: 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 4-25: 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

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

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

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

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

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

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

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

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

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

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

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

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

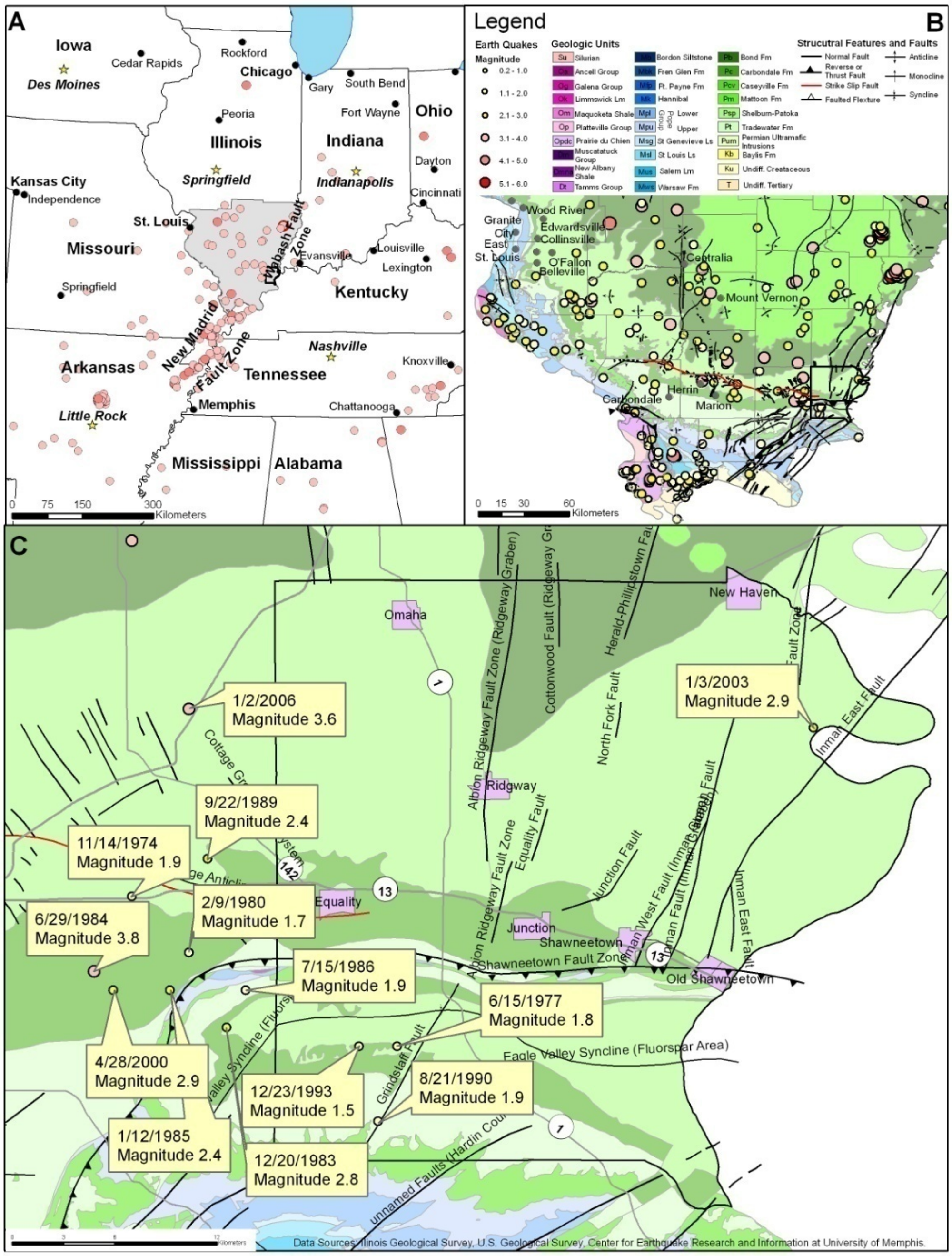
Dozens of other shocks originating in Missouri, Arkansas, Kansas, Nebraska, Tennessee, Indiana, Ohio, Michigan, Kentucky, and Canada have been felt in Illinois without causing damage. There have been three earthquakes slightly greater than magnitude 5.0 and Intensity level VII which occurred in 1968,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

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

Geographic Location for Earthquake Hazard

Gallatin County occupies a region susceptible to earthquakes. Regionally, the two most significant zones of seismic activity are the New Madrid Seismic Zone and the Wabash Valley Fault System. Between 1977 and 2006 the epicenters of five instrumentally measured earthquakes ranging in magnitude from 1.9 to 2.9M have occurred within Gallatin County. These earthquakes are believed to be associated with the Wabash Valley Faults System and/or the Cottage Grove Fault System.

Figure 4-14 A) Location of notable earthquakes in the Illinois region with inset of Gallatin County, Illinois. **B)** Generalized geologic bedrock map with earthquake epicenters, geologic structures and inset of Gallatin County, Illinois. **C)** Geologic and earthquake epicenter map of Gallatin County, Illinois



Hazard Extent for Earthquake Hazard

The extent of the earthquake is countywide.

Calculated Risk Priority Index for Earthquake Hazard

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

RPI = Probability x Magnitude/Severity.

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

Vulnerability Analysis for Earthquake Hazard

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

Critical Facilities

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

Building Inventory

Table 4-8 shows building exposure for the entire county. The buildings within the county can all expect the same impacts, similar to those discussed for critical facilities. These impacts include structural failure and loss of building function, which could result in indirect impacts (e.g. damaged homes will no longer be habitable, causing residence to seek shelter).

Infrastructure

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

The SIU-Polis team reviewed existing geological information and recommendations for earthquake scenarios. Three earthquake scenarios—one based on USGS modeled scenarios and two based on deterministic scenarios were developed to provide a reasonable basis for earthquake planning in Gallatin County. The USGS analyses was a M7.7 event on the New Madrid fault zone Shake maps provided by FEMA were used in HAZUS-MH to estimate losses for Gallatin County based on these events. The second scenario was a M7.1 earthquake on the Wabash Valley Seismic Zone within Gallatin County. The final scenario was a M5.5 with the epicenter located in Gallatin County. This scenario was selected based upon a rupture on the Shawneetown Fault System, a series of local faults that presents a realistic earthquake scenario for planning purposes. Note that a deterministic scenario, in this context, refers to hazard or risk models based on specific scenarios without explicit consideration of the probability of their occurrences.

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. Currently, a NEHRP (National Earthquake Hazards Reduction Program) soil classification map does not exist for Illinois. NEHRP soil classifications portray the degree of shear-wave amplification that can occur during ground shaking.

Gallatin County and the surrounding area have a map for liquefaction potential that could be used by HAZUS-MH. Low-lying areas in floodplains with a water table within five feet of the surface are particularly susceptible to liquefaction. These areas contain Class F soil types. For this analysis, a depth to water table of five meters was used.

The instrumental recorded earthquakes in southern Illinois revealed a range of epicenter depths of 1.0 to ~25.0 km. The average epicenter depth of earthquake in southern Illinois is approximately 10.0 km. This average epicenter depth was used in the modeling of the deterministic earthquake scenario. HAZUS-MH also requires the user to define an attenuation function unless ground motion maps are supplied. To maintain consistency with the USGS's (2006) modeling of strong ground motion in the central United States the Toro et al. (1997) attenuation function was used for the deterministic earthquake scenario.

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

Earthquake Analysis

Results for 7.7 Magnitude Earthquake New Madrid Scenario

The results of the 7.7 New Madrid earthquake are depicted in Table 4-26, Table 4-27, and Figure 4-15. HAZUS-MH estimates that approximately 246 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 no buildings will be damaged beyond repair.

The total building-related losses totaled $9.99 million; 7% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies, which comprised more than 63% of the total loss.

The Assessor records often do not distinguish parcels by occupancy class if 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.

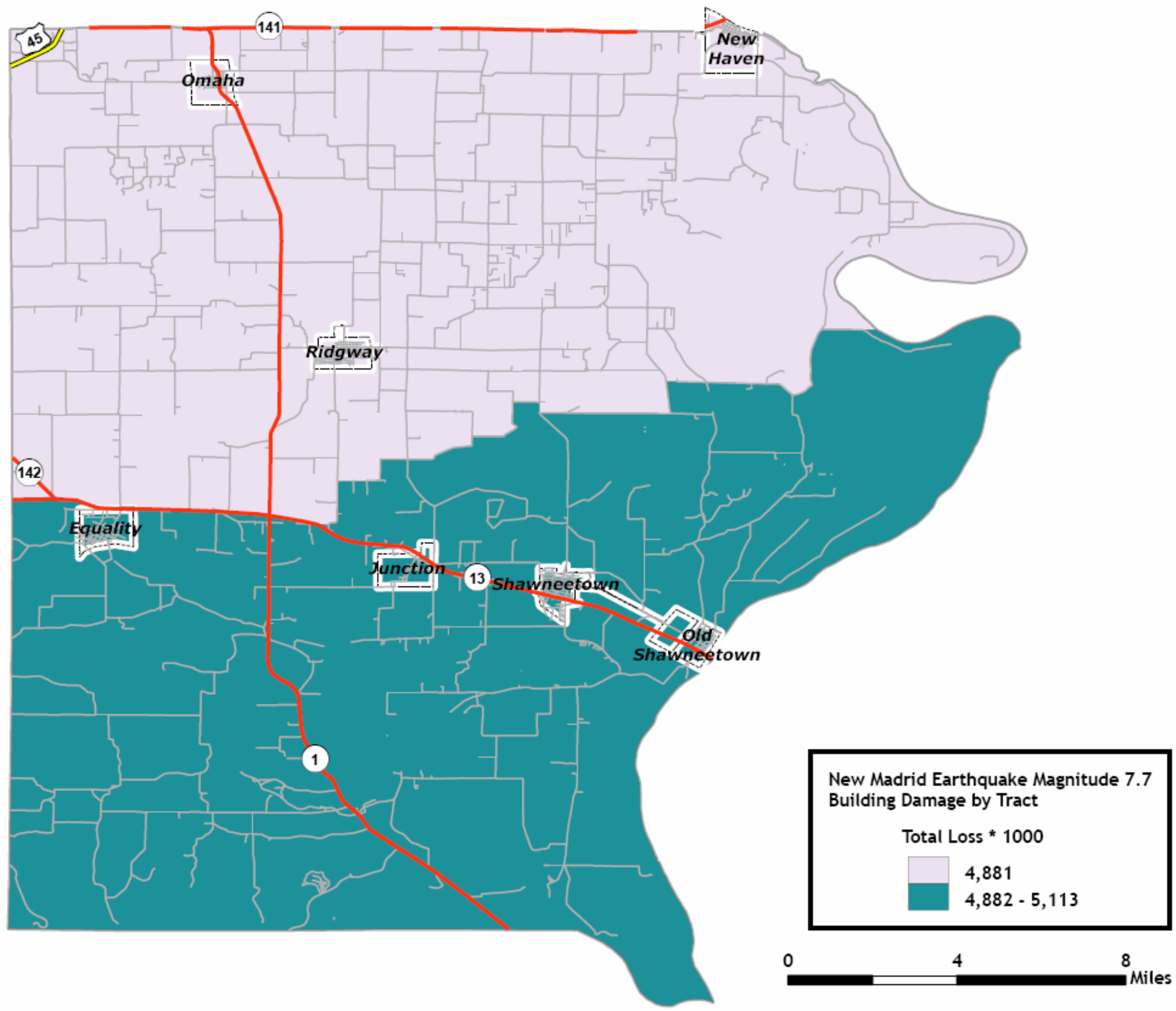
Table 4-26: New Madrid Scenario-Damages Counts by Building Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	4	0.19	2	0.28	1	0.42	0	0.88	0	0.62
Commercial	17	0.82	8	1.09	3	1.36	0	2.85	0	2.33
Education	1	0.06	1	0.08	0	0.09	0	0.13	0	0.22
Government	3	0.15	1	0.19	0	0.20	0	0.28	0	0.40
Industrial	5	0.22	2	0.31	1	0.49	0	1.10	0	0.55
Other Residential	333	16.13	275	39.32	159	66.85	4	47.61	0	3.27
Religion	4	0.18	2	0.22	1	0.25	0	0.48	0	0.60
Single Family	1,699	82.24	409	58.53	72	30.34	4	46.68	0	92.01
Total	2,066		699		238		8		0	

Table 4-27: New Madrid Scenario-Building Economic losses in Millions of Dollars

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Loses							
	Wage	0.00	0.01	0.19	0.01	0.03	0.25
	Capital-Related	0.00	0.01	0.17	0.00	0.01	0.18
	Rental	0.08	0.06	0.14	0.00	0.01	0.29
	Relocation	0.01	0.00	0.01	0.00	0.00	0.02
	Subtotal	0.09	0.08	0.51	0.01	0.06	0.74
Capital Stock Loses							
	Structural	0.43	0.25	0.24	0.02	0.22	1.17
	Non_Structural	2.69	0.92	0.79	0.12	0.53	5.06
	Content	1.57	0.29	0.58	0.08	0.43	2.95
	Inventory	0.00	0.00	0.03	0.02	0.03	0.08
	Subtotal	4.69	1.46	1.64	0.24	1.22	9.25
	Total	4.78	1.54	2.15	0.25	1.28	9.99

Figure 4-15: New Madrid Scenario-Building Economic Losses in Thousands of Dollars



New Madrid Scenario—Essential Facility Losses

Before the earthquake, the region had 76 care beds available for use. On the day of the earthquake, the model estimates that only two care beds (4%) are available for use by patients already in medical care facilities and those injured by the earthquake. After one week, 58% of the beds will be back in service. By day 30, 85% will be operational. The HAZUS-MH analysis calculated no essential facility losses for this event.

