Clinton County, Missouri

Natural Hazard Mitigation Plan

Section I: County Profile
Section II: Identified Hazards
Section III: Capability and Vulnerability Assessment
Section IV: Mitigation Strategy

May 2005

DRAFT

Prepared by:

Mo-Kan Regional Council
1302 Faraon Street
Saint Joseph, Missouri 64501
(816) 233-3144

Table of Contents

Section 4

Appendix A, Adoption Resolutions

Introduction

Following the severe weather, tornado, and flood disaster that was declared in the spring of 2002 (DR-1412), Missouri's State Emergency Management Agency (SEMA) received flood buyout project proposals from 23 communities across the state. Fortunately, they were able to assist many of these communities rebuild with federal mitigation grant funding provided through the Federal Emergency Management Agency (FEMA). After November 1, 2004, communities like these will still be eligible for federal disaster public assistance and individual assistance, but will not be eligible for mitigation assistance unless they have an approved hazard mitigation plan on file. For the nearly 1,000 cities and 114 counties in Missouri, mitigation plans will be required for all federally-declared disasters such as flood, earthquake, ice storm, tornado, and fire. Under the new rules for federal mitigation funding, local governments will be required to have FEMA approved hazard mitigation plans in place as a condition to receiving federal mitigation grant funding as of the 2004 deadline.

SEMA's initiative further states that, due to time and funding limitations, the plans developed by Missouri's regional planning commissions should cover natural hazards only. Manmade and/or technological hazards, including terrorism, are not addressed in this plan, except in the context of cascading damages.

Under the initiative set forth by SEMA, the Missouri Association of Councils of Government (MACOG) agreed to meet the challenge of developing county and municipal plans throughout the state. The 19 regional planning commissions of MACOG provide an effective way for local governments to work together to share technical staff and address common problems in need of an area-wide approach. They also can effectively deliver programs that might be beyond the resources of an individual county or municipal government. The intent of the regional planning commissions in Missouri is to be of service to their member counties and municipalities and to bring an organized approach to addressing a broad cross-section of area-wide issues. They also are available to assist their member entities in coordinating the needs of the area with state and federal agencies or with private companies or other public bodies.

Most of the rural regional planning commissions in Missouri were formed under Chapter 251 of the Revised Statutes of the State of Missouri. All regional councils in Missouri operate as "quasi-governmental" entities. In Missouri, regional planning commissions are advisory in nature, and county and municipal governments hold membership on a voluntary basis.

The role of a regional planning commission varies across the state, depending upon the desires of the member counties and municipalities and their representatives. Nonetheless, the primary role of the regional planning commission is to provide a technical staff capable of providing sound advice to its membership and working for coordination of various planning and infrastructure needs among the various counties and municipalities, as appropriate.

Through SEMA's Scope of Work, Clinton County contracted with Mo-Kan Regional Council and participated fully in the preparation of the plan. Once the plan is approved, Clinton County and communities within the county will be eligible for future mitigation assistance from FEMA and will be able to more effectively carry out mitigation activities to lessen the adverse impact of future disasters within the county.

The Clinton County hazard mitigation plan was prepared by the staff of the Mo-Kan Regional Council (Mo-Kan), a member of MACOG, which was created February 26, 1968 by Governor Warren E. Hearnes. The commission serves the northwest Missouri counties of Andrew, Buchanan, Clinton, and DeKalb, as well as Atchison and Doniphan counties in northeast Kansas, and 36 member communities.

Assurance Statements of Compliance with FEMA

This city/county mitigation plan complies with SEMA's and FEMA's planning guidance; FEMA regulations, rules, guidelines, and checklists; Code of Federal Regulations; and existing Federal and State laws; and such other reasonable criteria as the President/Governor, Federal/State congresses and SEMA/FEMA may establish in consultation with City/County governments while this plan is being developed.

This plan also meets the minimum planning requirements for all FEMA mitigation programs, such as the Flood Mitigation Assistance (FMA) Program, the Pre-Disaster Mitigation (PDM) Program, and the Hazard Mitigation Grant Program (HMGP), and where appropriate, other FEMA mitigation related programs such as the National Earthquake Hazards Reduction Program (NEHRP), the National Flood Insurance Program (NFIP) and the Community Rating System (CRS).

