



SIUC Multi-Hazard Mitigation
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May 10, 2013

To: Bryan Purchis
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CC: Ryan Weber
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Mr. Bryan Purchis,

Monroe County, with the help of SIU, completed the Monroe County (multi-jurisdictional) Multi-Hazard Mitigation Plan as of May 10, 2013 and is seeking FEMA's approval. Please find enclosed a copy of the unapproved Monroe County Multi-Hazard Mitigation Plan (MHMP) with the FEMA Plan Review Tool and a copy of associated maps. If you have any further questions please do not hesitate to contact me at the information provided above.

Regards,

A handwritten signature in black ink that reads "Beth Ellison". The signature is written in a cursive, flowing style.

Beth Ellison
Staff Researcher & Project Manager

Multi-Hazard Mitigation Plan

Monroe County, IL



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Multi-Hazard Mitigation Plan

Monroe County, Illinois

Adoption Date: -- _____ --

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APPENDIX A:

LOCAL MITIGATION PLAN REVIEW TOOL

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to the community.

- The Regulation Checklist provides a summary of FEMA's evaluation of whether the Plan has addressed all requirements.
- The Plan Assessment identifies the plan's strengths as well as documents areas for future improvement.
- The Multi-jurisdiction Summary Sheet is an optional worksheet that can be used to document how each jurisdiction met the requirements of the each Element of the Plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

The FEMA Mitigation Planner must reference this *Local Mitigation Plan Review Guide* when completing the *Local Mitigation Plan Review Tool*.

Jurisdiction: Monroe County	Title of Plan: Multi-Hazard	Date of Plan: 5/13/2013
Local Point of Contact: Ryan Weber	Address: 100 S. Main Street Waterloo, IL 62298	
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State Reviewer:	Title:	Date:
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FEMA Reviewer:	Title:	Date:
Date Received in FEMA Region <i>(insert #)</i>		
Plan Not Approved		
Plan Approvable Pending Adoption		
Plan Approved		

SECTION 1: REGULATION CHECKLIST

INSTRUCTIONS: The Regulation Checklist must be completed by FEMA. The purpose of the Checklist is to identify the location of relevant or applicable content in the Plan by Element/sub-element and to determine if each requirement has been ‘Met’ or ‘Not Met.’ The ‘Required Revisions’ summary at the bottom of each Element must be completed by FEMA to provide a clear explanation of the revisions that are required for plan approval. Required revisions must be explained for each plan sub-element that is ‘Not Met.’ Sub-elements should be referenced in each summary by using the appropriate numbers (A1, B3, etc.), where applicable. Requirements for each Element and sub-element are described in detail in this *Plan Review Guide* in Section 4, Regulation Checklist.

1. REGULATION CHECKLIST		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)				
ELEMENT A. PLANNING PROCESS				
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	Section 2, pp. 1-6			
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))	Section 2.4 & 2.5, p. 4			
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Section 2.3, p. 3			
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Section 2.6, pp. 4-5			
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Section 6, pp. 132-133			
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	Section 6, pp. 132-133			
ELEMENT A: REQUIRED REVISIONS				

1. REGULATION CHECKLIST		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)				
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT				
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	Section 4.1, pp. 13-20			
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	Section 4.1, pp. 13-20			
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	Section 4.2 – 4.4, pp. 21-78			
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	Section 4.4.2, pp. 31-41			
<u>ELEMENT B: REQUIRED REVISIONS</u>				
ELEMENT C. MITIGATION STRATEGY				
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	Section 5.1, pp. 78-80			
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	Section 5.1.1, p. 78-79			
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	Section 5.2-5.4, pp. 81-132			
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	Section 5.4 & Section 5.5, pp. 83-132			
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	Section 5.4 & Section 5.5, pp. 83-132			
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	Section 6.2, p. 133			
<u>ELEMENT C: REQUIRED REVISIONS</u>				

1. REGULATION CHECKLIST		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)				
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)				
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	N/A			
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	N/A			
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	N/A			
<u>ELEMENT D: REQUIRED REVISIONS</u>				
ELEMENT E. PLAN ADOPTION				
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))	Section 2.8, p. 5 & Appendix C, pp. BB-HH			
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	Section 2.8, p. 5 & Appendix C, pp. BB-HH			
<u>ELEMENT E: REQUIRED REVISIONS</u>				
ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)				
F1.				
F2.				
<u>ELEMENT F: REQUIRED REVISIONS</u>				

SECTION 2: PLAN ASSESSMENT

INSTRUCTIONS: The purpose of the Plan Assessment is to offer the local community more comprehensive feedback to the community on the quality and utility of the plan in a narrative format. The audience for the Plan Assessment is not only the plan developer/local community planner, but also elected officials, local departments and agencies, and others involved in implementing the Local Mitigation Plan. The Plan Assessment must be completed by FEMA. The Assessment is an opportunity for FEMA to provide feedback and information to the community on: 1) suggested improvements to the Plan; 2) specific sections in the Plan where the community has gone above and beyond minimum requirements; 3) recommendations for plan implementation; and 4) ongoing partnership(s) and information on other FEMA programs, specifically RiskMAP and Hazard Mitigation Assistance programs. The Plan Assessment is divided into two sections:

1. Plan Strengths and Opportunities for Improvement
2. Resources for Implementing Your Approved Plan

Plan Strengths and Opportunities for Improvement is organized according to the plan Elements listed in the Regulation Checklist. Each Element includes a series of italicized bulleted items that are suggested topics for consideration while evaluating plans, but it is not intended to be a comprehensive list. FEMA Mitigation Planners are not required to answer each bullet item, and should use them as a guide to paraphrase their own written assessment (2-3 sentences) of each Element.

The Plan Assessment must not reiterate the required revisions from the Regulation Checklist or be regulatory in nature, and should be open-ended and to provide the community with suggestions for improvements or recommended revisions. The recommended revisions are suggestions for improvement and are not required to be made for the Plan to meet Federal regulatory requirements. The italicized text should be deleted once FEMA has added comments regarding strengths of the plan and potential improvements for future plan revisions. It is recommended that the Plan Assessment be a short synopsis of the overall strengths and weaknesses of the Plan (no longer than two pages), rather than a complete recap section by section.

Resources for Implementing Your Approved Plan provides a place for FEMA to offer information, data sources and general suggestions on the overall plan implementation and maintenance process. Information on other possible sources of assistance including, but not limited to, existing publications, grant funding or training opportunities, can be provided. States may add state and local resources, if available.

A. Plan Strengths and Opportunities for Improvement

This section provides a discussion of the strengths of the plan document and identifies areas where these could be improved beyond minimum requirements.

Element A: Planning Process

How does the Plan go above and beyond minimum requirements to document the planning process with respect to:

- *Involvement of stakeholders (elected officials/decision makers, plan implementers, business owners, academic institutions, utility companies, water/sanitation districts, etc.);*
- *Involvement of Planning, Emergency Management, Public Works Departments or other planning agencies (i.e., regional planning councils);*
- *Diverse methods of participation (meetings, surveys, online, etc.); and*
- *Reflective of an open and inclusive public involvement process.*

Element B: Hazard Identification and Risk Assessment

In addition to the requirements listed in the Regulation Checklist, 44 CFR 201.6 Local Mitigation Plans identifies additional elements that should be included as part of a plan's risk assessment. The plan should describe vulnerability in terms of:

- 1) *A general description of land uses and future development trends within the community so that mitigation options can be considered in future land use decisions;*
- 2) *The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas; and*
- 3) *A description of potential dollar losses to vulnerable structures, and a description of the methodology used to prepare the estimate.*

How does the Plan go above and beyond minimum requirements to document the Hazard Identification and Risk Assessment with respect to:

- *Use of best available data (flood maps, HAZUS, flood studies) to describe significant hazards;*
- *Communication of risk on people, property, and infrastructure to the public (through tables, charts, maps, photos, etc.);*
- *Incorporation of techniques and methodologies to estimate dollar losses to vulnerable structures;*
- *Incorporation of Risk MAP products (i.e., depth grids, Flood Risk Report, Changes Since Last FIRM, Areas of Mitigation Interest, etc.); and*
- *Identification of any data gaps that can be filled as new data became available.*

Element C: Mitigation Strategy

How does the Plan go above and beyond minimum requirements to document the Mitigation Strategy with respect to:

- *Key problems identified in, and linkages to, the vulnerability assessment;*
- *Serving as a blueprint for reducing potential losses identified in the Hazard Identification and Risk Assessment;*
- *Plan content flow from the risk assessment (problem identification) to goal setting to mitigation action development;*
- *An understanding of mitigation principles (diversity of actions that include structural projects, preventative measures, outreach activities, property protection measures, post-disaster actions, etc);*
- *Specific mitigation actions for each participating jurisdictions that reflects their unique risks and capabilities;*
- *Integration of mitigation actions with existing local authorities, policies, programs, and resources; and*
- *Discussion of existing programs (including the NFIP), plans, and policies that could be used to implement mitigation, as well as document past projects.*

Element D: Plan Update, Evaluation, and Implementation (*Plan Updates Only*)

How does the Plan go above and beyond minimum requirements to document the 5-year Evaluation and Implementation measures with respect to:

- *Status of previously recommended mitigation actions;*
- *Identification of barriers or obstacles to successful implementation or completion of mitigation actions, along with possible solutions for overcoming risk;*
- *Documentation of annual reviews and committee involvement;*
- *Identification of a lead person to take ownership of, and champion the Plan;*
- *Reducing risks from natural hazards and serving as a guide for decisions makers as they commit resources to reducing the effects of natural hazards;*
- *An approach to evaluating future conditions (i.e. socio-economic, environmental, demographic, change in built environment etc.);*
- *Discussion of how changing conditions and opportunities could impact community resilience in the long term; and*
- *Discussion of how the mitigation goals and actions support the long-term community vision for increased resilience.*

B. Resources for Implementing Your Approved Plan

Ideas may be offered on moving the mitigation plan forward and continuing the relationship with key mitigation stakeholders such as the following:

- *What FEMA assistance (funding) programs are available (for example, Hazard Mitigation Assistance (HMA)) to the jurisdiction(s) to assist with implementing the mitigation actions?*
- *What other Federal programs (National Flood Insurance Program (NFIP), Community Rating System (CRS), Risk MAP, etc.) may provide assistance for mitigation activities?*
- *What publications, technical guidance or other resources are available to the jurisdiction(s) relevant to the identified mitigation actions?*
- *Are there upcoming trainings/workshops (Benefit-Cost Analysis (BCA), HMA, etc.) to assist the jurisdictions(s)?*
- *What mitigation actions can be funded by other Federal agencies (for example, U.S. Forest Service, National Oceanic and Atmospheric Administration (NOAA), Environmental Protection Agency (EPA) Smart Growth, Housing and Urban Development (HUD) Sustainable Communities, etc.) and/or state and local agencies?*

SECTION 3:
MULTI-JURISDICTION SUMMARY SHEET (OPTIONAL)

INSTRUCTIONS: For multi-jurisdictional plans, a Multi-jurisdiction Summary Spreadsheet may be completed by listing each participating jurisdiction, which required Elements for each jurisdiction were 'Met' or 'Not Met,' and when the adoption resolutions were received. This Summary Sheet does not imply that a mini-plan be developed for each jurisdiction; it should be used as an optional worksheet to ensure that each jurisdiction participating in the Plan has been documented and has met the requirements for those Elements (A through E).

MULTI-JURISDICTION SUMMARY SHEET												
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township/ village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require- ments
1	Monroe County	County	Delbert Wittena uer				Y	Y	Y	Y		
2	Waterloo	City	Jim Trantha m				Y	Y	Y	Y		
3	Valmeyer	Village	Tom Andres				Y	Y	Y	Y		
4	Maeystown	Village	Lynden Prange				Y	Y	Y	Y		
5	Hecker	Village	Charles Kujawshi				Y	Y	Y	Y		
6	Fults	Village	Merrill Prange				Y	Y	Y	Y		
7	Columbia	City	Matt Stephens				Y	Y	Y	Y		

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Section 1 Introduction

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

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

In recognition of the importance of planning in mitigation activities, FEMA created **Hazards USA Multi-Hazard (Hazardus-MH)**, a powerful geographic information system (GIS)-based disaster risk assessment tool. This tool enables communities of all sizes to estimate losses from floods, hurricanes, earthquakes, and other natural hazards and to measure the impact of various mitigation practices that might help reduce those losses.

Southern Illinois University at Carbondale (SIUC) and The Polis Center (Polis) at Indiana University - Purdue University Indianapolis (IUPUI) are assisting Monroe County in updating and enhancing their MHMP. SIUC and Polis are guiding the planning process, performing the hazard risk assessment, and assisting in identifying sound mitigation activities.

Section 2 Planning Process

2.1 Timeline

The MHMP process is broken into a series of five meetings. These meetings are organized by SIUC and hosted by the Monroe County Emergency Management Agency. At these five meetings, various tasks are completed by SIUC and the Monroe County multi-hazard mitigation planning team (planning team):

Meeting 1: The purpose of Meeting 1 is to introduce the MHMP process and organize resources. SIUC gathers local resources which contribute to the detailed county risk assessment.

Meeting 2: SIUC presents the county's historical hazards. Based on this information, the planning team identifies natural hazards to include in the plan, and ranks hazards by potential damages and occurrences. The planning team also provides SIUC with disaster scenarios for the county risk assessment.

Meeting 3: SIUC and Polis present the draft risk assessment, derived from the Hazardus-MH and GIS modeling of the identified disasters, to the planning team. The general public is also invited to this meeting through a series of newspaper articles and/or radio spots. At the end of the meeting, SIUC

encourages the general public to ask questions and provide input to the planning process, fulfilling one of FEMA's requirements for public input.

Meeting 4: This meeting consists of a "brainstorming session." The planning team lends local knowledge to identify and prioritize mitigation strategies and projects that can address the threats identified in the risk assessment. FEMA requires the plan to contain mitigation strategies specific to each hazard and for each incorporated area within the county.

Meeting 5: The planning team reviews the draft plan, proposes revisions, and accepts the plan after SIUC incorporates the necessary changes. Subsequently, SIUC will forward the county MHMP to the mitigation staff at the Illinois Emergency Management Agency (IEMA) for review prior to submitting it to FEMA.

2.2 Planning Team Information

Ryan Weber, the Monroe County EMA director, heads the planning team. The planning team includes representatives from various county departments, municipalities, and public and private utilities. Table 2-1 identifies the planning team individuals and the organizations they represent.

Table 2-1: Mitigation Planning Team Members

Name	Title	Organization	Jurisdiction
Ryan Weber	Director	Monroe County EMA	Monroe County
Delbert Wittenauer	County Commissioner	Monroe County	Monroe County
Kelton Davis	Superintendent of Schools	Monroe-Randolph Regional Office of Education	Monroe County
Carla Heise	Director	Monroe County EMS	Monroe County
Gene Henckler	Deputy Director	Monroe County EMA	Monroe County
Laura Henry	GIS Coordinator	Monroe County	Monroe County
Dan Kelly	County Sheriff	Monroe County's Sheriff's Office	Monroe County
Aaron Metzger	County Engineer	Monroe County Highway	Monroe County
Michael Pate	Health Emergency Planner	Monroe County Health Department	Monroe County
Dennis Rodenberg	Commissioner	Stringtown Drainage & Levee District	Monroe County
Austin Scheibe	EMA	Monroe County EMA	Monroe County
Kevin Scheibe	EMA	Monroe County EMA	Monroe County
Kim Strellis	SamReadyAm Coordinator	Monroe County EMA	Monroe County
Gary Stumpf	President	Fish Lake Levee & Drainage District	Monroe County
John Wagner	Administrator	Monroe County Health Department	Monroe County
Andrea Kohring	Health Emergency Planner	Monroe County Health Department	Monroe County
James Nagel	Zoning Administrator	City of Waterloo	Waterloo
Richard Scott	EMA	Waterloo EMA	Waterloo
Jim Trantham	Chief of Police	Waterloo Police Department	Waterloo

Brett Wiegand	1 st Assistant Chief	Waterloo Fire Department	Waterloo
Tim Ahrens	Assistant City Engineer	Department of Public Works	Columbia
Andrew Callis	Captain of Technical Rescue	Columbia Fire Department	Columbia
Paul Ellis	Director of Community Economic Development	City of Columbia	Columbia
Jerald Paul	Deputy Chief of Police	Columbia Police Department	Columbia
Matt Stephens	Captain of Haz-Mat	Columbia Fire Department	Columbia
Tom Andres	Chief of Police	Valmeyer Police Department	Valmeyer
Bret Langsdorf	EMA	Valmeyer EMA	Valmeyer
Lynden Prange	Fire Chief	Maeystown Fire Department	Maeystown
Jason Reynolds	Trustee	Maeystown	Maeystown
Kevin Biffar	Assistant Chief	Hecker Fire Department	Hecker
Justin Eckart	Captain	Hecker Fire Department	Hecker
Charles Kujawski	President	Village of Hecker	Hecker
Merrill Prange	Village Trustee	Village of Fults	Fults
Ron Mueller	Chief Engineer	Harrisonville Telephone Company	Harrisonville
Elizabeth McElveen	Safety Coordinator	Gateway FS	Private

The DMA 2000 planning regulations require that planning team members from each jurisdiction actively participate in the MHMP process. The planning team was actively involved on the following components:

- Attending the MHMP meetings
- Providing available assessment and parcel 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

A MHMP kickoff meeting was held in Waterloo on June 21, 2012. Representatives from SIUC explained the rationale behind the MHMP program and answered questions from the participants. SIUC representatives provided an overview of Hazus-MH, described the timeline and the process of the mitigation planning project, and presented Monroe County with a Memorandum of Understanding (MOU) for sharing data and information.

The planning team met on June 21, 2012, July 19, 2012, August 30, 2012, October 3, 2012 and January 7, 2013. Each meeting was approximately two hours in length. Appendix A includes the minutes for each meeting. 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.

2.3 Public Involvement

The Monroe County EMA solicited public input during the planning process, and a public meeting (Meeting #3) was held on August 30, 2012 to review the county's risk assessment. Appendix A contains the minutes from the public meeting. Appendix B contains press releases and/or articles sent to local newspapers throughout the public input process.

2.4 Neighboring Community Involvement

The planning team invited participation from various representatives of county government, local city and town governments, community groups, local businesses, and universities. The team also invited participation from adjacent counties to obtain their involvement in the planning process. Table 2-2 summarizes details of neighboring stakeholders' involvement.

Table 2-2: Neighboring Community Participation

Person Participating	Neighboring Jurisdiction	Title/Organization	Participation Description
Randy Lay	St. Clair County	Coordinator St. Clair County Emergency Management Agency	Reviewed plan; offered comments
Nancy Schilling	Randolph County	Coordinator Randolph Emergency County Management Agency	Reviewed plan; offered comments

2.5 Review of Technical and Fiscal Resources

The mitigation planning team identified representatives from key agencies to assist in the planning process. SIUC obtained technical data, reports, and studies from these agencies. Table 2-3 summarizes these organizations and their contributions.

Table 2-3: Key Agency Resources Provided

Agency Name	Resources Provided
Illinois Environmental Protection Agency	Illinois 2008 Section 303(d) Listed Waters and watershed maps
U.S. Census	County Profile Information, e.g., Population and Physical Characteristics
Department of Commerce and Economic Opportunity	Community Profiles
Illinois Department of Employment Security	Industrial Employment by Sector
NOAA National Climatic Data Center	Climate Data
Illinois Emergency Management Agency	2010 Illinois Natural Hazard Mitigation Plan
Illinois Water Survey (State Climatologist Office)	Climate Data
Headwaters Economics & The Bureau of Land Management	A Socioeconomic Profile – Monroe County, IL

2.6 Review of Existing Plans

Monroe County and its local communities utilized a variety of planning documents to direct community development. These documents include land use plans, comprehensive plans, emergency response plans, municipal ordinances, and building codes. The planning process incorporated the existing natural hazard mitigation elements from previous planning efforts. Table 2-4 lists the plans, studies, reports, and ordinances used to develop of the plan.

Table 2-4: Planning Documents Used for MHMP Planning Processes

Author(s)	Year	Title	Description	Where Used
FEMA	2011	Monroe County Flood Insurance Study	Describes the NFIP program, which communities participates; provide flood maps	Sections 4 and 5
Supervisor of Assessments	2011	GIS Database	Parcel and Assessor Data For Monroe County.	Section 4
State of Illinois Emergency Management Agency	2010	2010 Illinois Natural Hazard Mitigation Plan	This plan provides an overview of the process for identifying and mitigating natural hazards in Illinois as require by the Disaster Mitigation Act of 2000.	Guidance on hazards and mitigation measures and background on historical disasters in Illinois.
Monroe County	2006	Monroe County, Illinois Hazard Mitigation Plan	Monroe County hazard mitigation plan for emergency preparedness, response, and recovery.	Sections 3, 4, and 5
Monroe County	1994 and 2010	Monroe County, Illinois Comprehensive Plan	Provided information about future development and land use in Monroe County and its jurisdictions.	Section 4

2.7 Jurisdiction Participation information

SIUC intends this plan to meet the requirements of the DMA 2000 and that each incorporated jurisdiction adopts it. Table 2-5 lists the incorporated communities included in this multi-jurisdictional plan.

Table 2-5: Participating Jurisdictions

Jurisdiction Name
Monroe County
Waterloo
Columbia
Valmeyer
Maeystown
Hecker
Fults

2.8 Adoption by Local Governing Body

SIUC delivered the draft plan to the Monroe County multi-hazard mitigation planning team for review on January 7, 2013. SIUC incorporated any comments from the planning team into the plan. The planning team presented and recommended the plan to the County Commissioners, who adopted it on **<date adopted>**. Appendix C includes resolution adoptions of this plan.

2.9 Jurisdiction Participation

DMA 2000 regulations require that each jurisdiction participate in the planning process. Table 2-6 lists each jurisdiction and describes its participation in the construction of this plan.

Table 2-6: Participating Members from Each Jurisdiction

Jurisdiction Name	Participating Member	Participation Description
City of Waterloo	Jim Trantham	Reviewed plan; offered comments
City of Columbia	Matt Stephens	Reviewed plan; offered comments
Village of Valmeyer	Tom Andres	Reviewed plan; offered comments
Village of Maestown	Lynden Prange	Reviewed plan; offered comments
Village of Hecker	Charles Kujawski	Reviewed plan; offered comments
Village of Fults	Merrill Prange	Reviewed plan; offered comments
Monroe County	Delbert Wittenauer	Reviewed plan; offered comments

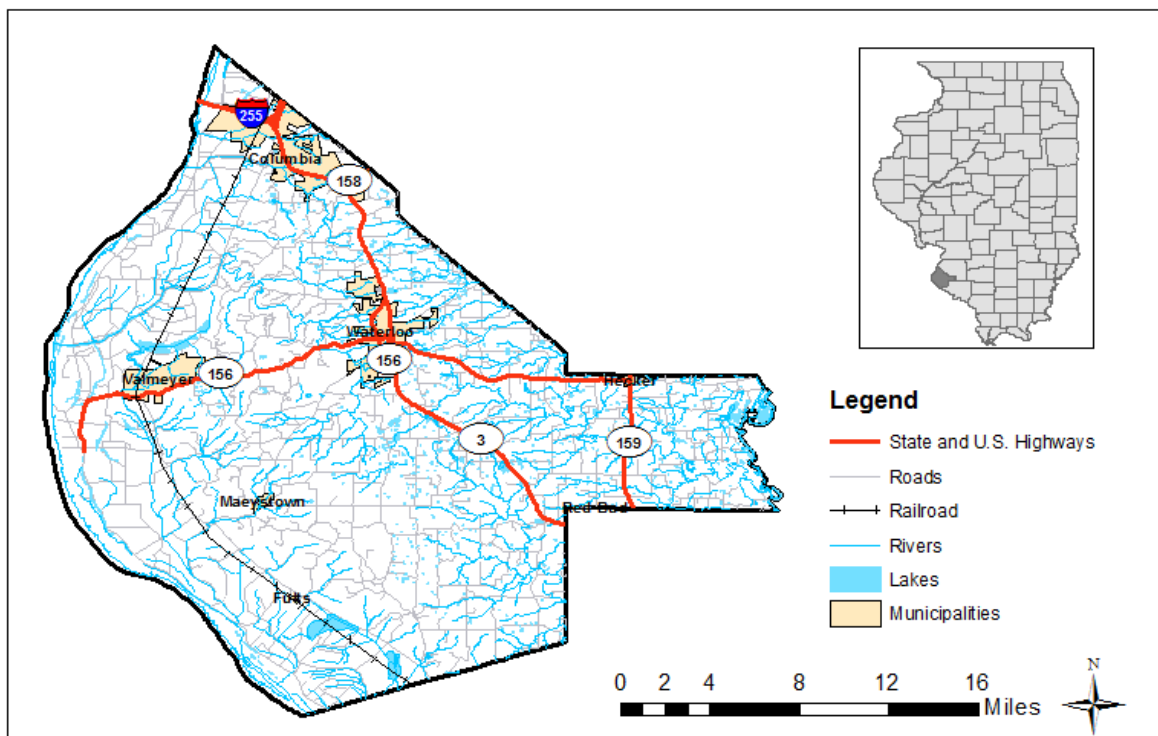
All members of the planning team actively participated in the MHMP meetings, providing available GIS data and historical hazard information, reviewing and providing comments on the draft plans, coordinating and participating in the public input process, and coordinating the county's formal adoption of the plan.

Section 3 County Profile

3.1 County Background

Monroe County, Illinois has a population of 32,957 as of 2010 (American FactFinder, 2012). Its county seat is Waterloo; its largest city is Columbia. Municipalities in Monroe County include the cities of Waterloo and Columbia and the villages of Valmeyer, Maeystown, Hecker, and Fuhs. The Mississippi River forms Monroe County's western boundary and the Kaskaskia River forms its eastern boundary. Philip Francois Renault founded the first European settlement in the county, St. Philippe, in 1723. Monroe County was established in 1816 as the 8th county in the Illinois Territory and was named after James Monroe, the 5th president of the United States.

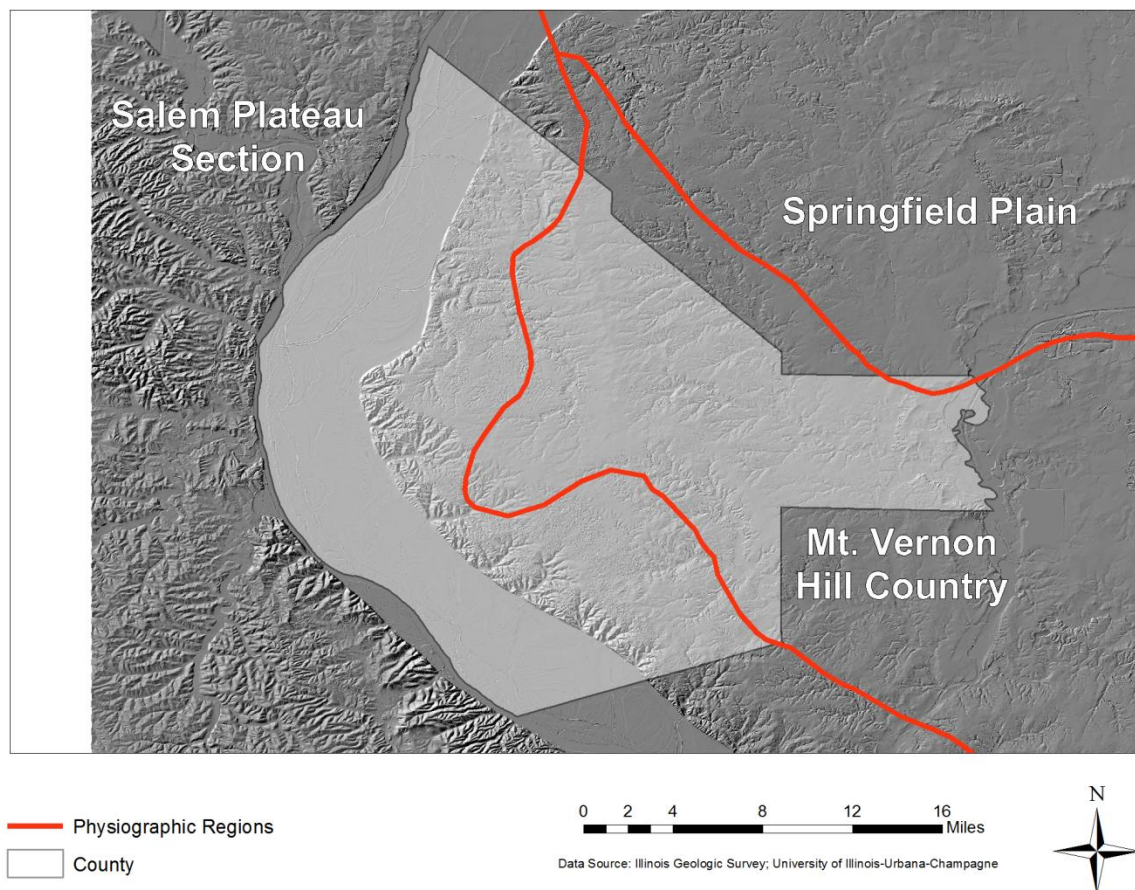
Figure 3-1: Monroe County's Geographical Location



3.2 Topography

Monroe County is situated in the Salem Plateau and Mt. Vernon Hill Country physiographic regions. Figure 3-2 depicts the physiographic regions.

Figure 3-2: Physiographic Divisions of Monroe County and the Surrounding Region



3.3 Climate

According to the National Weather Service, Monroe County climate is humid continental with warm summers. Average monthly temperatures range from 23 °F to 88 °F. The highest temperature on record is 107 °F and the lowest is -18 °F. Average annual precipitation is 42.27 inches, with most precipitation occurring in spring and summer months. The wettest year on record is 1973, with 52.73 inches of precipitation; the driest year on record is 1953, with 20.04 inches of precipitation. Average annual snowfall is approximately 19.6 inches.

3.4 Demographics

According to the 2010 US Census, Monroe County's population increased 19.3% from 2000 to 2010, and is 32,957 as of 2010 (American FactFinder, 2010). The population is spread through 10 precincts: Bluff,

Columbia, Harrisonville, Mitchie, Moredock, New Design, New Hanover, Prarie Du Long, Renault, and Waterloo. Monroe County has six incorporated jurisdictions, including: Waterloo, Columbia, Valmeyer, Maeystown, Hecker, and Fults. The largest incorporated jurisdiction in Monroe County is Waterloo, which has a population of approximately 9,707. Table 3-1 includes the breakdown of population by incorporated jurisdiction.

Table 3-1: Population by Incorporated Jurisdiction

Township	2010 Population	Percent of County
Waterloo	9,811	29.8
Columbia	9,707	29.5
Valmeyer	1,263	3.8
Maeystown	157	0.5
Hecker	481	1.5
Fults	26	0.1

3.5 Economy

American FactFinder (2010) reported that the civilian labor force comprised 69.6% of the workforce in Monroe County. Table 3-2 includes the employment distribution by industry. Manufacturing and education, health, and social services represent the largest sectors, employing approximately 31.7% of the workforce. The 2010 annual per capita income in Monroe County is \$32,342.

Table 3-2: Industrial Employment Sector

Industrial Sector	% Distribution in County 2010
Agriculture, forestry, fishing, hunting, and mining	1.7
Construction	8.0
Manufacturing	11.2
Wholesale trade	2.8
Retail trade	9.6
Transportation, warehousing and utilities	7.2
Information	2.9
Finance, insurance, real estate, and rental/leasing	7.3
Professional, technical services	9.8
Educational, health, and social services	20.5
Arts, entertainment, recreation	8.8
Other services	4.9
Public administration	5.3

3.6 Industry

According to the St. Louis Regional Chamber & Growth Association, Monroe County's major employers are Luhr Brothers construction, Monroe County Nursing, and the school districts of Columbia (#4) and Waterloo (#5). Table 3-3 lists these and other major employers.

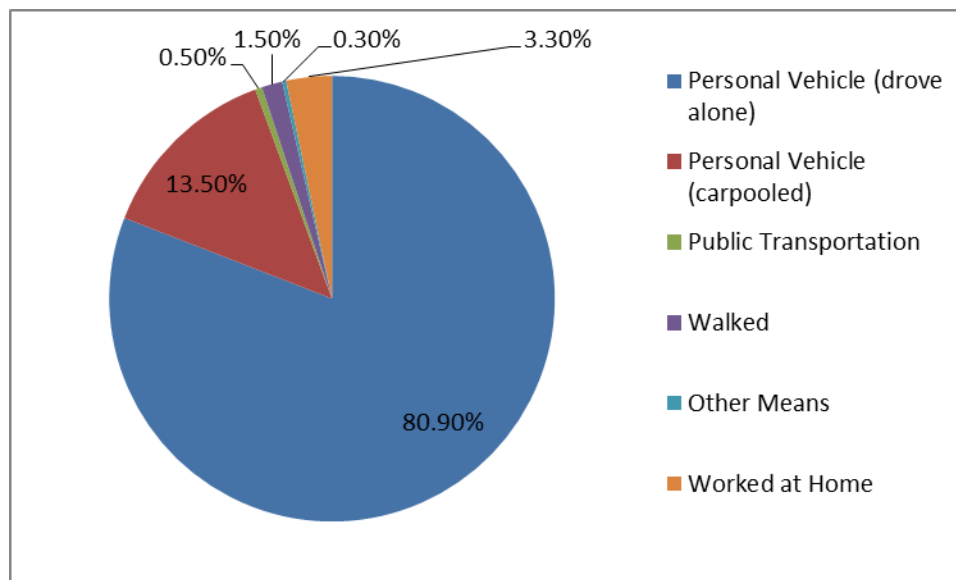
Table 3-3: Major Employers

Major Employer	Industry	Approximate Employment
Luhr Brothers	Construction	400
Waterloo School District #5	Education	350
Monroe County Nursing	Health Care	325
Columbia School District #4	Education	250
Maverick Technologies Holdings	Research Services	187
Columbia Care	Health Care	132
HTC Holding	Communications	122
Lighthouse Childcare	Education	110
Budnick Converting	Manufacturing	110
MAR Graphics	Other Services	90

3.7 Commuter Patterns

According to American FactFinder (2010), approximately 17,851 (54%) of Monroe County's population are in the work force as of 2010. The average travel time from home to work is 28.3 minutes. Figure 3-3 depicts the commuting patterns for Monroe County's labor force.