Results for 7.1 Magnitude Earthquake Wabash Valley Scenario

The results of the 7.1 Wabash Valley earthquake are depicted in Table 4-28, Table 4-29, and Figure 4-16. HAZUS-MH estimates that approximately 2,213 buildings will be at least moderately damaged. This is more than 73% of the total number of buildings in the region. It is estimated that 552 buildings will be damaged beyond repair.

The total building related losses totaled $176.91 million; 9% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies, which made up more than 62% of the total loss.

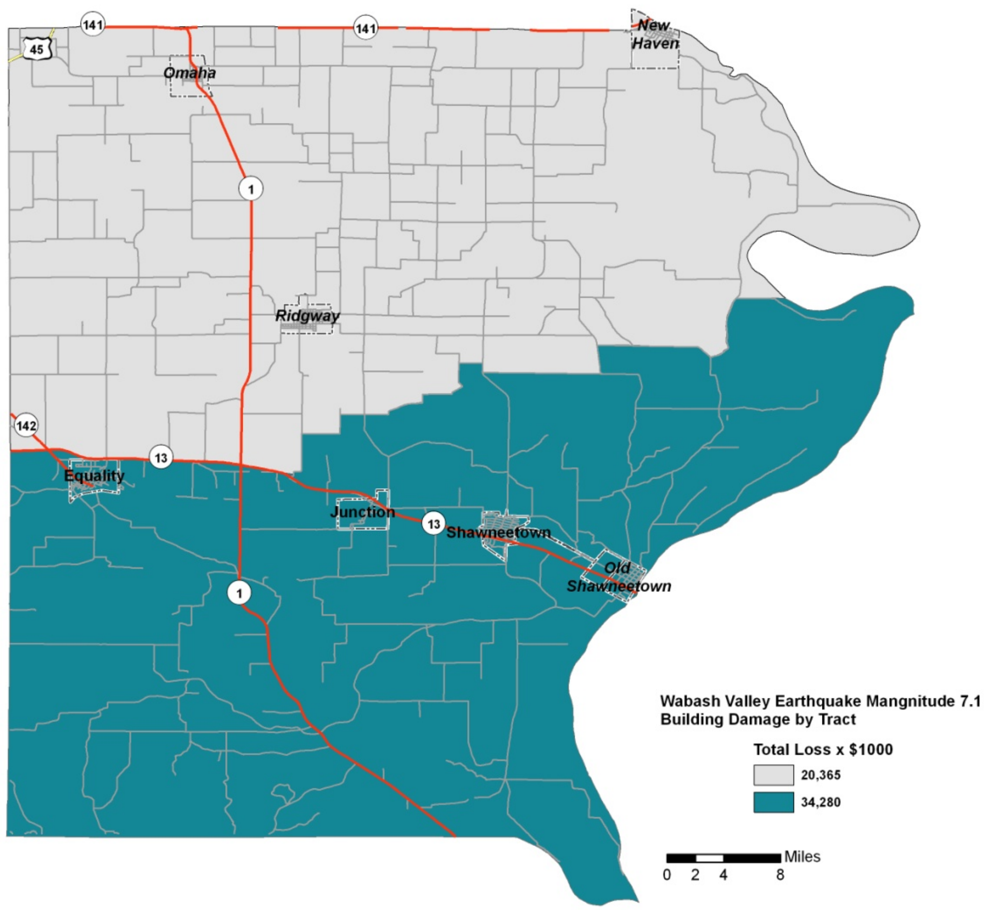
Table 4-28: Wabash Valley Scenario-Damage Counts by Building Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.08	0	0.07	1	0.15	2	0.30	3	0.52
Commercial	1	0.34	2	0.34	7	0.72	8	1.18	10	1.82
Education	0	0.03	0	0.02	0	0.05	1	0.09	1	0.13
Government	0	0.06	0	0.06	1	0.12	2	0.23	2	0.32
Industrial	0	0.08	0	0.07	2	0.17	2	0.35	3	0.61
Other Residential	15	6.80	52	9.02	162	17.01	276	39.01	266	48.07
Religion	0	0.15	1	0.14	2	0.16	2	0.22	2	0.33
Single Family	199	92.45	525	90.29	778	81.63	415	58.62	266	48.20
Total	216		582		953		708		552	

Table 4-29: Wabash Valley Scenario-Building Economic losses in Millions of Dollars

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Loses							
	Wage	0.00	0.80	3.93	0.11	0.63	5.46
	Capital-Related	0.00	0.34	3.31	0.06	0.23	3.94
	Rental	2.76	1.52	2.06	0.02	0.31	6.67
	Relocation	0.32	0.09	0.12	0.00	0.08	0.62
	Subtotal	**3.08**	**2.74**	**9.42**	**0.19**	**1.26**	**16.69**
Capital Stock Loses							
	Structural	13.31	4.83	5.94	0.50	5.63	30.22
	Non_Structural	49.21	18.00	16.45	2.07	9.85	95.57
	Content	13.93	4.19	8.23	1.25	5.62	33.21
	Inventory	0.00	0.00	0.43	0.31	0.48	1.22
	Subtotal	**76.45**	**27.01**	**31.04**	**4.14**	**21.57**	**160.22**
	Total	**79.53**	**29.76**	**40.46**	**4.33**	**22.83**	**176.91**

Figure 4-16: Wabash Valley Scenario-Building Economic Losses in Thousands of Dollars



Wabash Valley Scenario—Essential Facility Losses

Before the earthquake, the region had 76 care beds available for use. On the day of the earthquake, the model estimates that only four care beds (0%) 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, 6% will be operational. The HAZUS-MH analysis calculated no essential facility losses for this event.

Results for 5.5 Magnitude Earthquake in Gallatin County

The results of the initial analysis, the 5.5 magnitude earthquake with an epicenter in the center of Gallatin County, are depicted in Table 4-30 and 4-31 and Figure 4-17. HAZUS-MH estimates that approximately 318 buildings will be at least moderately damaged. This is more than 11% of the total number of buildings in the region. It is estimated that nine buildings will be damaged beyond repair.

The total building related losses totaled $17.37 million; 8% 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 64% of the total loss.

The Assessor records often do not distinguish parcels by occupancy class if 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.

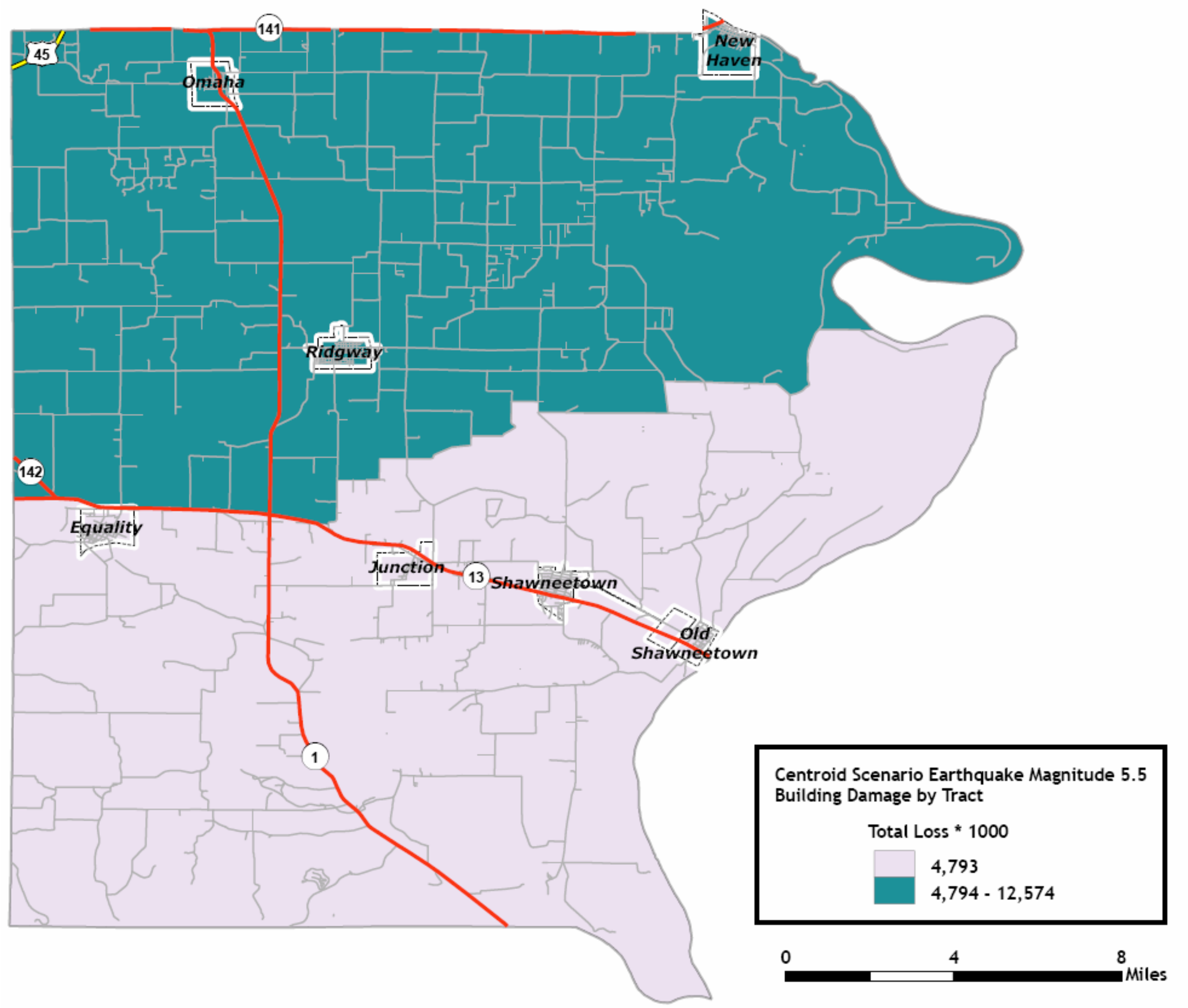
Table 4-30: Gallatin County 5.5M Scenario-Damage Counts by Building Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	4	0.20	1	0.23	1	0.39	0	0.69	0	0.57
Commercial	20	0.90	4	0.87	3	1.15	1	1.78	0	1.58
Education	1	0.06	0	0.06	0	0.10	0	0.16	0	0.21
Government	4	0.16	1	0.15	1	0.20	0	0.27	0	0.34
Industrial	5	0.25	1	0.24	1	0.40	0	0.66	0	0.42
Other Residential	510	23.35	141	27.62	106	40.86	14	27.46	1	10.20
Religion	4	0.17	1	0.22	1	0.31	0	0.56	0	0.66
Single Family	1,635	74.91	360	70.60	146	56.60	34	68.43	8	86.03
Total	2,183		510		259		50		9	

Table 4-31: Gallatin County 5.5M Scenario-Building Economic Losses in Millions of Dollars

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Loses							
	Wage	0.00	0.07	0.28	0.01	0.07	0.42
	Capital-Related	0.00	0.03	0.22	0.00	0.02	0.27
	Rental	0.24	0.12	0.21	0.00	0.03	0.60
	Relocation	0.03	0.01	0.01	0.00	0.01	0.05
	Subtotal	0.27	0.22	0.72	0.01	0.12	1.35
Capital Stock Loses							
	Structural	1.15	0.30	0.46	0.03	0.49	2.44
	Non_Structural	5.11	1.32	1.28	0.17	1.00	8.89
	Content	2.37	0.43	0.91	0.12	0.73	4.56
	Inventory	0.00	0.00	0.05	0.03	0.05	0.13
	Subtotal	8.63	2.05	2.71	0.35	2.28	16.02
	Total	8.90	2.27	3.43	0.36	2.40	17.37

Figure 4-17: Gallatin County 5.5M Scenario-Building Economic Losses in Thousands of Dollars



Gallatin County 5.5M Scenario—Essential Facility Losses

Before the earthquake, the region had 76 care beds available for use. On the day of the earthquake, the model estimates that only six care beds (9%) are available for use by patients already in medical care facilities and those injured by the earthquake. After one week, 60% of the beds will be back in service. By day 30, 83% will be operational. The HAZUS-MH analysis calculated that one care facility, three schools, one EOC, three police stations, and four fire stations would experience greater than 50% damage.

Vulnerability to Future Assets/Infrastructure for Earthquake Hazard

New construction, especially critical facilities, will accommodate earthquake mitigation design standards.

Analysis of Community Development Trends

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

4.4.4 Thunderstorm Hazard

Hazard Definition for Thunderstorm Hazard

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

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

Hail

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

Lightning

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

Severe Winds (Straight-Line Winds)

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

Previous Occurrences for Thunderstorm Hazard

The NCDC database reported 20 hailstorms in Gallatin County since 1950. Hailstorms occur nearly every year in the last spring and early summer months. The most recent significant occurrence was in June of 2007 when one-inch hail fell in the region.

Gallatin County hailstorms are listed in Table 4-32; additional details for NCDC events are included in Appendix D.

Table 4-32: Gallatin County Hailstorms*

Location or County	Date	Type	Magnitude	Deaths	Injuries	Property Damage
Gallatin	10/1/1973	Hail	1.25 in.	0	0	0
Junction	4/20/1995	Hail	0.75 in.	0	0	1K
Shawneetown	5/14/1995	Hail	0.75 in.	0	0	1K
Shawneetown	3/5/1996	Hail	0.75 in.	0	0	0
Shawneetown	6/14/1996	Hail	0.75 in.	0	0	0
Omaha	6/6/1999	Hail	1.00 in.	0	0	0
Equality	4/24/2002	Hail	Unknown	0	0	0
Equality	4/24/2002	Hail	0.75 in.	0	0	0
Ridgway	5/1/2003	Hail	0.88 in.	0	0	0
Ridgway	5/26/2004	Hail	1.75 in.	0	0	0
Shawneetown	6/1/2004	Hail	1.00 in.	0	0	0
Equality	6/1/2004	Hail	1.00 in.	0	0	0
Ridgway	6/1/2004	Hail	Unknown	0	0	0
Shawneetown	6/1/2004	Hail	Unknown	0	0	0
Ridgway	3/9/2006	Hail	Unknown	0	0	0
Ridgway	5/25/2006	Hail	0.88 in.	0	0	0
Ridgway	5/25/2006	Hail	0.88 in.	0	0	0
Junction	5/25/2006	Hail	0.88 in.	0	0	0
Ridgway	9/27/2006	Hail	0.75 in.	0	0	0
Junction	6/26/2007	Hail	1.00 in.	0	0	0K

Source: NCDC

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

The NCDC database reported no occurrences of a significant lightning strike in Gallatin County since 1950.