Basis for Planning Authority

The basis for authority to create a natural hazard mitigation plan lies in section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), 42 U.S.C. 5165. This act was enacted under Section 104 of the Disaster Mitigation Act of 2000 (DMA 2000), P.L. 106-390. Section 104 is the legal basis for FEMA's Interim Final Rule for 44 CFR Parts 201 and 206, published in the Federal Register on February 26, 2002.

Adoption by Local Governing Bodies

Participation of local governing bodies as stakeholders is critical to successful mitigation implementation. As former SEMA Deputy Director Beaufort C. "Buck" Katt writes:

> "One thing we have learned over the years is that mitigation programs crumble unless locals, both private and public, have a stake in the process; they simply must feel a sense of ownership for the program to be successful. We strongly believe that this effort will be successful and sustainable over the long term only if it enjoys

> grassroots support that stems from a sense of local and individual ownership. For this reason, SEMA Headquarters staff and Area Coordinators will support this initiative by providing training and technical assistance to the [Regional Planning Commissions (RPCs)] …but the grant funding will go to the participating counties/cities. The participating counties/cities will use SEMA's Scope of Work to contract with the RPCs and must participate fully in the preparation of the Mitigation Plan. Once the Mitigation Plans are completed and approved, these counties/cities will be eligible for future Mitigation Assistance and will be able to more effectively carry out mitigation activities to lessen the adverse impact of future disasters in those communities."

Therefore, Mo-Kan has collaborated with each local government to assure participation and sense of ownership among local government officials.

Acknowledgements and Special Thanks

Several county officials provided valuable assistance throughout the plan development process, from data sources to defining mitigation needs. Thanks especially to Mark Hoover, presiding commissioner, Jim Crenshaw, first district commissioner, E.W. Dixon, second district commissioner, Art McCarthy, emergency preparedness planner, Marcia Downey and Tammy Clough, Clinton County Health Department, and Mary Blanton, Clinton County Clerk. Finally, thanks to the Clinton County Hazard Mitigation Committee, who gave freely of their time and expertise to facilitate the successful completion of this plan.

Planning Process

The planning process for the Clinton County Hazard Mitigation Plan began during the Summer 2004, with presentations to Clinton County elected officials, community members, and other interested parties. Plan development began in September 2004 with a presentation to the Clinton County Local Emergency Planning Committee (LEPC) regarding the overarching goals and purpose of the mitigation planning process, and how it applies specifically to Clinton County. At the meeting in September, the planning committee was formed, with various committee members assisting with data mining. Three subsequent planning meetings were held, each with a particular focus in regards to a plan section:

- On October 27, 2004, committee members met to complete Clinton County hazard identification and analysis;
- On December 14, 2004, committee members met to assess Clinton County vulnerabilities;
- On January 28, 2005, committee members met to discuss and analyze specific mitigation activities for Clinton County.

These formal planning meetings were supplemented by data mining from various local, state, and federal sources, meetings with city and county officials, and surveys distributed to committee members.

At each point of review and comment, the plan was posted on the Mo-Kan website and copies were made available at government offices for the general public. During the spring 2005, the final plan was presented to each city government and the county commission, for support resolution adoption.

Each of the jurisdictions represented in the Clinton County Hazard Mitigation Plan participated in the planning process, detailed here:

Clinton County
Officials and volunteers representing Clinton County were intimately involved in all aspects of plan development. Clinton County representatives were present at all planning meetings, filled out plan surveys and information requests, and reviewed draft forms of the plan. Specifically, the Clinton County Commission, Health Department, and Director of Emergency Preparedness directing contributed to plan development.

City of Cameron
The fire chief of Cameron was present at a majority of the planning meetings, and submitted plan surveys. In addition, the Cameron city administrator was involved in the initial planning stages of the process, and provided Cameron-specific information for the plan.

City of Gower
The City of Gower appointed an alderman to serve on the hazard mitigation committee. The volunteer attended all planning meetings, submitted plan surveys, and reviewed a draft form of the plan.

Village of Grayson
The Village of Grayson filled out plan surveys and provided other information to the mitigation committee.

City of Holt
The Holt fire chief is the chair of the Clinton County Local Emergency Planning Committee, and participated in all aspects of plan development, including meeting attendance and survey submission.

City of Lathrop
The city administrator of Lathrop was present at all planning meetings, and assisted the committee with survey submission and data gathering.

City of Plattsburg
The Plattsburg city administrator, director of public works, and police chief all participated in plan development. The officials attended planning meetings and submitted surveys and other information.