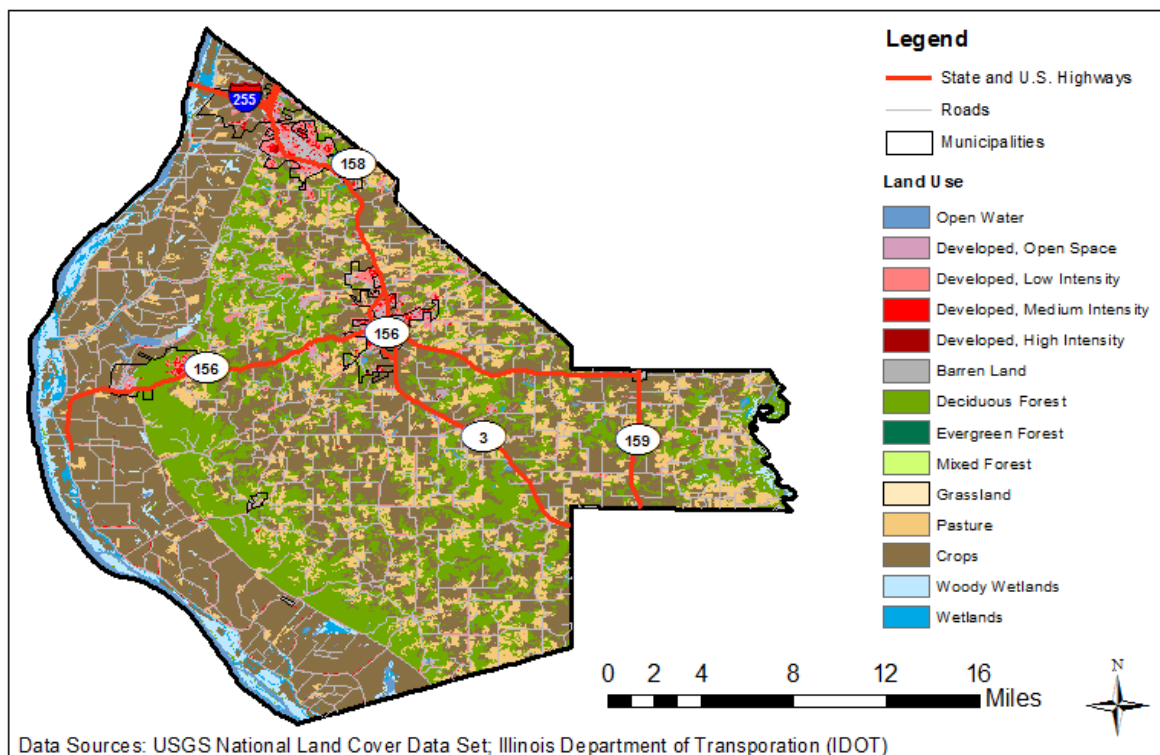
Figure 3-3: Commuter Patterns for Monroe County



3.8 Land Use and Development Trends

The predominant land cover in Monroe County is agriculture, pasture, and deciduous forest. Agricultural land is particularly prevalent on the Mississippi River floodplain in the western portion of Monroe County. Significant urban developments include the cities of Waterloo and Columbia. Interstate 255 provides access across the Mississippi River to the St. Louis metropolitan area. Major natural parks include Illinois Caverns State Natural Area and the Kaskaskia River State Fish and Wildlife Area. Monroe County has several listings in the National Register of Historic Places across Waterloo, Columbia, and Maestown. The Fountain Creek Bridge, a stone arch bridge built in 1849 by Herman Garleb, is a significant historic site in Monroe County.

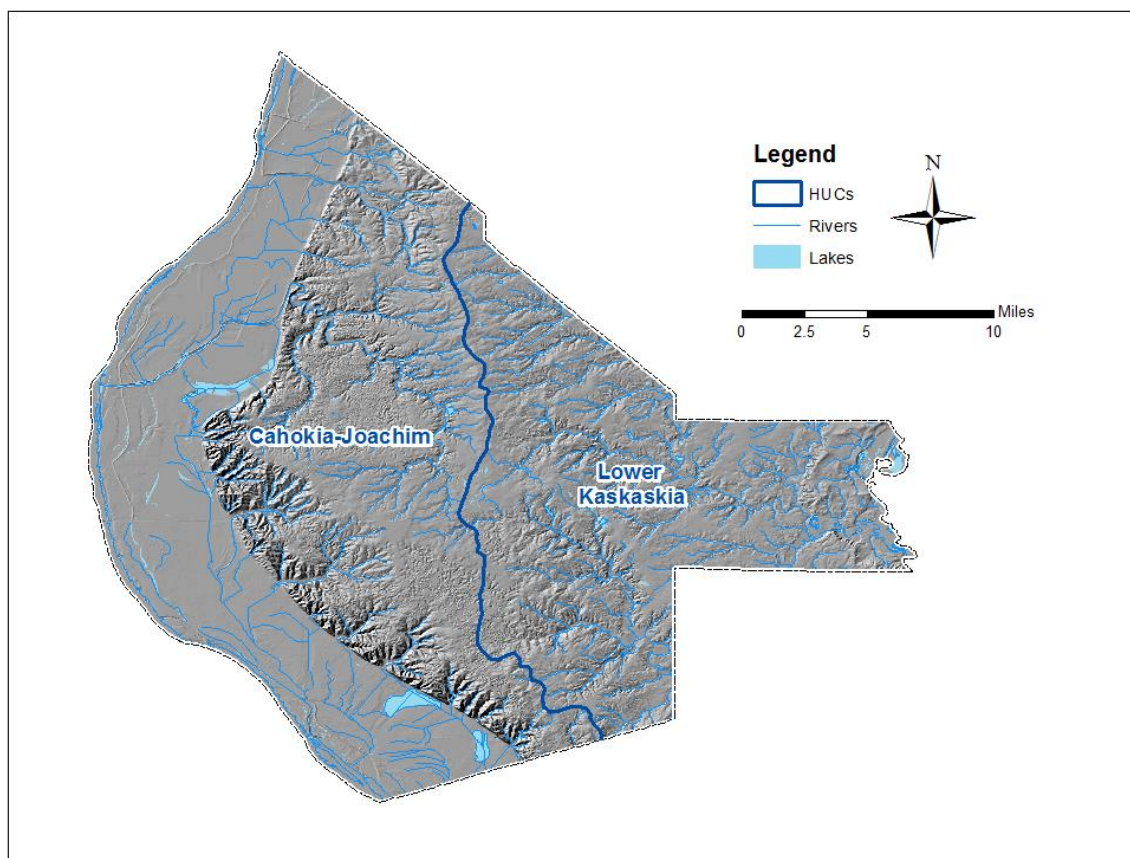
Figure 3-4: Land Cover in Monroe County



3.9 Major Lakes, Rivers and Watersheds

Monroe County has several bodies of water including the Mississippi River, Kaskaskia River, Moredock Lake, and Kidd Lake. The Mississippi River forms Monroe County's western border and the Kaskaskia River forms the easternmost boundary. According to the USGS, Monroe County consists of 2 drainage basins: the Cahokia-Joachim and the Lower Kaskaskia watersheds. Figure 3-5 depicts these hydrologic units within the county.

Figure 3-5: Major Lakes and Rivers in Monroe County



Section 4 Risk Assessment

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

4.1 Hazard Identification

4.1.1 Existing Plans

The plans identified in Table 2-4 did not contain a detailed risk analysis. SIUC and the planning team reviewed these local planning documents to identify historical hazards and help identify risk.

4.1.2 National Hazard Records

4.1.2.1 National Climatic Data Center (NCDC) Records

To assist the planning team, SIUC compiled historical storm event data from the National Climatic Data Center (NCDC). NCDC records are estimates of damage reported to the National Weather Service from various local, state, and federal sources. However, these estimates are often preliminary in nature and may not match the final assessment of economic and property losses.

The NCDC data included 283 reported events in Monroe County from 1968 to 2011 (the most updated information as of the date of this plan). The following hazard-profile sections each include a summary table of events related to each hazard type. Table 4-1 summarizes meteorological hazards reported by NCDC for Monroe County. Figures 4-1 and 4-2 summarize the relative frequency of NCDC reported meteorological hazards and the percent of total damage associated with each hazard for Monroe County. Full details of individual hazard events are on the [NCDC website](#). In addition to NCDC data, SIUC mapped Storm Prediction Center (SPC) data associated with tornadoes, strong winds, and hail using SPC-recorded latitudes and longitudes. Appendix D includes a map of these events.

Table 4-1: Summary of Meteorological Hazards Reported by NCDC for Monroe County, IL

Hazards	Time Period		Number of Events	Property Damage	Deaths	Injuries
	Start	End		Millions of Dollars		
Flooding	1994	2011	32	\$2.10	0	0
Severe Thunderstorms	1957	2011	169	\$1.81	0	0
Tornados	1957	2011	28	\$2.84	0	2
Winter Storms	1995	2011	26	\$0.05	2	6
Extreme Heat	1994	2011	28	\$0.1	18	355

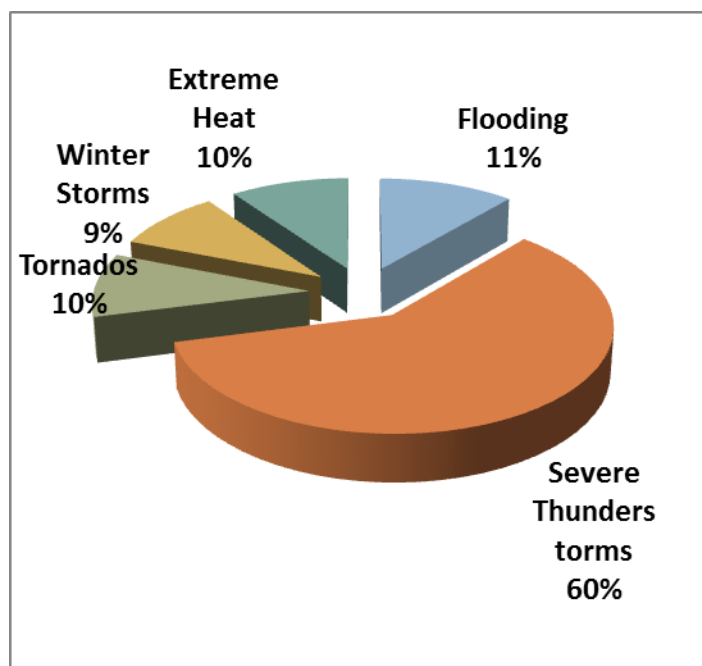
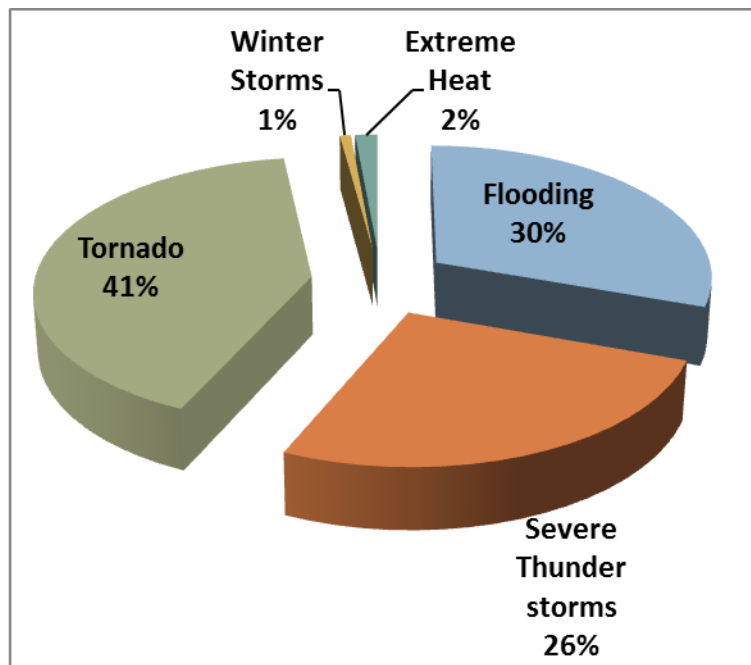
Figure 4-1: Number of Meteorological Events Reported by NCDC for Monroe County, IL

Figure 4-2: Percent Total Damage by Meteorological Hazard Reported by NCDC for Monroe County, IL

4.1.2.2 FEMA Disaster Information

Since 1965, FEMA has declared 55 disasters for the State of Illinois. Emergency declarations allow states to access FEMA funds for Public Assistance (PA); disaster declarations allow for even more PA funding, including Individual Assistance (IA) and the Hazard Mitigation Grant Program (HMGP). Monroe County has received federal aid for 15 declared disasters since 1965. Figure 4-3 depicts the disasters and emergencies that have been declared for Monroe County since 1965. Table 4-2 lists more specific information for each declaration.

Legend

FEMA Declared Disasters
Count by County from 1965-2011

0 - 3
4 - 6
7 - 9
10 - 13
14 - 18

Map showing FEMA Declared Disasters Count by County from 1965-2011. The map displays the distribution of disaster counts across Illinois counties, with a legend indicating the count ranges (0-3, 4-6, 7-9, 10-13, 14-18) and a compass rose.

Table 4-2: Details of FEMA-Declared Emergencies and Disasters in Monroe County (1965-2011)

Declaration Number	Date of Declaration	Description
276	08/30/1969	Flooding
373	04/26/1973	Flooding; Severe Storms
438	06/10/1974	Flooding; Severe Storms
583	04/30/1979	Flooding; Severe Storms
674	12/13/1982	Flooding; Severe Storm; Severe Winds; Tornado; Torrential Rains
684	06/06/1983	Flash Floods; Tornado; Thunderstorms
735	03/29/1985	Excessive Rainfall; Flooding; Ice Jam; Severe Storms
997	07/09/1993	Great Midwest Flood
1025	04/26/1994	Flash Floods; Thunderstorms; Torrential Rains
1053	05/30/1995	Flash Floods; Severe Storms; Severe Winds; Tornado; Thunderstorms; Torrential Rains
1112	05/06/1996	Severe Storms; Severe Winds; Torrential Rains
1416	05/21/2002	Flooding; Excessive Rainfall; Severe Storms; Tornado
3230	09/07/2005	Hurricane Sheltering
1681	02/09/2007	Severe Storms
1771	06/24/2008	Flooding; Severe Storms

4.1.3 Hazard Ranking Methodology

Based on planning team input, national datasets, and existing plans, Table 4-3 lists the hazards Monroe County will address in the MHMP. In addition, these hazards ranked the highest based on the Risk Priority Index (RPI) discussed in section 4.1.4.

Table 4-3: Planning Team Hazard List

Hazard
Winter Storms
Tornadoes
Severe Thunderstorms
Earthquakes
Floods
Wild Fires
Hazardous Materials Release
Extreme Heat

4.1.4 Calculating the Risk Priority Index

The RPI quantifies risk as the product of hazard probability and magnitude so planning team members can prioritize mitigation strategies for high-risk-priority hazards. Planning team members use historical hazard data to determine probability and knowledge of local conditions to determine the possible severity of a hazard. Tables 4-4 and 4-5 display the criteria the planning team used to quantify hazard probability and magnitude.

Table 4-4: Future Occurrence Ranking

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

Table 4-5: Hazard Magnitude

Magnitude/Severity	Characteristics
8 - Catastrophic	Multiple deaths. Complete shutdown of facilities for 30 or more days. More than 50% of property is severely damaged.
4 - Critical	Injuries and/or illnesses result in permanent disability. Complete shutdown of critical facilities for at least 14 days. More than 25% of property is severely damaged.

Magnitude/Severity	Characteristics
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.

The product of hazard probability and magnitude is the RPI. The planning team members ranked specified hazards based on the RPI, with larger numbers corresponding to greater risk. Table 4-6 identifies the RPI and ranking for each hazard specified by the planning team.

Table 4-6: Monroe County Hazards (RPI)

Hazard	Probability	Magnitude/Severity	Risk Priority Index	Rank
Thunderstorms	4	4	16	1
Winter Storms	3	4	12	2
Tornado	3	4	12	3
Flooding	3	2	6	4
Earthquakes	1	8	8	5
Extreme Heat	3	1	3	6
Hazardous Materials Release	2	1	2	7
Fire	2	1	2	8

4.1.5 Jurisdictional Hazard Ranking

Each jurisdiction created its own RPI because hazard susceptibility may differ by jurisdiction. During the five-year review of the plan, the planning team will update this table to ensure these jurisdictional rankings accurately reflect each community's assessment of these hazards. Table 4-7 lists the jurisdictions and their respective hazard rankings (Ranking 1 being the highest concern).

Table 4-7: Hazard Rankings by Jurisdiction

Jurisdiction	Hazard							
	Tornado	HAZMAT	Earthquake	Thunder storms	Flooding	Extreme Heat	Winter Storms	Wild Fire
Monroe County	3	7	4	1	5	6	2	8
Waterloo	2	5	4	1	6	n/a	3	7

Jurisdiction	Hazard							
	Tornado	HAZMAT	Earthquake	Thunder storms	Flooding	Extreme Heat	Winter Storms	Wild Fire
Columbia	2	8	4	3	5	7	1	6
Valmeyer	3	5	4	1	6	7	2	8
Maestown	2	8	3	4	5	n/a	1	7
Hecker	3	6	4	1	7	n/a	2	5
Fults								

4.1.6 GIS and Hazus-MH

The third step in this risk assessment is the risk analysis, which quantifies the risk to the population, infrastructure, and economy of the community. SIUC quantified the hazards using GIS analyses and Hazus-MH where possible. This process reflects a Level 2 Hazus-MH analysis. A level 2 Hazus-MH analysis involves substituting selected Hazus-MH default data with local data, improving the accuracy of model predictions.

Depending upon the analysis options and the quality of data the user inputs, Hazus-MH generates a combination of site-specific and aggregated loss estimates. Hazus-MH is not intended as a substitute for detailed engineering studies; it is intended to serve as a planning aid for communities interested in assessing their risk to flood-, earthquake-, and hurricane-related hazards. This plan does not fully document the processes and procedures completed in its development, but this documentation is available upon request.

Table 4-8 indicates the risk-assessment tool SIUC used to conduct a hazard risk analysis for each hazard.

Table 4-8: List of Risk Assessment Tools Used for Each Hazard

Hazard	Risk Assessment Tool(s)
Tornado	GIS-based
Winter Storms	Historical Records
Severe Thunderstorm	Historical Records
Extreme Heat and Drought	Historical Records
Flooding	Hazus-MH
Fire	Historical Records
Hazmat	GIS-based
Earthquakes	Hazus-MH

4.2 Vulnerability Assessment

4.2.1 Asset Inventory

4.2.1.1 Processes and Sources for Identifying Assets

SIUC first updated the Hazus-MH default critical facilities data using state resources. At meeting one, the planning team used their resources to further update this information. SIUC and the county used local GIS data to verify the locations of all critical facilities. SIUC GIS analysts incorporated these updates and corrections to the Hazus-MH data tables prior to performing the risk assessment. The updated Hazus-MH inventory contributed to a Level 2 analysis, which improved the accuracy of the risk assessment.

Updates to the default Hazus -MH data include:

- Updating the Hazus-MH defaults, critical facilities, and essential facilities based on the most recent available data sources.
- Reviewing, revising, and verifying locations of critical and essential point facilities with local input.
- Applying the essential facility updates (schools, medical care facilities, fire stations, police stations, and EOCs) to the Hazus-MH model data. Updating Hazus-MH reports of essential facility losses.

SIUC made the following assumptions during analysis:

- The building exposure for earthquake used Hazus-MH default data.
- The analysis is restricted to the county boundaries. Events that occur near the county boundaries do not contain damage assessments from adjacent counties.

4.2.1.2 Essential Facilities List

Table 4-9 identifies the number of essential facilities that SIUC added or updated for the analysis. Essential facilities are a subset of critical facilities. Appendices E and F include a map and a list of all critical facilities in Monroe County.

Table 4-9: Essential Facilities

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

4.2.1.3 Facility Replacement Costs

Table 4-10 identifies facility replacement costs and total building exposure. Monroe County provided local assessment data for updates to replacement costs. Table 4-10 also includes the estimated number of buildings within each occupancy class.

Table 4-10: Building Exposure

General Occupancy	Estimated Total Buildings	Total Building Exposure (x 1000)
Residential	11,607	\$3,271,023
Agriculture	437	\$19,265
Commercial	566	\$487,908
Education	18	\$26,982
Government	402	\$477,654
Religion	500	\$260,919
Industrial	74	\$ 78,900
Total	13,604	\$4,622,651

4.3 Future Development

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

Monroe County is vulnerable to a variety of natural hazards, therefore the county government—in partnership with state government—must make a commitment to hazard mitigation. Monroe County is committed to ensuring that county elected and appointed officials become informed leaders regarding community hazards so that they are better prepared to set and direct policies for emergency management in mitigation, preparedness, response, and recovery.

4.4 Hazard Profiles

4.4.1 Tornado Hazard

Hazard Definition

Tornadoes are 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 quickly and become a tornado. If the funnel cloud picks up and blows debris, it has reached the ground and is a tornado.

Tornadoes are a significant risk to Illinois and its citizens. Tornadoes can occur at any time on any day. The unpredictability of tornadoes makes them one of Illinois' most dangerous hazards. Tornado winds are violently destructive in developed and populated areas. Current estimates place maximum wind velocity at about 300 miles per hour, but higher values can occur. A wind velocity of 200 miles per hour results in a pressure of 102.4 pounds per square foot—a load that exceeds the tolerance limits of most buildings. Thus, it is easy to understand why tornadoes can devastate the communities they hit.

Tornadoes are classified according to the Enhanced Fujita tornado intensity scale. The Enhanced Fujita scale ranges from intensity EF0, with effective wind speeds of 40 to 70 miles per hour, to EF5 tornadoes,

with effective wind speeds of over 260 miles per hour. Table 4-11 outlines the Enhanced Fujita intensity scale.

Table 4-11: Enhanced Fujita Tornado Rating

Enhanced Fujita Number	Estimated Wind Speed	Path Width	Path Length	Description of Destruction
0 <i>Gale</i>	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 <i>Moderate</i>	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 <i>Significant</i>	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 <i>Severe</i>	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 <i>Devastating</i>	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 <i>Incredible</i>	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 of Tornadoes

The NCDC database reported 35 tornadoes/funnel clouds in Monroe County since 1805. The most recent recorded event occurred on April 22, 2011; NCDC reported 5 tornadoes during this event, in which EF2 was the maximum intensity.

Table 4-12 identifies NCDC-recorded tornadoes that caused damage, death, or injury in Monroe County. Additional details of individual hazard events are on the [NCDC website](#).

Table 4-12: NCDC-Recorded Tornadoes That Caused Damage, Death, or Injury in Monroe County

Location or County*	Date	Magnitude	Deaths	Injuries	Property Damage X \$1000	Crop Damage X \$1000
Waterloo	4/15/1994	F0	0	0	500	0
Burksville	5/18/1995	F2	0	0	110	0
Valmeyer	4/19/1996	F0	0	0	100	0
Monroe County	5/18/1995	F1	0	0	88	0
Maestown	5/18/1995	F2	0	0	75	0
Hecker	4/18/1975	F3	0	1	>50	0
Waterloo	4/3/1984	F0	0	0	>50	0
Burksville	5/18/1995	F1	0	0	50	0
Fults	3/19/1948	F2	0	0	30	0
Monroe County	5/18/1995	F1	0	0	23	0
Monroe County	5/6/2003	F1	0	0	10	0
Columbia	5/10/1959	F1	0	0	>5	0
Monroe County	5/26/1965	F1	0	0	>5	0
Waterloo	4/15/1998	F0	0	0	2	0
Columbia	3/8/1964	F1	0	0	>0.5	0
Fults	9/4/1965	F1	0	0	>0.5	0
Monroe County	3/15/1938	F2	1	18	0	0
Red Bud	11/17/1892	F3	2	7	0	0
Columbia	6/4/1877	F3	0	1	0	0
Waterloo	4/22/2011	EF2	0	1	0	0
Total			3	28	1,049	0

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

Geographic Location for Tornado Hazard

The entire county has the same risk of tornado occurrence. Tornadoes can occur at any location within the county.

Hazard Extent for Tornado Hazard

Historical tornadoes generally moved from southwest to northeast across the county. The extent of the hazard varies in terms of the size of the tornado, its path, and its wind speed.

Risk Identification for Tornado Hazard

Based on historical information, the probability of future tornadoes in Monroe County is likely. The county should expect tornadoes with varying magnitudes to occur in the future. Tornadoes ranked as the number 3 hazard according to the RPI.

RPI = Probability x Magnitude/Severity.

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

Vulnerability Analysis for Tornado Hazard

Tornadoes can occur within any area in the county; therefore, the entire county population and all buildings are vulnerable to tornadoes. To accommodate this risk, this plan considers all buildings located within the county as vulnerable. Table 4-9 and 4-10 display the existing buildings and infrastructure in Monroe County.

Critical Facilities

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

Building Inventory

Table 4-10 lists the building exposure in terms of types and numbers 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, damaging debris (trees or limbs), roofs blown off or windows broken by hail or high winds, and loss of building function (e.g., damaged home will no longer be habitable, causing residents to seek shelter).

Infrastructure

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

GIS-based Tornado Analysis

SIUC conducted one tornado scenario for Monroe County through the towns of Valmeyer, Waterloo, and Hecker. The planning team selected this scenario. The following analysis quantifies the anticipated impacts of tornadoes in the county in terms of numbers and types of buildings and infrastructure damaged.

SIUC used GIS-overlay modeling to determine the potential impacts of an F4 tornado. The analysis used a hypothetical path based upon the F4 tornado event that runs for 26 miles through Valmeyer, Waterloo and

Hecker, IL. Table 4-13 depicts tornado damage curves and path widths (NOAA) utilized for the modeled scenario. The damage curve is based conceptual wind speeds, path winds, and path lengths from the Enhanced-Fujita Scale guidelines.

Table 4-13: Tornado Path Widths and Damage Curves

Fujita Scale	Path Width (feet)	Maximum Expected Damage
5	2,400	100%
4	1,800	100%
3	1,200	80%
2	600	50%
1	300	10%
0	150	0%

Degrees of damage depend on proximity to the path centerline within a given tornado path. The most intense damage occurs within the center of the damage path, with decreasing amounts of damage away from the center. To model the F4 tornado, SIUC used GIS to create the desired tornado path and subsequently add buffers (damage zones) around the tornado path. Figure 4-4 and Table 4-14 illustrate the zone analysis. Figure 4-5 depicts the selected hypothetical tornado path, and Figure 4-6 shows the damage curve buffers.

Figure 4-4: Tornado Analysis (Damage Curves) Using GIS Buffers

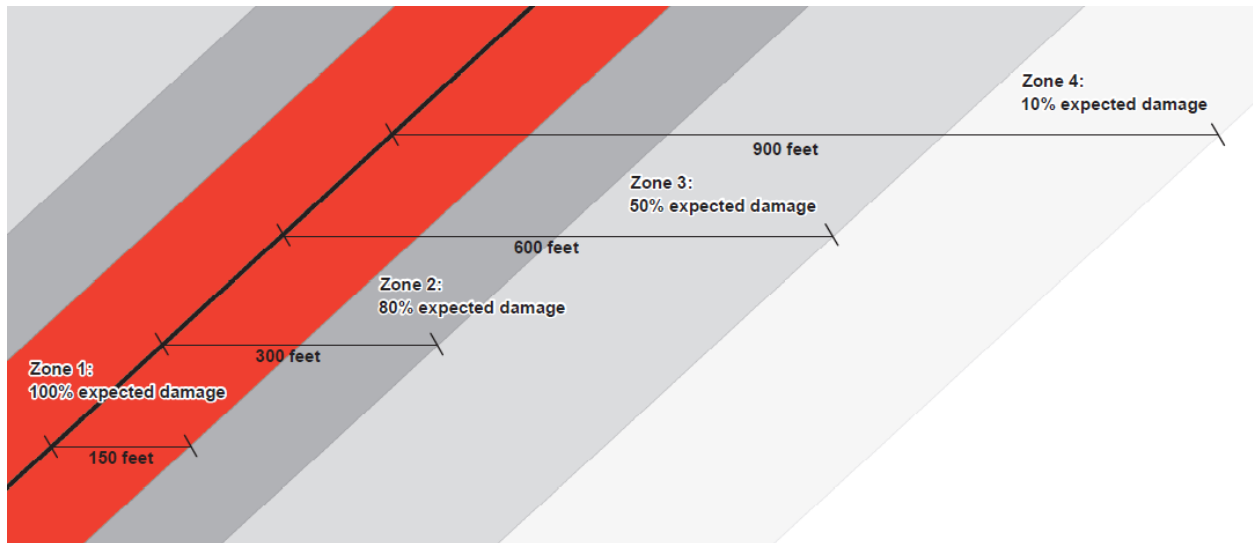


Table 4-14: F4 Tornado Analysis Using GIS Buffers

Zone	Buffer (feet)	Damage Curve
1	0-150	100%

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

Figure 4-5: Tornado Track through Valmeyer, Waterloo, and Hecker, IL

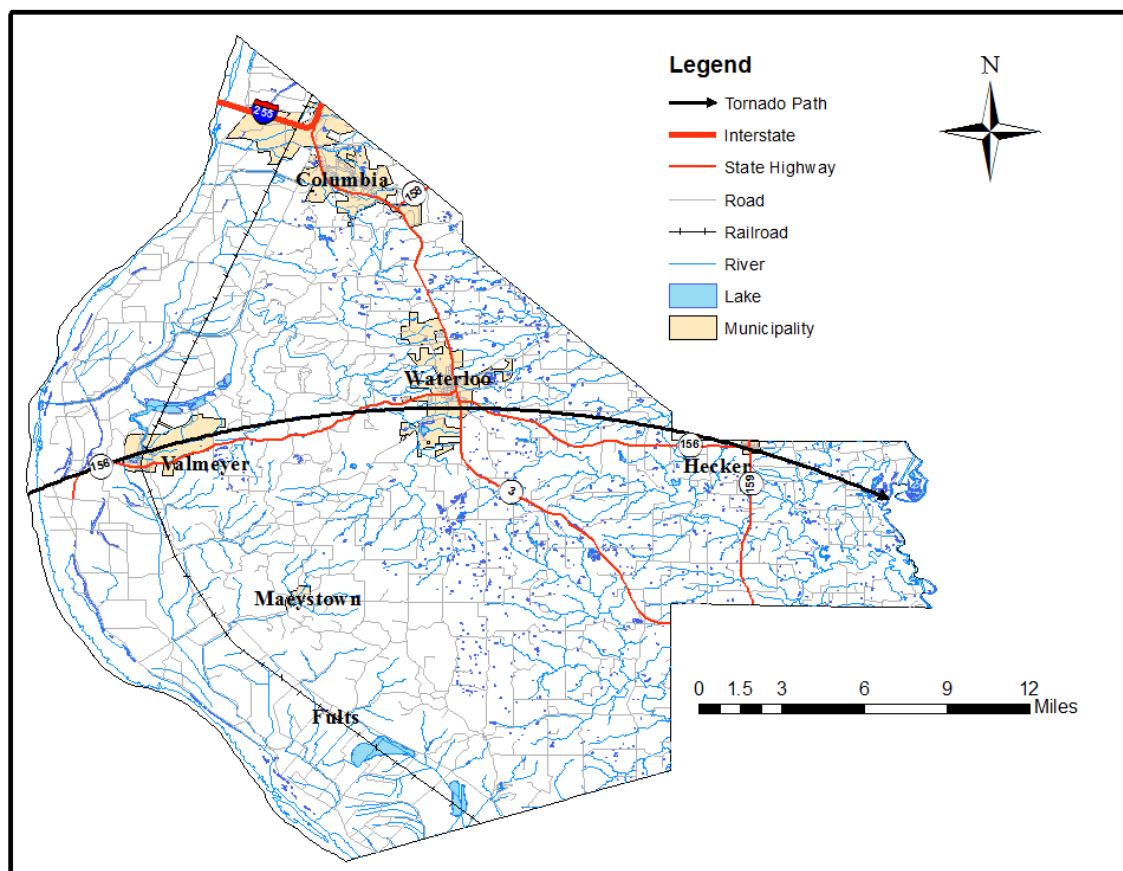


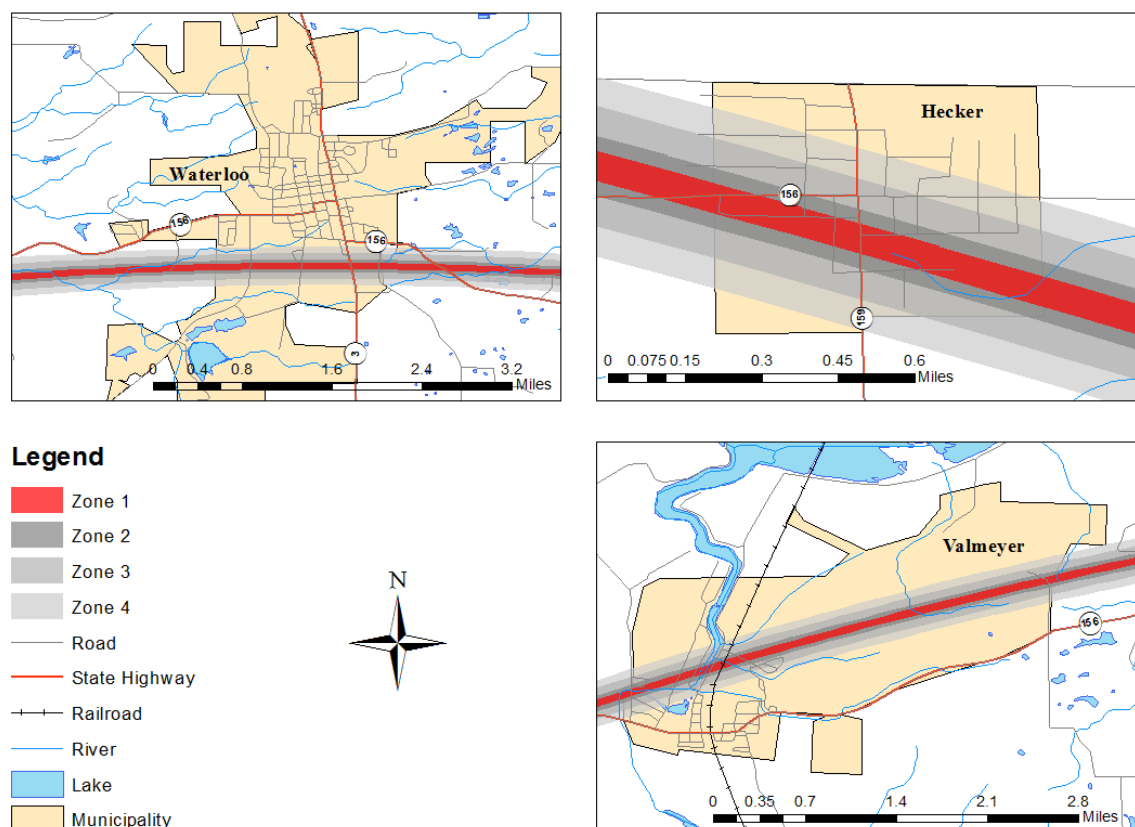
Figure 4-6: Modeled F4 Damage Buffers in Valmeyer, Waterloo, and Hecker, IL***Modeled Impacts of a F4 Tornado in Valmeyer, Waterloo, and Hecker, IL***

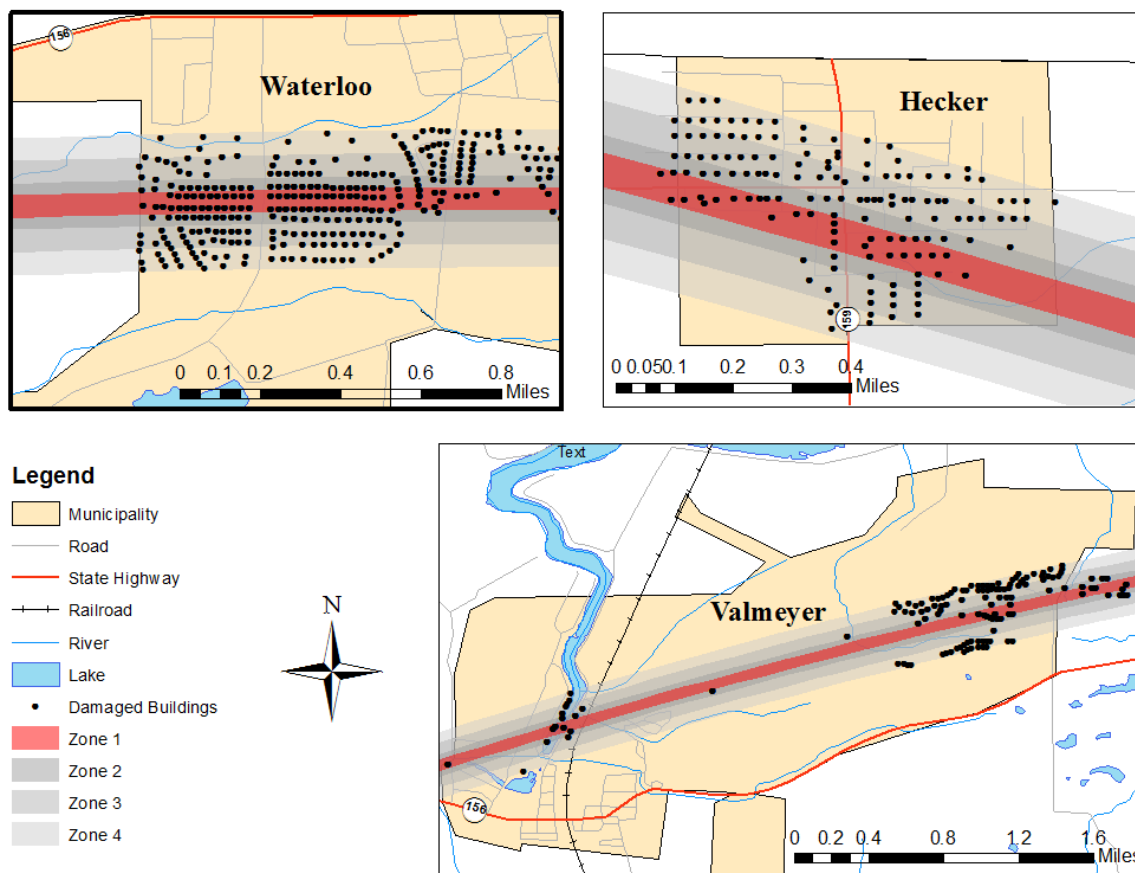
Table 4-15 and Figure 4-7 show the results of the tornado analysis. The GIS analysis estimates that the modeled tornado would damage 1,787 buildings, which is 46% of the total buildings in Valmeyer, Waterloo, and Hecker. The estimated building losses are over \$310 million. The building losses are an estimate of building replacement costs multiplied by the damage percent.