The NCDC database reported 49 wind storms reported since 1978. On multiple occasions in the past 30 years trees have been uprooted by severe winds in Gallatin County. These storms have been attributed with one injury and more than $750,000 in damage in Gallatin County. Many of the displaced trees landed on homes and automobiles. In addition, several of these extreme wind events resulted in damage to multiple buildings unable to withstand the force produced by the wind speeds.

For example, on January 29, 2008, a storm blew through the community of Shawneetown, damaging the roof of a tool shop. At Ridgway, power lines were down, and a mobile home was blown off its foundation. A powerful cold front moved rapidly southeast across southern Illinois during the late afternoon hours. An organized line of severe thunderstorms developed along the front as it approached southern Illinois. Widespread damaging winds accompanied the line of storms. Temperatures fell about 30 degrees in less than one hour when the very strong cold front passed through.

As shown in Table 4-33, wind storms have historically occurred year-round with the greatest frequency and damage in April through August.

Table 4-33: Gallatin County Wind Storms*

Location or County	Date	Type	Magnitude	Deaths	Injuries	Property Damage
Gallatin	4/6/1978	Tstorm Winds	Not Measured	0	0	0
Gallatin	7/20/1981	Tstorm Winds	Not Measured	0	0	0
Gallatin	6/8/1982	Tstorm Winds	Not Measured	0	0	0
Gallatin	7/9/1982	Tstorm Winds	Not Measured	0	0	0
Gallatin	7/27/1987	Tstorm Winds	Not Measured	0	0	0
Gallatin	3/14/1989	Tstorm Winds	52 kts.	0	0	0
Shawneetown	4/15/1994	Tstorm Winds	Not Measured	0	0	1K
Gallatin	7/19/1994	Tstorm Winds	Not Measured	0	0	50K
Gallatin	11/11/1995	High Winds	Not Measured	0	0	0
Gallatin	3/19/1996	High Wind	50 kts.	0	0	5K
Cottonwood	5/5/1996	Tstorm Winds	0 kts.	0	0	0
Junction	7/2/1996	Tstorm Winds	0 kts.	0	0	20K
Gallatin	10/22/1996	High Wind	0 kts.	0	0	28K
Gallatin	4/30/1997	High Wind	52 kts.	0	0	20K
Shawneetown	4/30/1997	Tstorm Winds	0 kts.	0	0	4K
Omaha	7/19/1997	Tstorm Winds	52 kts.	0	0	5K
Shawneetown	6/29/1998	Tstorm Winds	54 kts.	0	0	3K
Gallatin	2/7/1999	Strong Winds	N/A	0	0	23K
Shawneetown	5/5/1999	Tstorm Winds	0 kts.	0	0	60K
Ridgway	5/17/1999	Tstorm Winds	52 kts.	0	0	5K
Gallatin	6/4/1999	Tstorm Winds	52 kts.	0	0	5K
Omaha	6/6/1999	Tstorm Winds	52 kts.	0	0	0
Gallatin	4/20/2000	Wind	Not Measured	0	0	0
Ridgway	5/12/2000	Tstorm Winds	Not Measured	0	0	7K
Shawneetown	9/20/2000	Tstorm Winds	50 kts.	0	0	2K
Shawneetown	9/7/2001	Tstorm Winds	Not Measured	0	0	20K
Omaha	10/24/2001	Tstorm Winds	52 kts.	0	0	10K
Gallatin	11/29/2001	Strong Wind	Not Measured	0	1	10K
Gallatin	3/9/2002	Wind	Not Measured	0	0	3K
Ridgway	4/28/2002	Tstorm Winds	50 kts.	0	0	3K
Shawneetown	11/10/2002	Tstorm Winds	50 kts.	0	0	0
Gallatin	5/27/2004	Tstorm Winds	90 kts.	0	0	250K
Shawneetown	5/30/2004	Tstorm Winds	52 kts.	0	0	0
Gallatin	8/14/2005	Tstorm Winds	50 kts.	0	0	4K
Shawneetown	8/26/2005	Tstorm Winds	50 kts.	0	0	0
Junction	11/6/2005	Tstorm Winds	50 kts.	0	0	2K
Shawneetown	11/15/2005	Tstorm Winds	52 kts.	0	0	0
Ridgway	11/15/2005	Tstorm Winds	56 kts.	0	0	0
Gallatin	1/8/2006	Strong Wind	Not Measured	0	0	19K
Gallatin	1/19/2006	Strong Wind	Not Measured	0	0	19K
Equality	3/9/2006	Tstorm Winds	Not Measured	0	0	0
Gallatin	3/9/2006	Tstorm Winds	56 kts.	0	0	0
Ridgway	4/2/2006	Tstorm Winds	56 kts.	0	0	60K
Ridgway	5/24/2006	Tstorm Winds	61 kts.	0	0	10K
Shawneetown	5/25/2006	Tstorm Winds	50 kts.	0	0	4K
Gallatin	7/21/2006	Tstorm Winds	56 kts.	0	0	50K

Location or County	Date	Type	Magnitude	Deaths	Injuries	Property Damage
Gallatin	12/1/2006	Strong Wind	Not Measured	0	0	1K
Junction	6/26/2007	Tstorm Wind	Not Measured	0	0	0
Shawneetown	1/29/2008	Tstorm Wind	Not Measured	0	0	50K

Source: NCDC

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

Geographic Location for Thunderstorm Hazard

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

Hazard Extent for Thunderstorm Hazard

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

Calculated Risk Priority Index for Thunderstorm Hazard

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

RPI = Probability x Magnitude/Severity.

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

Vulnerability Analysis for Thunderstorm Hazard

Severe thunderstorms are an evenly distributed threat across the entire jurisdiction; therefore, the entire county’s population and all buildings are susceptible to severe thunderstorms and can expect the same impacts. This plan will therefore consider all buildings located within the county as vulnerable. The existing buildings and infrastructure in Gallatin County are discussed in types and numbers in Table 4-8.

Critical Facilities

All critical facilities are vulnerable to severe thunderstorms. A critical facility will encounter many of the same impacts as any other building within the jurisdiction. These impacts include structural failure, debris (trees or limbs) causing damage, roofs blown off or windows broken by hail or high winds, fires caused by lightning, and loss of function of the facility (e.g. a damaged police station will no longer be able to serve the community). Table 4-7 lists the types and numbers of all essential facilities in the area. Critical facility information, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

Building Inventory

A table of the building exposure in terms of types and numbers of buildings for the entire county is provided in Table 4-8. The buildings within the county can all expect the same impacts, similar to those discussed for critical facilities. These impacts include structural failure, debris (trees or limbs) causing damage, roofs blown off or windows broken by hail or high winds, fires caused by lightning, and loss of building functionality (e.g. a damaged home will no longer be habitable causing residence to seek shelter).

Infrastructure

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

Vulnerability to Future Assets/Infrastructure for Thunderstorm Hazard

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

Analysis of Community Development Trends

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

4.4.5 Drought Hazard

Hazard Definition for Drought Hazard

Drought is a normal climatic phenomenon that occurs across the State of Illinois and within Gallatin County. The meteorological condition which 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 refers to abnormally low amounts of precipitation over an extended period of time (usually a growing season or more). The severity of a drought depends on its location, duration, and geographical extent, as well as on the water supply and usage demands made by human activities, vegetation, or agricultural operations.

Drought brings several different problems that must be addressed. The quality and quantity of crops, livestock, and other agricultural activities will be affected during prolonged drought. Drought can adversely impact forested areas including the potential for destructive forest and woodland fires that could threaten residential, commercial, and recreational structures.

Previous Occurrences of Drought Hazard

The NCDC database reported 26 drought/heat wave events in Gallatin County since 1997; the most recent was reported in August 2007.

Surface high pressure located over the southern states remained nearly stationary. A persistent hot and humid southwest wind flow around this high brought an extended period of dangerously high heat indices, ranging from 105°F to 110°F on several afternoons. A number of persons were treated for heat exhaustion, including 37 at a Carbondale hospital. Several counties opened a cooling shelter.

NCDC records of droughts/heat waves are listed in Table 4-34. Additional details for NCDC events are included in Appendix D.

Table 4-34: Gallatin County Drought/Heat Wave Events*

Location or County	Date	Type	Deaths	Injuries	Property Damage	Crop Damage
Gallatin	7/2/1997	Excessive Heat	1	0	0	0
Gallatin	7/25/1997	Excessive Heat	0	12	0	0
Gallatin	2/1/1998	Abnormal Warmth	0	0	0	0
Gallatin	6/22/1998	Excessive Heat	1	0	0	0
Gallatin	9/1/1998	Drought	0	0	0	0
Gallatin	12/1/1998	Unusual Warmth	0	0	0	0
Gallatin	7/18/1999	Excessive Heat	4	0	0	0
Gallatin	8/1/1999	Drought	0	0	0	0
Gallatin	9/1/1999	Drought	0	0	0	0
Gallatin	10/1/1999	Drought	0	0	0	0
Gallatin	11/1/1999	Drought	0	0	0	0
Gallatin	12/1/1999	Drought	0	0	0	0
Gallatin	7/7/2001	Excessive Heat	0	0	0	0
Gallatin	8/1/2002	Drought	0	0	0	0
Gallatin	8/3/2002	Excessive Heat	0	8	0	0
Gallatin	9/1/2002	Drought	0	0	0	53.0M
Gallatin	6/1/2005	Drought	0	0	0	0
Gallatin	7/1/2005	Drought	0	0	0	0
Gallatin	7/21/2005	Excessive Heat	0	62	0	0
Gallatin	8/1/2005	Drought	0	0	0	0
Gallatin	8/19/2005	Excessive Heat	0	0	0	0
Gallatin	7/19/2006	Heat	0	0	0	0
Gallatin	7/31/2006	Heat	0	0	0	0
Gallatin	8/1/2006	Heat	0	0	0	0
Gallatin	8/19/2006	Heat	0	0	0	0
Gallatin	8/8/2007	Heat	0	0	0K	0K

Source: NCDC

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

Geographic Location for Drought Hazard

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

Hazard Extent for Drought Hazard

The extent of droughts varies in terms of geographical extent, temperature, duration, and the range of precipitation.

Calculated Priority Risk Index for Drought Hazard

Based on historical information, future droughts in Gallatin County are possible. Droughts of varying magnitudes are expected. According to the RPI, droughts ranked as the number eight greatest hazard posed to Gallatin County.

RPI = Probability x Magnitude/Severity.

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

Vulnerability Analysis for Drought Hazard

Drought impacts are an evenly distributed threat across the entire jurisdiction; therefore, the entire county is vulnerable to drought and can expect the same impacts within the affected area. The entire population and buildings have been identified as at risk. The building exposure for Gallatin County, as determined from the building inventory is included in Table 4-8.

Critical Facilities

All critical facilities are vulnerable to drought. A critical facility will encounter many of the same impacts as any other building within the jurisdiction, which should involve little damage. 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. Table 4-7 lists the types and numbers of all of the essential facilities in the area. Critical facility information, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

Building Inventory

A table of the building exposure in terms of types and numbers of buildings for the entire county is listed in Table 4-8. The buildings within the county can all expect the same impacts similar to those discussed for 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 fire that could result from the hot, dry conditions. Should such a fire event occur, any number of these items could become damaged. The impacts to these items may 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.

Vulnerability to Future Assets/Infrastructure for Drought Hazard

Future development will remain vulnerable to these events. Some urban and rural areas are more susceptible than others. 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, and dry conditions can lead to the ignition of wildfires that could threaten residential, commercial, and recreational areas.

Analysis of Community Development Trends

Because the droughts are regional in nature future development will be impacted across the county.

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 conditions: freezing rain, sleet, heavy snow, blizzards, icy roadways, extreme low temperatures, and strong winds. These conditions can cause human health risks such as frostbite, hypothermia, and death.

Ice (glazing) and Sleet Storms

Ice or sleet, even in small quantities, can result in hazardous driving conditions and can cause property damage. Sleet involves frozen raindrops that bounce when they hit the ground or other objects. Sleet does not stick to trees and wires. Ice storms, on the other hand, involve liquid rain that falls through subfreezing air and/or onto sub-freezing surfaces, freezing on contact with those surfaces. The ice coats trees, buildings, overhead wires, and roadways, sometimes causing extensive damage.

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

Snow Storms

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

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

Severe Cold

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

Previous Occurrences for Winter Storm Hazard

The NCDC database identified 51 winter storm and extreme cold events for Gallatin County since 1994. These storms have been attributed with three deaths, one injury, and $600,000 in property damage in Gallatin and adjacent counties.

For example, in February 2008, low pressure developed over the southern Plains, spreading widespread heavy precipitation across southern Illinois. At the same time, high pressure over the upper Ohio Valley produced a cold easterly wind flow. The result was a crippling ice storm.

Around one inch of ice caused extensive damage across far southern Illinois, along and south of a line from Carbondale and Marion to Harrisburg and Carmi. Many of those same areas received three to six inches of sleet and snow. The most destructive icing occurred in an east to west band across Union, Johnson, Massac, and Pope Counties. The state designated most counties in southern Illinois as a disaster area. Numerous trees and power lines were brought down, knocking out power to many thousands of homes. Power outages lasted up to a week.