City of Trimble
The City of Trimble returned all surveys and provided a great deal of Trimble-specific information.

Village of Turney
The Village of Turney filled out plan surveys and provided other information to the mitigation committee.

Participants and Jurisdictions Represented

This plan suggests mitigation actions for the following jurisdictions:

- Clinton County
- City of Cameron
- City of Gower
- Village of Grayson
- City of Holt
- City of Lathrop
- City of Plattsburg
- City of Trimble
- Village of Turney

The list of primary participants in the planning process is shown below:

- Mark Hoover, Clinton County Presiding Commissioner
- Jim Crenshaw, Clinton County First District Commissioner
- E.W. Dixon, Clinton County Second District Commissioner
- Art McCarthy, Clinton County Emergency Preparedness
- Marcia Downey, Clinton County Health Department
- Tammy Clough, Clinton County Health Department
- Don Moore, Lathrop City Administrator
- D.J. Gehrt, Plattsburg City Administrator
- Richard Benwelt, Cameron Fire Chief
- Bill Moore, Holt Fire Chief
- Tom Eads, Plattsburg Director of Public Works
- Trent Sprecker, United Cooperative General Manager
- Catherine Stice, Trimble City Clerk
- John Mattson, Gower Alderman
- Jim Richerson, Sales Administration
- Zephry Bingham, Plattsburg Chief of Police
- John Cogan, Platte-Clay Electric Operations Coordinator
- Scott Bulglord, Assistant Supervisor
- Larry Parsons, MoDOT maintenance supervisor
- Deon Grisby, MoDOT supervisor
- Carolyn Norris, Grayson Chairwoman
- Tammy Cutright, Turney City Clerk

In accordance with Missouri's Sunshine Law (RSMo 610.010, 610.020) 610.023, and 610.024), the public was notified each time the plan, or sections of the plan was presented for review. Input from public officials and committee members was solicited by direct mailing.

Timeframe for Preparation

The plan timeline included the following:

- Planning mechanism: August 2004
- Committee selection: September 2004
- Hazard identification: October 2004
- Vulnerability assessment: December 2004
- Mitigation goals and actions: January 2005
- Plan draft submitted to SEMA and committee members: March 2005
- Finalized plan submitted to SEMA/FEMA: April 2005
- Plan adopted by Clinton County and municipalities: June 2005

Executive Summary

Located at the eastern edge of the Great Plains near the center of the North American continent, Clinton County, Missouri has been fortunate to avoid many of the most devastating natural disasters that routinely impact other areas. The county is virtually unknown to hurricanes, tsunamis, tidal surge, landslides, and forest fires. Further, the geology of the region reduces earthquake damage to a minimal threat and the lack of any major river or tributary makes flooding issues generally localized and minor. Nonetheless, Clinton County is susceptible to other significant natural hazards. Tornadoes and severe thunderstorms, severe winter storms, drought, and heat waves are all hazards that impact the county on a routine basis, endangering both lives and property.

The overall goals of this and any mitigation plan are 1) to protect the lives, property, and livelihood of all citizens; 2) ensure uninterrupted government and emergency functions during a natural hazard event; and 3) manage growth through sustainable principles and practices to limit development in hazard-prone areas. These goals, and the other information contained within this plan, will be reviewed every five years under coordination of Clinton County.

Numerous citizens, public organizations, and elected officials have participated in this process. Implementation, monitoring, and evaluation will be sustainable over the long-term because it enjoys a grassroots support that stems from a sense of county.