Table 4-15: Estimated Building Losses by Occupancy Type (X \$1000)

Occupancy	Zone 1	Zone 2	Zone 3	Zone 4
Residential	139	263	488	714
Commercial	6	9	15	19
Industrial	0	0	0	1
Agriculture	1	7	8	10
Religious	1	5	14	19

Occupancy	Zone 1	Zone 2	Zone 3	Zone 4
Government	1	10	16	27
Education	1	3	5	5
Total	149	297	546	795

Figure 4-7: Building Inventory Affected by the F4 Tornado in Valmeyer, Waterloo, and Hecker, IL

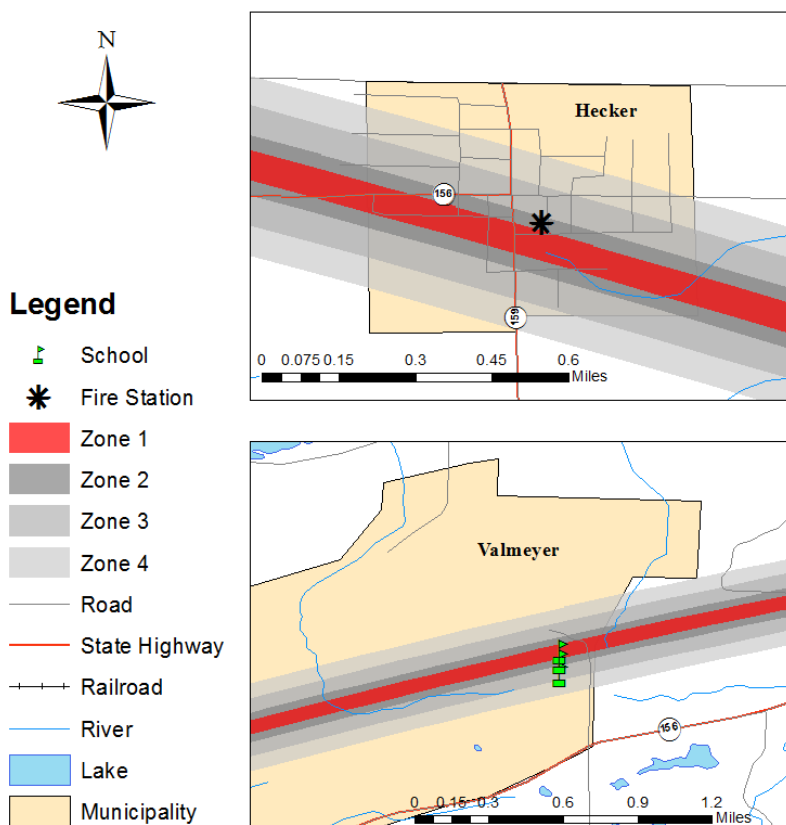


Critical Facilities Damage

There are six critical facilities located within 900 feet of the hypothetical tornado path. Table 4-16 identifies the affected facilities, and Figure 4-8 shows their geographic locations.

Table 4-16: Critical Facilities Affected by F4 Tornado in Valmeyer, Waterloo, and Hecker, IL

Critical Facility	Facility Name
Fire Stations	Hecker Fire Protection District
Schools	Valmeyer Elementary
	Valmeyer Junior High School
	Valmeyer High School
	Beck Area Career Center
	Beck AVC Alternative School

Figure 4-8: Essential Facilities Affected by the F4 Tornado in Valmeyer and Hecker, IL

Vulnerability to Future Assets/Infrastructure for Tornado Hazard

The entire population and all buildings are at-risk because tornadoes can occur anywhere within the state, at any time. Furthermore, any future development in terms of new construction within the county is at-risk. Table 4-10 includes the building exposure for Monroe County.

All critical facilities in the county are at-risk. Appendices E and F include a map and a list of all critical facilities in Monroe County.

Suggestions for Community Development Trends

Local officials will enhance severe storm preparedness if they sponsor a wide range of programs and initiatives to address the overall safety of county residents. The county needs to build new structures with more sturdy construction, and harden existing structures to lessen the potential impacts of severe weather. Building more warning sirens will warn the community of approaching storms to ensure the safety of Monroe County residents.

4.4.2 Flood Hazard***Hazard Definition for Flooding***

Flooding is a significant natural hazard throughout the United States. The type, magnitude, and severity of flooding are functions of the magnitude and distribution of precipitation over a given area, the rate at which precipitation infiltrates the ground, the geometry and hydrology of the catchment, and flow dynamics and conditions in and along the river channel. SIUC classifies floods as one of two types in this plan: 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 18 inches might carry off a car. Generally, upstream floods cause severe damage over relatively localized areas. Urban flooding is a type of upstream flood. Urban flooding involves the overflow of storm drain systems and can result from inadequate drainage combined with heavy rainfall or rapid snowmelt. Upstream or flash floods can occur at any time 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 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 landward of the levee. Dams and levees can fail due to either (1) water heights or flows above the capacity for which the structure was designed or (2) deficiencies in the structure such that it cannot hold back the potential energy of the water. If a dam or levee fails, issues of primary concern include loss of human life/injury, downstream property damage, lifeline disruption (e.g. 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 false sense of security leads to significantly increased risks downstream of dams and on floodplains protected by levees. Security leads to new construction, added infrastructure, and increased population over time, which means greater damages and losses when floods occur. 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 or less. When that maximum is exceeded by more than the design safety margin, the floodwaters will overtop the levee or the levee will otherwise fail, inundating communities in the land previously protected by that levee. A significant body of research suggests that climate change, land-use shifts, and some forms of river engineering increase the magnitude of large floods and the probability 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. are under-funded or otherwise neglected, leading to an unsatisfactory levee rating or, in the worst-case scenario, 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 compound into larger problems, increasing the risk of failure.

Previous Occurrences of Flooding

The NCDC database reported 32 flood events in Monroe County since 1993. Major Mississippi River Floods occurred in Monroe County during 1973, 1993, 1995, and 2008. The most severe flooding was the Great Midwestern Flood of 1993 when a catastrophic levee breach flooded the town of Valmeyer.

Table 4-17 identifies NCDC-recorded floods that caused damage, death, or injury in Monroe County. Additional details of individual hazard events are on the [NCDC website](#).

Table 4-17: NCDC Records of Flooding That Caused Damage, Death, or Injury in Monroe County

Location or County*	Date	Type	Deaths	Injuries	Property Damage x \$1000	Crop Damage X \$1000
Monroe County	05/09/1995	River Flood	0	0	15,000	12,000
Monroe	05/17/1995	Flash Flood	0	0	12	0

Location or County*	Date	Type	Deaths	Injuries	Property Damage x \$1000	Crop Damage X \$1000
County						
Columbia	09/22/1993	Flash Flood	0	0	5	5
Columbia	05/25/2008	Flash Flood	0	0	1	5
Red Bud	05/06/1993	Flash Flood	0	0	5	0
Monroe County	09/23/1993	Flash Flood	0	0	5	0
Waterloo	11/14/1993	Flash Flood	0	0	5	0
New Hanover	04/11/1994	Flash Flood	0	0	5	0
Columbia	04/28/1994	Flash Flood	0	0	5	0
Renault	06/28/1995	Rural Flood	0	0	1	0
Monroe County	1943 [#]	-	-	-	-	-
Monroe County	1957 [#]	-	-	-	-	-
Monroe County	1973 [#]	-	-	-	-	-
Monroe County	1993 [#]	-	-	-	-	-
Monroe County	1994 [#]	-	-	-	-	-
Monroe County	2008 [#]	-	-	-	-	-
Total			0	0	\$15,584	\$12,010

*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.

#These records are provided by the Monroe County planning team. They reflect events that pre-date NCDC recording, or they append NCDC records of the same year where planning team members found the damages to be inaccurate.

Previous Occurrences of Dam and Levee Failure

According to the Monroe County mitigation planning team, there are no records or local knowledge of any dam failure in the county. Since the completion of the federally constructed levees along the Mississippi River in the 1960s, Monroe County has experienced one levee failure. During the Great Midwestern Flood of 1993, the Harrisonville Levee Failed, resulting in the inundation of the Town of Valmeyer and several farms on the floodplain (Figure 4-9).

Repetitive Loss Properties

FEMA defines a repetitive loss structure as a structure covered by a contract of flood insurance issued under the NFIP that 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 $\geq 25\%$ of the market value of the structure at the time of each flood loss.

SIUC obtained the location of repetitive loss structures from the Illinois Emergency Management Agency (IEMA). Table 4-18 lists 2012 data for damages to these repetitive loss structures.

Table 4-18: Monroe County Repetitive Loss Structures

Jurisdiction	Occupancy Type	Number of Structures	Number of Losses
Columbia	Government, Agricultural	8	23
Valmeyer	Agricultural	1	2

Geographic Location for Flooding

Most flooding in Illinois occurs in the spring to early summer because of excessive rainfall and/or snowmelt. Severe thunderstorms may cause flooding during the summer or fall, but are often localized. The Mississippi and Kaskaskia Rivers are the primary sources of river flooding in Monroe County.

Flash floods, brief heavy flows in small streams or normally dry creek beds, also occur within the county.

The 2010 Preliminary DFIRM identified specific stream reaches for analysis. The map in Appendix D depicts areas of riverine flooding.

NOAA's Advanced Hydrologic Prediction Service provides information from stream gauges at points along various rivers across the United States. For Monroe County, there are no gauges located within the County. The nearest gauges on the Mississippi River to Monroe County are the St. Louis and Chester gauges. On the Kaskaskia River the closest gauge is New Athens (See Appendix E).

Geographic Location for Dam and Levee Failure

Hazus-MH identified 17 dams in Monroe County. Table 4-19 summarizes the dam and levee information. Appendix F contains a map showing the location of the dams in Monroe County.

Table 4-19: National Inventory of Dams for Monroe County, IL

Dam Name	River	Hazard	EAP
Hill Lake	Hill Lake Creek	H	N
Lake Mildred	One Mile Race Creek	L	N
Columbia Sportsman Club Lake	Palmer Creek	S	N
Waterloo New Reservoir	Fountain Creek	S	Y
Waterloo Reservoir 1	Fountain Creek	S	Y
Lake Ronnie	Rockhouse Creek	L	N
Lake Emmett	Horse Creek	L	N
Lake Loudel	Fountain Creek	L	N
Fisher Lake	Bradley Branch	L	N

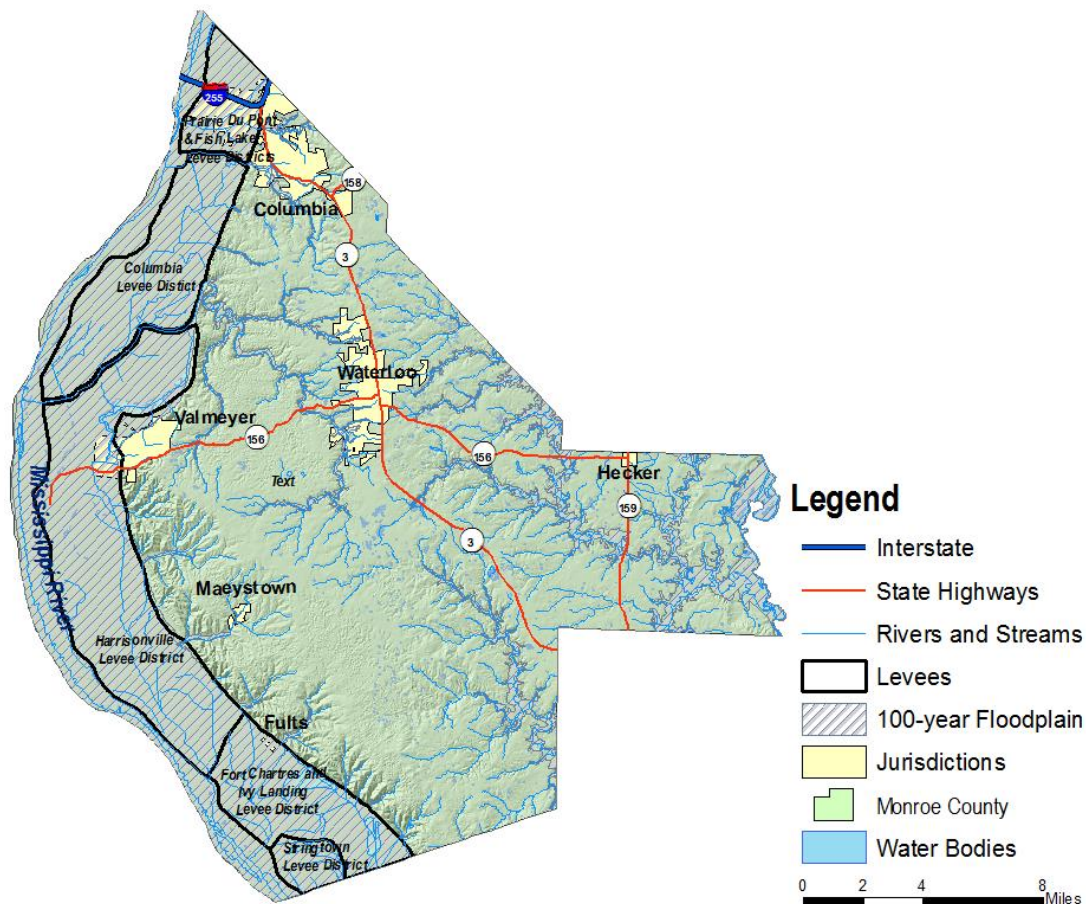
Dam Name	River	Hazard	EAP
Waterloo Reservoir 2	Fountain Creek	S	Y
Brand Lake	Prairie Du Long Creek	L	N
Waterloo Sportsman Club Lake 2	Horse Creek	L	N
Waterloo Sportsman Club Lake 1	Horse Creek	S	N
Village of Valmeyer	Murdock Lake	L	N
Keevan Lake	Prairie Du Long Creek	S	Y
Westview Acres Lake	Fountain Creek	L	N
West Lake Estates	Fountain Creek	S	Y

A review of the United States Army Corps of Engineers (USACE) and local records revealed 6 levee districts in Monroe County: Prairie Du Pont, Fish Lake, Columbia, Harrisonville, Stringtown, and Ft. Charles and Ivy Landing. Table 4-20 lists the levee districts and Figure 4-9 illustrates the levee districts.

Table 4-20: Levee and Drainage Districts in Monroe County, IL

Name	River	Sponsorship	Areas Protected (Acres)	Protection Level	Certification	
					PL 84 99 (USACE)	FEMA
Prairie Du Pont	Mississippi	Prairie Du Pont L&D	12,900	<100	Yes	No
Fish Lake	Mississippi	Fish Lake L&D			Yes	No
Columbia	Mississippi	Columbia D&L No 3	13,800	<100	Yes	No
Harrisonville	Mississippi	Harrisonville L&D	45,900	<100	Yes	No
Stringtown	Mississippi	Stringtown L&D			Yes	No
Ft. Charles & Ivy Landing	Mississippi	Fort Chartres and IVY L&D			Yes	No

Figure 4-9: Map of Levee Districts in Monroe County, IL



Hazard Extent for Flooding

All floodplains are susceptible to flooding in Monroe County. The floodplain of concern is for the 100-year flood event, shown in figure 4-9. However, flooding is dependent on various local factors including, but not limited to, impervious surfaces, amount of precipitation, river-training structures, etc.

Hazard Extent for Dam and Levee Failure

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

According to Monroe County records, one dam in Monroe County is classified as high hazard and five dams have Emergency Action Plans (EAP). An EAP is not required by the State of Illinois but is strongly recommended by the Illinois Department of Natural Resources.

Accurate mapping of flood risk behind levees requires knowing the condition and level of protection the levees actually provide. FEMA and the USACE work together to make sure that flood hazard maps clearly reflect the flood protection capabilities of levees, and that the maps accurately represent the flood risks posed to areas situated behind them. Levee owners—usually states, communities, or in some cases private individuals or organizations—are responsible for ensuring that the levees they own are maintained according to their design. Levee owners must provide documentation to prove the levee meets design, operation, and maintenance standards for protection against the one-percent-annual chance flood for FEMA to include the levee as a creditable flood-protection structure on its flood maps.

Risk Identification for Flood Hazard

Based on historical information, future occurrence of flooding in Monroe County is probable. According to the Risk Priority Index (RPI), flooding is ranked as the number 5 hazard.

RPI = Probability x Magnitude/Severity.

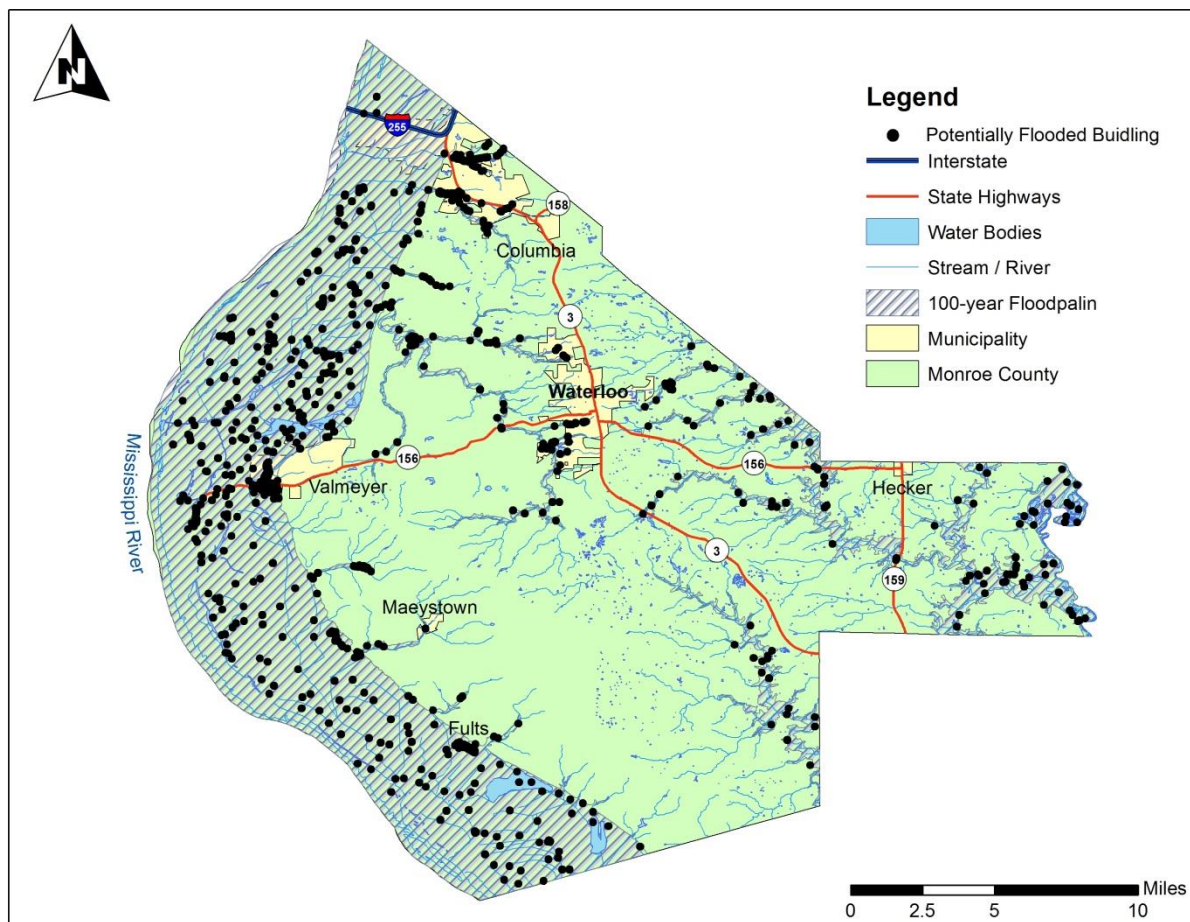
Probability	x	Magnitude /Severity	=	RPI
3	x	2	=	6

Risk Identification for Dam and Levee Failure

Based on operation and maintenance requirements and local knowledge of the dams and levees in Monroe County, the probability of failure is low to moderate. However, if a high-hazard dam or levee were to fail, the magnitude and severity of the damage could be great. The warning time and duration of the dam or levee failure event would be very short.

Hazus-MH Flood Analysis Using User-Defined Building Inventory

Hazus-MH generated the flood depth grid for a 100-year return period and made calculations by clipping the USGS one-third-arc-second DEM (~10 m) to the flood boundary. Next, SIUC used Hazus-MH to estimate the damages for Monroe County by utilizing a detailed building inventory database created from assessor and parcel data. According to this analysis, there are 861 buildings located in the Monroe County 100-year floodplain. The estimated damage to these structures is \$65.1 million. Figure 4-10 depicts the building inventory within the 100-year floodplain and Table 4-21 shows the lost estimates by occupancy class.

Figure 4-10: Monroe County 100-Year Floodplain Boundary**Table 4-21: Estimated Flood Losses within the 100-year Floodplain by General Occupancy Class**

Occupancy Class	Number of Structures	Estimated Building Related Losses (x \$1000)
Residential	461	\$42,647
Agricultural	138	\$3,571
Commercial	24	\$13,783
Industrial	6	\$684
Religious/Non Profit	43	\$4,420
Government	189	NA
Total	861	\$65,105

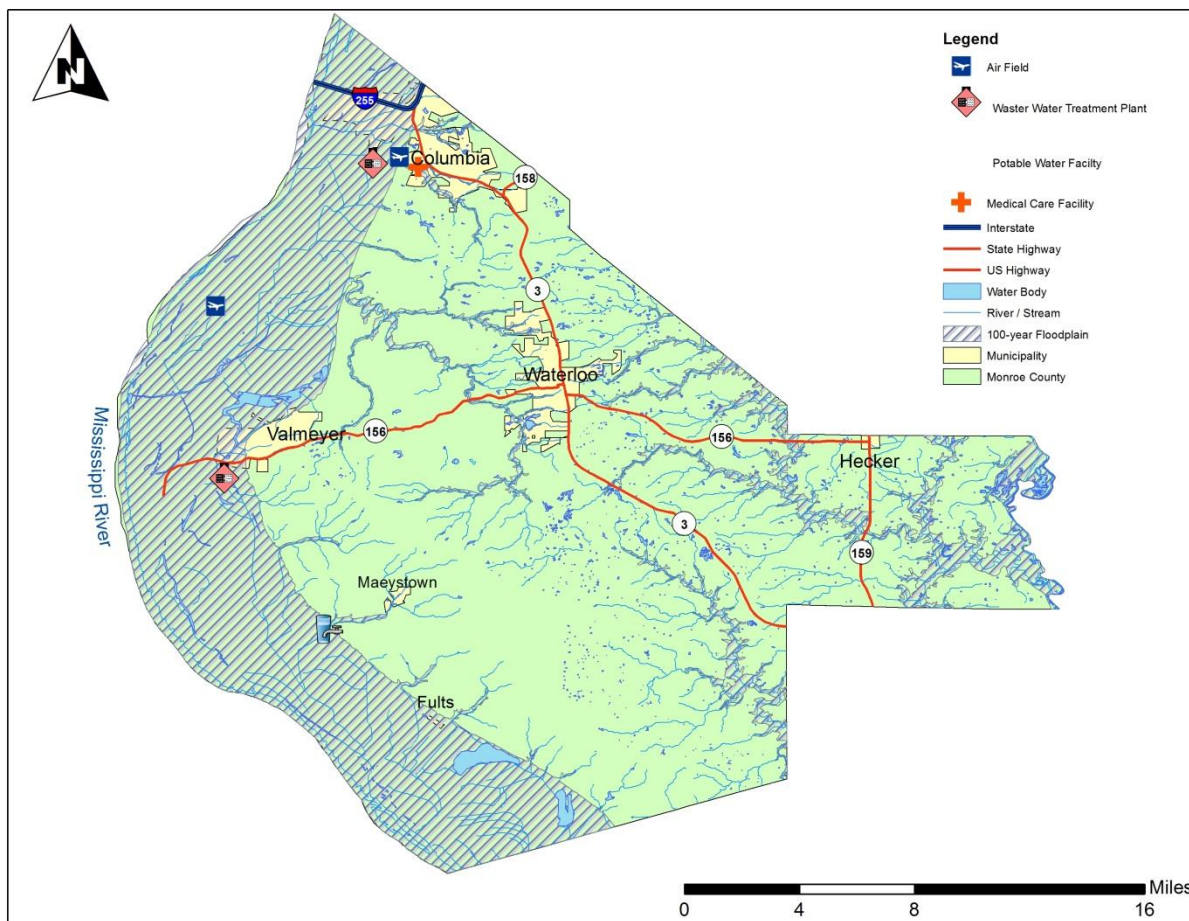
Critical Facilities

A critical 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 cannot serve the community). Appendices E and F include a map and a list of all critical facilities in Monroe County.

The analysis identified nine critical facilities that are subject to flooding. Table 4-22 lists these critical facilities, and Figure 4-11 displays them.

Table 4-22: Critical Facilities within the 100-year Floodplain

Critical Facility Type	Name of Facility
Medical Care	Columbia Convalescent Center
Electric Power	Valmeyer
	Fults
	Columbia
Potable Water Treatment	Mayestown Water Treatment Plant
Waste Water Treatment	Columbia Sewage Treatment Plant
	Valmeyer Sewage Treatment Plant
Air Fields	Sackman Field
	Jacobs Landing Strip

Figure 4-11: Critical Facilities within the 100 year floodplain

Infrastructure

The types of infrastructure potentially 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 a flood could damage any number of these items. The impacts to these items include: broken, failed, or impassable roadways; broken or failed utility lines (e.g., loss of power or gas to community); or railway failure from broken or impassable railways. Bridges could also fail or become impassable, causing risk to motorists.

Vulnerability Analysis for Flash Flooding

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

Appendices E and F include a map and a list of all critical facilities in Monroe County.

Suggestions for Community Development Trends

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

4.4.3 Earthquake Hazard

Hazard Definition

An earthquake is a shaking of the earth caused by the energy released when large blocks of rock slip past each other in the earth's crust. Imagine pressing two sandpaper blocks firmly together and trying to slide them past one another; at first they don't move at all, but as you continue to work harder they slip past each other very quickly. Similarly, blocks of the earth's crust (tectonic plates) are very slowly trying to slide past each other. When they build up enough energy, they quickly slip past each other, generating an earthquake.

Most earthquakes occur at plate tectonic boundaries; however, some earthquakes occur in the middle of plates, for example the New Madrid Seismic Zone or the Wabash Valley Fault System. Both of these seismic areas have a geologic history of strong quakes, and an earthquake from either seismic area could possibly affect Illinois counties. There may be other, currently unidentified faults in the Midwest also capable of producing strong earthquakes.

Strong earthquakes can collapse buildings and infrastructure, disrupt utilities, and trigger landslides, avalanches, flash floods, fires, and tsunamis. When an earthquake occurs in a populated area, it may cause death, injury, and extensive property damage. An earthquake might damage essential facilities, such as fire departments, police departments, and hospitals, disrupting emergency response services in the affected area. Strong earthquakes may also require mass relocation; however, relocation may be impossible in the short-term aftermath of a significant event due to damaged transportation infrastructure and public communication systems.

Earthquakes are usually measured by two criteria: intensity and magnitude (M). Earthquake intensity qualitatively measures the strength of shaking produced by an earthquake at a certain location and is determined from effects on people, structures, and the natural environment. Earthquake magnitude quantitatively measures the energy released at the earthquake's subsurface source in the crust, or epicenter. SIUC uses magnitude in the earthquake hazard analysis. Table 4-23 provides a comparison of magnitude and intensity, and Table 4-24 provides qualitative descriptions of intensity, for a sense of what a given magnitude might feel like.

Source: http://earthquake.usgs.gov/learning/topics/mag_vs_int.php

Table 4-23: Comparison of Earthquake Magnitude and Intensity

Magnitude (M)	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

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.

Previous Occurrences for Earthquakes

Historically, the most significant seismic activity in Illinois is associated with New Madrid Seismic Zone. The New Madrid Seismic Zone produced three large earthquakes in the central U.S. with magnitudes estimated between 7.0 and 7.7 on December 16, 1811, January 23, 1812, and February 7, 1812. These earthquakes caused violent ground cracking and volcano-like eruptions of sediment (sand blows) over an area >10,500 km², and uplifted a 50 km by 23 km zone (the Lake County uplift). The shaking was felt over

a total area of over 10 million km² (the largest felt area of any historic earthquake). 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 (M7.5-8.0) is 7%-10% over the next 50 years (USGS Fact Sheet 2006-3125).

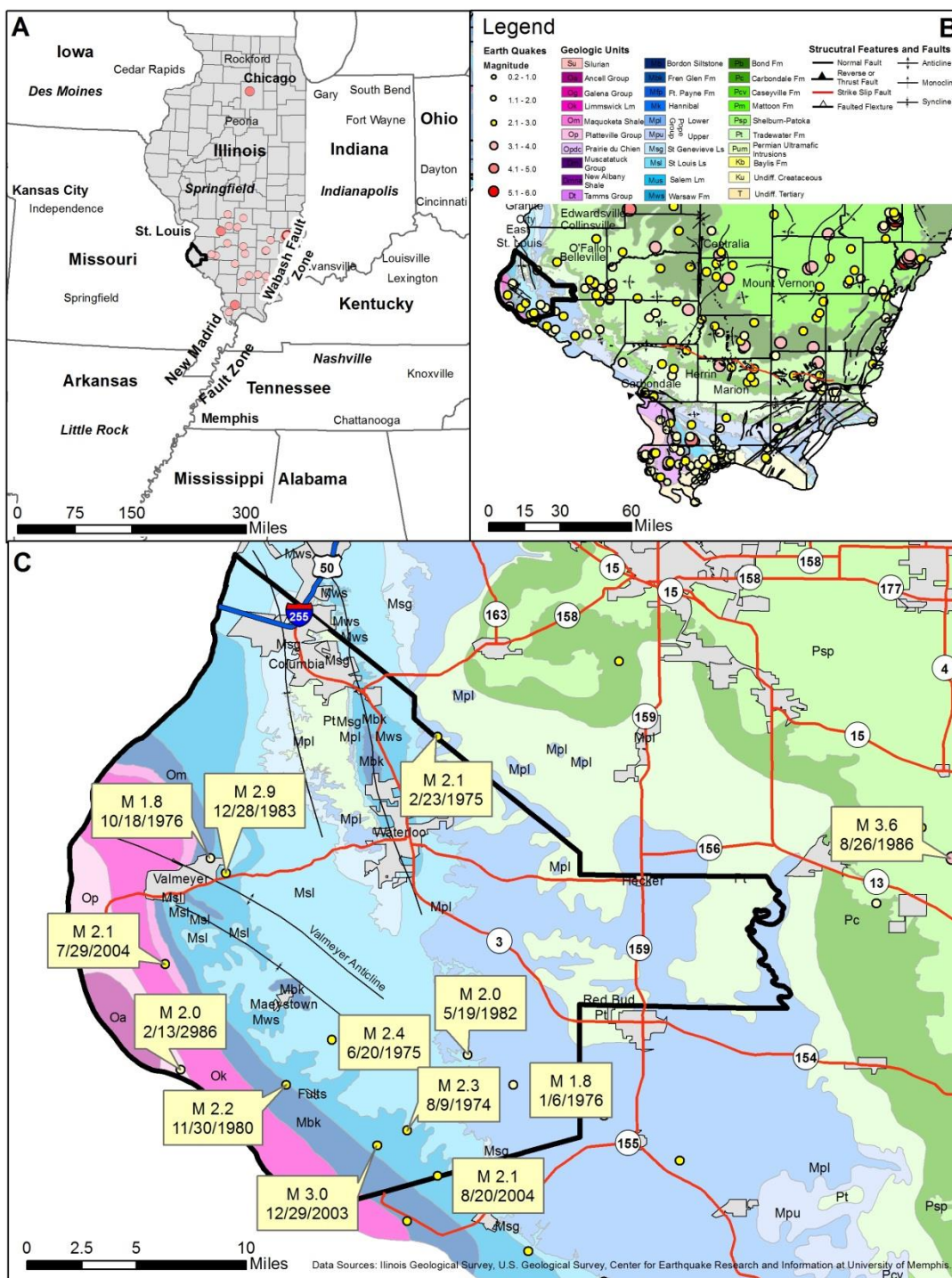
Earthquakes measured in Illinois typically vary in magnitude from very low microseismic events of M=1-3 to larger events up to M=5.4. The most recent earthquake in Illinois—as of the date of this report—is a M2.1 event on January 19, 2013 approximately two miles NNW of Valmeyer. The last earthquake in Illinois to cause minor damage occurred on April 18, 2008 near Mt. Carmel, IL and measured 5.2 in magnitude. Earthquakes resulting in more serious damage have occurred about every 70 to 90 years and are historically concentrated in southern Illinois.