The NCDC winter storms for Gallatin County are listed in Table 4-35. Additional details for NCDC events are included in Appendix D.

Table 4-35: Winter Storm Events*

Location or County	Date	Type	Deaths	Injuries	Property Damage
Southern Illinois	3/8/1994	Heavy Snow	0	0	500K
Gallatin	12/8/1995	Snow	0	0	0
Gallatin	12/9/1995	Cold Wave	0	0	0
Gallatin	2/2/1996	Extreme Cold	0	0	0
Gallatin	3/19/1996	Winter Storm	0	0	0
Gallatin	12/16/1996	Winter Storm	0	0	0
Gallatin	1/8/1997	Winter Storm	0	0	0
Gallatin	1/10/1997	Extreme Windchill	1	0	0
Gallatin	1/15/1997	Ice Storm	0	0	0
Gallatin	4/10/1997	Heavy Snow	0	0	0
Gallatin	4/18/1997	Frost	0	0	0
Gallatin	2/4/1998	Heavy Snow	0	0	0
Gallatin	12/21/1998	Freezing Rain	0	0	0
Gallatin	12/30/1998	Snow	0	0	0
Gallatin	1/1/1999	Ice Storm	0	0	150K
Gallatin	1/8/1999	Ice Storm	0	0	0
Gallatin	1/22/2000	Snow	0	0	0
Gallatin	4/9/2000	Frost	0	0	0
Gallatin	10/9/2000	Frost	0	0	0
Gallatin	12/2/2000	Snow	0	0	0
Gallatin	12/12/2000	Extreme Cold	0	0	0
Gallatin	12/13/2000	Winter Storm	0	0	0
Gallatin	12/15/2000	Freezing Rain	0	0	0
Gallatin	12/16/2000	Snow	0	0	0
Gallatin	1/1/2001	Extreme Cold	0	0	0
Gallatin	1/26/2001	Freezing Rain	0	0	0
Gallatin	2/21/2001	Winter Storm	0	0	0
Gallatin	4/18/2001	Frost	0	0	0
Gallatin	1/19/2002	Heavy Snow	0	0	0
Gallatin	12/4/2002	Winter Storm	0	0	0
Gallatin	12/23/2002	Winter Storm	0	0	0
Gallatin	1/22/2003	Winter Weather/mix	0	0	0
Gallatin	1/23/2003	Extreme Cold/wind Chill	0	0	0
Gallatin	2/16/2003	Winter Storm	0	0	0
Gallatin	2/23/2003	Heavy Snow	0	0	0
Gallatin	10/3/2003	Frost/freeze	0	0	0
Gallatin	12/13/2003	Winter Weather/mix	0	0	0
Gallatin	1/25/2004	Ice Storm	0	0	0
Gallatin	1/27/2004	Winter Weather/mix	0	0	0
Gallatin	1/29/2004	Winter Weather/mix	0	0	0
Gallatin	12/22/2004	Winter Storm	1	1	100K
Gallatin	12/23/2004	Extreme Cold/wind Chill	1	0	0
Gallatin	5/4/2005	Frost/freeze	0	0	0
Gallatin	10/28/2005	Frost/freeze	0	0	0

Location or County	Date	Type	Deaths	Injuries	Property Damage
Gallatin	12/8/2005	Winter Storm	0	0	0
Gallatin	2/11/2006	Winter Weather/mix	0	0	0
Gallatin	2/18/2006	Winter Weather/mix	0	0	0
Gallatin	2/1/2007	Winter Weather	0	0	0K
Gallatin	4/10/2007	Frost/freeze	0	0	0K
Gallatin	12/15/2007	Winter Weather	0	0	0K
Gallatin	2/11/2008	Winter Storm	0	0	0K

Source: NCDC

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

Geographic Location for Winter Storm Hazard

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

Hazard Extent for Winter Storm Hazard

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

Calculated Priority Risk Index for Winter Storm Hazard

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

RPI = Probability x Magnitude/Severity.

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

Vulnerability Analysis for Winter Storm Hazard

Winter storm impacts are evenly distributed across the jurisdiction; therefore the entire county is vulnerable to winter storms and can expect the same impacts within the affected area. The building exposure for Gallatin County, as determined from the building inventory, is included in Table 4-8.

Critical Facilities

All critical facilities are vulnerable to a winter storm. A critical facility will encounter many of the same impacts as any other buildings within the jurisdiction. These impacts include loss of gas or electricity from broken or damaged utility lines, roads and railways damaged or impassable, broken water pipes, and roof collapse from heavy snow. Table 4-7 lists the types and numbers of the essential facilities in the area. Critical facility information, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

Building Inventory

Table 4-8 lists the building exposure in terms of types and numbers of buildings for the entire county. The impacts to the building stock within the county are similar to the damages expected to the critical facilities, including loss of gas of electricity from broken or damaged utility lines, roads and railways damaged or impassable, broken water pipes, and roof collapse from heavy snow.

Infrastructure

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

Vulnerability to Future Assets/Infrastructure for Winter Storm Hazard

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

Analysis of Community Development Trends

Because the winter storm events are regional in nature, future development will be impacted across the county.

4.4.7 Hazardous Materials Storage and Transport Hazard

Hazard Definition for Hazardous Materials Storage and Transport Hazard

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

Previous Occurrences for Hazardous Materials Storage and Transport Hazard

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

Geographic Location for Hazardous Materials Storage and Transport Hazard

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

Hazard Extent for Hazardous Materials Storage and Transport Hazard

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

Calculated Priority Risk Index for Hazardous Materials Storage and Transport Hazard

The possibility of a hazardous materials accident is possible, based on input from the planning team. According to the RPI, Hazardous Materials Storage and Transport ranked as the number seven greatest hazard facing Gallatin County.

RPI = Probability x Magnitude/Severity.

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

Vulnerability Analysis for Hazardous Materials Storage and Transport Hazard

Hazardous material impacts are evenly distributed across the jurisdiction; therefore the entire county is vulnerable to a release associated with hazardous materials storage or transport and can expect the same impacts within the affected area. The building exposure for Gallatin County, as determined from building inventory, is included in Table 4-8. This plan will therefore consider all buildings located within the county as vulnerable.

Critical Facilities

All critical facilities and communities within the county are at risk. A critical facility, if vulnerable, will encounter many of the same impacts as other buildings within the jurisdiction. These impacts include structural failure due to fire or explosion and loss of function of the facility (e.g. a damaged police station will no longer be able to serve the community). Table 4-7 lists the types and numbers of all essential facilities in the area. Critical facility information, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

Building Inventory

Table 4-8 lists the building exposure in terms of type and number of buildings for the entire county. The buildings within the county can all expect the same impacts, similar to those discussed for critical facilities. These impacts include structural failure due to fire or explosion or debris and loss of function of the building (e.g. a damaged home will no longer be habitable causing residence to seek shelter).

Infrastructure

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

The U.S. EPA's ALOHA (Areal Locations of Hazardous Atmospheres) model was utilized to assess the area of impact for an anhydrous ammonia release at the intersection of State Road 1 and State Road 13.

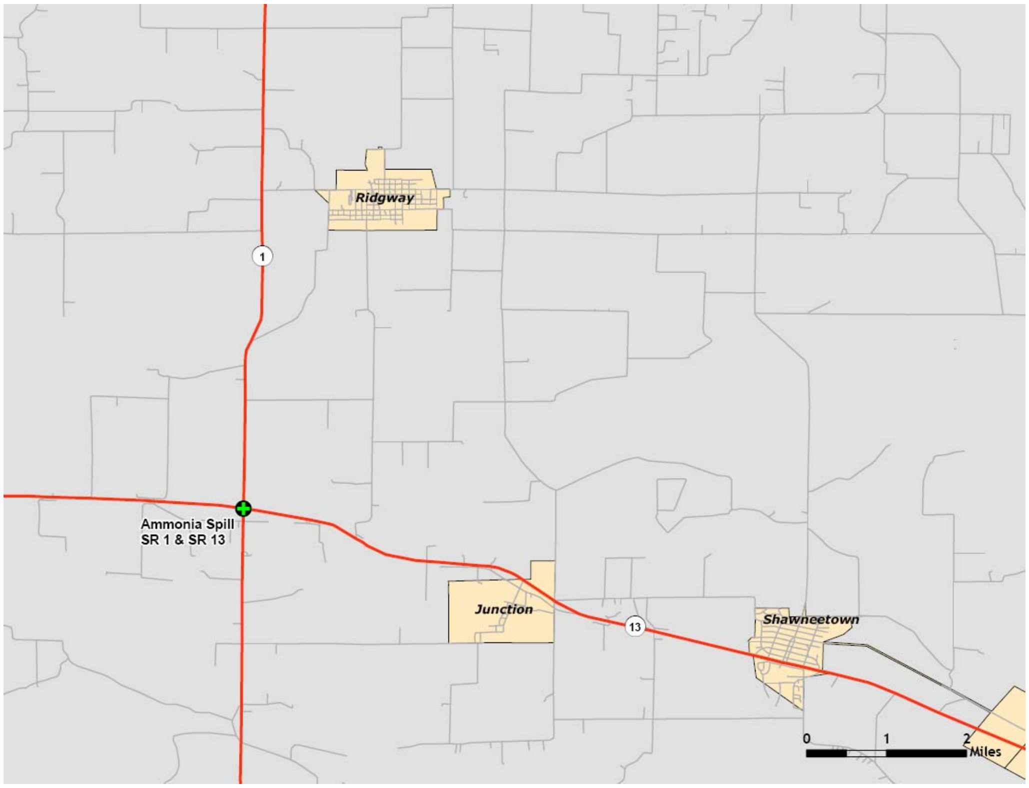
Anhydrous ammonia is a clear colorless gas with a strong odor. Contact with the unconfined liquid can cause frostbite. Though the gas is generally regarded as nonflammable, it can burn within certain vapor concentration limits with strong ignition. The fire hazard increases in the presence of oil or 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 southwest were assumed. The target area was chosen due to the high traffic of State Roads 1 and 13.

The geographic area covered in this analysis is depicted in Figure 4-18.

Figure 4-18: Location of Chemical Release



Analysis

The ALOHA atmospheric modeling parameters, depicted in Figure 4-19 were based upon a west southwesterly wind speed of five 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 eight feet and the length set to 33 feet (12,048 gallons). At the time of its release, it was estimated that the tank was 100% full. The anhydrous ammonia in this tank is in its liquid state.

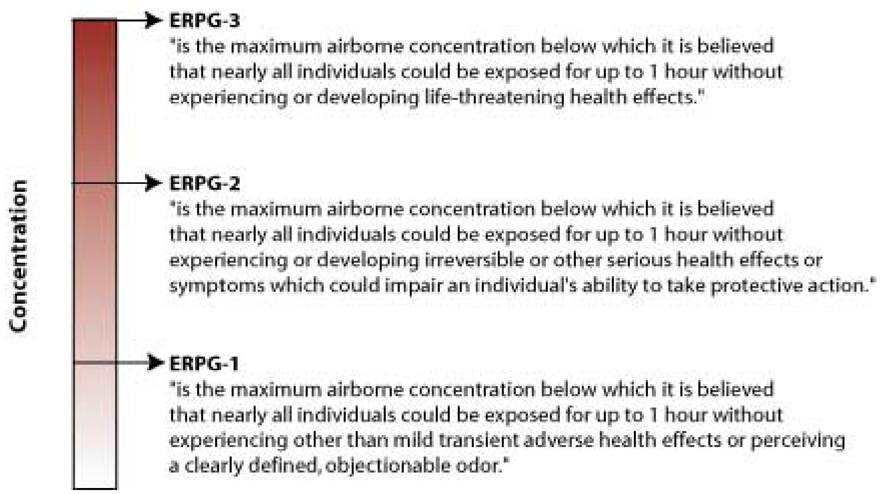
This release was based on a leak from a 2.5-inch-diameter hole, 12 inches above the bottom of the tank.

Figure 4-19: ALOHA Plume Modeling Parameters

```
SITE DATA:
  Location: EQUALITY, ILLINOIS
  Building Air Exchanges Per Hour: 0.29 (sheltered single storied)
  Time: October 24, 2008  1530 hours CDT (using computer's clock)

CHEMICAL DATA:
  Chemical Name: AMMONIA                  Molecular Weight: 17.03 g/mol
  ERPG-1: 25 ppm     ERPG-2: 150 ppm      ERPG-3: 750 ppm
  IDLH: 300 ppm      LEL: 160000 ppm      UEL: 250000 ppm
  Ambient Boiling Point: -28.6° 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 wsw 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: 8 feet                   Tank Length: 33 feet
  Tank Volume: 12,408 gallons
  Tank contains liquid                    Internal Temperature: 68° F
  Chemical Mass in Tank: 31.6 tons        Tank is 100% full
  Circular Opening Diameter: 2.5 inches
  Opening is 1 feet from tank bottom
  Release Duration: 15 minutes
  Max Average Sustained Release Rate: 7,740 pounds/min
     (averaged over a minute or more)
  Total Amount Released: 60,251 pounds
  Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

THREAT ZONE:
  Model Run: Heavy Gas
  Red   : 1.5 miles --- (750 ppm = ERPG-3)
  Orange: 3.6 miles --- (150 ppm = ERPG-2)
  Yellow: greater than 6 miles --- (25 ppm = ERPG-1)
```

The Emergency Response Planning Guidelines (ERPGs) were developed by the ERPG committee of the American Industrial Hygiene Association. The ERPGs were developed as planning guidelines, to anticipate human adverse health effects caused by exposure to toxic chemicals. The ERPGs are three-tiered guidelines with one common denominator—a one-hour contact duration. Each guideline identifies the substance, its chemical and structural properties, animal toxicology data, human experience, existing exposure guidelines, the rationale behind the selected value, and a list of references. Figure 4-20 illustrates the ERPG three-tiered guidelines.