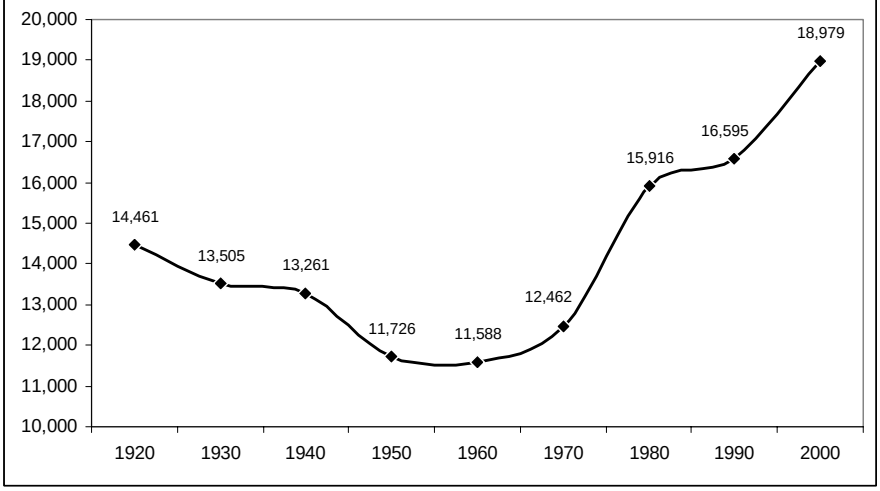
Section 1

Community Profiles

County Profile

From the very beginning, Clinton County Missouri has been portrayed as an area that is rich in heritage and history. The first settler of Clinton County was John Livingston during the year 1830. He lived off the land and frequently hunted on the land where the present day Clinton County Courthouse is located. Originally Clinton County was a part of Clay County, which served as the home of the world famous outlaw Jesse James. Until the Platte Purchase the area was considered a border county and was thought of as the "Gateway to the West." Clinton County was not established until the year 1833, when it was named after the seventh Governor of New York, Dewitt Clinton. Plattsburg was established as the county seat. In addition to John Livingston, other early pioneers in Clinton County included family names such as Biggerstaff, Fry, Newby, and Vassar.

Figure 1-1. Clinton County, Missouri Population* 1920 - 2000
*as recorded by the U.S. Census Bureau



Clinton County was primarily made up of Southern settlers, but had representation of both sides during the Civil War. This situation naturally caused the county to be divided, and casualties were common throughout the county.

Table 1-1 Clinton County Population Density

	Number	*Percent*
Total Persons	18,979	100%
Urban	4,234	22%
Rural	14,745	78%
Persons per square mile	45.3	-

After trending downward for the first half of the twentieth century, Clinton County has enjoyed a population upswing since 1960. Adding nearly 7,400 people since that year (a 64% increase), Clinton County is one of a few northwest Missouri counties demonstrating consistent growth. This is due to a number of factors, but the most obvious reason is one of geography. Not unlike other large cities around the country, the Kansas City metropolitan area, located adjacent to Clinton County to the southwest, is witnessing growth sprawl and declination of the urban core. Crossed by Interstate 35, Clinton County is an obvious target for increased

suburbanization, as citizens of the Kansas City area leave the city for more rural, albeit nearby, settings. Clinton County ranks 57th out of Missouri's 115 counties in terms of population.