Geographic Location for Earthquake Hazard

The two most significant zones of seismic activity in Illinois are the New Madrid Seismic Zone and the Wabash Valley Fault System. There are 11 earthquake epicenters recorded in Monroe County. The most recent earthquake (M2.1) with its epicenter in Monroe County occurred on January 19, 2013 (Figure 4-11). While large earthquakes (>M7.0) experienced during the New Madrid Events of 1811 and 1812 are unlikely in Monroe County, moderate earthquakes ($\leq 6.0M$) in or in the vicinity of Monroe County are probable. The USGS estimates the probability of a moderate M5.5 earthquake occurring in Monroe County within the next 500-years at approximately 20 percent (USGS 2009; Figure 4-12).

Figure 4-12 depicts the following: a) location of notable earthquakes in Illinois region; b) generalized geologic bedrock map with earthquake epicenters and geologic structures; c) geologic and earthquake epicenter map of Monroe County.

Figure 4-12: Earthquakes in Southern Illinois and Monroe County



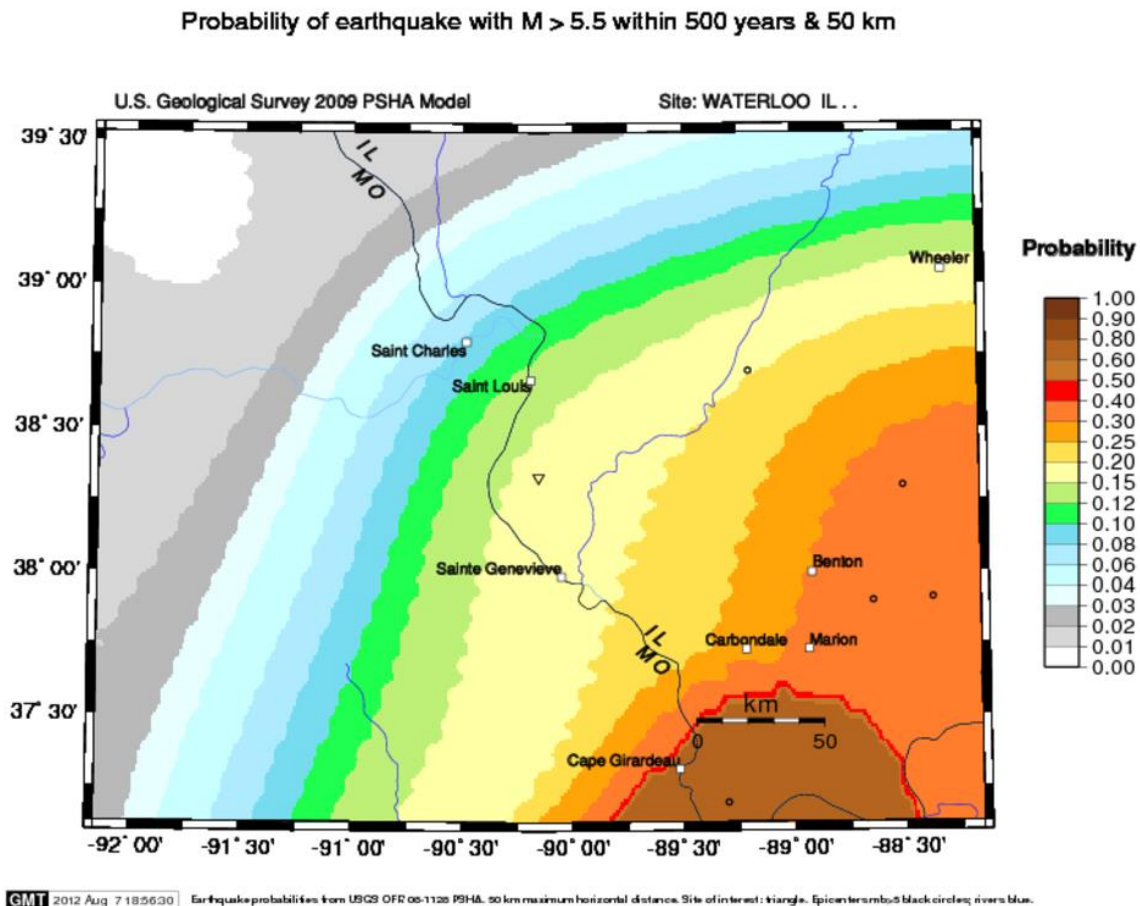
Hazard Extent for Earthquake Hazard

Earthquake effects are possible anywhere in Monroe County. One of the most critical sources of information that is required for accurate assessment of earthquake risk is soils data. SIUC used a National Earthquake Hazards Reduction Program (NEHRP) compliant soils map provided by FEMA for the analysis. The map identifies the soils most susceptible to failure.

Risk Identification for Earthquake Hazard

Based on historical information and current USGS and SIUC research and studies, future earthquakes in Monroe County are possible, but large ($>M7.0$) earthquakes that cause catastrophic damage are unlikely. Figure 4-13 illustrates the probability of a $M5.5$ event occurring within the next 500 years in the Monroe County region. According to the Monroe County planning team's assessment, earthquakes are ranked as the number 4 hazard.

Figure 4-13: USGS Probability Map of a $M5.5$ Earthquake Occurring in the Next 500 Years within Monroe County



RPI = Probability x Magnitude/Severity.

Probability	x	Magnitude /Severity	=	RPI
1	x	8	=	8

Vulnerability Analysis for Earthquake Hazard

Earthquakes could impact the entire county equally; therefore, the entire county's population and all buildings are vulnerable to an earthquake. To accommodate this risk, this plan considers 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., a damaged police station will no longer be able to serve the community). Appendices E and F include a map and a list of all critical facilities in Monroe County.

Building Inventory

Table 4-10 displays the building exposure in terms of types and numbers of buildings for the entire county. The buildings within the county can expect similar impacts 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 residents to seek shelter).

Infrastructure

During an earthquake, the types of infrastructure that shaking could impacted include roadways, utility lines/pipes, railroads, and bridges. Since an extensive inventory of the infrastructure is not available to SIUC, 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 also fail or become impassable, causing risk to motorists.

Hazus-MH Analyses for Earthquake Scenarios

SIUC reviewed existing geological information and recommendations for earthquake scenarios. SIUC ran a probabilistic and two deterministic earthquake scenarios to provide a reasonable basis for earthquake planning in Monroe County. The deterministic scenario was a Moment Magnitude of 5.5 with the epicenter located in Monroe County near Waterloo. This represents a realistic scenario for planning purposes.

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

The earthquake hazard modeling scenarios performed are:

- Magnitude 5.5 deterministic event near Waterloo, IL
- Magnitude 5.0 500-year probability event in Monroe County
- Magnitude 7.7 deterministic along the New Madrid Seismic Zone

Modeling a deterministic scenario requires user input for a variety of parameters. One of the most critical sources of information required for accurate assessment of earthquake risk is soils data. SIUC used a NEHRP soil classification map for Illinois in the analysis. NEHRP soil classifications portray the degree of shear-wave amplification that can occur during ground shaking. FEMA provided the soils map and liquefaction-potential map that is the default in Hazus-MH.

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

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

Results for 5.5M Scenario – General Building Stock

Tables 4-25 and 4-26 and Figure 4-14 show the results of the deterministic M5.5 earthquake scenario with an epicenter near Waterloo. Hazus-MH estimates that approximately 1,278 buildings will be at least moderately damaged. This is more than 10% of the total number of buildings in the region. Hazus-MH estimates that the event would damage 32 buildings beyond repair. Total building-related losses totaled \$97 million; 15% of the estimated losses were related to the business interruption. The residential occupancy class sustained the largest loss, experiencing 67% of the total loss.

Figure 4-14: M5.5 Magnitude Earthquake Scenario for Monroe County

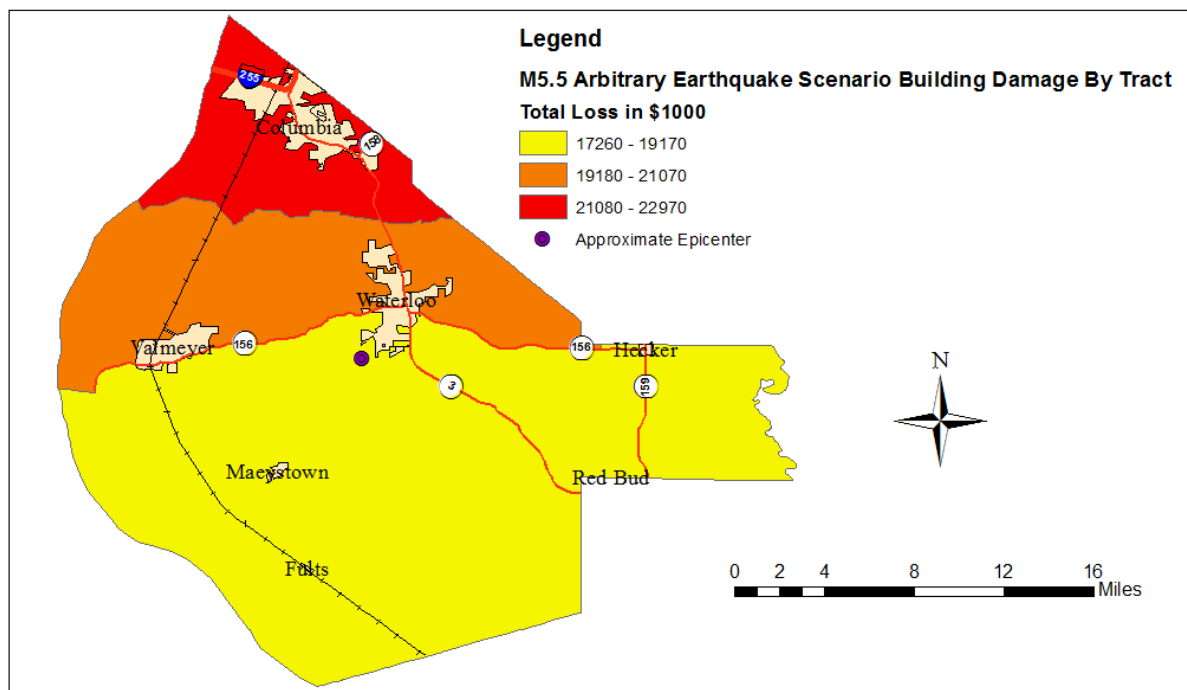


Table 4-25: Building Damage Estimates by Occupancy for a M5.5 Earthquake in Monroe County, IL

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	113	1.27	28	1.17	20	1.98	6	2.68	1	1.81
Commercial	405	4.53	112	4.64	71	6.90	19	9.08	2	7.50
Education	11	0.12	3	0.13	2	0.21	1	0.28	0	0.34
Government	12	0.14	3	0.13	2	0.19	0	0.21	0	0.24
Industrial	128	1.43	34	1.41	23	2.19	6	2.89	1	2.19
Other Residential	1,758	19.66	505	20.92	238	22.98	46	21.76	6	19.59
Religion	32	0.35	9	0.37	6	0.54	2	0.72	0	0.70
Single Family	6,481	72.50	1,719	71.24	672	65.01	132	62.39	22	67.63
Total	8,940		2,414		1,034		212		32	

Table 4-26: Building Economic Losses (in Millions of Dollars) for a M5.5 in Monroe County, IL

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.00	0.24	2.19	0.06	0.14	2.63
	Capital-Related	0.00	0.10	2.13	0.04	0.04	2.30
	Rental	1.08	0.58	1.17	0.02	0.05	2.90
	Relocation	4.01	0.43	1.65	0.14	0.52	6.76
	Subtotal	5.09	1.35	7.14	0.26	0.75	14.59
Capital Stock Losses							
	Structural	6.80	0.94	2.03	0.35	0.88	11.00
	Non_Structural	29.74	5.93	8.03	1.92	2.26	47.88
	Content	12.99	2.02	5.39	1.33	1.66	23.39
	Inventory	0.00	0.00	0.17	0.26	0.09	0.52
	Subtotal	49.53	8.89	15.60	3.86	4.90	82.78
	Total	54.62	10.24	22.74	4.12	5.65	97.37

Results for 500-Year Probabilistic Scenario – General Building Stock

Tables 4-27 and 4-28 show the results of the 500-year probabilistic analysis. Hazus-MH estimates that the event would at least moderately damage approximately 1,109 buildings. This is more than 8.0% of the total number of buildings in the region. Hazus-MH estimates that the event would damage 19 buildings beyond repair. Building-related losses totaled \$59.91 million; 21% of the estimated losses were related to the business interruption of the region. The residential occupancy class sustained the largest loss, experiencing 62% of the total loss.

Table 4-27: 500-Year Probabilistic Earthquake Damage Estimates by Building Occupancy for Monroe County, IL

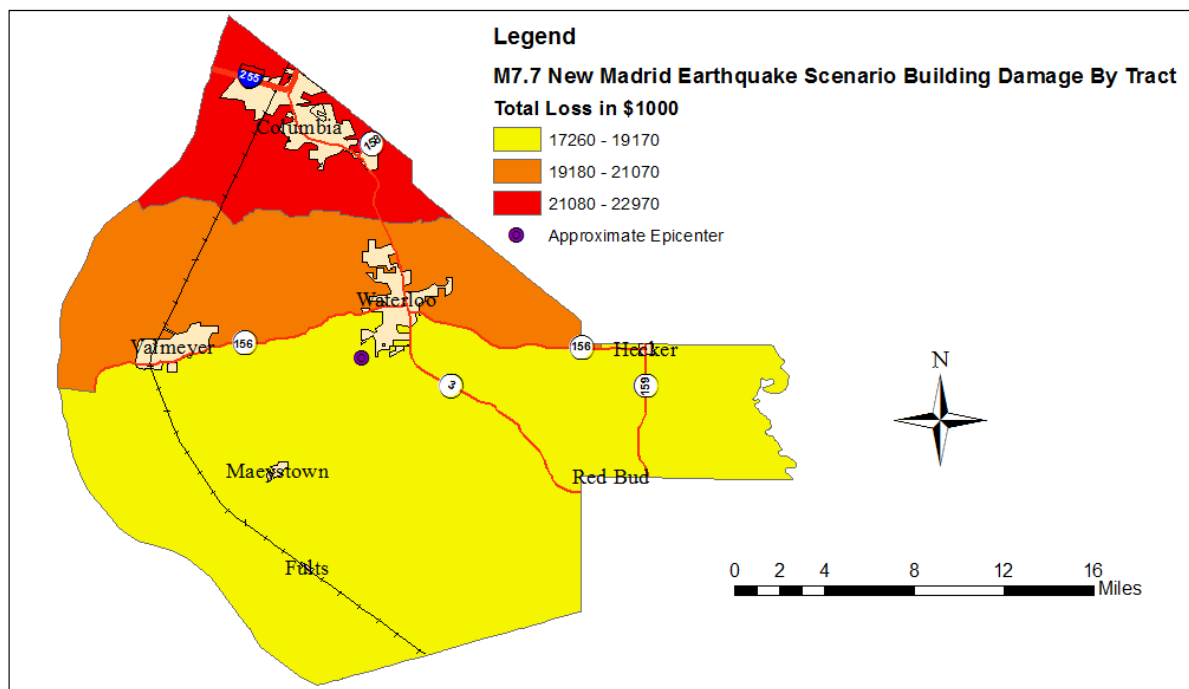
	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	107	1.12	31	1.45	24	2.80	7	4.24	1	3.11
Commercial	402	4.23	115	5.45	73	8.61	18	11.77	2	9.46
Education	12	0.12	3	0.14	2	0.23	0	0.25	0	0.31
Government	12	0.13	3	0.16	2	0.26	0	0.25	0	0.33
Industrial	124	1.31	35	1.69	24	2.88	6	4.07	1	3.10
Other Residential	1,879	19.76	435	20.68	199	23.57	36	23.16	4	20.31
Religion	33	0.35	8	0.39	5	0.59	1	0.81	0	0.75
Single Family	6,939	72.98	1,473	70.04	516	61.06	86	55.46	12	62.63
Total	9,509		2,104		845		156		19	

Table 4-28: 500-Year Probabilistic Earthquake Estimates of Building Economic Losses (in Millions of Dollars) for Monroe County, IL

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.00	0.12	2.12	0.06	0.12	2.42
	Capital-Related	0.00	0.05	2.09	0.04	0.03	2.21
	Rental	0.77	0.37	1.14	0.02	0.05	2.35
	Relocation	2.87	0.34	1.59	0.15	0.46	5.42
	Subtotal	3.65	0.88	6.94	0.27	0.66	12.40
Capital Stock Losses							
	Structural	4.95	0.68	1.88	0.37	0.88	8.76
	Non_Structural	17.44	3.10	4.98	1.08	1.36	27.96
	Content	5.77	0.81	2.50	0.65	0.80	10.54
	Inventory	0.00	0.00	0.07	0.13	0.05	0.25
	Subtotal	28.16	4.59	9.43	2.23	3.10	47.51
	Total	31.80	5.47	16.37	2.50	3.76	59.91

Results for M7.7 New Madrid Earthquake Scenario

Tables 4-29 and 4-30 and Figure 4-15 show the results of a M7.7 New Madrid earthquake scenario. Hazus-MH estimates that the event would at least moderately damage approximately 7 buildings. Building-related losses totaled \$6.78 million; 10% of the estimated losses were related to the business interruption of the region. The residential occupancy class sustained the largest loss, experiencing 65% of the total loss.

Figure 4-15: M7.7 New Madrid Earthquake Scenario for Monroe County**Table 4-29: New Madrid Earthquake Damage Estimates by Building Occupancy for Monroe County, IL**

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	166	1.32	2	2.11	0	3.23	0	0.85	0	0.00
Commercial	603	4.81	7	6.99	1	10.35	0	5.87	0	0.00
Education	17	0.13	0	0.22	0	0.25	0	0.15	0	0.00
Government	18	0.14	0	0.20	0	0.25	0	0.08	0	0.00
Industrial	189	1.51	2	2.23	0	3.46	0	1.73	0	0.00
Other Residential	2,525	20.15	26	28.00	2	29.43	0	17.29	0	0.00
Religion	47	0.38	1	0.57	0	0.71	0	0.40	0	0.00
Single Family	8,967	71.56	56	59.68	3	52.32	1	73.63	0	0.00
Total	12,531		94		6		1		0	

Table 4-30: Building Economic Losses (in Millions of Dollars) for M 7.7 New Madrid Scenario

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.00	0.00	0.02	0.00	0.00	0.02
	Capital-Related	0.00	0.00	0.02	0.00	0.00	0.02
	Rental	0.01	0.00	0.02	0.00	0.00	0.03
	Relocation	0.02	0.00	0.01	0.00	0.00	0.04
	Subtotal	0.03	0.01	0.06	0.00	0.01	0.11
Capital Stock Losses							
	Structural	0.08	0.01	0.02	0.00	0.01	0.12
	Non_Structural	1.94	0.45	0.89	0.28	0.24	3.80
	Content	1.35	0.20	0.71	0.19	0.21	2.67
	Inventory	0.00	0.00	0.02	0.04	0.01	0.07
	Subtotal	3.37	0.67	1.65	0.52	0.47	6.67
	Total	3.40	0.68	1.71	0.52	0.47	6.78

Vulnerability to Future Assets/Infrastructure for Earthquake Hazard

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

Suggestions for Community Development Trends

Community development should occur outside of the low-lying areas in floodplains with a water table within five feet of grade that is susceptible to liquefaction.

In Meeting #4, the MHMP team discussed specific mitigation strategies for reducing earthquake hazard. The discussion included strategies to harden and protect future and existing structures against the possible termination of public services and systems including power lines, water and sanitary lines, and public communication (see Section 5).

4.4.4 Thunderstorm Hazard

Hazard Definition – Thunderstorm

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

- Hail 0.75 inches or greater in diameter
- Frequent and dangerous lightning
- Wind speeds greater than or equal to 58 miles per hour

Hail

Hail is a possible product of a strong thunderstorm. Hail usually falls near the center of a storm, but strong winds occurring at high altitudes in the thunderstorm can blow the hailstones away from the storm center, resulting in damage in other areas near the storm. Hailstones range from pea-sized to baseball-sized, and 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 lightning damages 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 in 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 82 hail storms in Monroe County since 1971. Hail storms occur nearly every year in the late spring and early summer months. The most recent reported occurrence was in June of 2012, when a strong cold front triggered showers and thunderstorms around Hecker.

Table 4-31 identifies hail storms that caused damage, death, or injury in Monroe County. Additional details of individual hazard events are on the [NCDC website](#).

Table 4-31: NCDC-Recorded Hail Storms That Caused Damage, Death, or Injury for Monroe County, IL

Location or County*	Date	Type	Magnitude	Deaths	Injuries	Property Damage X \$1000
Columbia	05/06/1993	Hail	1.75 in.	0	0	5
Columbia	05/06/1993	Hail	1.75 in.	0	0	5
RedBud	04/19/1993	Hail	1.75 in.	0	0	1
Total				0	0	11

*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 significant lightning strikes in Monroe County.

The NCDC database includes 88 wind storms reported since 1968. The most recent event was in June of 2011, when thunderstorms blew down several large tree limbs near Waterloo.

Table 4-32 shows that thunderstorms occur year-round with the greatest frequency and damage between May and July. The following table includes thunder storms that have caused damage, death, or injury in Monroe County. Additional details of individual hazard events are on the [NCDC website](#).

Table 4-32: NCDC-Recorded Wind Storms That Caused Damage, Death, or Injury in Monroe County, IL

Location or County*	Date	Type	Magnitude	Deaths	Injuries	Property Damage X \$1000
Fults	04/15/1994	Thunderstorm	NM	0	0	500
Monroe	04/18/1995	High Winds	NM	0	0	400
Ames	05/06/2003	Thunderstorm	65 kts.	0	0	400
Hecker	05/07/2000	Thunderstorm	55 kts.	0	0	150
Columbia	05/18/1995	Thunderstorm	NM	0	0	125
RedBud	04/19/1993	Thunderstorm	NM	0	0	50
RedBud	04/19/1993	Thunderstorm	NM	0	0	50
Waterloo	06/07/1995	Thunderstorm	NM	0	0	6
Hecker	04/15/1994	Thunderstorm	NM	0	0	5
Waterloo	05/25/2008	Thunderstorm	55 kts.	0	0	5
Monroe	08/09/1995	Thunderstorm	NM	0	0	2
Valmeyer	06/10/1995	Thunderstorm	NM	0	0	1
Waterloo	03/24/1996	Thunderstorm	50 kts.	0	0	1
Total				0	0	1,695

*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 of 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 depends upon the extent of the storm, the wind speed, and the size of hail stones. Thunderstorms can occur at any location within the county.

Risk Identification for Thunderstorm Hazard

Based on historical information, the occurrence of future high winds, hail, and lightning is highly likely. The county should expect high winds with widely varying magnitudes are expected to happen. According to the RPI, thunderstorms and high wind damage ranked as the number 1 hazard.

RPI = Probability x Magnitude/Severity.

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

Vulnerability Analysis for Thunderstorm Hazard

The entire county's population and all buildings are vulnerable to a severe thunderstorm and can expect the same impacts within the affected area. This plan will therefore consider all buildings located within the county as vulnerable. Table 4-9 and 4-10 show the existing buildings and infrastructure in Monroe County.

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, damaging debris (trees or limbs), roofs blown off or windows broken by hail or high winds, fires caused by lightning, and loss of building functionality (e.g., a damaged police station will no longer be able to serve the community). Table 4-9 lists the types and numbers of all of the essential facilities in the area. Appendices E and F include a map and a list of all critical facilities in Monroe County.

Building Inventory

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

Infrastructure

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

Potential Dollar Losses for Thunderstorm Hazard

SIUC determined that Monroe County has incurred \$1,144,000 in damages relating to thunderstorms, including hail, lightning, and high winds since 2002. Table 4-31 lists the location, date, and type of each event resulting in property damage. 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. As a result, SIUC cannot reliably constrain potential dollar losses for a future event; however, based on average property damage in the past decade, SIUC estimates that Monroe County incurs property damages of approximately \$114,400 per year related to severe thunderstorms.

Vulnerability to Future Assets/Infrastructure for Thunderstorm Hazard

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

Suggestions for Community Development Trends

Local officials will enhance severe storm preparedness if they sponsor a wide range of programs and initiatives to address the overall safety of county residents. The county needs to build new structures with more sturdy construction, and harden existing structures to lessen the potential impacts of severe weather. Installing more warning sirens will warn the community of approaching storms to ensure the safety of Monroe County residents.

4.4.5 Winter Storm Hazard

Hazard Definition of Winter Storm Hazard

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

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 raindrops that freeze completely before reaching the ground. 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.

Ice storms are some of the most damaging winter storms in Illinois. Ice storms occur when moisture-laden Gulf air converges with the northern jet stream causing freezing rain that coats power and communication lines and trees with heavy ice. Strong winds can cause the overburdened limbs and cables to snap; leaving large sectors of the population without power, heat, or communication.

Snow Storms

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

Blizzards have repeatedly affected Illinois. Blizzard conditions cause power outages, loss of communication, and transportation difficulties. Blizzards can reduce visibility to less than one-quarter mile, and the resulting disorientation makes even travel by foot dangerous if not deadly.

Severe Cold

Severe cold involves ambient air temperatures that drop to 0°F or below. These extreme temperatures can increase the likelihood of frostbite and hypothermia. High winds during severe cold events can enhance the air temperature's effects. Fast winds during cold weather events can lower the wind chill factor (how cold

the air feels on your skin). As a result, the time it takes for frostbite and hypothermia to affect a person's body will decrease.

Previous Occurrences of Winter Storm Hazard

The NCDC database identified 27 winter storm and extreme cold events for Monroe County since 1994. The most recent reported event occurred in February of 2008 when about two inches of snow fell across Monroe County, causing several auto accidents.

The NCDC winter storms that caused damage, death, or injury in Monroe County are listed in Table 4-33. Additional details of individual hazard events are on the [NCDC website](#).

Table 4-33: NCDC-Recorded Winter Storm Events That Caused Damage, Death, or Injury in Monroe County, IL

Location or County*	Date	Type	Deaths	Injuries	Property Damage X \$1000
Monroe County	01/06/1995	Glaze Ice	0	0	5
Monroe County	01/03/1995	Cold	1	6	0
Monroe County	12/16/2000	Extreme Windchill	1	0	0
Monroe County	1982 [#]	-	-	-	-
Monroe County	1996 [#]	-	-	-	-
Monroe County	2008 [#]	-	-	-	-
Total			2	6	5

*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.

[#]These records are provided by the Monroe County planning team. They reflect events that pre-date NCDC recording, or they append NCDC records of the same year where planning team members found the damages to be inaccurate.

Geographic Location of Winter Storm Hazard

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

Hazard Extent of Winter Storm Hazard

The extent of the historical winter storms varies in terms of storm location, temperature, and ice or snowfall. A severe winter storm can occur anywhere in the county.

Risk Identification of Winter Storm Hazard

Based on historical information and input from the planning team, the occurrence of future winter storms is likely. The county should expect winter storms of varying magnitudes. According to the RPI, winter storms were ranked as the number 2 hazard.

RPI = Probability x Magnitude/Severity.

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

Vulnerability Analysis of Winter Storm Hazard

Winter storm impacts are equally likely across the entire county; therefore, the entire county is vulnerable to a winter storm and can expect impacts within the affected area. Table 4-10 includes the building exposure for Monroe County, as determined from the building inventory.

Critical Facilities

All critical facilities are vulnerable to a winter storm. A critical facility will encounter many of the same impacts as other buildings within the county. These impacts include loss of gas or electricity from broken or damaged utility lines, damaged or impassable roads and railways, broken water pipes, and roof collapse from heavy snow. Table 4-9 lists the types and numbers of the essential facilities in the area. Appendices E and F include a map and a list of all critical facilities.

Building Inventory

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

Infrastructure

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

Potential Dollar Losses for Winter Storm Hazard

It was determined that since 1994, Monroe County has not incurred significant property damages for most winter storms, including sleet/ice and heavy snow. The National Weather Service reports that on average, Monroe County received 1.05 inches of ice.

Vulnerability to Future Assets/Infrastructure for Winter Storm Hazard

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

Suggestions for Community Development Trends

Because the winter storm events are regional in nature, future development across the county will also face winter storms.

4.4.6 Hazardous Materials Storage and Transportation Hazard

Hazard Definition

Illinois has numerous active transportation lines that run through many of its counties. Active railways transport harmful and volatile substances across county and state lines every day. Transporting chemicals and substances along interstate routes is commonplace in Illinois. The rural areas of Illinois have considerable agricultural commerce, meaning transportation of fertilizers, herbicides, and pesticides is common on rural roads. These factors increase the chance of hazardous material releases and spills throughout the state of Illinois.

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

Previous Occurrences of Hazardous Materials Storage and Transportation Hazard

Monroe County has not experienced a significantly large-scale hazardous material incident at a fixed site or during transport resulting in multiple deaths or serious injuries, although minor releases have put local firefighters, hazardous materials teams, emergency management, and local law enforcement into action to try to stabilize these incidents and prevent or lessen harm to Monroe County residents.

Geographic Location of Hazardous Materials Storage and Transportation Hazard

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

Hazard Extent of Hazardous Materials Storage and Transportation Hazard

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

Risk Identification of Hazardous Materials Storage and Transportation Hazard

Based on input from the planning team, the occurrence of a hazardous materials accident is likely. According to the RPI, "hazardous materials storage and transport" ranked as the number seven hazard in Monroe County.

RPI = Probability x Magnitude/Severity.

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

Vulnerability Analysis for Hazardous Materials Storage and Transportation Hazard

The entire county is vulnerable to a hazardous material release and can expect impacts within the affected area. The main concern during a release or spill is the affected population. Table 4-10 includes the building exposure for Monroe County, as determined from building inventory. 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 will encounter many of the same impacts as any other building 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 can no longer serve the community). Table 4-9 lists the types and numbers of all essential facilities in the area. Appendices E and F include a map and list of all critical facilities.

Building Inventory

Table 4-10 includes the building exposure including types and numbers of buildings for the entire county. Buildings within the county can expect 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 person cannot inhabit a damaged home, causing residents to seek shelter).

Infrastructure

During a hazardous material release, the types of potentially-impacted infrastructure include roadways, utility lines/pipes, railroads, and bridges. Since an extensive inventory of the infrastructure is not available to this plan, it is important to emphasize that a hazardous materials release could damage any number of these items. 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 become impassable causing risk to motorists.

ALOHA Hazardous Chemical Release Analysis

SIUC used the U.S. Environmental Protection Agency's ALOHA (Areal Locations of Hazardous Atmospheres) model to assess the impacted area for chlorine release in the center of Columbia, Illinois and ammonia release in Festus, Missouri. The Monroe County planning team chose Columbia, Illinois because of significant rail and truck traffic along major transportation routes within a relatively densely populated area. The Monroe County planning team selected Festus, Missouri because of an industrial plant's large ammonia storage located upwind of the typical wind direction in Monroe County.

Chlorine is a greenish yellow gas with a pungent to suffocating odor. The gas liquefies above -35°C at ambient pressure and will liquefy from pressure applied at room temperature. Contact with unconfined liquid chlorine can cause frostbite from evaporative cooling. Chlorine does not burn but, like oxygen, supports combustion. The toxic gas can have adverse health effects from either long-term inhalation of low

concentrations of vapors or short-term inhalation of high concentrations. Chlorine vapors are much heavier than air and tend to settle in low areas. Chlorine is commonly used to purify water, bleach wood pulp, and make other chemicals (NOAA Reactivity 2007).

SOURCE: <http://cameochemicals.noaa.gov/chemical/2862>

Ammonia is a clear colorless gas with a strong odor. Ammonia is shipped as a liquid under its own vapor pressure. The density of liquid ammonia is 6 lb / gal. Contact with the unconfined liquid can cause frostbite. Gas generally regarded as nonflammable but does burn within certain vapor concentration limits and with strong ignition. Fire hazard increases in the presence of oil or other combustible materials. Although gas is lighter than air, vapors from a leak initially hug the ground. 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. Used as a fertilizer, as a refrigerant, and in the manufacture of other chemicals (NOAA Reactivity, 2007).

SOURCE: <http://cameochemicals.noaa.gov/chemical/4860>

ALOHA is a computer program designed for response to chemical accidents, as well as emergency planning and training. Both chlorine and ammonia are common chemicals used in industrial operations and are found in either liquid or gas form. Rail and truck tankers haul chlorine and ammonia to and from facilities.

For the Columbia scenario, SIUC assumed moderate atmospheric and climatic conditions with a slight breeze from the west. The Monroe County planning team chose the Columbia target area due to its large population and the potential for a transportation related accidental release. Figure 4-16 depicts the geographic area covered in this analysis.

For the Festus scenario, SIUC assumed summer atmospheric and climatic conditions with a slight breeze from the west-southwest. The Monroe County planning team chose the Festus target area due to the large amount of ammonia stored in an industrial facility upwind of Monroe County. Figure 4-17 depicts the geographic area covered in this analysis.