Figure 4-20: Three-Tiered ERPG Public Exposure Guidelines



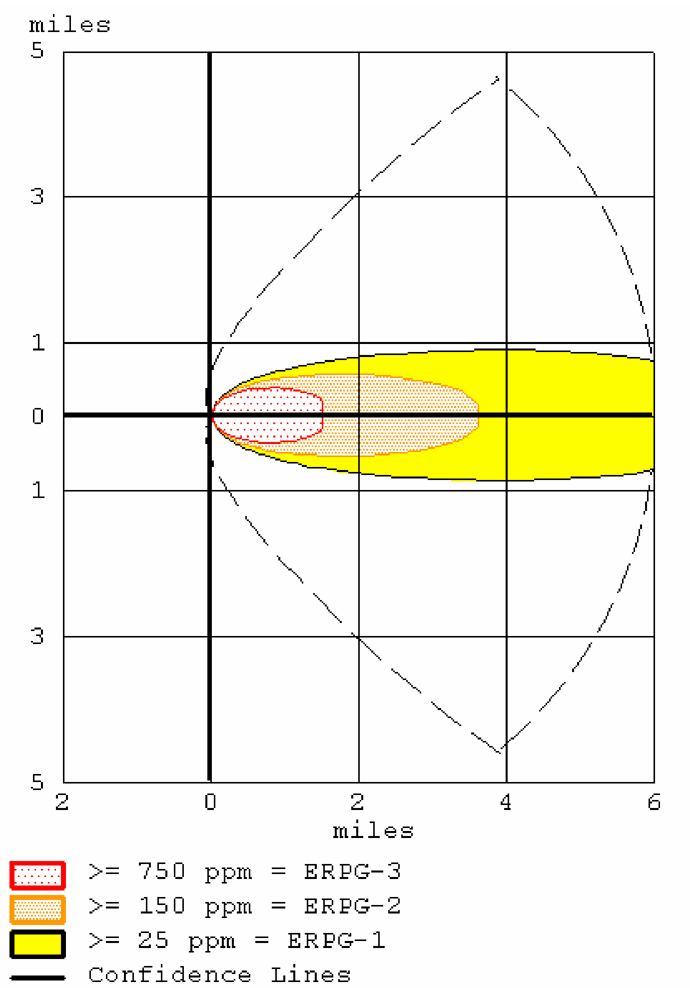
The definitions and format are from the ERPG publication.

The ERPG guidelines do not protect everyone. Hypersensitive individuals would suffer adverse reactions to concentrations far below those suggested in the guidelines. In addition, ERPGs, like other exposure guidelines, are based mostly on animal studies, thus raising the question of applicability to humans. The guidelines are focused on one period of time—one hour. Exposure in the field may be longer or shorter. However, the ERPG committee strongly advises against trying to extrapolate ERPG values to longer periods of time.

The most important point to remember about the ERPGs is that they do not contain safety factors usually incorporated into exposure guidelines such as the TLV. Rather, they estimate how the general public would react to chemical exposure. Just below the ERPG-1, for example, most people would detect the chemical and may experience temporary, mild effects. Just below the ERPG-3, on the other hand, it is estimated that the effects would be severe, although not life-threatening. The TLV differs in that it incorporates a safety factor into its guidelines, to prevent ill effects. The ERPG should serve as a planning tool, not a standard to protect the public.
Source: http://archive.orr.noaa.gov/cameo/locs/expguide.html

According to the ALOHA parameters, approximately 7,740 pounds of material would be released per minute. The image in Figure 4-21 depicts the plume footprint generated by ALOHA.

Figure 4-21: Plume Footprint Generated by ALOHA

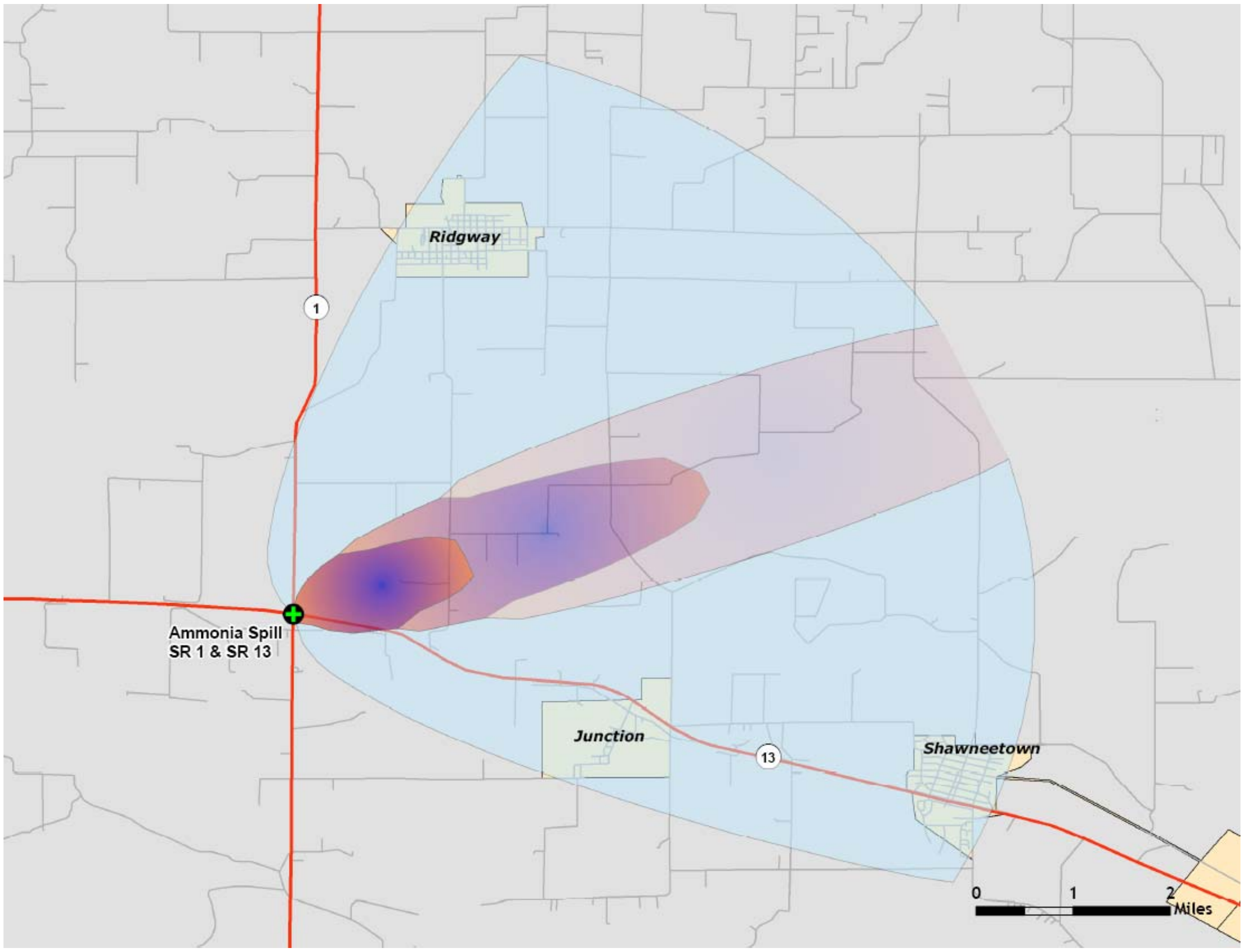


As the substance moves away from the source, the level of substance concentration decreases. Each color-coded area depicts a level of concentration measured in parts per million (ppm). For the purpose of clarification, this report will designate each level of concentration as a specific zone. The zones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

- **Zone 1** (ERPG-3): The red buffer (>=750 ppm) extends no more than 1.5 miles from the point of release after one hour.
- **Zone 2** (ERPG-2): The orange buffer (>=150 ppm) extends no more than 3.7 miles from the point of release after one hour.
- **Zone 3** (ERPG-1): The yellow buffer (>=25 ppm) extends more than six miles from the point of release after one hour.
- **Zone 4** (Confidence Lines): The dashed lines depict the level of confidence in which the exposure zones will be contained. The ALOHA model is 95% confident that the release will stay within this boundary.

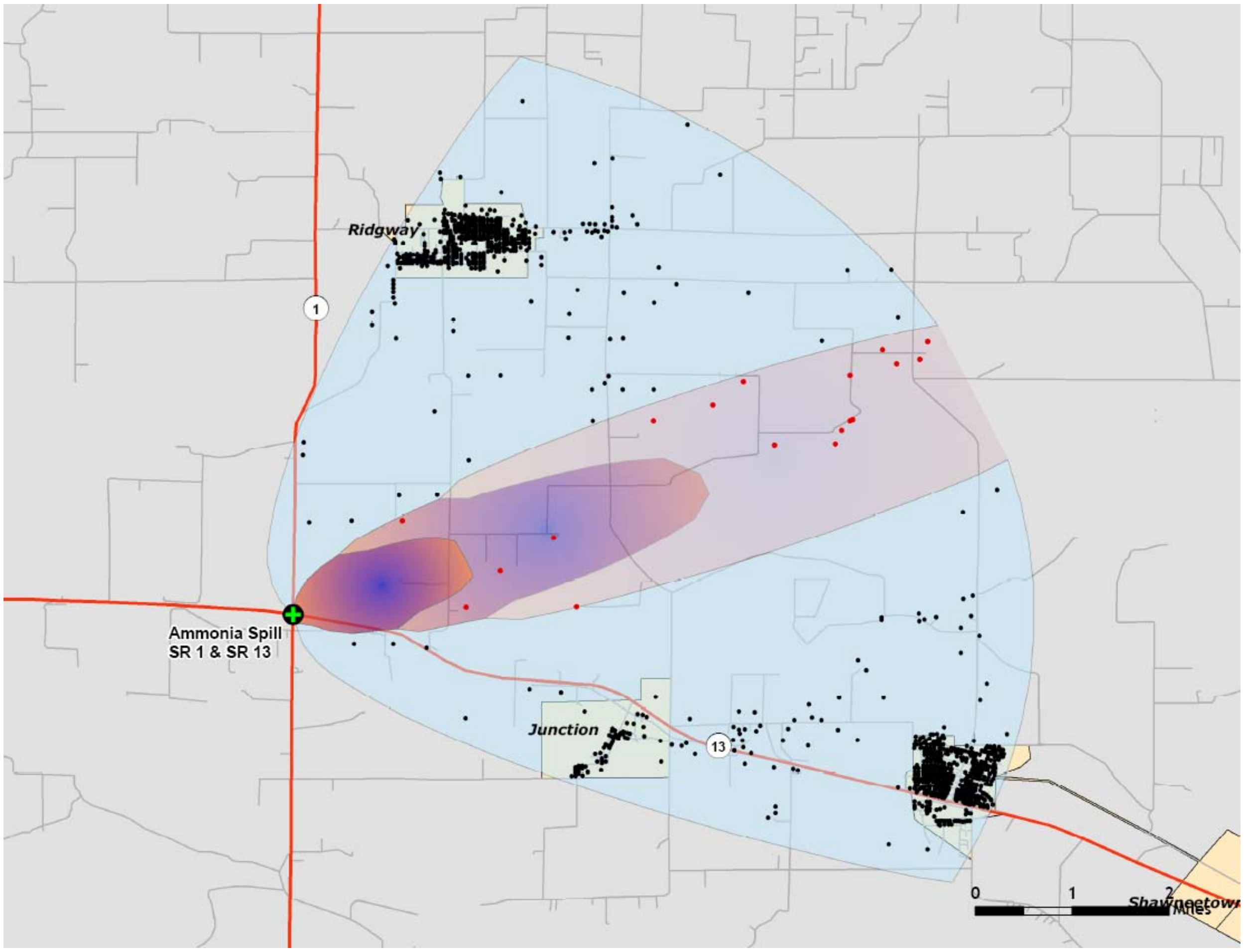
The image in Figure 4-22 depicts the plume footprint generated by ALOHA.

Figure 4-22: ALOHA Plume Footprint Overlaid in ArcGIS



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

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



Results

By summing the building inventory points within all ERPG zones (Zone 1: > 750 ppm, Zone 2: > 150 ppm, Zone 3: > 25 ppm, and Zone 4 < 25 ppm), the GIS overlay analysis predicts that as many as 1,212 buildings could be exposed at a replacement cost of $53.77 million. If this event were to occur, approximately 3,400 people would be affected.

Building Inventory Damage

The results of the analysis against the building inventory points are depicted in Tables 4-36 through 4-40. Table 4-36 summarizes the results of the chemical spill by combining all ERPG zones.

Table 4-36: Estimated Exposure (all ppm)

Occupancy	Population	Building Counts	Exposure
Residential	2,453	981	$34,782,981
Commercial	0	127	$6,642,057
Industrial	0	6	$395,784
Agriculture	0	95	$3,754,587
Religious	0	0	$0
Government	0	0	$0
Education	948	3	$8,198,000
Total	3,401	1,212	$53,773,409

Tables 4-35 through 4-37 summarize the results of the chemical spill for each zone separately.

Table 4-37: Estimated Exposure (> 750 ppm)

Occupancy	Population	Building Counts	Exposure
Residential	0	0	$0
Commercial	0	0	$0
Industrial	0	0	$0
Agriculture	0	0	$0
Religious	0	0	$0
Government	0	0	$0
Education	808	1	$6,893,000
Total	**808**	**1**	**$6,893,000**

Table 4-38: Estimated Exposure (> 150 ppm)

Occupancy	Population	Building Counts	Exposure
Residential	3	1	$71,196
Commercial	0	0	$0
Industrial	0	0	$0
Agriculture	0	3	$186,273
Religious	0	0	$0
Government	0	0	$0
Education	0	0	$0
Total	**3**	**4**	**$257,469**

Table 4-39: Estimated Exposure (> 25 ppm)

Occupancy	Population	Building Counts	Exposure
Residential	3	1	$48,765
Commercial	0	1	$155,604
Industrial	0	1	$102,705
Agriculture	0	11	$361,689
Religious	0	0	$0
Government	0	0	$0
Education	0	0	$0
Total	**3**	**14**	**$668,763**

Zone 4 depicts the level of confidence in which the exposure zones will be contained. The ALOHA model is 95% confident that the release will stay within this boundary. Table 4-38 summarizes the results of the chemical spill for Zone 4.