Figure 4-16: Location of Modeled Chemical Release in Columbia, IL

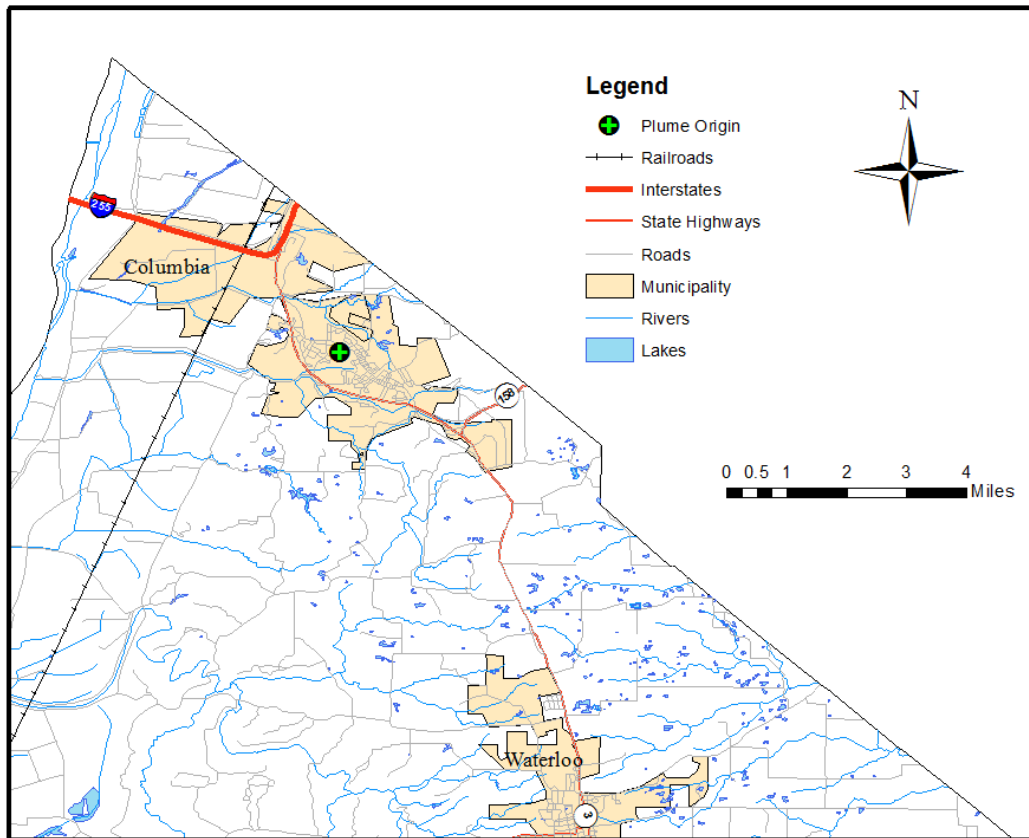
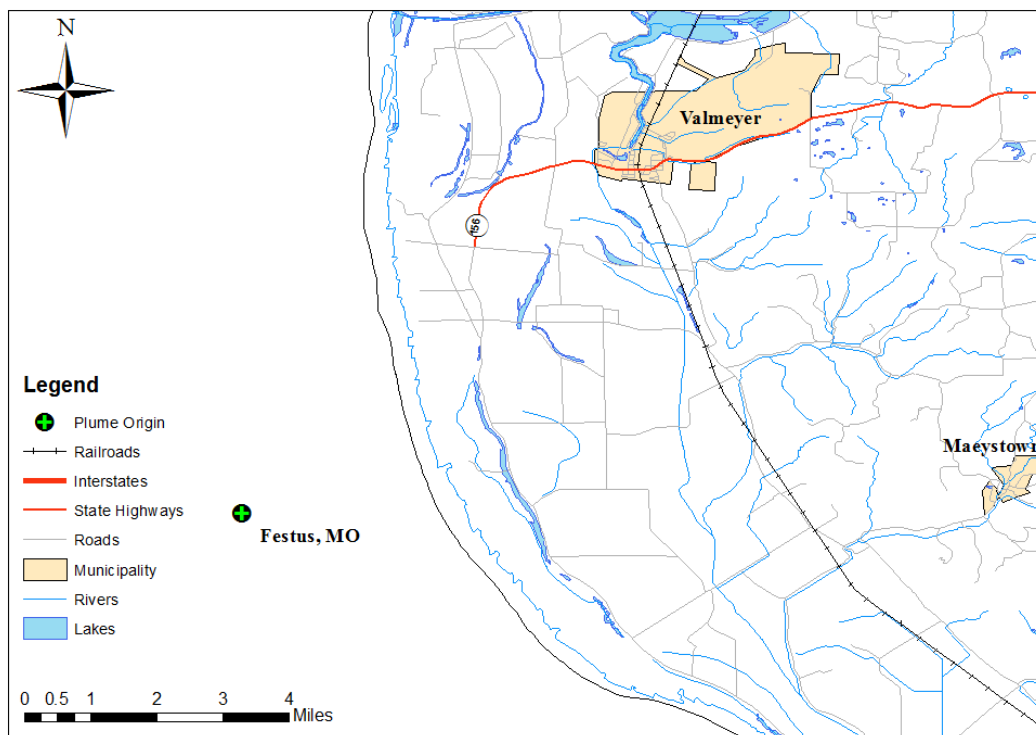


Figure 4-17: Location of Modeled Chemical Release in Festus, MO

Analysis Parameters

The ALOHA atmospheric modeling parameters for Columbia, depicted in Figure 4-18, were based upon a western wind speed of 5 miles per hour. The temperature was 68 °F with 75 % humidity and a cloud cover of five-tenths skies.

The source of the chemical spill is a horizontal, cylindrical-shaped tank. The diameter of the tank was set to 8 feet and the length set to 33 feet (12,408 gallons). At the time of its release, it was estimated that the tank was 75% full. The chlorine in this tank is in its liquid state.

This release was based on a leak from a 2.5-inch-diameter hole, 12 inches above the bottom of the tank. According to these ALOHA parameters, this scenario would release approximately 10,400 pounds of material per minute. Figure 4-19 depicts the plume footprint generated by ALOHA.

Figure 4-18: ALOHA Modeling Parameters for Chemical Release in Columbia, IL**SITE DATA:**

Location: COLUMBIA, ILLINOIS
Building Air Exchanges Per Hour: 0.30 (sheltered single storied)
Time: August 21, 2012 1228 hours CDT (using computer's clock)

CHEMICAL DATA:

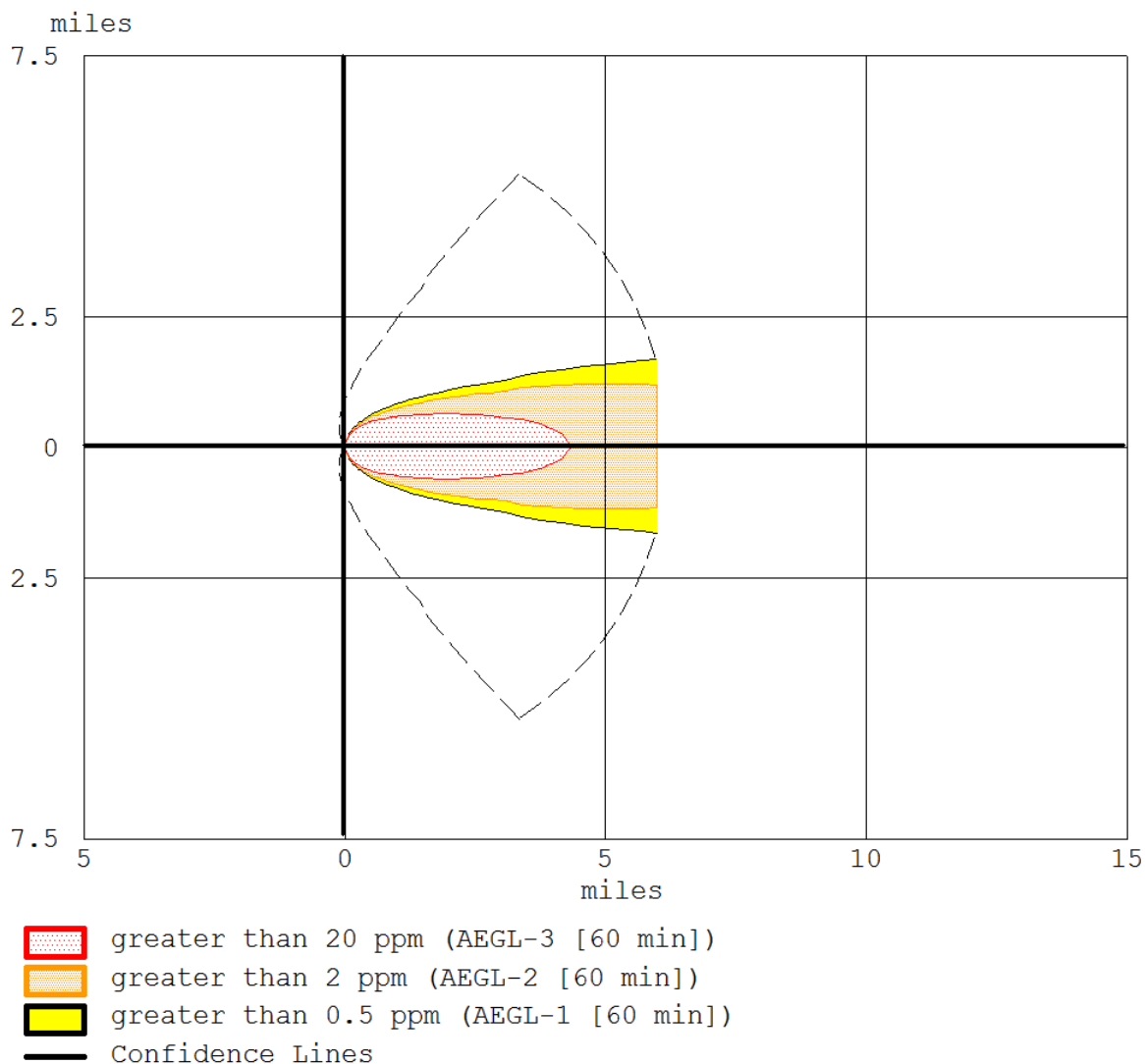
Chemical Name: CHLORINE Molecular weight: 70.91 g/mol
AEGL-1 (60 min): 0.5 ppm AEGL-2 (60 min): 2 ppm AEGL-3 (60 min): 20 ppm
IDLH: 10 ppm
Ambient Boiling Point: -29.9° F
Vapor Pressure at Ambient Temperature: greater than 1 atm
Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 5 miles/hour from W at 10 meters
Ground Roughness: open country Cloud cover: 5 tenths
Air Temperature: 68° F Stability Class: B
No Inversion Height Relative Humidity: 75%

SOURCE STRENGTH:

Leak from hole in horizontal cylindrical tank
Non-flammable chemical is escaping from tank
Tank Diameter: 8 feet Tank Length: 33 feet
Tank Volume: 12,408 gallons
Tank contains liquid Internal Temperature: 68° F
Chemical Mass in Tank: 55.0 tons Tank is 75% full
Circular Opening Diameter: 2.5 inches
Opening is 12 inches from tank bottom
Release Duration: 15 minutes
Max Average Sustained Release Rate: 10,400 pounds/min
(averaged over a minute or more)
Total Amount Released: 101,933 pounds
Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

Figure 4-19: ALOHA-Generated Plume Footprint of Columbia, IL Chemical Release

The ALOHA atmospheric modeling parameters for Festus, depicted in Figure 4-20, were based upon a western wind speed of 5 miles per hour. The temperature was 63.3 °F with 83 % humidity and a cloud cover of five-tenths skies.

The source of the chemical spill is a direct source, with a release rate of 900,000 pounds per minute. The total amount released was 54,011,280 pounds, or 90% of the maximum capacity of ammonia storage of the industrial facility. Figure 4-21 depicts the plume footprint generated by ALOHA.

Figure 4-20: ALOHA Modeling Parameters for Chemical Release in Festus, MO

SITE DATA:

Location: FESTUS, MISSOURI
Building Air Exchanges Per Hour: 0.34 (sheltered single storied)
Time: September 10, 2012 1515 hours CDT (using computer's clock)

CHEMICAL DATA:

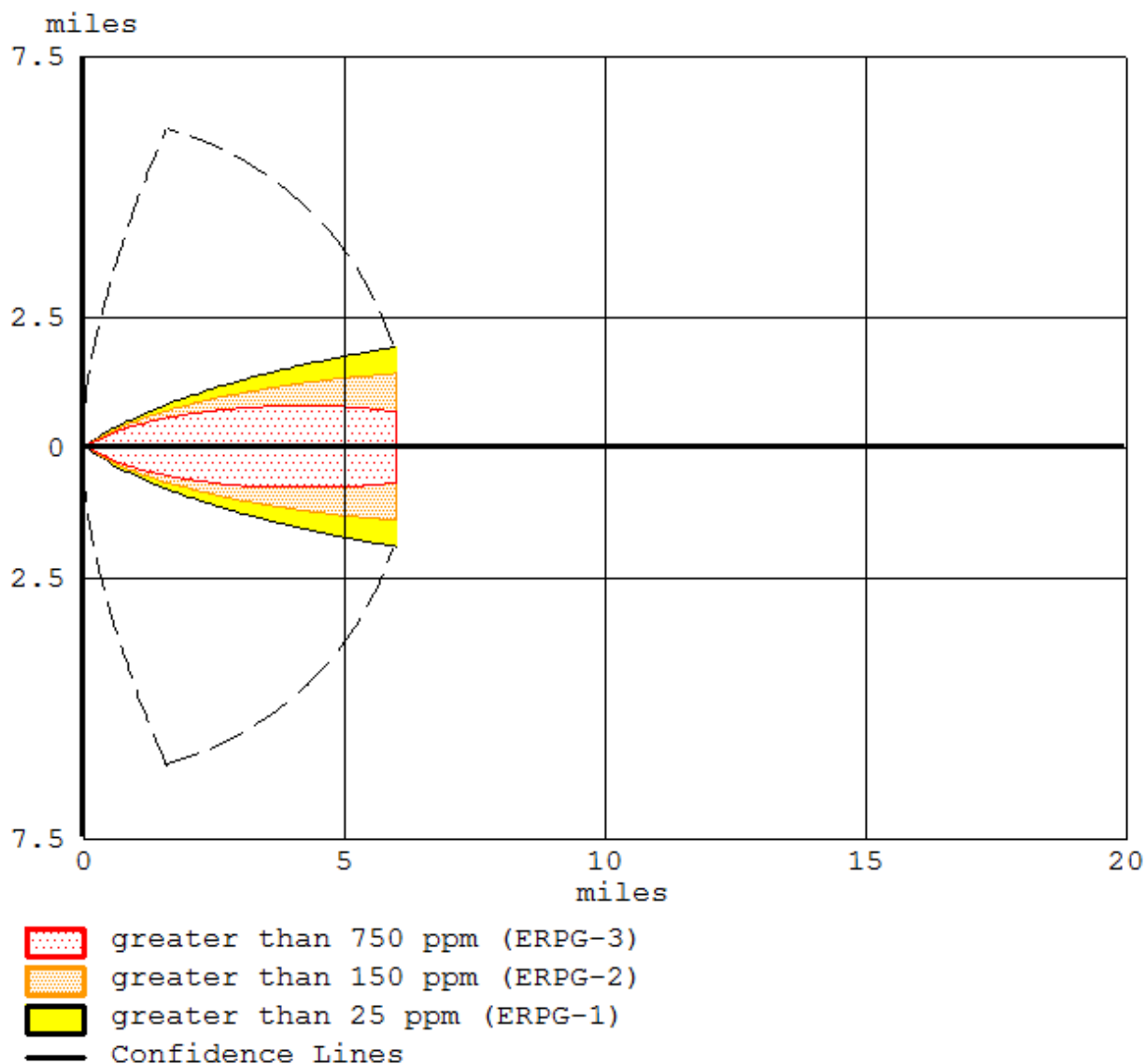
Chemical Name: AMMONIA Molecular weight: 17.03 g/mol
AEGL-1 (60 min): 30 ppm AEGL-2 (60 min): 160 ppm AEGL-3 (60 min): 1100 ppm
IDLH: 300 ppm LEL: 150000 ppm UEL: 280000 ppm
Ambient Boiling Point: -28.7° F
Vapor Pressure at Ambient Temperature: greater than 1 atm
Ambient Saturation Concentration: 1,000,000 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: 63.3° F Stability Class: B
No Inversion Height Relative Humidity: 83%

SOURCE STRENGTH:

Direct Source: 900188 pounds/min Source Height: 0
Release Duration: 60 minutes
Release Rate: 900,000 pounds/min
Total Amount Released: 54,011,280 pounds
Note: This chemical may flash boil and/or result in two phase flow.
Use both dispersion modules to investigate its potential behavior.

Figure 4-21: ALOHA-Generated Plume Footprint of Columbia, IL Chemical Release

Acute Exposure Guideline Levels (AEGLs) are intended to describe the health effects on humans due to once-in-a-lifetime or rare exposure to airborne chemicals. The National Advisory Committee for AEGLs is developing these guidelines to help both national and local authorities, as well as private companies, deal with emergencies involving spills or other catastrophic exposures. As the substance moves away from the source, the level of substance concentration decreases. Each color-coded area depicts a level of concentration measured in parts per million (ppm). The image in Figure 4-22 depicts the plume footprint generated by ALOHA in ArcGIS.

- **AEGL 3:** Above this airborne concentration of a substance, it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death.

- **AEGL 2:** Above this airborne concentration of a substance, it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape. The orange buffer (≥ 2.0 ppm) extends greater than six miles from the point of release after one hour.
- **AEGL 1:** Above this airborne concentration of a substance, it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure. The yellow buffer (≥ 0.5 ppm) extends more than six miles from the point of release after one hour.
- **Confidence Lines:** The dashed lines depict the level of confidence in which the exposure level will be contained. The ALOHA model is 95% confident that the release will stay within this boundary.

Emergency Response Planning Guidelines (ERPGs) estimate the concentrations at which most people will begin to experience health effects if they are exposed to a hazardous airborne chemical for 1 hour. The Emergency Response Planning Committee of the American Industrial Hygiene Association is developing these guidelines to help both national and local authorities, as well as private companies, deal with emergencies involving spills or other catastrophic exposures. As the substance moves away from the source, the level of substance concentration decreases. Each color-coded area depicts a level of concentration measured in parts per million (ppm). The image in Figure 4-23 depicts the plume footprint generated by ALOHA in ArcGIS.

- **ERPG 3:** The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing life-threatening health effects. The red buffer (≥ 750 ppm) extends greater than six miles from the point of release after one hour.
- **ERPG 2:** The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms which could impair an individual's ability to take protective action. The orange buffer (≥ 150 ppm) extends greater than six miles from the point of release after one hour.
- **ERPG 1:** The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing other than mild transient health effects or perceiving a clearly defined, objectionable odor. The yellow buffer (≥ 25 ppm) extends greater than six miles from the point of release after one hour.
- **Confidence Lines:** The dashed lines depict the level of confidence in which the exposure level will be contained. The ALOHA model is 95% confident that the release will stay within this boundary.

Source: <http://response.restoration.noaa.gov/>

Figure 4-22: ALOHA Plume Footprint for Columbia, IL Overlaid in ArcGIS

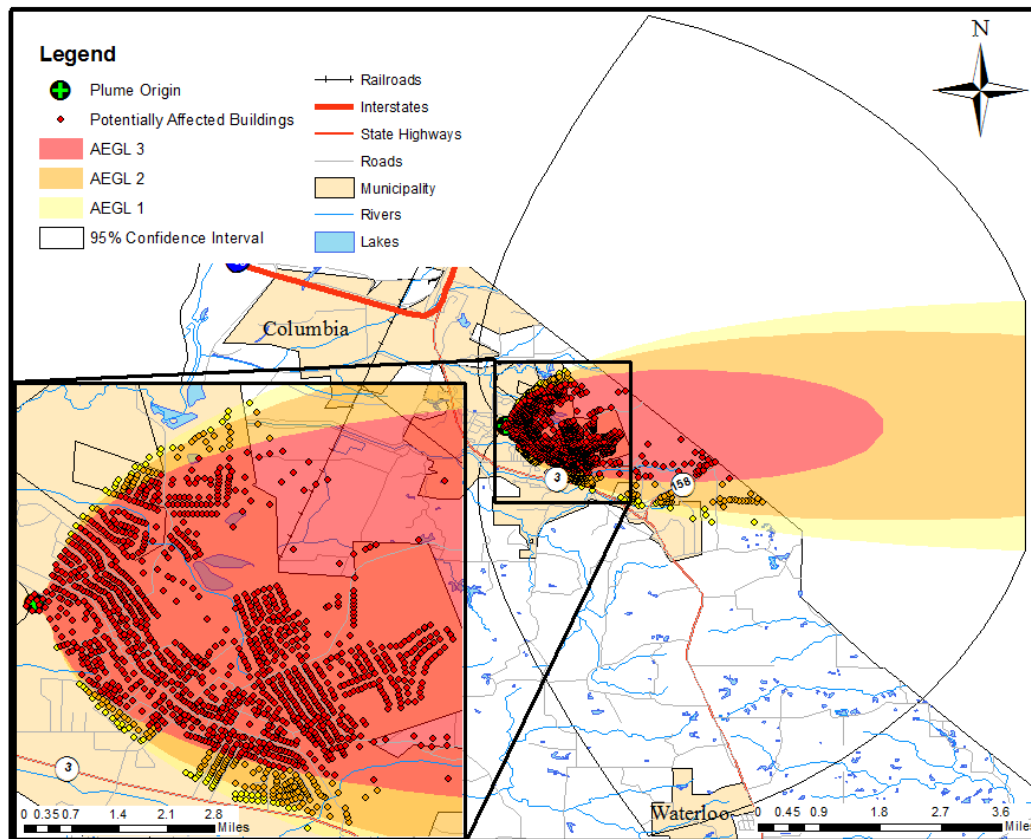
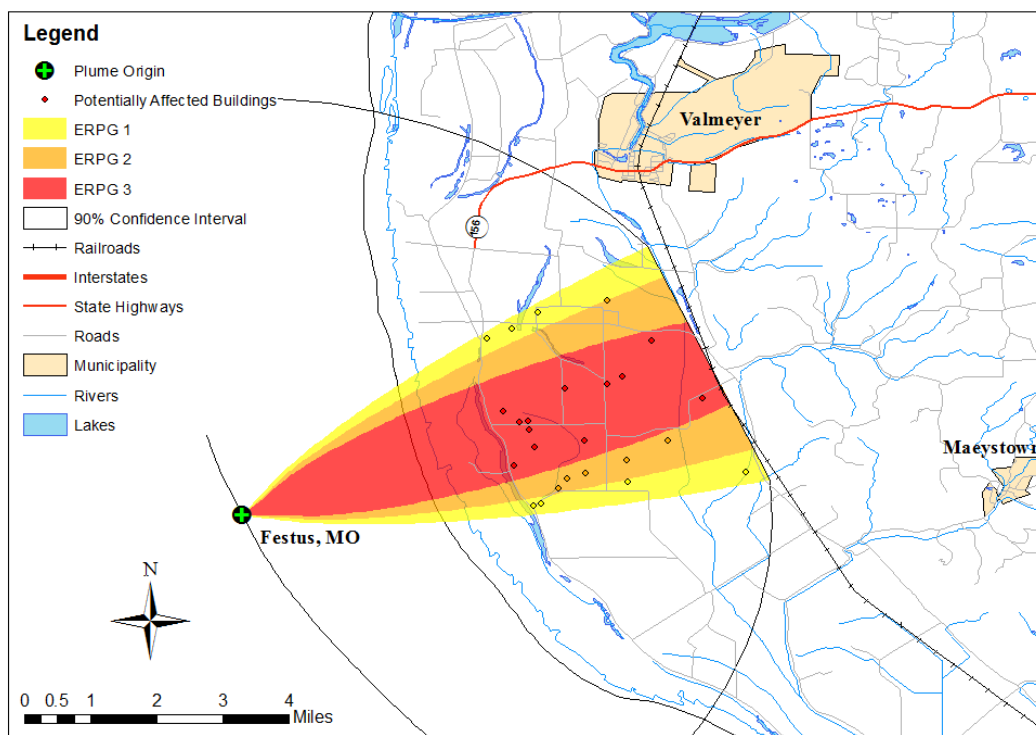


Figure 4-23: ALOHA Plume Footprint for Festus, MO Overlaid in ArcGIS

Results for Hazardous Chemical Release Analysis

SIUC calculated an estimate of property exposed to the chlorine spill in Columbia, IL by using the building inventory and intersecting these data with each of the AEGL levels (AEGL 3: ≥ 20.0 ppm, AEGL 2: ≥ 2.0 ppm and AEGL 1: ≥ 0.5 ppm.). Based on the GIS-analysis, full replacement cost of exposed buildings is over \$571 million. This GIS overlay analysis estimates the full replacement cost of the buildings exposed to the chlorine plume are over \$571 million. Table 4-34 lists building exposure by AEGL zone.

Table 4-34: Estimated Building Exposure for all AEGL Zones for Columbia, IL scenario (x 1000)

Occupancy	Building Exposure			Number of Buildings		
	AEGL 1	AEGL 2	AEGL 3	AEGL 1	AEGL 2	AEGL3
Residential	\$18,827	\$44,396	\$276,186	78	181	1117
Commercial	\$782	\$6,627	\$40,522	3	8	96
Industrial	\$0	\$634	\$4,656	0	3	11
Agriculture	\$0	\$0	\$8,550	0	0	3
Religious	\$3,389	\$9,424	\$26,665	4	5	16
Government	\$4,353	\$4,353	\$32,675	2	2	26

Occupancy	Building Exposure			Number of Buildings		
	AEGL 1	AEGL 2	AEGL 3	AEGL 1	AEGL 2	AEGL3
Education	\$29,980	\$29,980	\$29,981	2	2	2
Total	\$57,334	\$95,416	\$410,695	89	201	1271

SIUC calculated an estimate of property exposed to the ammonia spill in Festus, MO by using the building inventory and intersecting these data with each of the ERPG levels (ERPG 3: ≥ 750 ppm, ERPG 2: ≥ 150 ppm and ERPG 1: ≥ 25 ppm.). This GIS overlay analysis estimates the full replacement cost of exposed buildings as over \$6.9 million. Table 4-35 lists building exposure by AEGL zone.

Table 4-35: Estimated Building Exposure for all ERPG Zones for Festus, MO scenario (x 1000)

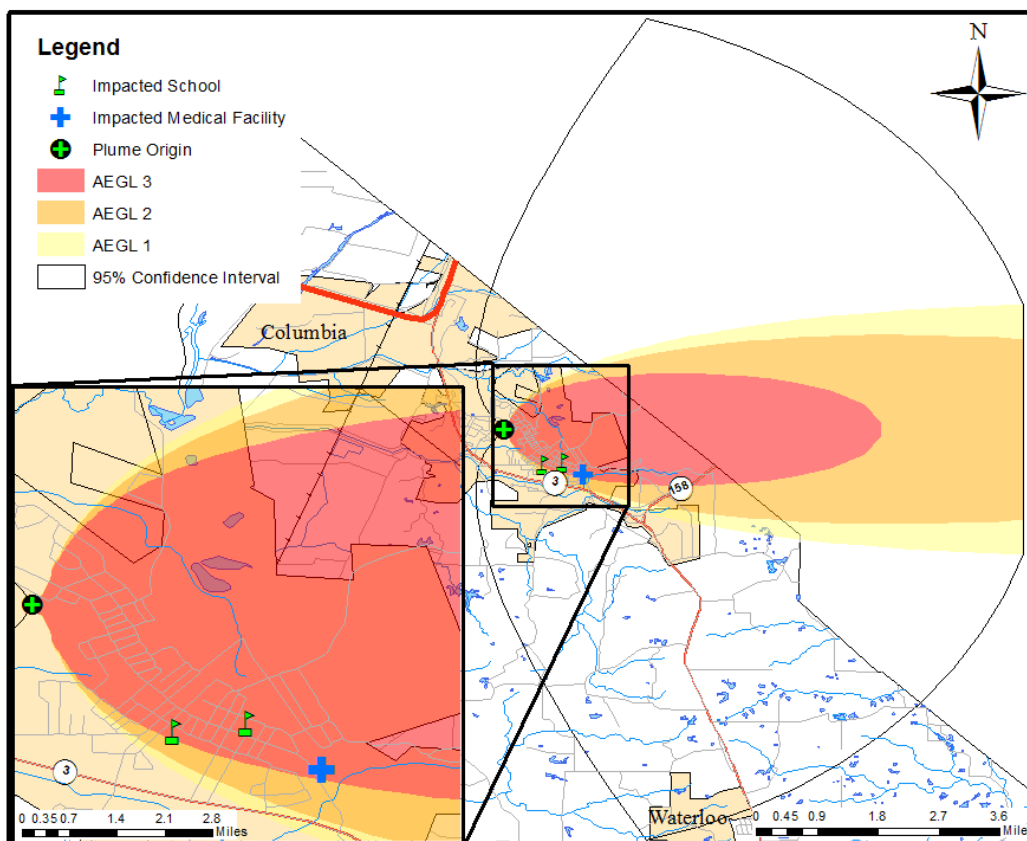
Occupancy	Building Exposure			Number of Buildings		
	AEGL 1	AEGL 2	AEGL 3	AEGL 1	AEGL 2	AEGL3
Residential	\$618	\$631	\$1,063	2	2	5
Commercial	\$0	\$0	\$0	0	0	0
Industrial	\$0	\$0	\$0	0	0	0
Agriculture	\$284	\$270	\$207	3	4	5
Religious	\$379	\$0	\$0	1	0	0
Government	\$1,180	\$0	\$2,360	1	0	2
Education	\$0	\$0	\$0	0	0	0
Total	\$2,463	\$901	\$3,631	7	6	12

Critical Facilities Damage

There are three critical facilities within the limits of the Columbia, IL scenario. Table 4-36 and Figure 4-24 identifies the affected facilities. No critical facilities are within the limits of the Festus, MO scenario.

Table 4-36: Essential Facilities within Plume Footprint

Critical Facility	Facility Name
Emergency Operations Centers	Garden Place Senior Living
Schools	Eagle View Elementary
	Immaculate Conception School

Figure 4-24: Map of Essential Facilities Located within the Plume Footprint in Columbia, IL

Building Inventory Damage

Table 4-10 lists the building exposure, including type and number of buildings, for the entire county. Buildings within the county can all expect 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 person cannot inhabit a damaged home, causing residents to seek shelter).

Vulnerability to Future Assets/Infrastructure of Hazardous Materials

Storage and Transportation Hazard

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

Suggestion for Community Development Trends

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

4.4.7 Fire Hazard

Hazard Definition for Fire Hazard

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

Tire Fires

The state of Illinois generates thousands of scrap tires annually. Many of those scrap tires end up in approved storage sites that are carefully regulated and controlled by federal and state officials. However, scrap tires are sometimes dumped in unapproved locations throughout the state, the number of which is inestimable.

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

- Relatively small tire fires can require significant fire resources to control and extinguish.
- Those resources often strain local community and county capabilities.
- There may be significant environmental consequences of a major tire fire. Extreme heat can convert a standard vehicle tire into approximately two gallons of oily residue that may leak into the soil or migrate to streams and waterways.

Structural Fires

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

Wildfires

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

Previous Occurrences for Fire Hazard

Monroe County has not experienced a significant or large-scale fire that resulted in a large number of fatalities or serious injuries.

Geographic Location for Fire Hazard

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

Hazard Extent for Fire Hazard

The extent of the fire hazard varies both in terms of the severity of the fire and the type of material burning. Fires are a potential hazard for all communities in Monroe County.

Risk Identification for Fire Hazard

Based on input from the Monroe County planning team, the fire occurrence is likely. Fire/explosion ranked as the number 8 hazard, according to the RPI.

RPI = Probability x Magnitude/Severity.

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

Vulnerability Analysis for Fire Hazard

Fire hazard threatens the entire jurisdiction; therefore, the entire population and all buildings within the county are vulnerable to fires.

Table 4-10 includes the building exposure for Monroe County, as determined from the building inventory. The entire population and all buildings are at risk.

Critical Facilities

All critical facilities are vulnerable to fire hazards. A critical facility will encounter many of the same impacts as any other building within the jurisdiction. These impacts include structural damage from fire and water damage from efforts extinguishing fire. Table 4-9 lists the types and numbers of essential facilities in the area. Appendices E and F include a map and a list of all critical facilities in Monroe County.

Building Inventory

Table 4-10 lists building exposure, including types and numbers of buildings for the entire county. Impacts to the general buildings within the county are similar to the damages expected to the critical facilities. These impacts include structural damage from fire and water damage from efforts to extinguish the fire.

Infrastructure

During a fire, potentially-impacted infrastructure includes roadways, utility lines/pipes, railroads, and bridges. Since the county's entire infrastructure is equally vulnerable, it is important to emphasize that a fire could become damage any number of these items. Potential impacts include structural damage resulting in impassable roadways and power outages.

Vulnerability to Future Assets/Infrastructure for Fire Hazard

Any future development will be vulnerable to these events.

Assessment of Community Development Trends

Fire hazard events may occur anywhere within the county, therefore future development is at-risk.

4.4.8 Drought and Extreme Heat

Hazard Definition for Drought Hazard

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

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

Hazard Definition for Extreme Heat Hazard

Drought conditions are often accompanied by extreme heat, which is defined as temperatures that exceed the average high for the area and for the last for several weeks by 10°F or more.

Common Terms Associated with Extreme Heat

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

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

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

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

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

Source: FEMA

Previous Occurrences for Drought and Extreme Heat

The NCDC database reported 29 drought/heat wave events in Monroe County since 1994. The most recent reported event occurred in 2010. High temperatures in the middle to upper 90s °F lasted from June 26 through June 28. Average heat index values during the two-day period reached 110 °F. Extreme heat attributed to \$55,000 in property losses, \$310,000 in crop losses, multiple deaths and multiple injuries in

Monroe County. This does not include data from the 2012 drought, which occurred during the construction of this plan. Data for total losses during the 2012 drought are not yet available.

Table 4-37 includes NCDC records of droughts/heat waves that caused damage, death, or injury in Monroe County. Additional details of individual hazard events are on the [NCDC website](#).

Table 4-37: NCDC-Recorded Extreme Heat Events That Caused Damage, Death or Injury Monroe County, IL

Location or County	Date	Type	Deaths	Injuries	Property Damage x \$1000	Crop Damage x \$1000
Monroe County	07/11/1995	Heat	2	95	50	200
Monroe County	08/09/1995	Heat	2	97	0	200
Monroe County	07/28/1995	Heat	0	30	5	10
Monroe County	07/18/1999	Excessive Heat	8	119	0	0
Monroe County	06/12/1994	Heat	0	10	0	0
Monroe County	07/14/2006	Excessive Heat	0	4	0	0
Monroe County	06/23/2005	Excessive Heat	2	0	0	0
Monroe County	08/24/2003	Excessive Heat	1	0	0	0
Monroe County	07/20/2005	Excessive Heat	1	0	0	0
Monroe County	07/29/2006	Excessive Heat	1	0	0	0
Monroe County	08/01/2006	Excessive Heat	1	0	0	0
Total			18	355	55	310

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

Geographic Location for Drought and Extreme Heat

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

Hazard Extent for Drought and Extreme Heat

The extent of droughts or extreme heat varies both depending on the magnitude and duration of the heat and the range of precipitation.

Risk Identification for Drought and/or Extreme Heat

Based on input from the planning team, the occurrence of future drought and extreme heat is not of high-concern. The planning team drought and extreme heat as a hazard.

Vulnerability Analysis for Drought and Extreme Heat

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

The entire population and all buildings are at-risk. Table 4-10 includes the building exposure for Monroe County, as determined from the building inventory.

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 or no damage. Potential 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 4-9 lists the types and numbers of all of the essential facilities in the area. Appendices E and F include a map and a list of all critical facilities in Monroe County.

Building Inventory

Table 4-10 lists the building exposure, including types and numbers of buildings for the entire county. The buildings within the county can all expect 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 potentially-impacted infrastructure include roadways, utility lines/pipes, railroads, and bridges. The risk to these structures is primarily associated with fire, which could result from hot, dry conditions. Since the county's entire infrastructure is vulnerable, damage to any infrastructure is possible. The impacts to these items include: impassable roadways; broken or failed utility lines (e.g., loss of power or gas to community); or impassable railways. Bridges could become impassable, causing risk to motorists.

Vulnerability to Future Assets/Infrastructure for Drought/Extreme Heat Hazard

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

Assessment of Community Development Trends

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

Source: FEMA

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

Section 5 Mitigation Strategies

The goal of mitigation is to reduce the future impacts of a hazard, including property damage, disruption to local and regional economies, and the amount of public and private funds spent to assist with recovery. Overall, mitigation strategies attempt to build disaster-resistant communities. Mitigation actions and projects are necessarily based on a well-constructed risk assessment (Section 4). Mitigation is an ongoing process that adapts over time to accommodate a community's needs.

5.1 Community Capability Assessment

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

5.1.1 National Flood Insurance Program (NFIP)

Waterloo, Columbia, Valmeyer, Fufts, and the unincorporated areas of Monroe County participate in the NFIP. Communities with a flood risk who choose not to participate in the NFIP include Maestown and Hecker. Monroe County will continue to educate these jurisdictions on the benefits of the program. Table 5-1 includes a summary of additional information for Monroe County participation in the NFIP.

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

SIUC conducted the flood hazard analysis in this MHMP using a DFIRM that incorporated FEMA's "without levee" approach, in which de-accredited levees are considered non-existent. FEMA declared Monroe County's levees de-accredited in 2007; in 2011, FEMA issued a reprieve to this declaration (e.g. Monroe County *Independent*). FEMA has not released an updated DFIRM for Monroe County that re-incorporates the levees, so SIUC used the most current DFIRM available at the time of this plan.

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

Community	Participation Date	FIRM Date	CRS Date	CRS Rating	Floodplain Ordinance
Monroe County	05/15/1986	03/17/2003	N/A	N/A	03/2003
Waterloo	09/24/1984	09/24/1984	N/A	N/A	N/A

Community	Participation Date	FIRM Date	CRS Date	CRS Rating	Floodplain Ordinance
Columbia	09/05/1990	03/17/2003	N/A	N/A	04/02/1990
Valmeyer	09/04/1985	09/04/1985	N/A	N/A	07/19/2005
Maeystown	N/A	04/02/1976	N/A	N/A	N/A
Hecker	N/A	N/A	N/A	N/A	N/A
Fults	09/04/1985	09/04/1985	N/A	N/A	N/A

*NFIP status and information are documented in the Community Status Book Report updated on 7/29/2012.

Since the establishment of the NFIP in 1978, Monroe County had several flood insurance claims. Table 5-2 summarizes the claims since 1978.

Table 5-2: Policy and Claim Statistics for Flood Insurance in Monroe County, IL

Community	Closed Losses	Open Losses	CWOP Losses	Total Losses	Payments
Monroe County	3	2	0	1	\$29,756.48
Waterloo	-	-	-	-	-
Columbia	3	3	0	0	\$44,162.83
Valmeyer	-	-	-	-	-
Maeystown	4	4	0	0	\$128,966.65
Hecker	-	-	-	-	-
Fults	-	-	-	-	-

*NFIP policy and claim statistics since 1978 until the most recently updated date of 10/31/2011. Closed Losses refer to losses that are paid; open losses are losses that are not paid in full; CWOP losses are losses that are closed without payment; and total losses refers to all losses submitted regardless of status. Lastly, total payments refer to the total amount paid on losses.

5.1.2 Jurisdiction Ordinances

Ordinances that directly pertain, or can pertain, to disaster mitigation are listed in Table 5-3 and are discussed in more detail, if information was provided, in this section.

Table 5-3: List of Jurisdiction Ordinances and Their Most Recent Adoption Date

Community Name	Zoning	Stormwater Mgmt	Subdivision Control	Burning	Seismic	Erosion Mgmt	Land Use Plan	Building Codes
Monroe County	07/1969	10/1999	03/1974	N/A	N/A	N/A	06/1967	12/2000
Waterloo	1997							
Columbia	04/14/1969	01/03/1995	07/07/1997	08/02/1999	N/A	07/07/1997	04/14/1969	04/07/2008
Valmeyer	03/01/1994	07/23/1994	03/01/1994	04/19/1994	N/A	07/23/1994	N/A	05/18/1993
Maeystown	07/1969	10/1999	03/1974	N/A	N/A	N/A	06/1967	12/2000
Hecker	11/08/1994	06/08/1993	06/08/1993	06/08/1993	N/A	06/08/1993	N/A	06/08/

Community Name	Zoning	Stormwater Mgmt	Subdivision Control	Burning	Seismic	Erosion Mgmt	Land Use Plan	Building Codes
								1993
Fults	07/1969	10/1999	03/1974	N/A	N/A	N/A	06/1967	12/2000

5.1.2.1 Stormwater Management

In unincorporated communities of Monroe County, Maeystown, and Fults, the stormwater ordinance covers development in commercial and industrial zones, as well as in new subdivisions in residential and agricultural zones. Columbia requires installation of stormwater facilities to control stormwater runoff for subdivisions and other developments. Valmeyer discourages runoff of excessive stormwater from development. Hecker requires that a village engineer review stormwater pollution, as well as erosion, sedimentation, and runoff due to stormwater.

5.1.2.2 Burning

Columbia and Valmeyer do not allow open burning. Hecker does not allow burning of refuse or agricultural waste, and restricts burning of yard waste.

5.1.2.3 Erosion Management

Columbia requires installation of runoff and erosion control structures for problematic subdivisions and developments. Valmeyer requires that erosion cannot damage people, property, or the environment.

5.1.2.4 Building Codes

Unincorporated communities of Monroe County, Maeystown, and Fults, require materials, electrical, and plumbing inspections for new construction projects. Columbia adopted the 2006 edition of International Building Codes.

5.1.3 Fire Insurance Ratings

Table 5-4 lists Monroe County's fire departments and respective information. All of Monroe County's fire departments are volunteer fire departments.

Table 5-4: Fire Departments and Their Insurance Ratings

Fire Department Name	Urban Fire Insurance Rating	Rural Fire Insurance Rating
Waterloo Fire Department	4	10 (>5mi), 8 (<5mi)
Columbia Fire Department	4	9 (>5mi)
Valmeyer Fire Department	Urban = 5; Rural = 9	9
Maeystown Fire Department	7	9 (>5mi)
Hecker Fire Department	10 (>10mi), 9 (<10mi), 6 (<1000ft from hydrant <5mi from station)	10 (>10mi), 9 (<10mi), 6 (<1000ft from hydrant <5mi from station)
Red Bud Fire Department*	5 (<5mi)	9 (>5mi)
Prairie du Rocher Fire Department*	6	9

5.2 Mitigation Goals

In Section 4 of this plan, the risk assessment identified Monroe County as prone to several hazards. The mitigation planning team members understand that although they cannot eliminate hazards altogether, Monroe County can work towards building disaster-resistant communities. Below is a generalized list of goals, objectives, and actions. The goals represent long-term, broad visions of the overall vision the county would like to achieve for mitigation. The objectives are strategies and steps that will assist the communities in attaining the listed goals.

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

- (a) Objective: Retrofit critical facilities and structures with structural design practices and equipment that will withstand natural disasters and offer weather-proofing.
- (b) Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards.
- (c) Objective: Minimize the amount of infrastructure exposed to hazards.
- (d) Objective: Evaluate and strengthen the communication and transportation abilities of emergency services throughout the county.
- (e) Objective: Improve emergency sheltering in Monroe County.

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

- (a) Objective: Support compliance with the NFIP for each jurisdiction in Monroe County.
- (b) Objective: Review and update existing, or create new, community plans and ordinances to support hazard mitigation.
- (c) Objective: Conduct new studies/research to profile hazards and follow up with mitigation strategies.

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

- (a) Objective: Raise public awareness on hazard mitigation.
- (b) Objective: Improve education and training of emergency personnel and public officials.

5.3 Mitigation Actions/Plans

Upon completion of the risk assessment and development of the goals and objectives, the mitigation planning committee reviewed 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 impacts of a hazard. Such structures include dams, levees, floodwalls, seawalls, retaining walls, and safe rooms.

After Meeting #3, held on August 31, 2012, mitigation planning team were presented with the task of individually listing potential mitigation activities using the FEMA evaluation criteria. The planning team brought their mitigation ideas to Meeting #4 which was held October 3, 2012. FEMA uses their evaluation criteria STAPLE+E (stands for social, technical, administrative, political, legal, economic and environmental) to assess the developed mitigation strategies.

Social:

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

Technical:

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

Administrative:

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

Political:

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

Legal:

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

Economic:

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

Environmental:

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

5.4 Implementation Strategy and Analysis of Mitigation Projects

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

In Meeting #4, the planning team prioritized mitigation actions based on a number of factors. The factors were the STAPLE+E criteria listed in Table 5-5. A rating of high (complete within 1-3 years), medium (complete within 3-5 years), or low (complete within 5-10 years) was assessed for each mitigation item and is listed next to each item in Table 5-6.

Table 5-5: Summary of STAPLE+E Criteria

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 is conducted prior to the implementations of any mitigation actions. Tables 5-6 through 5-12 presents mitigation projects for each incorporated jurisdiction developed by the planning committee, as well as actions that are ongoing or already completed. Monroe County did not have applicable, detailed mitigation strategies in their first plan. The objective of this updated plan is to generate proactive mitigation strategies with clearer goals and objectives.

Table 5-6: List of Mitigation Strategies Developed for Monroe County, IL

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Encourage communities to sponsor outreach program to increase awareness of hazards that affect Monroe County	Goal: Develop long-term strategies to educate Monroe County residents on the hazards affecting their community Objective: Raise public awareness of hazard mitigation	All Hazards	High	Public awareness needs to increase. We will work with local communities to promote awareness and preparedness amongst all county residents.
Search and Rescue Team	Goal: Create search and rescue teams in Monroe County Objective: Have Search and Rescue teams in Monroe County to respond immediately to the counties needs.	All Hazards	Medium	Currently the county has agreements with neighboring jurisdictions for search and rescue. However, in a large scale event, it may be necessary for Monroe County to have our own Search and Rescue Team. The County EMA will work with the Police and Fire Departments to secure funding for training and materials.
Obtain a back-up generator for communities that don't have one	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Improve emergency sheltering in Monroe County	All Hazards	Medium	Monroe County EMA will work with it municipalities to look for funding for back-up generators.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Generator at Courthouse all county buildings	Goal: Provide power to all public building Objective: Provide backup power to all county buildings in the event of a power failure	All Hazards	High	This would provide emergency backup power to all county buildings to allow the county government to continue to function. This would also replace the old (1970's) generator currently at the Sheriff Dept that there are no longer any parts for. This will also provide power to building for sheltering.
Install transfer switches at shelters	Goal: Provide power to shelters. Objective: Equip all designated shelters with power transfer switches and generators for emergency power	All Hazards	Medium	This would provide emergency power quickly to all of the designated shelter in Monroe County. Currently only 1 shelter has a transfer switch available but no on site generator.
NOAA Weather Radios	Goal: Obtain one weather radios for each county residence Objective: Warn county residents of approaching hazards and be able to notify each residence where to go for assistance.	All Hazards	Medium	The County EMA will work with local jurisdictions to write a grant to obtain several weather radios for disbursement at countywide events. It is the goal of the EMA to have a weather radio in every household.
Outdoor Emergency Alert Systems	Goal: Be able to notify all residents of emergency situations outside of their residence Objective: Place outdoor sirens so all residents will be able to hear outdoor warnings.	All Hazards	High	Monroe County EMA will determine locations for additional sirens. Funding will be sought through various federal grant programs. This will be an outdoor notification system to compliment the Global Connect system that we are currently using.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Family Disaster Plans & Kits	Goal: Develop long-term strategies to educate residents on the hazards affecting their community Objective: Raise public awareness on hazard mitigation	All Hazards	Medium	Monroe county EMA will work with the Citizen Corps to come up with a program to reach out to citizens to develop disaster plans and make disaster kits.
Create list of special-needs residents within Monroe County	Goal: Create new or revise existing plans/maps for Monroe County Objective: Review and update existing, or create new, community plans and ordinances to support hazard mitigation	All Hazards	High	Monroe County will continue to work with communities to identify residents with special needs and create maps to pinpoint their locations.
Encourage communities to obtain heating and cooling shelters	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Improve emergency sheltering	All Hazards	Medium	Monroe County has established heating and cooling centers in the Waterloo and Columbia areas but will work its partners to add centers in the outlying communities.
Participate in the NFIP	Goal: Create new or revise existing plans/maps for Template County Objective: Support compliance with the NFIP for each jurisdiction in Template County	Flood	High	Monroe County has participated in the NFIP since 1985.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Participate in the Community Rating System (CRS)	Goal: Create new or revise existing plans/maps for Template County Objective: Support compliance with the NFIP for each jurisdiction in Template County	Flood	Medium	Monroe County and its jurisdictions will investigate the benefit of participating in the CRS. The County EMA will take charge of this and report to local jurisdictions.
Property Acquisitions (i.e. "buyouts")	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Flood	Medium	Monroe County will work with FEMA and local municipalities to determine need for property acquisition.
Home Elevations	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Flood	Medium	Monroe County will work with FEMA and local municipalities to determine need for home elevations
Property Relocations	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Flood	Medium	Monroe County will work with FEMA and local municipalities to determine need for property relocations
Floodplain Ordinances	Goal: Create new or revise existing plans/maps for Template County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Flood	High/High	Parts of Monroe County are located within the Mississippi River floodplain. Communities with floodplain ordinances include Columbia and Valmeyer. Monroe County EMA will continue to encourage other floodplain communities to adopt and enforce floodplain ordinances.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Dam and/or Levee Maintenance Plan	Goal: Create new or revise existing plans/maps for Template County Objective: Review and update existing, or create new plans to maintain levees	Flood	High	Monroe County will continue to work with the levee districts to make sure the levees will withstand flood waters.
Dam and/or Levee Failure – Emergency Response Plan	Goal: Revise existing Dam and/or Levee Failure – Emergency Response Plan Objective: Help ensure safety of residents living on the dry side of dams or levees in the county	Flood	High	Monroe County will continue to work with the levee districts to make sure the levees will withstand flood waters.
Improve early warning system for flash flooding in Monroe County	Goal: Use Global Connect system for notifying residents in areas of flash floods. Objective: Ensure safety of county residents in flash flooding situations.	Flood	High	Monroe County EMA will create a plan using Global Connect notification system to warn residents in problem areas of flash flooding. No funding is necessary.
Elevate Low-Lying Roads in the county floodplains	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Flood	Low	Monroe County Highway Dept will work state and federal authorities to elevate roadways in the floodplain
Installation of Pumping Stations	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Flood	Medium	Installation of pumping stations within the Ft. Chartres and Ivy Levee Districts. Monroe County EMA will work with the levee districts to obtain funding and complete this project. Further studies necessary to determine the exact location of needed pumping stations.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Culvert Replacement in floodplains	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Flood	Low	Monroe County Highway Dept will work state and federal authorities to replace culverts located in the floodplains
Bury Power Lines	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Tornado / Severe Storms	Low	Monroe County will work with the local power companies to look at feasibility of burying power lines. Most new development throughout the county must bury power lines.
Provide and Publicize Location Shelters	Goal: Publicize shelter locations Objective: Improve emergency sheltering in the county	Tornado / Severe Storms	Medium	Monroe County EMA will work to publicize shelter locations to help the residents of Monroe County to know where to go when needed.
Anchoring of Manufactured Homes & Exterior Attachments	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Tornado / Severe Storms	Low	Monroe County government will work with local jurisdictions to draft a "tie-down" ordinance for all manufactured homes.
Ordinance for Higher Construction Standards/Techniques in regards to severe storms	Goal: Create new or revise existing plans/maps for Template County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Tornado / Severe Storms	Medium	Monroe County Government will work with local jurisdictions to draft ordinances for higher construction standards and techniques in regards to severe storms.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Cooling/Warming Shelters	Goal: Provide residents a place to go when heating or cooling is needed. Objective: Improve emergency sheltering in the county	Extreme Temperatures	Medium	Monroe county EMA will work with local jurisdictions and the private sector to improve warming/cooling shelters.
Burning Ordinance	Goal: Cut down the possibility of wildfires. Objective: Create a burn ordinance to decrease the chance of wildfires during drought.	Extreme Temperatures/Wild Fire	High	Monroe County EMA has the authority through county ordinance 12-5 to ban all open burning in draught situations at the request of the local fire depts., city mayors, village presidents or county board members.
Tire Disposal Encouragement and Enforcement	Goal: Create a tire disposal plan Objective: Make plans for tire disposal in the county.	Extreme Temperatures/Wild Fire	Low	Set up collection points for tire collection, especially in rural Monroe County. Pass ordinance so tire disposal is enforced.
Install Snow Fences	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Keep roadways open during winter weather.	Winter Storms	Medium	Monroe County Highway Dept will work with Local, State and Federal agencies to procure funding for snow fences.
Earthquake Mapping Exercises	Goal: Develop long-term strategies to educate residents on the hazards affecting their community Objective: Improve education and training of emergency personnel and public officials	Earthquake	Medium	Monroe County GIS dept will work with other agencies to create earthquake mapping.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Earthquake Response Plan	Goal: Create new or revise existing plans/maps for Template County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Earthquake	High	Monroe county EMA has an earthquake annex in the Emergency Operations Plan.
Develop a Post-Incident Plan for Road Repair	Goal: Create new or revise existing plans/maps for Template County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Earthquake	Low	Monroe County will work with the IL Department of Transportation to develop this plan. The plan will address inspection and reconstruction sequence for repair to roads and bridges on the county, local, and municipal level and identify the most critical routes.
Capital Improvement Plan	Goal: Create a plan to improve the community should disaster strike. Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Earthquake	Low	Monroe county EMA will work with county officials and local governments to create this plan.
Harden infrastructure including: (Sheriff Department, all schools, government buildings, including courthouse)	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Earthquake/Tornado	Medium	Monroe County will work with local, state and federal agencies to find funding to harden essential facilities such as the Monroe County Courthouse, Jail, Annex Building. We will also encourage all communities and schools in the county to harden their facilities.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Install Inertia Valves for Public Buildings	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	Earthquake	Medium	Monroe County Maintenance will work with state and federal agencies to install inertia valves in all county buildings.
Procure Backup Water Supply	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	Earthquake	Medium	Most of the county water supply is piped into the county underground and will not withstand a strong earthquake. Also the residents with wells should not use well water for consumption following an earthquake due to contamination until it is checked leaving a large number of people without a water supply
Register county for USGS "The Great Central U.S. Shake Out" program for earthquake awareness, mitigation, and response; encourage communities to do the same	Goal: Develop long-term strategies to educate residents on the hazards affecting their community Objective: Raise public awareness	Earthquake	Medium	Monroe County EMA will register for The Great Central U.S Shakeout to promote earthquake awareness, mitigation and response and we will encourage all of the communities to register and participate.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Emergency Plan/Protocol for HAZMAT	Goal: Protect residents following a hazmat incident. Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Hazmat	High	Monroe county EMA has a Hazard Materials Annex in the Emergency Operations Plan.
Conduct a Commodity Flow Study	Goal: Know what materials are being transported throughout the county on the rails and roadways. Objective: Conduct new studies/research to profile hazards and follow-up on mitigation	Hazmat	Medium	Monroe County EMA will work with the IL Department of Transportation and other companies, railroad and communities to create a list of hazardous materials the travel through the county to help prepare the first responders and residents.
Industrial Site Buffering and Analysis	Goal: Provide a safe place for residents Objective: Conduct new studies/research to profile hazards and follow-up with mitigation strategies	Hazmat	Medium	Monroe County will encourage site buffering for all tier II locations.
Hazmat Trained Response Team	Goal: Have a Hazmat team available for response in Monroe county Objective: Improve education and training of emergency personnel in regards to Hazmat	Hazmat	Medium	Monroe County will assist in seeking funding to improve education, training and eventually creating a team to respond to hazmat situations.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Hazmat Spill Removal and Disposal Procedures	Goal: Remove hazardous materials safely and quickly following a release. Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Hazmat	Medium	Monroe county EMA will work with hazmat teams and the private sector to create plans for removal of hazard materials following a spill.

Table 5-7: List of Mitigation Strategies Developed for Waterloo, IL

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Public Education/Awareness	Goal: Develop long-term strategies to educate Template County residents on the hazards affecting their community Objective: Raise public awareness of hazard mitigation	All Hazards	Medium	Waterloo has some public education/awareness programs but would like to expand this.
Mutual Aid Agreements	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Evaluate and strengthen the communication and transportation abilities of emergency services	All Hazards	High	Mutual aid agreements are with other government bodies within the county and local businesses.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Back-up Generators	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects on hazards	All Hazards	Medium	Some facilities have back-up generators but they are needed for other critical facilities. The city will also identify private homes that would need a back-up generator in the event of a power outage.
Enhanced Communication Systems	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Evaluate and strengthen the communication and transportation abilities of emergency services	All Hazards	Low	Since project could affect entire county a board of all county government should be formed. Found might could from local government and grants.
NOAA Weather Radios	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	All Hazards	Medium	Some facilities are equipped with weather radios. However, the EMA and Fire Department will work together to procure weather radios at a reduced cost to citizens, especially for those who are not within a certain radius of warning sirens.
Emergency Alert Systems – Additional Sirens	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Evaluate and strengthen the communication and transportation abilities of emergency services	All Hazards	Medium	City will assist in a hired contractor to erect additional sirens pending funding. Voice-enhanced sirens could be installed for post-disaster assistance with evacuation and directions for the community.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Animal Protection/Rescue	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Improve emergency sheltering	All Hazards	Medium	Protect and rescue of animals will come from local animal shelters and veterinarians. Local and grant funding
Family Disaster Plans & Kits	Goal: Develop long-term strategies to educate residents on the hazards affecting their community Objective: Raise public awareness on hazard mitigation	All Hazards	Medium	Disaster information will be provided to citizens though local emergency responders. Most are already funded by their salary or are volunteers.
Establish Local Emergency Planning Committee	Goal: Create new or revise existing plans/maps for Template County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	All Hazards	High	Planning committees would be made up of existing emergency responders and volunteers. .
Obtain Vehicle for Weather Spotter and EMA Personnel		All Hazards	Medium	Waterloo will work with outside agencies to acquire funding for vehicles and their maintenance.
Participate in the NFIP	Goal: Create new or revise existing plans/maps for Template County Objective: Support compliance with the NFIP for each jurisdiction in Template County	Flood	Medium	Project would be supported by local EMA directors and the affiliates.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Property Acquisitions (ie "buyouts")	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Flood	Medium	Local government would oversee project. Funding through local, state and federal governments.
Home Elevations	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Flood	Medium	Local Government would manage project..
Property Relocations	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Flood	Medium	Relocations will be managed by local government in cooperation with state and federal authorities.
Stormwater Management Ordinance	Goal: Create new or revise existing plans/maps for Template County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Flood	High	Management and ordinances would come through local government
Floodplain Ordinances	Goal: Create new or revise existing plans/maps for Template County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Flood	High	Ordinances will be enacted by local and county government.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Procure permanent signage or swing gates for roads that frequently flood in flash-flooding scenarios.	Goal: Create new or revise existing plans/maps for Template County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Flood	Medium	Waterloo will work with the County to identify all roads that frequently flood. These roads will be marked with permanent signage or swing gates so that the public is aware of the situation.
Bury Power Lines	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Tornado / Severe Storms	High	Local governments who have their own power lines and privately owned power companies.
Provide and Publicize Location of Safe Rooms and/or Shelters	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Improve emergency sheltering in the county	Tornado / Severe Storms	Medium	On top of various shelters, provide a tornado safe room in all public buildings.
Anchoring of Manufactured Homes & Exterior Attachments	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Tornado / Severe Storms	Medium	Local building inspectors will evaluate work and private individuals will be responsible for work. Grants may be needed.
Back-up power source for critical facilities	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	Tornado / Severe Storms	High	Local governments and private power companies will ensure back-up power source are available.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Tree Management/Trimming Plan	Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	Tornado / Severe Storms	High	Local government along with private power companies will make sure tree are managed and trimmed.
Ordinance for Higher Construction Standards/Techniques in regards to severe storms	Goal: Create new or revise existing plans/maps for Template County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Tornado / Severe Storms	High	Local government will enact ordinances that comply with proper construction codes.
Cooling/Warming Shelters	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Improve emergency sheltering in the county	Extreme Temperatures	High	Shelters will be managed by local EMA'S
Burning Ordinance	Goal: Create new or revise existing plans/maps for Template County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Extreme Temperatures/Wild Fire	Medium	Waterloo needs to adopt a burning ordinance. No funding is required.
Procure Snow Removal Equipment	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	Winter Storms	High	Local government bodies will be responsible for removal of snow and have agreements with national guard in emergencies.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Earthquake Mapping Exercises	Goal: Develop long-term strategies to educate residents on the hazards affecting their community Objective: Improve education and training of emergency personnel and public officials	Earthquake	Medium	Local Ema's will plan and coordinate exercises..
Earthquake Response Plan, Including School Survey Procedures	Goal: Create new or revise existing plans/maps for Template County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Earthquake	Medium	Local Ema's in cooperation with local school district will implement plan and have follow-up survey procedures.
Capital Improvement Plan	Goal: Create new or revise existing plans/maps for Template County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Earthquake	Medium	Local governments will access and plan accordingly as budget allows for capital improvements..
Adopt Earthquake Building Codes	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Earthquake	High	Local governments will enact building codes relating to earthquakes.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Harden infrastructure including: shelters	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Earthquake	Medium	Waterloo, Monroe County and the EMAs will work together to target funding for hardening of shelters so there's a place of safety in the event of an earthquake.
Harden Power Plant	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Earthquake	Medium	The City has a backup power generation system. However, if an earthquake were to occur this building would suffer and back-up power would not be available. Waterloo will work with the power plant personnel and seek funding for hardening of this facility.
Emergency Plan/Protocol for HAZMAT	Goal: Create new or revise existing plans/maps for Template County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Hazmat	Medium	Waterloo has an initial assessment which needs to be expanded upon. Waterloo needs a plan on how to handle the spill itself. This plan needs a protocol on how to inform local residents of situation and potential evacuation plans.
Industrial Site Buffering and Analysis	Goal: Create new or revise existing plans/maps for Template County Objective: Conduct new studies/research to profile hazards and follow-up with mitigation strategies	Hazmat	Medium	Local governments will ensure for industrial site buffering and analysis.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Hazmat Trained Response Team	Goal: Develop long-term strategies to educate residents on the hazards affecting their community Objective: Improve education and training of emergency personnel and public officials	Hazmat	Medium	Mutual Aid agreement with St. Clair County to use their Hazmat team.
Hazmat Spill Removal and Disposal Procedures	Goal: Create new or revise existing plans/maps for Template County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Hazmat	High	Mutual Aid agreement with St. Clair County to use their Hazmat team for spill removal and disposal. However, local personnel should be trained on the basics of hazard spill removal and disposal.

Table 5-8: List of Mitigation Strategies Developed for Columbia, IL

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Public Education/Awareness	Goal: Develop long-term strategies to educate Monroe County residents on the hazards affecting their community Objective: Raise public awareness of hazard mitigation	All Hazards	High	Increase the publicity of the education outreach on natural disasters. Examples include publishing information on webpages and including information in the new resident's packet. Local officials will work together to develop a new plan. No additional funding is necessary.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Mutual Aid Agreements	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Evaluate and strengthen the communication and transportation abilities of emergency services	All Hazards	High	Columbia has mutual aid agreements with Mabis, Ileas, St. Clair Special Emergency Services.
Back-up Generators	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects on hazards	All Hazards	Medium	The Columbia Fire Station is the only facility with a back-up generator. Columbia will procure other mobile generators for post-disaster events, including those for special needs populations. Procure one back-up generator for the community in general.
Enhanced Communication Systems	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Evaluate and strengthen the communication and transportation abilities of emergency services	All Hazards	High	The City of Columbia is in the process of switching over to the STARCOM 21 system
NOAA Weather Radios	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	All Hazards	High	All critical facilities have NOAA weather radios; however Columbia would like to initiate a public distribution of weather radios through an outside-funded event.
Emergency Alert Systems – Sirens	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Evaluate and strengthen the communication and transportation abilities of emergency services	All Hazards	Medium	Apply for various grants to increase the number of early warning sirens.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Family Disaster Plans & Kits	Goal: Develop long-term strategies to educate residents on the hazards affecting their community Objective: Raise public awareness on hazard mitigation	All Hazards	Low	The City of Columbia will work with Columbia EMA and Monroe County EMA to find a way to get the information out to the public.
Establish Local Emergency Planning Committee	Goal: Create new or revise existing plans/maps for Monroe County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	All Hazards	High	Monroe County has a LEPC
Special Needs Population List	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	All Hazards	Medium	Monroe County EMA and the Monroe County Health Department will work with City of Columbia officials to create a list.
Procure a Back-up Water Supply	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	All Hazards	High	Have two connections to Illinois American and Dupont, Cahokia Commonfields and Prairie Dupont Water Systems.
Mississippi River Gas Line Study	Goal: Develop long-term strategies to educate residents on the hazards affecting their community Objective: Improve education and training of emergency personnel and public officials	All Hazards	Medium	Columbia Fire Department and Monroe County will work together to get a list of the gas company's equipment.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Obtain Inflatable Tents / Shelter		All Hazards	Medium	These shelters are for on-site command and short-term sheltering.
Procure Rescue Equipment and Gear		All Hazards	Medium	Obtaining new and updated gear will allow the FD to respond to several types of disasters.
Participate in the NFIP	Goal: Create new or revise existing plans/maps for Monroe County Objective: Support compliance with the NFIP for each jurisdiction in Monroe County	Flood	High	Overseen by Building Department and City Engineer. NFIP maps reviewed once submitted. No cost anticipated..
Participate in the Community Rating System (CRS)	Goal: Create new or revise existing plans/maps for Monroe County Objective: Support compliance with the NFIP for each jurisdiction in Monroe County	Flood	High	Overseen by Building Department and City Engineer. NFIP maps reviewed once submitted. No cost anticipated..
Stormwater Management Ordinance	Goal: Create new or revise existing plans/maps for Monroe County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Flood	High	Overseen by Building Department and City Engineer. Have Storm Water Management Ordinance and have NPDES Storm Water Discharge Permit.
Floodplain Ordinances	Goal: Create new or revise existing plans/maps for Monroe County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Flood	High	Floodplain ordinances and construction requirements are outlined in Municipal Code 15.60. Code is available on the Columbia website.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Dam and/or Levee Maintenance Plan	Goal: Create new or revise existing plans/maps for Monroe County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Flood	High	Levee Districts in Monroe County will work with the US Army Corps of Engineers to maintain levees.
Maintain Acceptable Ratings for Monroe County Levees	Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	Flood	High	Columbia is part of the Metro East Levee District. Columbia will work with the Metro East Levee District to have a levee maintenance plan and also work to get FIRMs approved by the federal government.
Dam and/or Levee Failure – Emergency Response Plan	Goal: Create new or revise existing plans/maps for Monroe County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Flood	High	There is an Evacuation Plan in the Monroe County EOP
Elevate Low-Lying Roads (Valmeyer Rd)	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Flood	Medium	Overseen by City Engineer. Hydraulic study will be performed to lesser effect of flooding on roadways..
Culvert Replacement	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Flood	High	None Known.
Installation of Pumping Stations	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Flood	Low	Extremely cost prohibitive due to expanse of drainage areas and volume of storm water.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Obtain Rescue Boat	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards.	Flood	Low	A rescue boat will be shared between the county fire departments.
Improvement of Drainage Ditches	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Flood	Low	City performs routine maintenance of ditchlines along roadways.
Bury Power Lines	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Tornado / Severe Storms	High	All new subdivisions must have buried power lines. City will hire someone to investigate the cost-effectiveness of burying existing power lines.
Provide and Publicize Location of Safe Rooms and/or Shelters	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Improve emergency sheltering in the county	Tornado / Severe Storms	Low	Columbia EMA will look into this should funding come available.
Anchoring of Manufactured Homes & Exterior Attachments	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Tornado / Severe Storms	High	Building codes require anchoring and all manufactured homes are anchored
Back-up power source for critical facilities	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	Tornado / Severe Storms	High	Public Works has 85KW, 90KW and 150KW generators for water/sewer facilities.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Tree Management/Trimming Plan	Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	Tornado / Severe Storms	High	Ameren Illinois performs annual tree trimming program
Ordinance for Higher Construction Standards/Techniques in regards to severe storms	Goal: Create new or revise existing plans/maps for Monroe County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Tornado / Severe Storms	High	New construction or renovations are governed by 2006 International Building Code.
Install Inertia Valves for Public Buildings	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	Tornado / Earthquake	Low	Will investigate although installation of inertia valves has previously been deemed too costly.
New Firehouse for Columbia Fire Department	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Evaluate and strengthen the communication and transportation abilities of emergency services throughout the county.	Tornado / Earthquake	Low	Columbia Fire Department is a metal building and will not withstand an earthquake or small tornado. If said event happened, the FD and EMS would not be fit to respond to emergencies. Columbia recognizes that the FEMA Hazard Mitigation Grant Program cannot fund the new construction of a building but rather the code enhancements for earthquake and/or tornado resistance.
Cooling/Warming Shelters	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Improve emergency sheltering in the county	Extreme Temperatures	Medium	Columbia will work with the EMA to set up more cooling and heating shelters and publicize their location.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Burn Ordinance	Goal: Create new or revise existing plans/maps for Monroe County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Extreme Temperatures/Wild Fire	High	Ordinance #1775 Municipal Code Chapter 9.16.160. Code is available on the Columbia website.
Tire Disposal Ordinance	Goal: Create new or revise existing plans/maps for Monroe County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Wild Fire	Low	Set-up collection points for tire collection, especially in rural Monroe County outside Columbia. Pass ordinance so tire disposal is enforced.
Obtain new tanker/tender fire truck for Columbia Fire Department	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.	Wild Fire/Hazmat	Medium	This will allow for Columbia Fire Dept to better fight and assist other agencies in fighting wild fires and controlling Hazmat situations
Procure Snow Removal Equipment	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	Winter Storms	High	Public Works has adequate equipment for snow removal.
Install Snow Fences	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Winter Storms	High	Snow fences are not felt to be warranted as there is limited drifting that occurs.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Earthquake Mapping Exercises	Goal: Develop long-term strategies to educate residents on the hazards affecting their community Objective: Improve education and training of emergency personnel and public officials	Earthquake	High	Felt EMA is better suited to educate residents. City would be willing to help facilitate educational and training sessions
Earthquake Response Plan, Including School Survey Procedures	Goal: Create new or revise existing plans/maps for Monroe County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Earthquake	High	City will help to review and update the maps if coordinated through EMA.
Capital Improvement Plan	Goal: Create new or revise existing plans/maps for Monroe County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Earthquake	Medium	City will look at developing plans and ordinances to support hazard mitigation to the extent possible
Adopt Earthquake Building Codes	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Earthquake	High	Earthquake design and construction inherent to 2006 International Building Codes
Harden infrastructure including:	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Earthquake	High	New structure or rehabbed structures are designed and constructed to seismic requirements

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Emergency Plan/Protocol for HAZMAT	Goal: Create new or revise existing plans/maps for Monroe County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Hazmat	High	The Columbia Fire Dept has a hazmat protocol and there is an emergency plan in the Monroe County EOP
Obtain Foam Trailer	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.	Hazmat	Medium	The Columbia airport will utilize and house this trailer but would be available through mutual aid agreements.
Conduct a Commodity Flow Study	Goal: Create new or revise existing plans/maps for Monroe County Objective: Conduct new studies/research to profile hazards and follow-up on mitigation	Hazmat	Medium	Columbia Fire Dept or the City of Columbia will work with shipping agencies and Rail Road should funding come available.
Industrial Site Buffering and Analysis	Goal: Create new or revise existing plans/maps for Monroe County Objective: Conduct new studies/research to profile hazards and follow-up with mitigation strategies	Hazmat	Low	City has limited industrial areas but will analyze the industrial areas to determine if mitigation is necessary

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Hazmat Trained Response Team	Goal: Develop long-term strategies to educate residents on the hazards affecting their community Objective: Improve education and training of emergency personnel and public officials	Hazmat	High	Columbia Fire Dept has an agreement with the St. Clair Special Emergency Services to assist with hazmat incidents however that team also services 2 other counties so we are not guaranteed to get them. We would like our own team to provide service for our community an to assist other communities as well.
Hazmat Spill Removal and Disposal Procedures	Goal: Create new or revise existing plans/maps for Monroe County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Hazmat	High	Columbia Fire has an agreement with St.Clair Special Emergency Services to assist with Hazmat spills.
Conduct Detailed Study of Undermining and Sinkholes in Monroe County	Goal: Create new or revise existing plans/maps for Monroe County Objective: Conduct new studies/research to profile hazards and follow-up with mitigation strategies	Subsidence	Low	City will supply what information it has concerning undermining and sinkholes
Public Education on Undermining and/or Sinkholes and Benefits of Insurance	Goal: Develop long-term strategies to educate Columbia residents on the hazards affecting their community Objective: Raise public awareness of hazard mitigation	Subsidence	Low	City will supply what information it has concerning undermining and sinkholes

Table 5-9: List of Mitigation Strategies Developed for Valmeyer, IL

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Public Education/Awareness	Goal: Develop long-term strategies to educate Template County residents on the hazards affecting their community Objective: Raise public awareness of hazard mitigation	All Hazards	High	We will work with EMA to help educate the public on hazards affecting the community and work to mediate those hazards
NOAA Weather Radios	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	All Hazards	Medium	Work on funding for purchase of weather radios to supply to residents for notification of severe weather or emergent situations.
Emergency Alert Systems	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Evaluate and strengthen the communication and transportation abilities of emergency services	All Hazards	High	Valmeyer has warning sirens in place.
Back-up Generators	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects on hazards	All Hazards	Medium	We will work to find funding to for a generator at the school that can be used for shelter

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Family Disaster Plans & Kits	Goal: Develop long-term strategies to educate residents on the hazards affecting their community Objective: Raise public awareness on hazard mitigation	All Hazards	Low	Valmeyer will put together a plan to have 'Family Disaster Plans & Kits workshop' for its residents. Valmeyer will work with County EMA to find resources to provide some basic materials.
Communications in Rock City	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	All Hazards	Medium	The Village of Valmeyer owns Rock City, which is used to store federal documents and is a refrigeration facility for many corporations. There is high traffic in this facility and it needs an antenna for adequate communications in a disaster event.
Procure temporary signage to use during 1) power outages, 2) road closures, and/or 3) shelter location	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	All Hazards	Medium	Local resources will fund this project.
Property Relocations	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Flood	High	In 1993, most of the Village of Valmeyer relocated 400 feet up and off the floodplain.
Procure sandbagging equipment	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Flood	Medium	During high flood events, having local sandbagging equipment will allow for expediting the flood flight.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Maintain acceptable ratings for Monroe County levees	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Retrofit critical facilities and structures with structural design practices and equipment that will withstand natural disasters and offer weather-proofing	Flood	Medium	Valmeyer is part of the Harrisonville Levee District (HLD). Valmeyer will work with the HLD to determine appropriate course of action to maintain levees, and furthermore get the Monroe County FIRMs approved.
Improve early warning system for flash flooding in Valmeyer	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	Medium	Work with County EMA to improve early warning for flash flooding and train on evacuation and set up of temporary sheltering
Require homeowners to anchor manufactured homes	Goal: Lessen the impact of hazards to new and existing infrastructure Objective: Retrofit critical facilities and structures with structural design practices and equipment that will withstand natural disasters and offer weather-proofing	Tornado	Low	Valmeyer recognizes the importance for homes that are manufactured to be anchored for safety and will support county wide effort to promote this safety measure

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Back-up power source for shelters	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	Tornado / Severe Storms	Medium	The County has heating and cooling shelters set available in the county but none within 10 miles of Valmeyer. We would like to see something set up on our community or arrangements made to assist in transportation for our older residents
Harden infrastructure including: (schools and fire department)	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Earthquake	Medium	Work with local and federal governments to obtain funding to harden critical facilities in Valmeyer to insure infrastructure is intact and it will serve as location for sheltering if needed.
Train existing fire personnel in Hazmat response	Goal: Develop long-term strategies to educate residents on the hazards affecting their community Objective: Improve education and training of emergency personnel and public officials	Hazmat	Medium	Obtain equipment and train team for Hazmat response along the railroad. Valmeyer will work with the county and county fire departments to establish a countywide team.
Industrial site buffering for all identified tier II locations near Valmeyer	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Retrofit critical facilities and structures with structural design practices and equipment that will withstand natural disasters and offer weather-proofing	Hazmat	Medium	We will work with the local companies to make their facilities stronger in turn making the residents of Valmeyer safer from the chemicals that are in the area

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Tire disposal encouragement and enforcement	Goal: Create new or revise existing plans/maps for Monroe County Objective: Review and update existing, or create new, community plans and ordinances to support hazard mitigation	Wildfire	Low	Set up collection points for tire collection, especially in rural Monroe County. Pass ordinance so tire disposal is enforced.
Develop more stringent burn ordinance	Goal: Create New or revise existing plans/maps for Monroe County Objective: Review and update existing, or create new, community plans and ordinances to support hazard mitigation	Wildfire	Medium	Each Fire Dist. will pass an ordinance against burning during dry conditions. Monroe County EMA can issue burn bans at the request of fire departments.