Table 4-40: Estimated Exposure (< 25 ppm)

Occupancy	Population	Building Counts	Exposure
Residential	2,448	979	$34,663,020
Commercial	0	126	$6,486,453
Industrial	0	5	$293,079
Agriculture	0	81	$3,206,625
Religious	0	0	$0
Government	0	0	$0
Education	140	2	$1,305,000
Total	**2,588**	**1,193**	**$45,954,177**

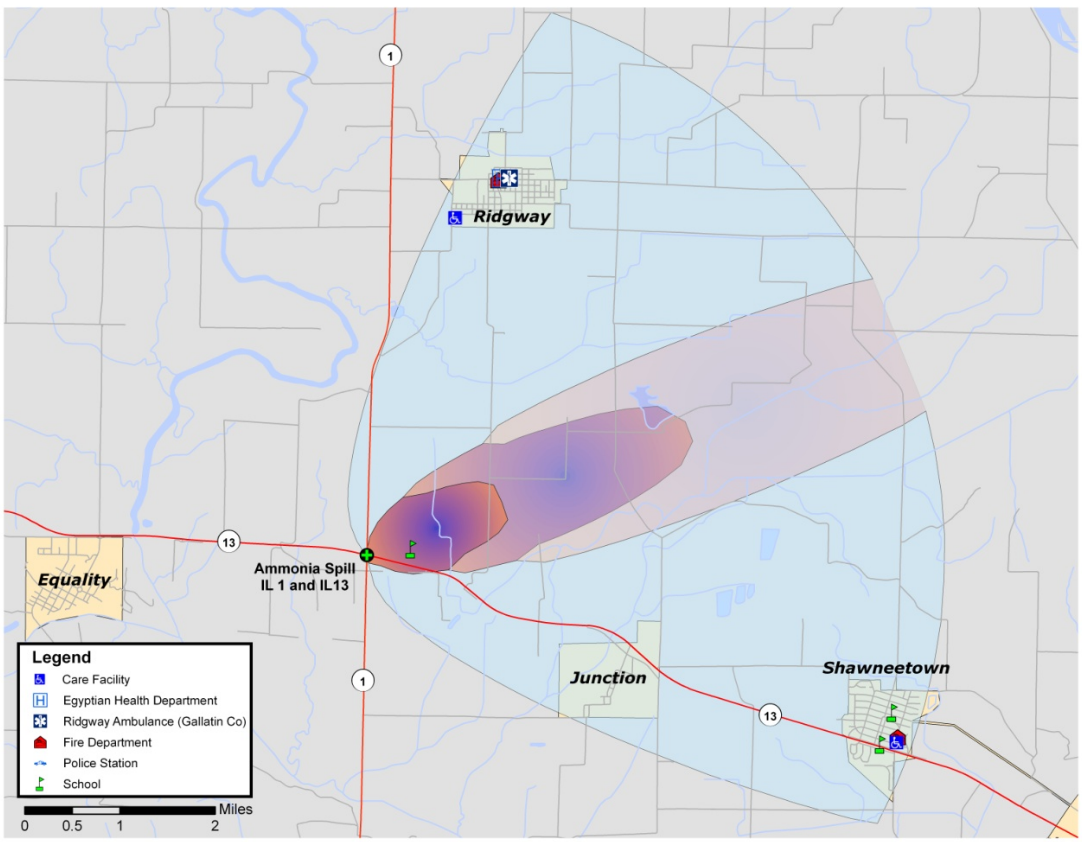
Essential Facilities Damage

There are nine essential facilities within the limits of the chemical spill plume. All are located within the confines of the <25 ppm confidence lines. The affected facilities are identified in Table 4-41. Their geographic locations are depicted in Figure 4-24.

Table 4-41: Essential Facilities within Plume Footprint

Name
The Willow of Ridgway
Warren House
Ridgway Fire Department
Shawneetown City Fire Department
Egyptian Health Department
Ridgway Ambulance (Gallatin County)
Ridgway Police Department
Wabash Area Development
Coleman Tri-County Services
Gallatin County Elementary
Gallatin County Junior School
Gallatin County High School

Figure 4-24: Essential Facilities within Plume Footprint



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

Much new development in Gallatin County is in close proximity to transportation corridors, such as along Route 1 or 13. These areas are particularly vulnerable to chemical releases because of transportation of hazardous materials.

Analysis of Community Development Trends

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

4.4.8 Ground Failure Hazard

Subsidence

Subsidence in Illinois is a sinking of the land surface, usually associated with either underground mining or collapse of soil into crevices in underling soluble bedrock. Areas at risk for subsidence can be determined from detailed mapping of geologic conditions or detailed mine maps. Data sources were compiled from the Illinois Geologic Survey and Illinois Department of Natural Resources to assess the risk of subsidence in Gallatin County. This section provides an overview of the subsidence hazards in Illinois in general and a discussion of the potential subsidence risk for Gallatin County.

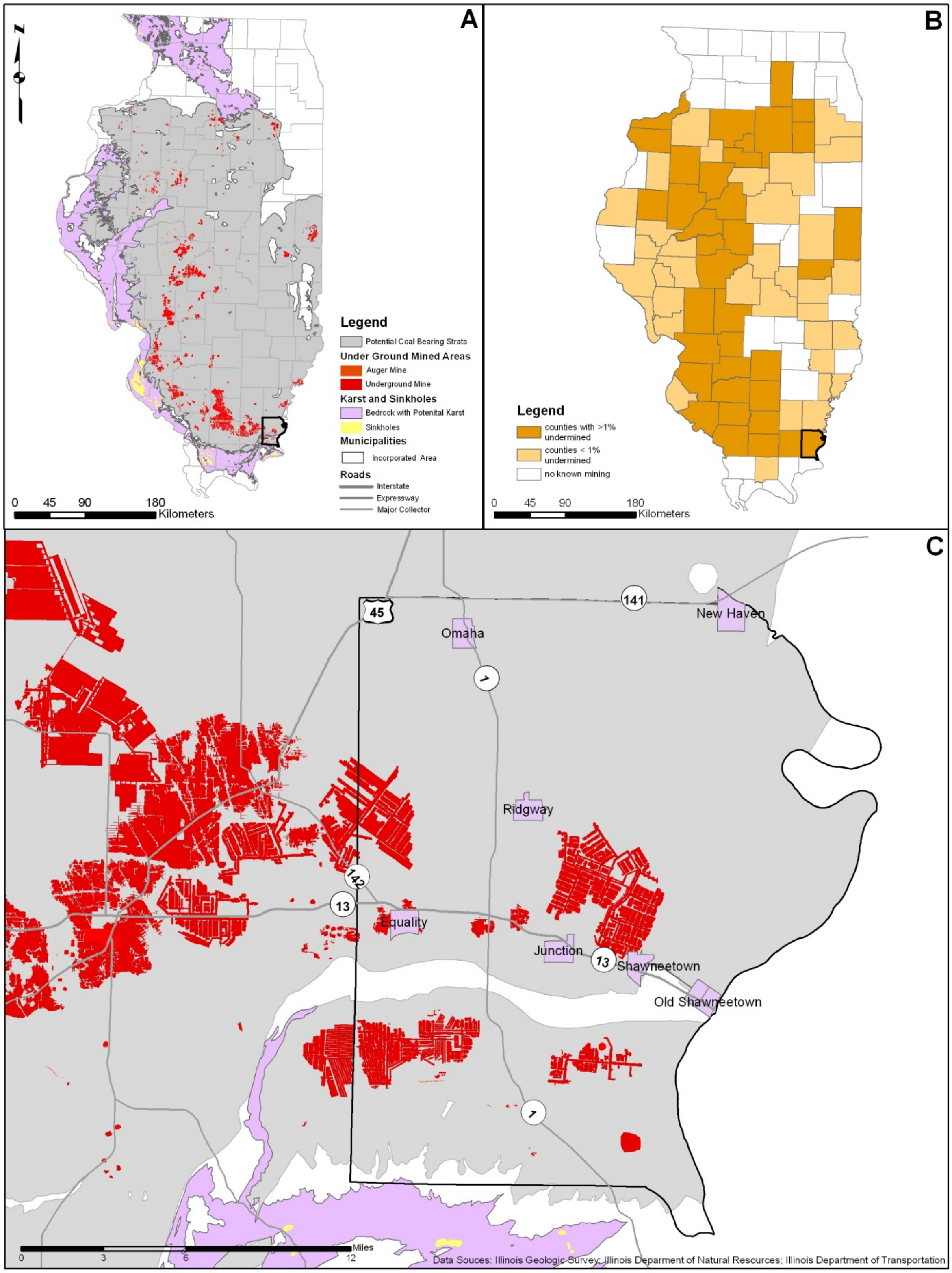
Underground Mining and Subsidence

Underground mines have been used extensively in Illinois to extract coal, lead, zinc, fluorites, shale, clay stones, limestone, and dolomite. When mining first began in Illinois, land over mined areas was sparsely populated. If the ground subsided, homes or other structures were seldom damaged. As towns and cities expanded over mined-out areas, subsidence damage to structures became increasingly more common. The most common underground mines in Illinois are coal mines. A recent study in Illinois has found that approximately 333,100 housing units were located over or adjacent to 839,000 acres mined for coal (Bauer, 2008).

Illinois has abundant coal resources. All or parts of 86 of 102 counties in the state have coal-bearing strata. As of 2007, approximately 1,050,400 acres (2.8% of the state) were mined. Of that total, 836,655 acres are underground mines (Bauer, 2008). Illinois ranks first among all U.S. states for reserves of bituminous coal (Illinois Coal Association, 1992).

Figure 4-23a shows the statewide distribution of bedrock with karst potential, coal bearing strata, sink holes, and underground mines. Figure 4-23b shows the counties which are 0, < 1%, and >1% undermined; Figure 4-23c shows the countywide distribution of bedrock with karst potential, coal bearing strata, sink holes, and underground mines.

Figures 4-23a, 4-23b, and 4-23c: Maps of Statewide and Countywide Areas with Subsidence Hazard Potential



Mining Methods

There are two fundamental underground mining methods used in Illinois: high-extraction methods, such as long-wall and low-extraction room, and pillar mining. High-extraction methods remove almost all of the coal in localized areas. For modern mining practices, subsidence associated with high-extraction methods is planned and regulated by state and federal authorities. The subsurface subsides above the mine within several days or weeks after the coal has been removed. Subsidence of the overburden above the mined-out area can continue up to seven years after subsurface removal, depending on the local geologic conditions (Bauer, 2008). The initial ground movements associated with this mining, which tend to be the largest, diminish rapidly after a few months. After subsidence has decreased to a level that no longer causes damage to structures, the land may be suitable for development. The maximum amount of subsidence is proportional to the amount of material extract and the depth between the mining and the surface. In general, over the centerline of the mine panel, subsidence can be 60% to 70% of the extract material (e.g., 10 ft of material extracted would cause a maximum subsidence of six to seven feet; Bauer, 2006).

For low-extraction techniques such as room-and-pillar mining, miners create openings (rooms) as they work. Enough of the coal layer is left behind in the pillars to support the ground surface. In Illinois, this system of mining extracts 40% to 55% of the coal resources in modern mines and up to 75% is some older mines. Based on current state regulations, room-and-pillar mines in operation after 1983 that do not include planned subsidence must show that they have a stable design. Although these permitting requirements have improved overall mine stability, there are no guarantees that subsidence will not occur above a room-and-pillar mine in the future. In general, if coal or other mined resources has been removed from an area, subsidence of the overlying material is always a possibility (Bauer, 2006).

Types of Mine Subsidence

In Illinois, subsidence of the land surface related to underground mining undertakes two forms: pit subsidence or trough (sag) subsidence. Pit subsidence structures are generally six to eight feet deep and range from two to 40 feet in diameter. Pit subsidence mostly occurs over shallow mines that are <100 feet deep where the overlying bedrock is <50 feet thick and composed of weak rock materials, such as shale. The pit is produced when the mine roof collapses and the roof fall void works its way to the surface. These structures form rapidly. If the bedrock is only a few feet thick and the surface materials are unconsolidated (loose), these materials may fall into adjacent mine voids, producing a surface hole deeper than the height of the collapse mine void. Pit subsidence can cause damage to a structure if it develops under the corner of a building, under a support post of a foundation, or in another critical location. Subsidence pits should be filled to ensure that people or animals do not fall into these structures (Bauer, 2006).

Trough subsidence forms a gentle depression over a broad area. Some trough subsidence may be as large as a whole mine panel (i.e. several hundred feet long and a few hundred feet wide). Several acres of land may be affected by a single trough event or feature. As previously discussed, the maximum vertical settlement is 60% to 70% of the height of material removed (e.g., two to six feet). Significant troughs may develop suddenly, within a few hours or days, or gradually over a period of years. Troughs originate over places in mines where pillars have collapsed, producing downward movement at the ground surface. These failures can develop over mines of any depth. Trough subsidence produces an orderly pattern of tensile features (tension cracks) surrounding a central area of possible compression features. The type and extent of damage to surface structures relates to their orientation and position within a trough. In the tension zone, the downward-bending movements that develop in the ground may damage buildings, roads, sewer and water pipes, and other utilities. The downward bending of the ground surface causes the soil to crack, forming the tension cracks that pull structures apart. In the relatively smaller compression zone, roads may buckle and foundation walls may be pushed inward. Buildings damaged by compressional forces typically need their foundations rebuilt and may also need to be leveled due to differential settling (Bauer, 2006).