Table 5-10: List of Mitigation Strategies Developed in for Maeystown, IL

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Outreach program to increase awareness of hazards that affect Maeystown, and cost-effective mitigation measures for each hazard	Goal: Develop long-term strategies to educate Maeystown residents on the hazards affecting their community Objective: Raise public awareness of hazard mitigation	All Hazards	Medium	We will work with EMA to help educate the public on hazards affecting the community and work to mediate those hazards

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Plan evacuation routes of rural areas	Goal: Develop and practice plans for evacuation of residents in rural areas. Objective: Train first responders and residents of the routes and steps that need to be taken when evacuating to make evacuation when needed as quick and safe as possible.	All Hazards	Medium	Maeystown will work with Monroe County EMA to create or review plans and have a practical training to practice the evacuation and shelter set up. This will include training for logistics, funding and procurement.
Obtain a back-up generator for the community	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Improve emergency sheltering in Maeystown	All Hazards	Medium	We will work to obtain assistance in putting in a generator for power backup to lessen the impact on the community and improving the ability to shelter in emergent situations
Erect additional early-warning sirens	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Evaluate and strengthen the communication and transportation abilities of emergency services in Waterloo	Thunderstorms / Tornado	Medium	Work with County EMA to search for funding to erection of outdoor warning sirens in Maeystown.
Supply weather radios to county residents	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	Thunderstorms / Tornado	Medium	Work on funding for purchase of weather radios to supply to residents for notification of severe weather or emergent situations.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Maintain acceptable ratings for Monroe County levees	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Retrofit critical facilities and structures with structural design practices and equipment that will withstand natural disasters and offer weather-proofing	Floods	Medium	Maeystown is not in a levee district, but recognizes the importance of levee protection to the county economy, and will contribute to county-wide efforts to maintain acceptable levees. Maeystown FPD and PD also service Fults, which is in a levee district.
Improve early warning system for flash flooding in Maeystown	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	Floods	Medium	Work with County EMA to improve early warning for flash flooding and train on evacuation and set up of temporary sheltering
Require homeowners to anchor manufactured homes	Goal: Lessen the impact of hazards to new and existing infrastructure Objective: Retrofit critical facilities and structures with structural design practices and equipment that will withstand natural disasters and offer weather-proofing	Tornado	Medium	Maeystown recognizes the importance for homes that are manufactured to be anchored for safety and will support county wide effort to promote this safety measure.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Contribute to burying county power lines	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Retrofit critical facilities and structures with structural design practices and equipment that will withstand natural disasters and offer weather-proofing	Tornado	Medium	Maeystown will work with the Power company to see where it is feasible to bury power lines.
Obtain heating and cooling shelters for Maeystown	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Improve emergency sheltering in Maeystown	Extreme Heat / Winter Storms	Low	The County has heating and cooling shelters set available in the county but none within 10 miles of Maeystown. We would like to see something set up on our community or arrangements made to assist in transportation for our older residents
Winter storm sheltering	Goal: Lessen the impact on local residents during winter storms. Objective: Set up shelter before storms hit by preplanning	Extreme Heat/ Winter Storms	Medium	Coordinate with Monroe County EMA and Red Cross to see what kind of shelters are needed and how to fund them.
Build snow fences along high risk roads	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	Extreme Heat / Winter Storms	Medium	We will work with county highway department and road districts to work on funding for materials to erect snow fences in known problem areas.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Harden critical facilities of Maeystown	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Retrofit critical facilities and structures with structural design practices and equipment that will withstand natural disasters and offer weather-proofing	Earthquake	Medium	Work with local and federal governments to obtain funding to harden critical facilities in Maeystown to insure infrastructure is intact and it will serve as location for sheltering if needed.
Register for USGS "The Great Central U.S. Shake Out" program for earthquake awareness, mitigation, and response	Goal: Develop long-term strategies to educate Monroe County residents on the hazards affecting their community Objective:	Earthquake	Low	We will work with County EMA in promoting the Great Central U.S. Shake Out. This will promote education, awareness, mitigation and response to all residents of Monroe County
Create and train a hazmat response team to service Maeystown	Goal: Develop long-term strategies to educate Monroe County residents on the hazards affecting their county Objective: Improve education and training of emergency personnel	Hazmat	Medium	With the railroad running through portions of Monroe County and the amount of farming chemicals that are used we would like to create a Hazmat response team for Monroe County.
Industrial site buffering for all identified tier II locations near Maeystown	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Retrofit critical facilities and structures with structural design practices and equipment that will withstand natural disasters and offer weather-proofing	Hazmat	Low	We will work with the local companies to make their facilities stronger in turn making the residents of Maeystown safer from the chemicals that are in the area.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Tire disposal encouragement and enforcement	Goal: Create new or revise existing plans/maps for Monroe County Objective: Review and update existing, or create new, community plans and ordinances to support hazard mitigation	Wildfire	Low	Set up collection points for tire collection, especially in rural Monroe County. Pass ordinance so tire disposal is enforced.
Sprinkler Systems in Buildings	Goal: Create ordinance to set new guidelines for sprinklers in buildings. Objective: To set requirements that all new construction has sprinkler systems installed	Wildfire/Structure Fire	Medium	This will reduce the amount of fire damage to a residence and reduce the chance that a wildfire start.
Smoke Detector Program	Goal: Make sure every household has working smoke detectors. Objective: Create a plan to have a program that will provide smoke detectors to every household that cannot afford them.	Wildfire/ Structure Fire	Medium	Maeystown Fire Dept will look for funding to create a public display and to have detectors on hand for those who cannot afford them.
Develop more stringent burn ordinance	Goal: Create New or revise existing plans/maps for Monroe County Objective: Review and update existing, or create new, community plans and ordinances to support hazard mitigation	Wildfire	Low	Each Fire Dist. pass an ordinance against burning during dry conditions. Monroe County EMA can issue burn bans at the request of fire departments.

Table 5-11: List of Mitigation Strategies Developed for Fults, IL

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Outreach program to increase awareness of hazards that affect Fults, and cost-effective mitigation measures for each hazard	Goal: Develop long-term strategies to educate Fults residents on the hazards affecting their community Objective: Raise public awareness of hazard mitigation	All Hazards	Medium	We will work with EMA to help educate the public on hazards affecting the community and work to mediate those hazards
Obtain a back-up generator for the community to be stored at the church.	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Improve emergency sheltering in Fults	All Hazards	Low	We will work to obtain assistance in putting in a generator for power backup to lessen the impact on the community and improving the ability to shelter in emergent situations
Erect additional early-warning sirens	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Evaluate and strengthen the communication and transportation abilities of emergency services in Waterloo	Thunderstorms / Tornado	Medium	Work with County EMA to search for funding to erection of outdoor warning sirens in Fults.
Supply weather radios to county residents	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	Thunderstorms / Tornado	Medium	Work on funding for purchase of weather radios to supply to residents for notification of severe weather or other emergency situations

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Maintain acceptable ratings for Monroe County levees	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Retrofit critical facilities and structures with structural design practices and equipment that will withstand natural disasters and offer weather-proofing	Floods	Medium	Fults is part of the Ft. Charles and Ivy Landing Levee District
Improve early warning system for flash flooding in Fults	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	Floods	Medium	Work with County EMA to improve early warning for flash flooding and train on evacuation and set up of temporary sheltering
Require homeowners to anchor manufactured homes	Goal: Lessen the impact of hazards to new and existing infrastructure Objective: Retrofit critical facilities and structures with structural design practices and equipment that will withstand natural disasters and offer weather-proofing	Tornado	Medium	Fults recognizes the importance for homes that are manufactured to be anchored for safety and will support county wide effort to promote this safety measure.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Contribute to burying county power lines	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Retrofit critical facilities and structures with structural design practices and equipment that will withstand natural disasters and offer weather-proofing	Tornado	Low	The village of Fults will work with Monroe County Electric to search for funding to bury power lines.
Obtain heating and cooling shelters for Fults	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Improve emergency sheltering in Fults	Extreme Heat / Winter Storms	Low	The County has heating and cooling shelters set available in the county but none within 15 miles of Fults. We would like to see something set up on our community or arrangements made to assist in transportation for our older residents
Build snow fences along high risk roads	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	Extreme Heat / Winter Storms	Low	We will work with county highway department and road districts to work on funding for materials to erect snow fences in known problem areas.
Harden essential facilities of Fults	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Retrofit critical facilities and structures with structural design practices and equipment that will withstand natural disasters and offer weather-proofing	Earthquake	Medium	Work with local and federal governments to obtain funding to harden critical facilities in Fults to insure infrastructure is intact and it will serve as location for sheltering if needed

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Register for USGS "The Great Central U.S. Shake Out" program for earthquake awareness, mitigation, and response	Goal: Develop long-term strategies to educate Monroe County residents on the hazards affecting their community Objective: Raise public awareness on hazard mitigation.	Earthquake	Low	We will work with County EMA in promoting the Great Central U.S. Shake Out. This will promote education, awareness, mitigation and response to all residents of Monroe County
Train existing fire personnel in hazmat response	Goal: Develop long-term strategies to educate Monroe County residents on the hazards affecting their county Objective: Improve education and training of emergency personnel	Hazmat	Low	Fults is serviced by Maeystown FPD; Fults will collaborate with Maeystown on response team creation.
Industrial site buffering for all identified tier II locations near Fults	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Retrofit critical facilities and structures with structural design practices and equipment that will withstand natural disasters and offer weather-proofing	Hazmat	High	Fults sits next to a RailRoad track so there are continuous chemicals being transported through our community.
Tire disposal encouragement and enforcement	Goal: Create new or revise existing plans/maps for Monroe County Objective: Review and update existing, or create new, community plans and ordinances to support hazard mitigation	Wildfire	Low	Set up collection points for tire collection, especially in rural Monroe County. Pass ordinance so tire disposal is enforced.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Develop more stringent burn ordinance	Goal: Create New or revise existing plans/maps for Monroe County Objective: Review and update existing, or create new, community plans and ordinances to support hazard mitigation	Wildfire	Low	Fults is part of the Maeystown Fire Protection district. We believe that the fire chief should have authority to restrict burning during drought periods to prevent wildfires.

Table 5-12: List of Mitigation Strategies Developed for Hecker, IL

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Elevate Roadways (list roadways to be elevated)	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Flood	Medium	Project to be overseen by Monroe County Highway Department and funded by the County/Road District. These jurisdictions will work together to secure the funding.
Temporary Signage for Road Closures	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	Flood	Medium	Hecker Fire and Village will work together to secure funding for EMA for this project.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Pass a Stormwater Management Ordinance	Goal: Create new or revise existing plans/maps for Template County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Flood	High	The Village of Hecker passed a stormwater management ordinance on 6/8/1993.
Pass an Erosion Management Ordinance	Goal: Create new or revise existing plans/maps for Template County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Flood	High	The Village of Hecker passed a erosion management ordinance on 6/8/1993.
Enhance Outdoor Weather Sirens	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Evaluate and strengthen the communication and transportation abilities of emergency services	Tornado	Medium	Project overseen and funded by the Village of Hecker.
Temporary Shelter	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Improve emergency sheltering in the county	All Hazards	Medium	Materials donated by the Sportsman's Club to complete this project.
Harden Hecker Community Center	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Earthquake	Medium	Contact Engineer and have Monroe County EMA fund project.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Earthquake Awareness	Goal: Develop long-term strategies to educate Template County residents on the hazards affecting their community Objective: Raise public awareness of hazard mitigation	Earthquake	Medium	Purchase brochures and mail. Funded by Hecker Fire.
Conduct Commodity Flow Study	Goal: Create new or revise existing plans/maps for Template County Objective: Conduct new studies/research to profile hazards and follow-up on mitigation	Hazmat	Medium	EMA will work with Highway Department to complete this project. Community will seek funding from the Illinois Department of Transportation.
Evacuation Plan	Goal: Create new or revise existing plans/maps for Template County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Hazmat	Medium	Hecker EMA will work with Monroe County EMA to develop this plan.
Electronic Message Sign	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	Heat/Wildfire	Medium	Work with members of community to donate money to purchase sign for Fire Department.

Mitigation Item	Goals and Objects Satisfied	Hazards Addressed	Priority	Comments
Public Awareness and Handout of Fire Prevention Materials	Goal: Develop long-term strategies to educate Template County residents on the hazards affecting their community Objective: Raise public awareness of hazard mitigation	Wildfire	Medium	Hecker will work with Monroe County EMA to get materials to hand out to the public.
Pass a Burning Ordinance	Goal: Create new or revise existing plans/maps for Template County Objective: Review and update existing, or create new community plans and ordinances to support hazard mitigation	Heat/Wildfire	High	The Village of Hecker passed a burning ordinance on 6/8/1993.

The Monroe County Emergency Management Agency will be the local champions for the mitigation actions. The County Commissioners and the city and town councils will be an integral part of the implementation process. Federal and state assistance will be necessary for a number of the identified actions.

5.5 Multi-Jurisdictional Mitigation Strategy

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

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

Section 6 Plan Maintenance

6.1 Monitoring, Evaluating, and Updating the Plan

Throughout the five-year planning cycle, the Monroe County Emergency Management Agency (EMA) will reconvene the mitigation planning team to monitor, evaluate, and update the plan on an annual basis. Additionally, a meeting will be held during 2017, to address the five-year update of this plan. Members of the planning committee are readily available to engage in email correspondence between annual meetings. If the need for a special meeting, due to new developments or a declared disaster occurs in the county, the team will meet to update mitigation strategies. Depending on grant opportunities and fiscal resources, mitigation projects may be implemented independently by individual communities or through local partnerships.

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

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

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

6.2 Implementation through Existing Programs

The results of this plan will be incorporated into ongoing planning efforts since many of the mitigation projects identified as part of this planning process are ongoing. Monroe County and its incorporated jurisdictions will update the zoning plans and ordinances listed in Table 5-2 as necessary and as part of regularly scheduled updates. Each community will be responsible for updating its own plans and ordinances.

6.3 Continued Public Involvement

Continued public involvement is critical to the successful implementation of the MHMP. Comments from the public on the MHMP will be received by the EMA Coordinator and forwarded to the mitigation planning team for discussion. Education efforts for hazard mitigation will be ongoing through the EMA. The public will be notified of periodic planning meetings through notices in the local newspaper. Once adopted, a copy of the MHMP will be maintained in each jurisdiction and in the county EMA Office.

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United States Geologic Survey (USGS). 2007. Earthquake Hazard in the Heart of America. http://pubs.usgs.gov/fs/2006/3125/pdf/FS06-3125_508.pdf, last accessed July 10, 2008.

Appendix A. MHMP Meeting Minutes

IEMA Multi-Hazard Mitigation Plan

Assembly of the Monroe County Planning Team Meeting 1
Chairman: Delbert Wittenauer
Plan Directors: SIUC Geology Department and IUPUI - Polis

Meeting Date: 06/21/2012

Meeting Time: 7:00PM

Place: Monroe County Courthouse, 100 S. Main Street, Waterloo, IL 62298

Planning Team/Attendance: 29

Introduction to the Multi-Hazard Mitigation Planning Process

The meeting is called to order

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

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

Jonathan Remo divided the planning project into five to six meetings. At the 1st meeting, the planning team will review critical facility maps. The planning team will be asked to research and verify the location of all critical facilities within the county. Jonathan stated that public participation is very important throughout the planning process. He explained that all of the meetings are open to the public but there will be a particular effort made to invite the public to the 3rd meeting. At that meeting, the SIUC Geology Department will present historic accounts of natural disasters that have affected this area. At the 2nd meeting the discussion will focus on natural disasters that are relevant to this area. These hazards will be given a probability rating and ranked by their occurrence and potential level of risk. The SIUC Geology Department will research these hazards and present them to the planning team. The 3rd meeting is publicized in order to encourage public participation. The SIUC Geology Department will produce a risk assessment in draft

form (each planning team member will get a copy) as well as present strategies and projects that FEMA and other counties have undertaken for the planning team to review. The 4th meeting consists of a brainstorming session focused on disasters that were analyzed in the risk assessment report. The Planning Team will list strategies and projects that could be implemented to mitigate the potential hazards that threaten the county. FEMA requires that for every identified hazard, a strategy to mitigate the loss and damage must be in place. The strategies may range from educational awareness to hardening a building or building a levee. After the 4th meeting the plan will be in its final draft form. At the 5th meeting the planning team will need to review the plan prior to sending it to IEMA. IEMA will review the plan and will make recommendation to it as they see fit, then it is submitted to FEMA for review and approval. Once the plan has been submitted to FEMA, local governments are eligible to apply for grants to mitigate these established hazards. After FEMA approves the plan, it is sent back to the Planning Team. At the 6th meeting the Planning Team will present the Pre-Disaster Mitigation Plan to the County Board for adoption. Incorporated communities must either adopt the county plan or prepare its own plan, in order to access mitigation assistance from FEMA. The communities are encouraged to participate and contribute to development of the plan. Once the County Board has adopted the plan, each incorporated community will have the opportunity to adopt the plan as well.

Jonathan Remo then assigned research homework arranged by categories to individual planning team members to locate missing or incorrect critical facilities.

Lastly, Jonathon Remo fielded any questions from the planning team about the process of mitigation planning.

Meeting was adjourned.

Multi-Hazard Mitigation Planning Meeting Attendance

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Jurisdiction Name	Print Name	Initial	Job Title/Company	Contact Information (e-mail address and/or phone number)
CITY OF WATERLOO	R. 014370 SCOTT	4	EMA	ROBERT WATERLOO-ILCOUS wfd@htc.net 618-567-4804 bmmf@sephoc.com
Waterloo Fire Dept.	Brett Wiegand	JMW	1st Asst. Chief	
Marystown Fire Prot Dist	LYNDEN RANSSE	LPR	FIRE CHIEF	mrf@htc.net 618-458-6560
Columbia Fire Prot Dist	Andrew Callis	ACC	Captain of Tech Rescue	cuf@htc.net 618- 789 789-1065
Columbia Fire Prot. Dist.	Matt Stephens	MRS	Captain of HazMat	cvfd@htc.net 618-381-6688

Multi-Hazard Mitigation Planning Meeting Attendance

Jurisdiction Name	Print Name	Initial	Job Title/Company	Contact Information (e-mail address and/or phone number)
	Karin Scheiba		Monroe County	Scheiba
	Kelton Davis	Secretary of Schools	MONROE-RANDOLPH REGIONAL OFFICE of Ed	KDAVIS@BOE.45.ORG 618-939-5650
	Dan Kelley		MCSA	Stewart@HRC.net 618-939-1657
	Stelle Heucke		MOCO EMA	MOCOEMA1@HRC.net 618-939-8661
	Ron Mueller		Harrisonville Tel Co	rmueller@HRC.net 939-9277
	Carla Heise		MOCO EMS	mcemsr@HRC.net 618-939-6175
	Jim Trautham		Chief of Police Watkelee Police Dept.	trautham@watkelee.il.us 618-939-3377
County	Laura Henry		GIS Coordinator	lco@co.gis@yahoo.com 618-939-8681 X287

Multi-Hazard Mitigation Planning Meeting Attendance

Meeting 1 - Monroe County

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Jurisdiction Name	Print Name	Initial	Job Title/Company	Contact Information (e-mail address and/or phone number)
Monroe County EMA	Ryan Weber	RW	Director Monroe County EMA	moncoema@att.net 618-773-1061
Health	Michael Tate	MT	Monroe County Health Emergency Director	mtate@moncoema.net 618-340-6128
Health Dept	John Wagner	JW	Administrator	618-939-3871
DOH	Tom Ahrens	TA	ASSISTANT CITY ENGINEER CITY OF COLUMBIA	ahrens@moncoema.net 281-4364
VALMERE EMA	Beth Langsdorf	BL	EMA Mgr. Chief	langsdorfb@att.net 618-793-0223
SEMPER PARVUS DIST. 4	Dennis Rodenberg	DR	COMMISSIONER	rodend@att.net 618-791-7445
Fish Lake Levee	Gary Stumpf		Pres	
Columbia Levee District	Daniel Rube		Chairman	618-604-4114
Valmeyer Police	Tom Andres	TA	Police Chief	618-935-2131
COLUMBIA Police	Jerrell Paul	JP	Deputy Police Chief	350@columbiaillinois.com 618-281-5151

Multi-Hazard Mitigation Planning Meeting Attendance

Jurisdiction Name	Print Name	Initial	Job Title/Company	Contact Information (e-mail address and/or phone number)	
	Elizabeth McSweeney		Gutwray FS Safety Coordinator	618-282-4000	
	Charles W. Kyrush Jr.	CW	President/Village of Hecker	618-779-5974	CW1217@htc.net
	Justin Eckart	JE	Hecker Fire Dept Captain	618-779-0857	jme48@adl.com
	Kevin B. Fair	KB	Asst. Chief Hecker	618-363-3926	hecker.FD@HTC.net
	John Reynolds	JR	Marshall Rustoe	618-301-2402	disa@dosdameril.com
	DELBERT WILLIAMS	DW	County Commissioner	618-473-0013	DW11@ncmga.com

EMA Multi-Hazard Mitigation Plan

Assembly of the Monroe County Planning Team Meeting 2:
Chairman: Delbert Wittenauer
Plan Directors: SIUC Geology Department and IUPUI - Polis

Meeting Date: 7/19/2012

Meeting Time: 7:30PM

Place: Monroe County Courthouse, 100 S. Main Street, Waterloo, IL 62298

Planning Team/Attendance: 19

Historical Hazards, their Probability, and Hazard Ranking

The meeting was called to order.

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

Jonathan Remo provided the planning team with a handout to direct the focus of the meeting discussion. As Jonathan began to conduct the prioritizing process, he described the risk assessment ranking that FEMA has established.

Narrative: The Planning Team was then asked to assess and rank the hazards that could potentially befall Monroe County using the risk priority index (RPI). The identified hazards were ranked as followed for Monroe County:

- #1: Thunderstorms
- #2: Winter Storms
- #3: Tornado
- #4: Earthquake
- #5: Flooding
- #6: Extreme Heat
- #7: HAZMAT
- #8: Wild Fire

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

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

Meeting was adjourned

Multi-Hazard Mitigation Planning Meeting Attendance

Jurisdiction Name	Print Name	Initial	Job Title/Company	Contact Information (e-mail address and/or phone number)	
County Sheriff	Dan Kelly		MCSO	sheriff@htc.net	618-934-8657
Hecker	Charles Kujawshi		President, Village of Hecker	cwhl217@htc.net	618-779-5974
Valmerer EMA + Fire	Bret Langsdorf	<i>BL</i>	Assistant Chief, EMA	langsdorf007@gmail.com	618-719-3023
LEPC/Gateway FS	Elizabeth McElveen	<i>EM</i>	Gateway FS Safety Coordinator		618-282-4000
Harrisonville Tel Co	Ron Mueller	<i>RM</i>	Harrisonville Tel. Co.	rmueller@htc.net	618-939-9277
Columbia Police	Jerald Paul	<i>JP</i>	Deputy Police Chief	35@columbia.illinois.com	618-281-5151 618-781-3094 (cell)
Health	Michael Pate		Monroe County Health Emergency Planner	mocoema@htc.net	618-779-1061
Maystown FPD	Lynden Prange	<i>LP</i>	Fire Chief	mvpd@htc.net	618-458-6560
Maystown	Jason Reynolds		Maystown trustee	diggitydog@gmail.com	618-301-7402
Levee And Drainage	Dennis Rodenberg		Commissioner	rody@htc.net	618-781-7416

Jurisdiction Name	Print Name	Initial	Job Title/Company	Contact Information (e-mail address and/or phone number)	
DOPW	Tim Ahrens		Assistant City Engineer, City of Columbia	tahrens@columbiaillinois.com	618-281-4264
Valmeyer Police	Tom Andres		Police Chief	valmeyerpd@yahoo.com	618-935-2135
Hecker Fire	Kevin Biffar	<i>KB</i>	Assistant Chief, Hecker	heckerFD@htc.net	618-363-3926
Columbia FPD	Andrew Callis		Captain of Technical Rescue	cufd@htc.net	618-789-6688
Regional Sup. Of Schools	Kelton Davis	<i>KD</i>	Superintendent of Schools, Monroe-Randolph regional office of education	kdavis@roe45.org	618-939-5650
Hecker Fire	Justin Eukart	<i>JE</i>	Hecker Fire Dept. Captain	jmehfd@aol.com	618-779-0857
Monroe EMS	Carla Heise	<i>CH</i>	Monroe County EMS	mcemsr@htc.net	618-939-6175
Monroe EMA	Gene Henckler		Deputy Director/Monroe County EMA	mocoema1@htc.net	618-939-8681 x214
County	Laura Henry	<i>LH</i>	GIS Coordinator	mocogis@yahoo.com	618-939-8681 x287

Meeting 2 -

Please print clearly

Jurisdiction Name	Print Name	Initial	Job Title/Company	Contact In (e-mail address and
Monroe County Hwy	Aaron Metzger	AM	County Engineer	MCH@Hrc.net
City of Columbia	Raul Ellis	RE	City Community Eng	rellis@columbiailinois
City of Waterloo	JAMES NAGEL	JN	ZONING/SUBDIVISION ADMINISTRATOR	JN@CCE@WATERLOO.IL.US

Multi-Hazard Mitigation Planning Meeting Attendance

Jurisdiction Name	Print Name	Initial	Job Title/Company	Contact Information (e-mail address and/or phone number)	
Columbia Levee and Drainage	Daniel (Rule?)		Chairman		618-604-4194
Monroe County EMA	Kevin Scheibe		Monroe County EMA	scheibek@yahoo.com	618-973-9787
City of Waterloo	Richard Scott		EMA	rscott@waterloo.il.us	
Fish Lake Levee	Gary Stumpf		President		
Columbia FPD	Matt Stephens	MS	Captain of Haz-Mat	cufd@htc.net	618-281-6688
Waterloo Police	Jim Trantham		Chief of Police, Waterloo PD	jtrantham@waterloo.il.us	618-939-3377
Health Dept.	John Wagner		Administrator	jwagner@monroecountyhealth.org	618-939-3871
EMA	Ryan Weber		Director, Monroe County EMA	mocoema@htc.net	618-779-1061
Waterloo Fire Dept.	Brett Wiegand	BW	1 st Assistant Chief	wfd@htc.net bmwwfd28@yahoo.com	618-567-4804
Monroe County	Delbert Wittenauer	DW	County Commissioner	dwitt@norcom2000.com	618-473-2213

IEMA Multi-Hazard Mitigation Plan

Assembly of the Monroe County Planning Team Meeting 3:

Chairman: Delbert Wittenauer

Plan Directors: SIUC Geology Department and IUPUI - Polis

Meeting Date: 08/30/2012

Meeting Time: 7:00PM

Place: 100 S. Main Street, Waterloo, IL

Planning Team/Attendance: 20

Public Meeting and the County Risk Assessment

The meeting was called to order.

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

A draft of the Monroe County Mitigation Plan was given to each of the planning team members for review. Jonathan explained the contents of the plan via power point presentation. A mitigation strategies survey and a mitigation strategies summary table were given to each planning team member for the purpose of stimulating thought on mitigation strategies for each hazard. Jonathan asked each of the planning team members to come up with at least two mitigation strategies for each hazard.

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

Meeting was adjourned.

Multi-Hazard Mitigation Planning Meeting Attendance

Jurisdiction Name	Print Name	Initial	Job Title/Company	Contact Information (e-mail address and/or phone number)	
DOPW	Tim Ahrens	TA	Assistant City Engineer, City of Columbia	tahrens@columbiaillinois.com	618-281-4264
Valmeyer Police	Tom Andres		Police Chief	valmeyerpd@yahoo.com	618-935-2135
Hecker Fire	Kevin Biffar	KB	Assistant Chief, Hecker	heckerFD@htc.net	618-363-3926
Columbia FPD	Andrew Callis		Captain of Technical Rescue	cufd@htc.net	618-789-6688
Regional Sup. Of Schools	STEVE LANE Kelton Davis	SL	Superintendent of Schools, Monroe-Randolph regional office of education	kdavis@roe45.org	618-939-5650
Hecker Fire	Justin Eukart	JE	Hecker Fire Dept. Captain	jimehd@aol.com	618-779-0857
Monroe EMS	Carla Heise	CH	Monroe County EMS	mcemsr@htc.net	618-939-6175
Monroe EMA	Gene Henckler	GH	Deputy Director/Monroe County EMA	mocoema1@htc.net	618-939-8681 x214
County	Laura Henry	LH	GIS Coordinator	mocogis@yahoo.com	618-939-8681 x287

Multi-Hazard Mitigation Planning Meeting Attendance

Jurisdiction Name	Print Name	Initial	Job Title/Company	Contact Information (e-mail address and/or phone number)	
County Sheriff	Dan Kelly		MCSO	sheriff@htc.net	618-934-8657
Hecker	Charles Kujawshi		President, Village of Hecker	cwh1217@htc.net	618-779-5974
Valmer EMA + Fire	Bret Langsdorf		Assistant Chief, EMA	langsdorf007@gmail.com	618-719-3023
LEPC/Gateway FS	Elizabeth McElveen		Gateway FS Safety Coordinator		618-282-4000
Harrisonville Tel Co	Ron Mueller		Harrisonville Tel. Co.	rmueller@htc.net	618-939-9277
Columbia Police	Jerald Paul		Deputy Police Chief	35@columbia.illinois.com	618-281-5151 618-781-3094 (cell)
Health	Michael Pate		Monroe County Health Emergency Planner	mocoema@htc.net	618-779-1061
Maeystown FPD	Lynden Prange		Fire Chief	mvpd@htc.net	618-458-6560
Maeystown	Jason Reynolds		Maeystown trustee	diggitvdog@gmail.com	618-301-7402
Levee And Drainage	Dennis Rodenberg		Commissioner	rodny@htc.net	618-781-7416

Multi-Hazard Mitigation Planning Meeting Attendance

Jurisdiction Name	Print Name	Initial	Job Title/Company	Contact Information (e-mail address and/or phone number)	
Columbia Levee and Drainage	Daniel (Rule?)		Chairman		618-604-4194
Monroe County EMA	Kevin Scheibe		Monroe County EMA	scheibe@monroe-ema.com	618-973-9787
City of Waterloo	Richard Scott		EMA	rscott@waterloo.il.us	
Fish Lake Levee	Gary Stumpf		President		
Columbia FPD	Matt Stephens		Captain of Haz-Mat	cuid@htc.net	618-281-6688
Waterloo Police	Jim Trantham		Chief of Police, Waterloo PD	jtrantham@waterloo.il.us	618-939-3377
Health Dept.	John Wagner		Administrator	jwagner@monroecountyhealth.org	618-939-3871
EMA	Ryan Weber		Director, Monroe County EMA	mocoema@htc.net	618-779-1061
Waterloo Fire Dept.	Brett Wiegand		1st Assistant Chief	wfd@htc.net bmwwwfd28@yahoo.com	618-567-4804
Monroe County	Delbert Wittenauer		County Commissioner	dwitt@norcom2000.com	618-473-2213
Monroe County Highway	Aaron Metzger		County Engineer	mch@htc.net	618-939-8681

Multi-Hazard Mitigation Planning Meeting Attendance

[illegible]

IEMA Multi-Hazard Mitigation Plan

Assembly of the Monroe County Planning Team Meeting 4:

Chairman: Delbert Wittenauer

Plan Directors: SIUC Geology Department and IUPUI – Polis

Meeting Date: October 4, 2012

Meeting Time: 7:00PM

Place: 100 S. Main Street, Waterloo, Illinois, 62298

Planning Team/Attendance: 16

Determining Hazard Mitigation Strategies

The meeting was called to order.