Mine Subsidence Insurance

The Mine Subsidence Insurance, as of 1979, created subsidence insurance as part of an Illinois homeowner's policy. Homeowners in any of the Illinois counties undermined by approximately 1% or more automatically have mine subsidence insurance as a part of their policy, unless coverage is waived in writing. Mine subsidence insurance is especially important for homes located near or over mines that operated before the 1977 Surface Mine Control and Reclamation Act. The companies that operated these mines may no longer be in business (Bauer, 2006).

Mine Subsidence in Gallatin County

Nearly all of Gallatin County is underlain by rock units which potentially contain coal. Analysis of the GIS data layer of active and abandoned coal mines in Illinois obtained from the Illinois Department of Natural Resources (ILDNR) revealed that 32.4 mi^2 out of Gallatin County's total 328 mi^2 (~ 10%) have been undermined. The undermined areas general are found in the Southern half of the County generally paralleling Route 13. Incorporated areas potentially impacted by ground subsidence include Equality, Junction, and Shawneetown.

Subsidence Related to Karst Features

Subsidence can also occur on land located over soluble bedrock. The land over such bedrock often has topography characteristics of past subsidence events. This topography is termed "karst." Karst terrain has unique landforms and hydrology found only in these areas. Bedrock in karst areas are typically limestone, dolomite, or gypsum. In Illinois, limestone and dolomite (carbonate rocks) are the principle karst rock types; 9% of Illinois has carbonate rock types close enough to the ground surface to have a well-developed karst terrain. The area in Illinois in which the karst terrain is most developed is the southern and southwestern part of the state (Panno, et al., 1997).

Sinkhole Formation

The karst feature most associated with subsidence is the sinkhole. A sinkhole is an area of ground with no natural external surface drainage—when it rains, all of the water stays inside the sinkhole and typically drains into the subsurface. Sinkholes can vary from a few feet to hundreds of acres, and from less than one to more than 100 feet deep. Typically, sinkholes form slowly, so that little change is seen during a lifetime, but they also can form suddenly when a collapse occurs. Such a collapse can have a dramatic effect if it occurs in a populated setting.

Sinkholes form where rainwater moves through the soil and encounters soluble bedrock. The bedrock begins to dissolve along horizontal and vertical cracks and joints in the rock. Eventually, these cracks become large enough to start transporting small soil particles. As these small particles of soil are carried off, the surface of the soil above the conduit slump down gradually, and a small depression forms on the ground surface. This depression acts like a funnel and gathers more water, which makes the conduit still larger and washes more soil into it.

Sinkhole Collapse

Sudden collapse of a sinkhole occurs when the soil close to the ground surface does not initially slump down, but instead forms a bridge. Beneath that surface cover, a void forms where the soil continues to wash into the conduit. These voids are essentially shallow caves. Over time, the void enlarges enough that the weight of the overlying bridge can no longer be supported. The surface layer then suddenly collapses into the void, forming a sinkhole.

The process of forming a conduit and a soil bridge usually takes years to decades to form. However this natural process can be aggravated and expedited by human activates. Since the process of forming a sinkhole depends on water to carry soil particle down into the karst bedrock, anything that increases the amount of water flowing into the subsurface can accelerate sinkhole formation process. Parking lots, streets, altered drainage from construction, and roof drainage are a few of the things that can increase runoff.

Collapses are more frequent after intense rainstorms. However, drought and altering of the water table can also contribute to sinkhole collapse. Areas where the water table fluctuates or has suddenly been lowered are more susceptible to sinkhole collapse. It is also possible for construction activity to induce the collapse of near-surface voids or caves. In areas of karst bedrock, it is imperative that a proper geotechnical assessment be completed prior to construction of any significant structures. Solutions to foundation problems in karst terrain generally are expensive (White, 1988).

Sinkhole Subsidence or Collapse Potential for Gallatin County

No large areas of karst bedrock underlie Gallatin County (Figure 4-25c). Hence, ground subsidence related to karstic bedrock and sinkholes is unlikely.

Hazard Extent for Subsidence

The extent of subsidence hazard in Gallatin County is a function of where current development is located relative to areas of past and present underground mining.

Calculated Risk Priority Index for Ground Failure

Based on historical information, future ground failure in the affected regions of Gallatin County is possible. According to the RPI, ground failure ranked as the number eight highest hazard in the county.

RPI = Probability x Magnitude/Severity.

Probability	x	Magnitude /Severity	=	RPI
3	x	1	=	3

Vulnerability Analysis for Ground Failure

The existing buildings and infrastructure of Gallatin County are discussed in types and numbers in Table 4-8.

Critical Facilities

Any critical facility built above highly soluble bedrock could be vulnerable to land subsidence. A critical facility will encounter the same impacts as any other building within the affected area. These impacts include damages ranging from cosmetic to structural. Buildings may sustain minor cracks in walls due to a small amount of settling, while in more severe cases, the failure of building foundations can cause cracking of critical structural elements. Table 4-7 lists the essential facilities in the area. Critical facility information, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

Building Inventory

Table 4-8 lists the building exposure in terms of types and numbers of buildings for the entire county. The buildings within this area can anticipate impacts similar to those discussed for critical facilities, ranging from cosmetic to structural. Buildings may sustain minor cracks in walls due to a small amount of settling, while in more severe cases, the failure of building foundations causes cracking of critical structural elements.

Infrastructure

Land subsidence areas within Gallatin County could impact the roadways, utility lines/pipes, railroads, and bridges. The risk to these structures is primarily associated with land collapsing directly beneath them in a way that undermines their structural integrity. 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. In addition bridges could fail or become impassable causing risk to traffic.

Vulnerability to Future Assets/Infrastructure for Ground Failure

New buildings and infrastructure placed on undermined land or on highly soluble bedrock will be vulnerable to ground failure.

Analysis of Community Development Trends

Abandoned underground mine subsidence may affect several locations within the county; therefore buildings and infrastructure are vulnerable to subsidence. Continued development will occur in many of these areas. Currently, Gallatin County reviews new development for compliance with the local zoning ordinance. Newly planned construction should be reviewed with the historical mining maps to minimize potential subsidence structural damage.

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Section 5 - Mitigation Strategy

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

5.1 Community Capability Assessment

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

5.1.1 National Flood Insurance Program (NFIP)

Hazus-MH estimates that there are approximately 380 households located in the Gallatin County Special Flood Hazard Area. As of June 2007, the Federal Emergency Management Agency's NFIP Insurance Report for Illinois showed that 39 households paid flood insurance, insuring $2,180,900 in property value in Gallatin County. The total premiums collected amounted to $16,928, which on average was $434 annually. From 1978 to 2008, 23 claims were filed, totaling $179,554. The average claim was $7,807.

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

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

Community	Participation Date	FIRM Date	CRS Date	CRS Rating	Floodplain Zoning Ordinance Adopted Last
Gallatin County	12/15/1978	2/1/1984	NA	NA	12/15/1978
Village of Junction	9/26/1975	1/5/1984	NA	NA	9/26/1975
Village of New Haven	1/16/1974	10/16/1984	NA	NA	1/16/1974
Village of Omaha	5/10/1974	9/18/1985	NA	NA	5/10/1974
Village of Ridgway	2/22/1974	7/15/1985	NA	NA	2/22/1974

In Gallatin County, five out of eight incorporated communities participate in the NFIP. The City of Shawneetown has no identified flood hazard boundaries; therefore does not participate in the NFIP. The Village of Equality has been sanctioned for not enforcing its floodplain ordinance.

The levee protecting the village of Old Shawneetown has recently been decertified by the Army Corps of Engineers. However, the Letter of Map Revision placing the town back into the regulatory floodplain is currently being processed by the Illinois Department of Natural Resources and FEMA. As of the date of this plan, Old Shawneetown was not officially sanctioned under the NFIP by FEMA.

5.1.2 Stormwater Management Stream Maintenance Ordinance

The Gallatin County does not have a storm management ordinance; however, they do have six (6) different Drainage Districts that oversees the storm management for the county. They are Rocky Branch, Ridgway and Sub-Districts 1 & 2, Pond Settlement, Cypress and Union #2.

5.1.3 Zoning Management Ordinance

The county of Gallatin has no Zoning Management Ordinance in place.

5.1.4 Erosion Management Program/ Policy

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

5.1.5 Fire Insurance Rating Programs/ Policy

Table 5-3 lists the county's fire departments, as well their ratings and number of firefighters.

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

Fire Department	Fire Insurance Rating	Number of Firefighters
Equality Fire Department	ISO 7	20
New Haven Fire Department	ISO 7	16
Shawneetown Fire Department	ISO 5	28
Omaha Fire Department	ISO 7	13
Ridgway Fire Department	ISO 4	24

5.1.6 Land Use Plan

The County of Gallatin does not have a land use plan.

5.1.7 Building Codes

Gallatin County and some of its communities have adopted the National Building Code and used Illinois Capital Development Board's Building Codes as its guide for public building standards.

5.2 Mitigation goals

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

The goals represent long-term, broad visions of the overall vision the county would like to achieve for mitigation. The objectives are strategies and steps which will assist the communities to attain the listed goals. Table 5-6 lists mitigation actions, which are defined projects that will help to complete the defined goals and objectives.

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

(a) Objective: Retrofit critical facilities 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 hazards.

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

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

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

Goal 2: Create new or revise existing plans/maps related to hazards affecting Gallatin County

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

(b) Objective: Review and update existing 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 the public on the hazards affecting Gallatin County

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

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

5.3 Mitigation Actions/Projects

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

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

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

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

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

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

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

After Meeting #3, held November 6, 2008, 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 February 23, 2009. The evaluation criteria (STAPLE+E) involved the following categories and questions.

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

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

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

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

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

Economic:
- Are there currently sources of funds that can be used to implement the action?
- What benefits will the action provide?
- Does the cost seem reasonable for the size of the problem and likely benefits?
- What burden will be placed on the tax base or local economy to implement this action?
- Does the action contribute to other community economic goals such as capital improvements or economic development?
- What proposed actions should be considered but be “tabled” for implementation until outside sources of funding are available?

Environmental:

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

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

5.3.1 Completed or Current Mitigation Actions/Projects

Since this is the first mitigation plan developed for Gallatin County, there are no deleted or deferred mitigation items. Table 5-4 presents the completed and ongoing mitigation actions and projects in the county.

Table 5-4: Completed or Current Mitigation Actions

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Jurisdictions Covered	Comments
Update floodplain maps	**Goal:** Create new or revise existing plans/maps related to hazards affecting Gallatin County **Objective:** Support compliance with the NFIP for each jurisdiction in Gallatin County	Flood	Gallatin County, Shawneetown, Ridgeway, New Haven, Omaha, Junction, Old Shawneetown, Equality	The County is currently updating its floodplain maps, and the project will continue to expand to cover Gallatin County's other communities.
Distribute weather radios to cities, fire stations, police departments, and schools	**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, Tornado, Earthquake, Thunderstorm, Winter Storm	Gallatin County, Shawneetown, Ridgeway, New Haven, Omaha, Junction, Old Shawneetown, Equality	The County has successfully completed this project. The County EMA will continue to evaluate any necessary equipment updates in the future.
Repair and maintain state roads	**Goal:** Lessen the impacts of hazards to new and existing infrastructure **Objective:** Minimize the amount of infrastructure exposed to hazards	Flood	Junction	ILDOT successfully completed this strategy.
Work with utility companies to trim trees throughout the county	**Goal:** Lessen the impacts of hazards to new and existing infrastructure **Objective:** Minimize the amount of infrastructure exposed to hazards	Winter Storm, Tornado, Thunderstorm	Gallatin County, Shawneetown, Ridgeway, New Haven, Omaha, Junction, Old Shawneetown, Equality	The electric companies, Ameren and Southeast, successfully completed this strategy. The County will continue to oversee the project as a current strategy.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Jurisdictions Covered	Comments
Establish an LEPC for Gallatin County	**Goal:** Develop long-term strategies to educate the public on the hazards affecting Gallatin County **Objective:** Improve education of emergency personnel and public officials	All	Gallatin County	The County EMA successfully implemented this project.
Purchase back-up generators for warming centers, emergency shelters, healthcare facilities, schools, and other critical facilities	**Goal:** Lessen the impacts of hazards to new and existing infrastructure **Objective:** Improve emergency sheltering in Gallatin County	Flood, Tornado, Earthquake, Thunderstorm, Winter Storm	Gallatin County, Shawneetown, Ridgeway, New Haven, Omaha, Junction, Old Shawneetown, Equality	The County has procured generators for public schools and fire stations in Shawneetown, Equality, Ridgeway, and Junction. This is an ongoing project, and the county hopes to provide for other critical facilities as well.
Implement a program in which communities must develop a fuel usage plan based on its needs and available providers	**Goal:** Develop long-term strategies to educate the public on the hazards affecting Gallatin County **Objective:** Raise public awareness on hazard mitigation	Flood, Tornado, Earthquake, Thunderstorm, Winter Storm	Gallatin County, Shawneetown, Ridgeway, New Haven, Omaha, Junction, Old Shawneetown, Equality	The Village of Shawneetown has already initiated this project. The County EMA will oversee the completion of the project. Funds will be sought from local resources.
Create an underground mine map	**Goal:** Create new or revise existing plans/maps related to hazards affecting Gallatin County **Objective:** Conduct new studies/research to profile hazards and follow up with mitigation strategies	Subsidence	Gallatin County, Shawneetown, Ridgeway, New Haven, Omaha, Junction, Old Shawneetown, Equality	IL Geologic Survey and IL Department of Natural Resources oversaw the implementation of this project.

5.4 Implementation Strategy and Analysis of Mitigation Projects

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

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

Table 5-5: STAPLE+E planning factors

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

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

Table 5-6: Mitigation Strategies

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Jurisdictions Covered	Priority	Comments
Raise public awareness about flood mitigation and the benefits of the NFIP	**Goal:** Create new or revise existing plans/maps related to hazards affecting Gallatin County **Objective:** Support compliance with the NFIP	Flood	Equality	High	The County EMA will oversee the implementation of this project. Local resources will be used to compile and distribute NFIP literature at public events. If resources are available, implementation is forecasted to begin within approximately one year.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Jurisdictions Covered	Priority	Comments
Purchase permanent signage or flood gates for flood-prone areas throughout the county	**Goal:** Lessen the impacts of hazards to new and existing infrastructure **Objective:** Minimize the amount of infrastructure exposed to hazards	Flood	Gallatin County, Ridgeway, New Haven, Omaha, Junction, Old Shawneetown, Equality	High	The County EMA will oversee the implementation of this project. Local resources and ILDOT will be used to evaluate the areas for signage. Funding has not been secured, but ILDOT and IDNR are possible sources. If funding is available and signage is purchased, the County will store the signage and distribute as necessary in the event of flooding. Implementation is forecasted to begin within approximately one year.
Implement a plan for voluntary buyouts of residences in flood-prone areas	**Goal:** Create new or revise existing plans/maps related to hazards affecting Gallatin County **Objective:** Support compliance with the NFIP	Flood	Gallatin County, Ridgeway, New Haven, Omaha, Junction, Equality	Medium	The County EMA will oversee the implementation of this project. Local resources will be used to evaluate the applicable areas. Funding has not been secured, but additional funding will be sought from the Pre-Disaster Mitigation program. Implementation is forecasted to begin within approximately three years.
Amend ordinances to improve stormwater drainage and management	**Goal:** Create new or revise existing plans/maps related to stormwater management Gallatin County **Objective:** Review and update existing community plans and ordinances to support hazard mitigation	Flood	Gallatin County, Shawneetown, Ridgeway, New Haven, Omaha, Junction, Old Shawneetown, Equality	Low	The County EMA with the assistance of the county and local municipal engineers will oversee the implementation of this project. Local resources will be used to review the current ordinances. Funding has not been secured. Implementation is forecasted to begin within approximately five years.
Harden water treatment plants and waste stations against the threat of floods	**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	Flood	New Haven, Ridgeway	Low	The County EMA with the assistance of the New Haven and Ridgeway water treatment plant manager will oversee the implementation of this project. Funding has not been secured as of 2009, but the pre-disaster mitigation program and community development grants are a possible funding source. Implementation, if funding is available, is forecasted to begin within approximately five years.
Implement a plan for levee maintenance and improvements	**Goal:** Create new or revise existing plans related to the Old Shawneetown Levee **Objective:** Conduct new studies/research to profile flood hazard and follow up with mitigation strategies	Flood	Old Shawneetown	Medium	The County EMA will work with the representatives of Old Shawneetown and the U.S. Corps of Engineers to develop a plan for levee maintenance and improvements. Funding has not been secured as of 2009, but local, state, and federal funds will be sought. Implementation, if funding is available, will begin within three years.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Jurisdictions Covered	Priority	Comments
Elevate flood-prone roads (Shawneetown Blacktop)	**Goal:** Lessen the impacts of flooding on existing infrastructure **Objective:** Reduce flood risk along critical transportation routes	Flood	Shawneetown, New Haven	Medium	The county engineer with assistance from IDOT engineers will oversee the implementation of this project. Funding has not been secured as of 2009, but IDOT is a possible funding source. Implementation, if funding is available, is forecasted to begin within three years.
Establish a Comprehensive Emergency Responses Team	**Goal:** Develop a base of trained responders to address a variety of hazards that can potential befall Gallatin County **Objective:** Improve education of emergency personnel and public officials	All	Gallatin County, Shawneetown, Ridgeway, New Haven, Omaha, Junction, Old Shawneetown, Equality	Low	The County EMA will oversee the implementation of this project. Funding will be sought for staff and training, and the pre-disaster mitigation program is a possible source. Implementation, if funding is available, is forecasted to begin within five years.
Construct a new Emergency Operations Center	**Goal:** Lessen the impacts of hazards to new and existing infrastructure **Objection:** Equip public facilities and communities to guard against damage caused by hazards	All	Gallatin County	High	The County EMA will oversee the implementation of this project. Funding has not been secured as of 2009, but the pre-disaster mitigation program and community development grants are a possible funding source. Implementation, if funding is available, is forecasted to begin within approximately one year.
Install early warning sirens throughout the county	**Goal:** Lessen the impacts of hazards to people, property, and infrastructure **Objective:** Evaluate and strengthen the communication and transportation abilities of emergency services throughout the county	All	Gallatin County, Shawneetown, Ridgeway, New Haven, Omaha, Junction, Old Shawneetown, Equality	Medium	The County EMA along with representatives from the incorporate communities will oversee the implementation of this project. Local resources will be used to evaluate the cost of the sirens. Funding has not been secured as of 2009. Implementation, if funding is available, is forecasted to begin within approximately three years.
Implement a public information call-in center in the event of a hazard	**Goal:** Lessen the impacts of hazards to people, property, and infrastructure **Objective:** Evaluate and strengthen the communication and transportation abilities of emergency services throughout the county	All	Gallatin County, Shawneetown, Ridgeway, New Haven, Omaha, Junction, Old Shawneetown, Equality	Low	The County EMA will oversee this project. Funding has not been secured as of 2009, but local resources are a possibility. Implementation, if funding is available, is forecasted to begin within five years.
Construct saferooms in public assembly buildings	**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	All	Gallatin County, Shawneetown, Ridgeway, New Haven, Omaha, Junction, Old Shawneetown, Equality	Low	The County EMA along with representatives from the incorporate communities will oversee the implementation of this project. Funding has not been secured as of 2009, but the pre-disaster mitigation program and community development grants are a possible funding source. Implementation, if funding is available, is forecasted to begin within approximately five years.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Jurisdictions Covered	Priority	Comments
Develop public outreach programs to instruct public on what to do during potential hazards (e.g. county-specific brochures, family emergency plans developed in schools, etc.)	**Goal:** Develop long-term strategies to educate the public on the hazards affecting Gallatin County **Objective:** Raise public awareness on hazard mitigation	All	Gallatin County, Shawneetown, Ridgeway, New Haven, Omaha, Junction, Old Shawneetown, Equality	High	The County EMA, schools, healthcare facilities, and other organizations have implemented various forms of this strategy. Local resources have been used to target and inform the resident population. Additional funding will be sought from the Pre-Disaster Mitigation program. Implementation, if funding is available, is forecasted to begin within one year.
Implement Reverse 911 for decision makers, first responders, and representatives from school systems	**Goal:** Lessen the impacts of hazards to people, property, and infrastructure **Objective:** Evaluate and strengthen the communication and transportation abilities of emergency services throughout the county	All	Gallatin County, Shawneetown, Ridgeway, New Haven, Omaha, Junction, Old Shawneetown, Equality	Low	The County EMA along with representatives from the incorporate communities and school systems will oversee the implementation of this project. Funding has not been secured, but additional funding will be sought from the Homeland Security program funds. Implementation is forecasted to begin within approximately five years.
Harden critical facilities such as fire stations, police stations, and city municipal buildings	**Goal:** Lessen the impacts of hazards to new and existing infrastructure **Objection:** Retrofit critical facilities with structural design practices and equipment that will withstand natural disasters and offer weather-proofing	Tornado, Thunderstorm, Flood, Earthquake, Winter Storm	Gallatin County, Shawneetown, Ridgeway, New Haven, Omaha, Junction, Old Shawneetown, Equality	Medium	The County EMA along with representatives from the incorporate communities will oversee the implementation of this project. Funding has not been secured as of 2009, but the pre-disaster mitigation program and community development grants are a possible funding source. Implementation, if funding is available, is forecasted to begin within approximately three years.
Develop and distribute county-specific hazmat brochures	**Goal:** Develop long-term strategies to educate the public on the hazards affecting Gallatin County **Objective:** Raise public awareness on hazard mitigation	Hazmat	Gallatin County, Shawneetown, Ridgeway, New Haven, Omaha, Junction, Old Shawneetown, Equality	Medium	The County EMA will oversee this project while working with local organizations. Funding has not been secured as of 2009. Implementation, if funding is available, is forecasted to begin within three years.
Construct emergency shelters/ warming shelters for each community within the county	**Goal:** Lessen the impacts of hazards to the effected community members **Objective:** Improve emergency sheltering in Gallatin County	Tornado, Thunderstorm, Flood, Drought, Winter Storm	Gallatin County, Shawneetown, Ridgeway, New Haven, Omaha, Junction, Old Shawneetown, Equality	High	The County EMA along with representatives from the incorporate communities will oversee the implementation of this project. Local resources will be used to evaluate the cost benefit of the shelters and define specific locations. Funding has not been secured as of 2009. Implementation is forecasted to begin within approximately one year.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Jurisdictions Covered	Priority	Comments
Establish a database for special needs residents and residents with 4WD vehicles.	**Goal:** Assist at risk members of the community during a disaster or severe weather. **Objective:** Improve coordination and response during a disaster or severe weather	All	Gallatin County, Shawneetown, Ridgeway, New Haven, Omaha, Junction, Old Shawneetown, Equality	Low	The County EMA will oversee the implementation of this project and work with representatives from local healthcare providers and advocacy groups. Local organizations will be used as resources and for possible funding. Implementation, if available, is forecasted to begin within approximately five years.
Prepare and store disaster preparedness kits for hazardous events	**Goal:** Lessen the impacts of hazards to the effected community members **Objective:** Improve emergency preparedness in Gallatin County	All	Gallatin County, Shawneetown, Ridgeway, New Haven, Omaha, Junction, Old Shawneetown, Equality	Low	The County EMA will oversee the implementation of this project. Local resources will be used to organize and distribute the rations. Funding has not been secured, but local organizations and businesses are an option. Implementation is forecasted to begin within approximately five years.
Establish an ordinance requiring mobile homes to have tie downs	**Goal:** Create new or revise existing plans related to hazards affecting mobile homes in Gallatin County **Objective:** Review and update existing community plans and ordinances to support hazard mitigation	Tornado, Flood, Thunderstorm	Gallatin County, Shawneetown, Ridgeway, New Haven, Omaha, Junction, Old Shawneetown, Equality	Low	The County EMA along with representative from the local incorporated communities will oversee the implementation of this project. Local resources will be used to organize and distribute the rations. Funding has not been secured, but local organizations and businesses are an option. Implementation is forecasted to begin within approximately five years.
Identify critical facilities constructed over underground mines	**Goal:** Lessen the impacts of hazards to new and existing infrastructure **Objective:** Retrofit critical facilities with structural design practices and equipment that will withstand disasters	Subsidence	Gallatin County, Shawneetown, Ridgeway, New Haven, Omaha, Junction, Old Shawneetown, Equality	Low	The County EMA along with the County Engineer will oversee this project. Local resources will be used to identify the facilities. Implementation is forecasted to begin within five years.

The Gallatin County Emergency Management will be the local champions for the mitigation actions. The county commissioners and the city and town councils will be an integral part of the implementation process. Federal and state assistance will be necessary for a number of the identified actions. Southeastern Illinois Regional Planning and Development Commission is qualified to provide technical grant writing services to assist the county in seeking resources to achieve the recommended mitigation action.

5.5 Multi-Jurisdictional Mitigation Strategy

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

Each of the seven incorporated communities within Gallatin 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. When a community was not able to provide representation at these sessions, it was contacted individually and afforded the opportunity to provide input about its specific jurisdiction and the county strategies in general. In Gallatin County, this occurred from the incorporated communities of New Haven and Omaha. 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, Southeastern Illinois Regional Planning & Development Commission 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, 2014 to address the five-year update of this plan. Members of the planning committee are readily available to engage in email correspondence between annual meetings. If the need for a special meeting arises, due to new developments or a declared disaster, the team will meet as necessary to update mitigation strategies. Depending on grant opportunities and fiscal resources, mitigation projects may be implemented independently by individual communities or through local partnerships.

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

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

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

6.2 Implementation through Existing Programs

The results of this plan will be incorporated into ongoing planning efforts. Many of the mitigation projects identified as part of this planning process are ongoing. If necessary, the County and its incorporated jurisdictions will update the planning documents, zoning plans, and ordinances listed in Tables 1-4 and 5-1 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 Southeastern Illinois Regional Planning & Development Commission and forwarded to the MHMP planning committee for discussion. Education efforts for hazard mitigation will be ongoing through periodic updates in the paper, public meetings during the five year update cycle, public comment, or via a website.

Once adopted, a copy of this plan will be posted at Southeastern Illinois Regional Planning and Development offices and the Gallatin County Courthouse in Shawneetown, Illinois.

Glossary of Terms

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

A

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

B

BFE – Base Flood Elevation

C

CAMEO – Computer-Aided Management of Emergency Operations
CEMA – County Emergency Management Agency
CEMP – Comprehensive Emergency Management Plan
CERI – Center for Earthquake Research and Information
CPRI – Calculated Priority Risk Index
CRS – Community Rating System

D

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

E

EAP – Emergency Action Plan
EOC – Emergency Operations Center
ERPG – Emergency Response Planning Guidelines
EMA – Emergency Management Agency
EPA – Environmental Protection Agency

F

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

G

GIS – Geographic Information System

H

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

I

IDNR – Illinois Department of Natural Resources
IEMA – Illinois Emergency Management Agency

M

MHMP – Multi-Hazard Mitigation Plan

N

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

P

PPM – Parts Per Million

S

SPC – Storm Prediction Center
SWPPP – Stormwater Pollution Prevention Plan

U

USGS – United States Geological Survey