Elizabeth Ellison gave a short presentation on the goals, strategies, funding, and successful examples of hazard mitigation, supplemented by a packet on mitigation ideas.

Elizabeth Ellison then led a round-table discussion of Monroe County's possible, on-going, and completed mitigation strategies for each hazard that the planning team identified as a potential risk. Elizabeth Ellison directed the planning team to specify locations of mitigation strategies, and to assume unlimited funding in this preliminary stage. Keith Prosk recorded the strategies for each hazard as the planning team discussed them.

Elizabeth Ellison gave each planning team member a mitigation strategies survey and an ideas for mitigation strategies sheet to fill out in the course of two weeks, in which each planning team member will identify possible, on-going, and completed mitigation strategies in detail. Below are preliminary, possible mitigation strategies the planning team discussed for each hazard:

Tornadoes/Storms:

- Shelters
- Back-Up generators
- Transfer switches
- Advance warning sirens
- Weather radio system
- Public education (National Weather Service)

Flood:

- Back-Up generators
- Elevate low roads on floodplain, or install cautionary flood signage
- Ditches for flash flooding (e.g. Columbia Ave.)
- Public education
- Special needs high-risk locations study

Earthquake:

- Back-Up water supply
- Back-Up generators
- Back-Up fuel supply
- Shelters
- Harden: Schools, Nursing Homes, Critical Facilities, Public Buildings, etc.
- Special needs high-risk locations study

Haz-Mat Release:

- Commodity flow study
- Shelters
- Evacuation plan/ Bus MOU
- Public education

Heat/Wildfires

- Public education (burning, heat exhaustion, etc.)
- Fire Department training for wildfires
- Fire Department equipment upgrade for wildfires
- Air Conditioning funds for special needs

4

Multi-Hazard Mitigation Planning Meeting Attendance

Jurisdiction Name	Print Name	Initial	Job Title/Company	Contact Information (e-mail address and/or phone number)
DOPW	Tim Ahrens		Assistant City Engineer, City of Columbia	tahrens@columbiaillinois.com 618-281-4264
Valmeyer Police	Tom Andres		Police Chief	valmeyerpd@yahoo.com 618-935-2135
Hecker Fire	Kevin Biffar	<i>KB</i>	Assistant Chief, Hecker	heckerFD@htc.net 618-363-3926
Columbia FPD	Andrew Callis	<i>ACC</i>	Captain of Technical Rescue	cufd@htc.net 618-789-6688
Regional Sup. Of Schools	Kelton Davis	<i>JD</i>	Superintendent of Schools, Monroe-Randolph regional office of education	kdavis@roe45.org 618-939-5650
Hecker Fire	Justin Eukart	<i>JE</i>	Hecker Fire Dept. Captain	jmehtd@aol.com 618-779-0857
Monroe EMS	Carla Heise	<i>CH</i>	Monroe County EMS	mcemsr@htc.net 618-939-6175
Monroe EMA	Gene Henckler		Deputy Director/Monroe County EMA	mocoema1@htc.net 618-939-8681 x214
County	Laura Henry	<i>LH</i>	GIS Coordinator	mocogis@yahoo.com 618-939-8681 x287

Multi-Hazard Mitigation Planning Meeting Attendance

Jurisdiction Name	Print Name	Initial	Job Title/Company	Contact Information (e-mail address and/or phone number)
County Sheriff	Dan Kelly		MCSO	sheriff@htc.net 618-934-8657
Hecker	Charles Kujawshi		President, Village of Hecker	cwhl217@htc.net 618-779-5974
Valmerer EMA + Fire	Bret Langsdorf	<i>BL</i>	Assistant Chief, EMA	langsorf007@gmail.com 618-719-3023
LEPC/Gateway FS	Elizabeth McElveen		Gateway FS Safety Coordinator	618-282-4000
Harrisonville Tel Co	<i>RHM</i> Ron Mueller		Harrisonville Tel. Co.	rmueller@htc.net 618-939-9277
Columbia Police	Jerald Paul		Deputy Police Chief	618-281-5151 35@columbia.illinois.com 618-781-3094 (cell)
Health	Michael Pate		Monroe County Health Emergency Planner	618-779-1061 mocoema@htc.net
Maeystown FPD	Lynden Prange	<i>LP</i>	Fire Chief	618-458-6560 mvfd@htc.net
Maeystown	Jason Reynolds		Maeystown trustee	618-301-7402 diggydog@gmail.com
Levee And Drainage	Dennis Rodenberg		Commissioner	618-781-7416 rody@htc.net

4

Multi-Hazard Mitigation Planning Meeting Attendance

Jurisdiction Name	Print Name	Initial	Job Title/Company	Contact Information (e-mail address and/or phone number)
Columbia Levee and Drainage	Daniel (Rule?)		Chairman	618-604-4194
Monroe County EMA	Kevin Scheibe		Monroe County EMA	618-973-9787 scheibek@yahoo.com
City of Waterloo	Richard Scott		EMA	rscott@waterloo.il.us
Fish Lake Levee	Gary Stumpf		President	
Columbia FPD	Matt Stephens		Captain of Haz-Mat	618-281-6688 cufd@htc.net
Waterloo Police	Jim Trantham		Chief of Police, Waterloo PD	618-939-3377 jtrantham@waterloo.il.us
Health Dept.	John Wagner		Administrator	618-939-3871 jwagner@monroecountyhealth.org
EMA	Ryan Weber		Director, Monroe County EMA	618-779-1061 mocoema@htc.net
Waterloo Fire Dept.	Brett Wiegand		1 st Assistant Chief	618-567-4804 wfd@htc.net bmwwfd28@yahoo.com
Monroe County	Delbert Wittenauer		County Commissioner	618-473-2213 dwitt@norcom2000.com
Monroe County Highway	Aaron Metzger		County Engineer	618-939-8681 mch@htc.net

4

Multi-Hazard Mitigation Planning Meeting Attendance

Jurisdiction Name	Print Name	Initial	Job Title/Company	Contact Information (e-mail address and/or phone number)
City of Columbia	Paul Ellis		Div. Community Ec. Dev. (?)	pellis@columbiaillinois.com 618-281-71??
City of Waterloo	James Nagel		Zoning/Subdivision Administrator	inagel@waterloo.il.us 618-939-4525
Monroe County EMA	Kim Strellis		SamReady/LAM Coordinator	kimstrellis@ymail.com 307-699-1737
	Steve Lauer		(on behalf of Kelton Davis)	
VILLAGE OF FONTS	MERIZELL PRANGE		VILLAGE TRUSTEE	618 458-7138 msprange@htc.net
Monroe County EMA	Austin Scheiber	A.S.	EMA	618-973-3425

Appendix B. Local Newspaper Articles



CITY OF WATERLOO



WATERLOO CITY HALL

August 2012

Newsletter Courtesy of your Mayor and City Council

939.8600

Events

Aug 24 Homecoming
8:00 pm - Out of Focus

Aug 25 Homecoming
5:00 pm - Parade
8:30 pm - After Shock

Aug 30 Public Meeting on Multi-Hazard Mitigation Planning
7:00 pm - Monroe County Courthouse in the old courtroom
This is a strategy planning session to identify potential natural hazards and establish mitigation procedures.

Sept 7 Vendors for a Cause Quarter Auction
Supporting: Humane Society
visit www.vendors4acause.weebly.com for more info.

Sept 8 Waterloo Country Club Open House
Wine Tasting and Fine Market
email waterloo@wcfc.net for more info.

Sept 8 10th Annual Kick-A-Thon
9:00 am - Rural King
Hosted by Championship Martial Arts. All proceeds will be donated to Missouri Children's Burn Camp on behalf of the Waterloo Fire Department.

Sept 14 Discover Historic Waterloo
Featured Shop: World of Difference
*Store will be open until 8:30 pm
Featured Restaurant: JJ's
Like "Discover Historic Waterloo" on Facebook for details.

Box Tops for Education

Box Tops for Education has helped America's schools earn over \$400 million since 1996. You can earn cash for Waterloo's school by clipping Box Tops coupons from hundreds of participating products.

Last year, Gardner, Rogers, Zahnnow and Sts. Peter and Paul collected over 211,000 Box Tops at 10¢ each raising over \$21,000. The money was used to purchase classroom technology, school spirit items and beautification projects.

If you have products with Box Tops, clip them and drop them off at any school office. The kids will thank you.

Emergency Notification System

The City of Waterloo provides an emergency notification system for all residents. If you currently have a landline, you are automatically enrolled. If you do not have a landline, you can register your cell phone number in order to receive important notifications regarding weather alerts, boil orders, burn bans, etc.

To register, go to waterloo.il.us and click the "Sign Up" box on the home page.

* Reminder: Tornado sirens are tested at 10am on the first Tuesday of each month.

Recycling Progress

The recycling program has been very successful and the City would like to thank everyone for their efforts. Just a few notes about recycling:

Acceptable Items

- Newspapers, magazines, etc.
- Steel/Tin cans (soup & vegetable)
- Aluminum beverage cans
- Corrugated cardboard (no wax covered boxes)
- Clear or colored glass jars & bottles
- Plastics #1 - #7 (must have ♻️ logo)

* When recycling items that contain food, please rinse items out. If the item contains food, it is considered contaminated and cannot be recycled.

Unacceptable Items

- Plastic grocery bags, bubble wrap, newspaper wrappers, etc.
- Small batteries and florescent light bulbs.

These items can be recycled at Schnucks and Walmart.

Additional Recycling Resources

- Appliances can be recycled at the Monroe County Recycling Center at 901 Illinois Ave.
- Cell phones, laptops, ink and toner cartridges and digital cameras can be recycled through the Violence Prevention Center of Southwestern Illinois. Call 618.939.8114 for more details on electronic recycling.

Congratulations

Congratulations to Concord Presbyterian Church on celebrating their 40th anniversary.

Welcome

The City would like to welcome the following new businesses to our community:

Crown Frozen Custard
742 North Market Street

Gail's Coins & Collectables
129 S. Main Street

Waterloo Feed & Pet Supply Dog Salon
401 West Third Street

Tree & Limb Pickup

The City of Waterloo provides tree limb pickup after a storm-related incident. If you need this service, contact City Hall at 618.939.8600.

Limbs should be placed parallel to the road, within 2 feet of the curb or roadside. If residents would like to dispose of their own tree limbs or branches, the City of Waterloo Yard Waste site is available to all city residents.

Like us on Facebook
Like the Waterloo, IL City Page and stay

Mayor Tom Smith
Phone: 939.8600 ext. 200

Remember to support local businesses

Columbia Daze, is scheduled for Friday, Aug. 17 and Saturday, Aug. 18, at Turner Hall and A.C. Metter Park.

The event will open at 4 p.m. each afternoon with amusement rides, games, and food and drink vendors.

Rock Hoppers (8 p.m. to 10 p.m.) and Rock City Overpass (10 p.m. to 12 midnight). Saturday evening wraps-up with a performance by Aftershock (8 p.m. to 12 midnight).

The Columbia Daze parade

steps off at 5 p.m. on the north end of town, traveling south to Cedar Street.

The parade is open to local businesses, clubs and organizations (a donation of \$10 per vehicle is required).

Bands in the parade

High School marching bands. To participate, call Parade Chairman, Paul Khoury at 281-7193.

Food stands include fried fish, pulled pork, bratwurst, hot dogs, pizza, chicken on a stick and funnel cakes.

Proceeds benefit local clubs, groups, and organizations, points out event Chairman Ken Schmidt.

Advance ride tickets can be purchased at Khoury Pharmacy.

Waterloo Homecoming Is Set For Aug. 24-25

The Waterloo Homecoming is set to take place Friday, Aug. 24 and Saturday, Aug. 25 around the courthouse square in downtown Waterloo.

As always, the event features plenty of food, refreshments, games, music, rides and a parade.

Friday's band will be the

Waterloo Municipal Band (7 p.m. to 8 p.m.) and Out of Focus (8 p.m. to midnight). Saturday's musical lineup includes the Bud Light Brigade (6 p.m. to 8 p.m.) and rock band Aftershock (8 p.m. to midnight).

Advanced ride tickets may be purchased at local banks for \$18 (sheet of 24) through

Aug. 24.

The parade will be Saturday, Aug. 25, at 5 p.m. This year's theme is "USA - The Olympics."

Trophies will be presented after the parade (about 7 p.m.) for most original, best musical and best overall entry.

Hecker Kirchenfest To Take Place This Saturday

St. Augustine Catholic Church of Hecker's annual Kirchenfest is Saturday, Aug. 18 at the grounds of the Hecker Community Center.

The event kicks off at 3 p.m. with the all-you-can-eat fried chicken and pork sausage served in the air-conditioned hall.

Mass will be conducted in the church at 4 p.m.

The rest of the events that evening take place outside, including the quilt and cash bingo, beer stands, washers tournament (7 p.m.) and music by Butch's Polka Kinds (7 p.m. to 11 p.m.).

In addition, there are games

for kids and adults, a silent auction, cake stand, baskets and a country store.

Another highlight, for both participants and attendees, is the sixth annual Tiki Trot. The 5K race winds through the back roads of Hecker with the path lit by tiki posted along the roadways.

Hazard Mitigation Is Topic Of Upcoming Meeting

A public meeting will be held Thursday, Aug. 30 to identify potential natural hazards and to produce a mitigation plan to address the issues.

The ongoing effort is being coordinated by the Monroe County office of the Emergency Management Agency to create a Multi-Hazard Mitigation Plan. The plan seeks to reduce or eliminate the negative impact that a particular hazard may have on the county.

Some topics for discussion

will be storm shelters, warning sirens, flood walls and fire protection enhancements.

The meeting will begin at 7 p.m. at the Monroe County Courthouse in Waterloo.

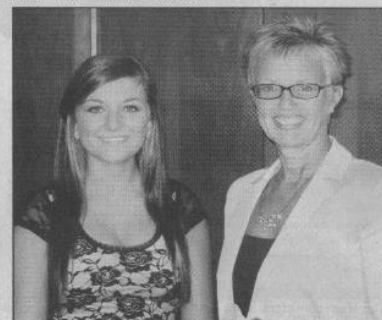
Through a grant, the local EMA has formed an alliance with Southern Illinois University-Carbondale to identify potential natural hazards and to produce a mitigation plan to address the issues.

The Federal Emergency Management Agency now

requires each county in the U.S. to have a FEMA-approved MHMP.

Over the last several months, the planning team has been working with staff from the SIUC Department of Geology to develop a plan to submit to FEMA approval.

The MHMP's will serve as framework for developing hazard mitigation projects that will reduce the negative impacts of future disasters on the communities and unincorporated areas of the county.



Abby Kueker of Red Bud, left, accepts the HTC / Henry W. Gentsch Memorial Scholarship from Karen Bergman, vice-president.

Kueker Earns HTC Scholarship

Abby Kueker of Red Bud, a freshman at Southern Illinois University-Carbondale, is the 2012 recipient of the Harrisonville Telephone Company / Henry W. Gentsch Memorial Scholarship.

Kueker will receive a \$4,000 award of \$1,000 each year for the next four years of her studies. She plans to major in paralegal studies.

Abby is the daughter of Mike and Jana Kueker of Red Bud.

While a student at

RBHS, Kueker received the President's Award For Academic Excellence, was on the honor roll, National Honor Society, math team, WYSE, FBLA and played volleyball.

Harrisonville Telephone Company formed this scholarship in 2002 to honor Henry W. Gentsch, whose telecommunications career spanned nearly 73 years, of which 55 years were with Harrisonville Telephone Company.

"We are pleased to award this scholarship to Abby and wish her success in achieving her career goals," said Karen

Guardian Mini
Self-Storage

Ryan Weber

From: Corey Saathoff <rredit@htc.net>
Sent: Monday, October 01, 2012 11:26 AM
To: Ryan Weber
Subject: Re: need info

Ryan: This was mentioned as part of a county board story that appeared in our Aug. 8 print edition. See below (in bold).

Proposed winery, property tax bills among county topics

By ANDREA DEGENHART
 For the Republic-Times

On Tuesday night, the Monroe County Zoning Board of Appeals met to hear from residents about a special use request and an amendment to current county zoning code that would allow for wineries in an area zoned as agricultural (A-1) on a permit basis. While the amendment request passed with a 4-1 vote, the special use permit request failed to get the required 3/4 majority and was declined by a 3-2 vote. Next the county board will vote on the amendment change.

The special use request came as a result of a proposed winery by Paul, Alice and Grant Frierdich, operating as Domex Properties, in the area of 1200 Centerville Road in Columbia. The family was hoping to have the winery up and running possibly by this fall.

The site of the proposed winery is Spring Dale Acres, a house and barn built circa 1850 of locally-mined stone, according to local historian Nelson William Rex. There is an active, natural spring in the cellar, which was designed for the storage of wine and beer.

Mike Fausz, Director of Monroe County Mapping and Platting, said the special use request and zoning amendment were approved by the Monroe County Planning Commission on July 12.

"They have proposed a winery with inside and outside seating that would host special events," Fausz said. "They would just be selling wine, not growing."

An adjacent property owner

to the proposed winery, Pam Keeven of 1253 Centerville Road, said neighbors are concerned that such a business would result in more traffic on what is a narrow, curvy country road.

"There's no center line and plenty of winding turns... and people going there will obviously be drinking," Keeven said.

In other county news:

The Board of Commissioners met Monday morning and heard from Monroe County Treasurer Kevin Koenigstein, who, along with County Clerk Dennis Knobloch, provided an update on the real estate tax cycle.

"If everything goes as planned, by the end of business tomorrow, you will have your tax cycle," Knobloch told the board.

The clerk's office will then spend about two weeks printing them before they are ready to be sent.

"We hope to have them out by the end of the month," he said.

Allowing the required 30 days for appeals, Koenigstein said the first due date for payment installments of real estate taxes will be early- to mid-October. The second payment will be due approximately 30 days after that.

Koenigstein also told the board to expect slightly lower sales taxes over last year's numbers for this time period.

"I expect sales taxes to decline this summer because it's so hot," he said.

The county enjoyed an increase in sales tax revenues last year, but with people staying home more because of the excessive heat, sales on gas and

dining are down. Also at the meeting, Jessica

Gentry of the Monroe Randolph Transit District told the board ridership is on track to reach 24,000 to 25,000 trips this year. This would beat last year's record-high of 17,739 trips.

In addition to seeing an increase in riders for medical appointments, chemotherapy and radiation therapy, and dialysis, Gentry said the transit district is trying to meet needs in the county that have emerged due to state funding decreases to school districts.

"I think we're going to be able to step in and help some of the day care places (providing after-school care)," she said.

Rides are \$2 each way in Monroe County, and \$5 for rides outside the county. The service runs from 6 a.m. to 6 p.m., Monday through Friday. Call 618-443-9087.

Finally, Monroe County Emergency Management Agency Director Ryan Weber announced the EMA will host a public information and strategy planning session Aug. 30 at 7 p.m. in the old courtroom of the Monroe County Courthouse. The public is invited to attend.

Through a grant, Monroe County EMA has partnered with Southern Illinois University-Carbondale to identify potential natural hazards and produce a mitigation plan to address the issues. The ongoing efforts of the partnership will result in a Multi-Hazard Mitigation Plan, which will seek to identify potential natural hazards for Monroe County, and then establish a mitigation measure intended to reduce or eliminate the negative impact a particular hazard may have on the locality. Examples of projects that have been completed by some communities include storm shelters, warning sirens, flood walls and fire protection enhancements.

Appendix C. Adopting Resolutions

Resolution # _____

ADOPTING THE MONROE COUNTY MULTI-HAZARD MITIGATION PLAN

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

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

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

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

NOW, THEREFORE, BE IT RESOLVED, that Monroe County hereby adopts The Monroe County Multi-Hazard Mitigation Plan as an official plan; and

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

ADOPTED THIS _____ Day of _____, 2013.

County Board Chairman

County Board Member

County Board Member

County Board Member

County Board Member

Attested by: County Clerk

Resolution # _____

ADOPTING THE MONROE COUNTY MULTI-HAZARD MITIGATION PLAN

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

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

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

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

NOW, THEREFORE, BE IT RESOLVED, that The City of Waterloo hereby adopts The Monroe County Multi-Hazard Mitigation Plan as an official plan; and

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

ADOPTED THIS _____ Day of _____, 2013.

City Board Chairman

City Board Member

City Board Member

City Board Member

City Board Member

Attested by: City Clerk

Resolution # _____

ADOPTING THE MONROE COUNTY MULTI-HAZARD MITIGATION PLAN

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

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

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

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

NOW, THEREFORE, BE IT RESOLVED, that The City of Columbia hereby adopts The Monroe County Multi-Hazard Mitigation Plan as an official plan; and

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

ADOPTED THIS _____ Day of _____, 2013.

City Board Chairman

City Board Member

City Board Member

City Board Member

City Board Member

Attested by: City Clerk

Resolution # _____

ADOPTING THE MONROE COUNTY MULTI-HAZARD MITIGATION PLAN

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

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

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

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

NOW, THEREFORE, BE IT RESOLVED, that The Village of Valmeyer hereby adopts The Monroe County Multi-Hazard Mitigation Plan as an official plan; and

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

ADOPTED THIS _____ Day of _____, 2013.

Village President

Village Council Member

Village Council Member

Village Council Member

Village Council Member

Attested by: Village Clerk

Resolution # _____

ADOPTING THE MONROE COUNTY MULTI-HAZARD MITIGATION PLAN

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

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

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

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

NOW, THEREFORE, BE IT RESOLVED, that The Village of Mayestown hereby adopts The Monroe County Multi-Hazard Mitigation Plan as an official plan; and

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

ADOPTED THIS _____ Day of _____, 2013.

Village President

Village Council Member

Village Council Member

Village Council Member

Village Council Member

Attested by: Village Clerk

Resolution # _____

ADOPTING THE MONROE COUNTY MULTI-HAZARD MITIGATION PLAN

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

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

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

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

NOW, THEREFORE, BE IT RESOLVED, that The Village of Hecker hereby adopts The Monroe County
Multi-Hazard Mitigation Plan as an official plan; and

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

ADOPTED THIS _____ Day of _____, 2013.

Village President

Village Council Member

Village Council Member

Village Council Member

Village Council Member

Attested by: Village Clerk

Resolution # _____

ADOPTING THE MONROE COUNTY MULTI-HAZARD MITIGATION PLAN

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

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

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

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

NOW, THEREFORE, BE IT RESOLVED, that The Village of Fults hereby adopts The Monroe County Multi-
Hazard Mitigation Plan as an official plan; and

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

ADOPTED THIS _____ Day of _____, 2013.

Village President

Village Council Member

Village Council Member

Village Council Member

Village Council Member

Attested by: Village Clerk

Appendix D. Historical Hazards Map

-See Attached Large-Format Maps

Appendix E. List of Critical Facilities

Airport Facilities Report

Name	Address	City	Replacement Cost
Sackman Field	11563 Bluff Rd	Columbia	
Jacobs Landing Strip	8000 B Rd	Valmeyer	
Smiths Landing Strip	9803 LL Rd	Red Bud	

Communication Facilities Report

Name	Address	City	Replacement Cost
Columbia Police Department	1020 N Main St	Columbia	
Ahne Road Tower	2887 Ahne Rd	Waterloo	
Valmeyer Fire	626 S Meyer Ave	Valmeyer	
Waterloo Fire	223 N Main St	Waterloo	
MCSD	225 E 3rd St	Waterloo	
Maeystown Fire	4002 Baum Rd	Maeystown	
HTC Communication Building	110 W 3rd St	Waterloo	
HTC Communication Building	4209 Kaskaskia Rd	Waterloo	
HTC Communication Building	114-116 N Main St	Columbia	
HTC Communication Building	309 E Hunters Ridge	Valmeyer	

Dams Report

Name	River	City	Replacement Cost
HILL LAKE DAM	HILL LAKE CREEK	COLUMBIA	
LAKE MILDRED DAM	TRIB ONEMILE RACE CREEK	PRAIRIE DU ROCHER	
COLUMBIA SPORTSMAN CLUB LAKE DAM	TRIB PALMER CREEK	COLUMBIA	
WATERLOO NEW RESERVOIR DAM	TRIB FOUNTAIN CREEK	WATERLOO	
WATERLOO RESERVOIR 1 DAM	TRIB FOUNTAIN CREEK	WATERLOO	
LAKE RONNIE DAM	TRIB ROCKHOUSE CREEK	WATERLOO	
LAKE EMMETT DAM	TRIB HORSE CREEK	RED BUD	
LAKE LOUDEL DAM	TRIB FOUNTAIN CREEK	VALMEYER	
FISHER LAKE DAM	BRADLEY BRANCH	RED BUD	
WATERLOO RESERVOIR 2 DAM	TRIB FOUNTAIN CREEK	WATERLOO	
BRAND LAKE DAM	TRIB PRAIRIE DU LONG CREEK	HECKER	
WATERLOO SPORTSMAN CLUB LAKE 2 DAM	TRIB HORSE CREEK	WATERLOO	
WATERLOO SPORTSMAN CLUB LAKE 1 DAM	TRIB HORSE CREEK	WATERLOO	
VILLAGE OF VALMEYER DAM	TRIB MURDOCK LAKE	VALMEYER	
KEEVEN LAKE DAM	PRAIRIE DU LONG CREEK	WATERLOO	
WESTVIEW ACRES LAKE DAM	TRIB FOUNTAIN CREEK	WATERLOO	
WEST LAKE ESTATES DAM	TRIB FOUNTAIN CREEK	WATERLOO	

Electric Power Facilities Report

Name	Address	City	Replacement Cost
WATERLOO CITY LIGHT PLANT	615 W Third St	WATERLOO	122100
WATERLOO	3999 State Rt 156	WATERLOO	
NORTH WATERLOO	967 N Market St	WATERLOO	
FOUNTAIN	1822 Fountain Rd	VALMEYER	
FULTS	2971 Bluff Rd	FULTS	
POE	6503 LL Rd	WATERLOO	
COLUMBIA	11412 Bluff Rd	COLUMBIA	
	100 Palmer Rd	COLUMBIA	
	235 N Briegel St	COLUMBIA	
	9255 Coach Stop Rd	COLUMBIA	
	4000 State Route 156	WATERLOO	
	1951 State Route 156	WATERLOO	
	6705 C Rd	WATERLOO	

EOC Facilities Report

Name	Address	City	Replacement Cost
Monroe County EOC	100 S Main St	Waterloo	15000000

Fire Station Facilities Report

Name	Address	City	Replacement Cost
Columbia Volunteer Fire Department	1020 N Main	Columbia	3000000
Waterloo Community Fire Protection Distr	223 N Main St	Waterloo	2000000
Valmeyer Fire Protection District	626 S Meyer Ave	Valmeyer	1300000
Hecker Fire Protection District	121 E Back St	Hecker	400000
Maeystown VFD	4002 Baum Rd	Maeystown	250000
Monroe County Ambulance	901 Illinois Ave	Waterloo	1100000

Hazardous Materials Report

Name	Address	City	Chemical
Columbia Station	11829 Bluff Rd	Columbia	Condensate PL
Columbia Station	11829 Bluff Rd	Columbia	Natural Gas
MPC 56	1553 N Main St	Columbia	Diesel
MPC 56	1553 N Main St	Columbia	Gasoline
Gateway FS Chalfin Bridge	3145 Maeystown Rd	Fults	Ammonia(Anhydrous)
Gateway FS Chalfin Bridge	3145 Maeystown Rd	Fults	Atrazine
Gateway FS Chalfin Bridge	3145 Maeystown Rd	Fults	Gramoxone
Gateway FS Chalfin Bridge	3145 Maeystown Rd	Fults	Isopropylamine
Gateway FS Chalfin Bridge	3145 Maeystown Rd	Fults	Propane
Gateway FS Warnock NH3	9518 B Rd	Valmeyer	Ammonia(Anhydrous)
Gateway FS Waterloo Crops	829 Gall Rd	Waterloo	Acetochlor
Gateway FS Waterloo Crops	829 Gall Rd	Waterloo	Ammonia(Anhydrous)
Gateway FS Waterloo Crops	829 Gall Rd	Waterloo	Atrazine
Gateway FS Waterloo Crops	829 Gall Rd	Waterloo	Gramoxone
Gateway FS Waterloo Crops	829 Gall Rd	Waterloo	Isopropylamine
Gateway FS Waterloo Crops	829 Gall Rd	Waterloo	Propane
Amerigas Propane	200 block N Moore St	Waterloo	Propane
Amerigas Propane	1373 S Illinois Rt 3	Waterloo	Propane
Midwestern Propane Gas Co.	5629 Sportsman Rd	Waterloo	Propane
Bulk Plant	6100 State Rt 159	Red Bud	Diesel
Bulk Plant	6100 State Rt 159	Red Bud	Gasoline
Waterloo Booster	13 Prairie View Estates	Columbia	Choline
Waterloo Booster	13 Prairie View Estates	Columbia	Diesel
Columbia Plant	1950 Westgate Dr	Columbia	Calcium Chloride
Columbia Plant	1950 Westgate Dr	Columbia	Diesel
Columbia Plant	1950 Westgate Dr	Columbia	Fly Ash
Columbia Plant	1950 Westgate Dr	Columbia	Portland Cement
HTC Columbia Central Office	114 N Main St	Columbia	Sulfuric Acid
HTC Waterloo Central Office	110 W Third St	Waterloo	Sulfuric Acid

Luhr Bros INC	250 W Sand Bank Rd	Columbia	Diesel
Luhr Bros INC	250 W Sand Bank Rd	Columbia	Gasoline
Luhr Bros INC	250 W Sand Bank Rd	Columbia	Gear Oil
Luhr Bros INC	250 W Sand Bank Rd	Columbia	Hydraulic Oil
Luhr Bros INC	250 W Sand Bank Rd	Columbia	Motor Oil
Luhr Bros INC Boat Dock Facility	10405 Levee Rd	Columbia	Diesel
Luhr Bros INC Boat Dock Facility	10405 Levee Rd	Columbia	Propane
MC 2	322 E Industrial Dr	Columbia	AlkylPhenol Ethoxylate
MC 2	322 E Industrial Dr	Columbia	Ethylene Glycol Monobutyl Ether
MC 2	322 E Industrial Dr	Columbia	Sodium Hydroxide
MC 2	322 E Industrial Dr	Columbia	Sodium Hypochlorite
MC 2	322 E Industrial Dr	Columbia	Sodium Thiosulfate
Waterloo Plant	5984 Old Red Bud Rd	Waterloo	Calcuim Chloride
Waterloo Plant	5984 Old Red Bud Rd	Waterloo	Diesel
Waterloo Plant	5984 Old Red Bud Rd	Waterloo	Fly Ash
Waterloo Plant	5984 Old Red Bud Rd	Waterloo	Limestone
Waterloo Plant	5984 Old Red Bud Rd	Waterloo	Natural Sand
Waterloo Plant	5984 Old Red Bud Rd	Waterloo	Portland Cement
Waterloo Plant	5984 Old Red Bud Rd	Waterloo	Propane

Medical Care Facilities Report

Name	Address	City	Number of Beds	Replacement Cost
Oak Hill	623 Hamacher St	Waterloo		
Columbia Convalescent Center	253 Bradington Dr	Columbia		
Magnolia Terrace	623 Hamacher St	Waterloo		
Southern Illinois Multi-Specialty Clinic	509 Hamacher St	Waterloo		
Monroe County Surgical Center	501 Hamacher St	Waterloo		
Garden Place Senior Living	710 S Main St	Columbia		
The Bridges of Columbia	480 DD Rd	Columbia		
Garden Place Assisted Living Center	735 Columbia Av	Waterloo		
The Rosedale House	228 Mueller Ln	Waterloo		
Legacy Place	526 Legacy Dr	Waterloo		

Police Station Facilities Report

Name	Address	City	Replacement Cost
Monroe County Sheriff Department	225 E 3rd St	Waterloo	5000000
Waterloo Police Department	301 S Main St	Waterloo	1554
Columbia Police Department	1020 N Main St	Columbia	1103657

Port Facilities Report

Name	Address	City	Replacement Cost
Luhr Bros., River Docks.		Columbia	
Louisiana Dock Co., Carroll Island Ancho		Carroll Island	

Potable Water Facilities Report

Name	Address	City	Replacement Cost
Maeystown WTP	4741 Chalfin Bridge Rd	FULTS	36963
Fountain Water District	732 Quarry Dr	VALMEYER	

School Facilities Report

Name	Address	City	Students	Replacement Cost
COLUMBIA MIDDLE SCHOOL	100 EAGLE DR	COLUMBIA	639	24,579
COLUMBIA HIGH SCHOOL	77 VETERANS PKWY	COLUMBIA	647	21,643
PARKVIEW ELEMENTARY	1 VETERANS PARKWAY	COLUMBIA	434	18,805
BECK AVC ALTERNATIVE SCHOOL	6137 BECK RD	RED BUD		2,151
BECK AREA CAREER CENTER	6137 BECK RD	RED BUD		2,116
VALMEYER HIGH SCHOOL	300 S CEDAR BLUFF DR	VALMEYER	135	2,667
VALMEYER ELEMENTARY SCHOOL	300 S CEDAR BLUFF DR	VALMEYER	250	3,128
VALMEYER JR HIGH SCHOOL	300 S CEDAR BLUFF DR	VALMEYER	116	1,489
ROGERS ELEMENTARY SCHOOL	200 N ROGERS ST	WATERLOO	363	9,148
WATERLOO JR HIGH SCHOOL	200 BELLEFONTAINE DR	WATERLOO	629	19,286
WATERLOO HIGH SCHOOL	505 E BULLDOG BLVD	WATERLOO	900	57,456
STS PETER AND PAUL SCHOOL	217 W 3RD ST	WATERLOO	338	5,162
W J ZAHNOW ELEMENTARY	301 HAMACHER ST	WATERLOO	415	9,548
IMMACULATE CONCEPTION SCHOOL	321 S METTER AVE	COLUMBIA	274	5,368
GIBAULT CATHOLIC HIGH SCHOOL	501 COLUMBIA AVE	WATERLOO	242	5,781
EAGLEVIEW ELEMENTARY	113 S RAPP AVE	COLUMBIA	302	13,247
GARDNER ELEMENTARY SCHOOL	1 ED GARDNER PL	WATERLOO	430	11,919

Waste Water Facilities Report

Name	Address	City	Replacement Cost
COLUMBIA SEWAGE TREATMENT PLANT	2577 BOTTOM RD	COLUMBIA	73926
HECKER STP	8300 NIKE RD	RED BUD	73926
MAEYSTOWN STP	1130 JACOB LN	MAEYSTOWN	73926
VALMEYER STP	801 LAGOON RD	VALMEYER	73926
WATERLOO EAST STP	1001 SHERWOOD LN	WATERLOO	73926
WATERLOO WEST WWTF	621 POPLAR ST	WATERLOO	73926
TIMBER LAKE ESTATES	5250 TIMBER LAKE DR	WATERLOO	

Appendix F. Critical Facilities Map

-See Attached Large-Format Maps