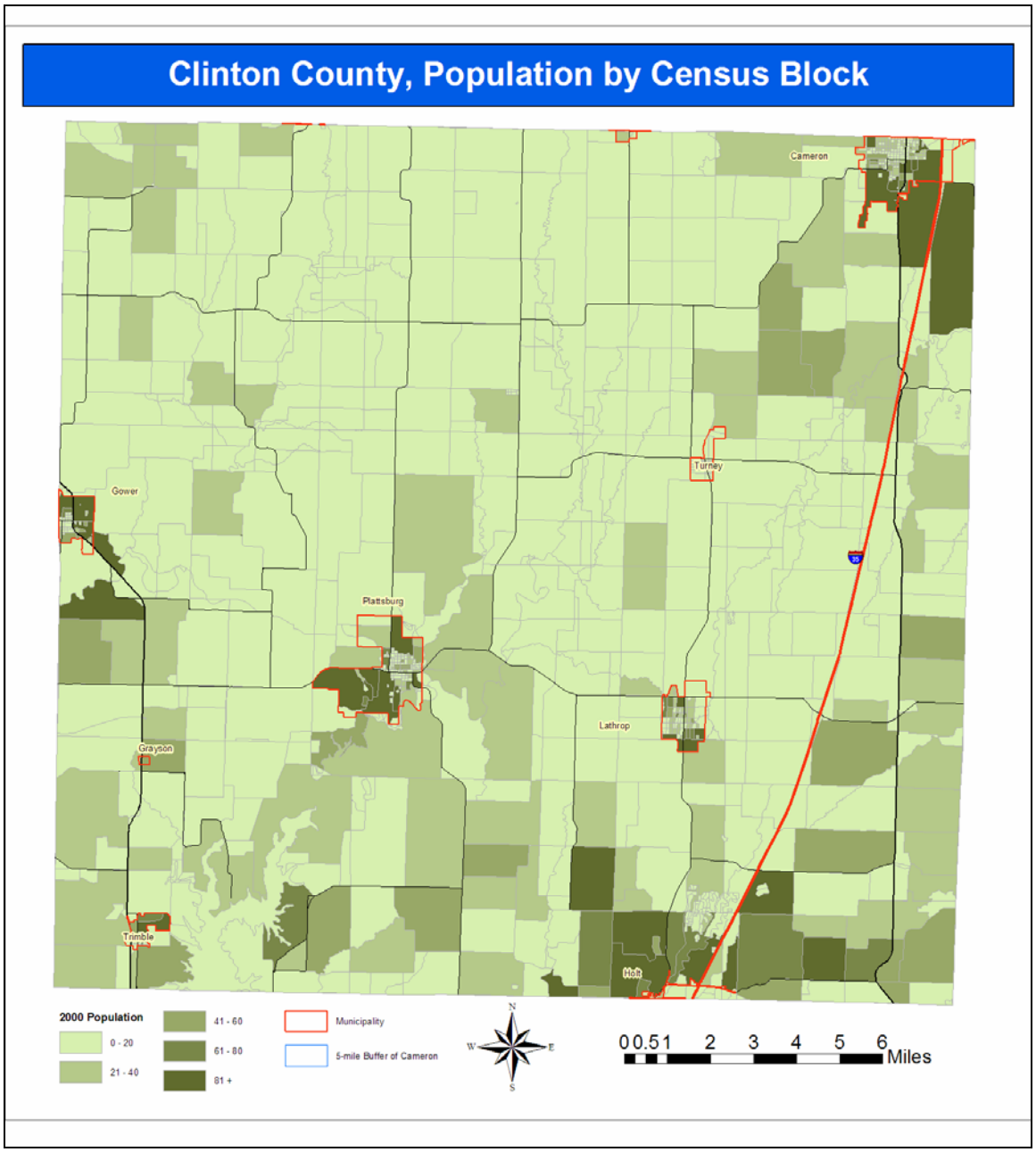


Figure 1-2

Geography, Geology, and Climate

Clinton County is landlocked, bordered by DeKalb County to the north, Buchanan and Platte Counties to the west, Clay County to the south, and Caldwell and Ray Counties to the east. Clinton County encompasses 419 square miles and lies upon Pennsylvanian-Age bedrock. The clay found throughout the area is common clay and shale, and thin limestone makes up the sand and gravel deposits. Coal-bearing strata underlie the area. The topography consists of moderately dissected plains.

The climate is generally moderate. The National Weather Service (NWS) at the Kansas City/Pleasant Hill location reports the seasonal average temperatures for the area to be 84 degrees in the summer, 54 degrees in the fall, 59 degrees in the spring, and 32 degrees in the winter. Typically the lowest average amount of precipitation occurs during the month of January with approximately 1.29 inches of precipitation. The highest average amount of precipitation occurs during the month of June with 4.86 inches of precipitation. The average snowfall for the area is 20.7 inches.

Form of Government

The county government primarily consists of the county commission, planning and zoning commission, county clerk, circuit clerk, assessor, sheriff, collector and treasurer. Clinton County operates as a third-class county. The county has zoning codes, subdivision regulations, floodplain regulations, and storm water regulations in effect. Third-class counties do not have building regulations. The three-member county commission is generally the final authority on county issues.

Community Partnerships

The county and its communities collaborate on numerous issues such as infrastructure development, law enforcement, and emergency issues. MoDOT, Mo-Kan Regional Council, the county and cities work together on transportation issues. Local volunteer fire departments and the Missouri Department of Conservation work together to safeguard wooded areas of the region.

Significant Cultural/Social Issues

As new residents emigrate from nearby metropolitan areas, Clinton County continually struggles with its identity. The county remains close to its rural roots, but as the overall economy of the Midwest shifts away from the family farm and towards corporate agri-business farms, many landowners have began to consider selling farmland to subdivision developers. Balancing the growth of new residents and a changing economy remains a top priority for county officials, who seek to retain the rural character of the county without stifling progress.

Public Awareness

The initial meeting for the Clinton County Hazard Mitigation Plan was held on September 21, 2004 at the Clinton County courthouse in Plattsburg, Missouri. Representatives from the county, all incorporated areas, members of the Local Emergency Planning Committee, and citizens at-large were invited to learn about the benefits of creating a natural hazard mitigation plan, the Stafford Act, mitigation funding, and as the planning process. The advantages of hazard mitigation were presented to local civic leaders at the meeting.

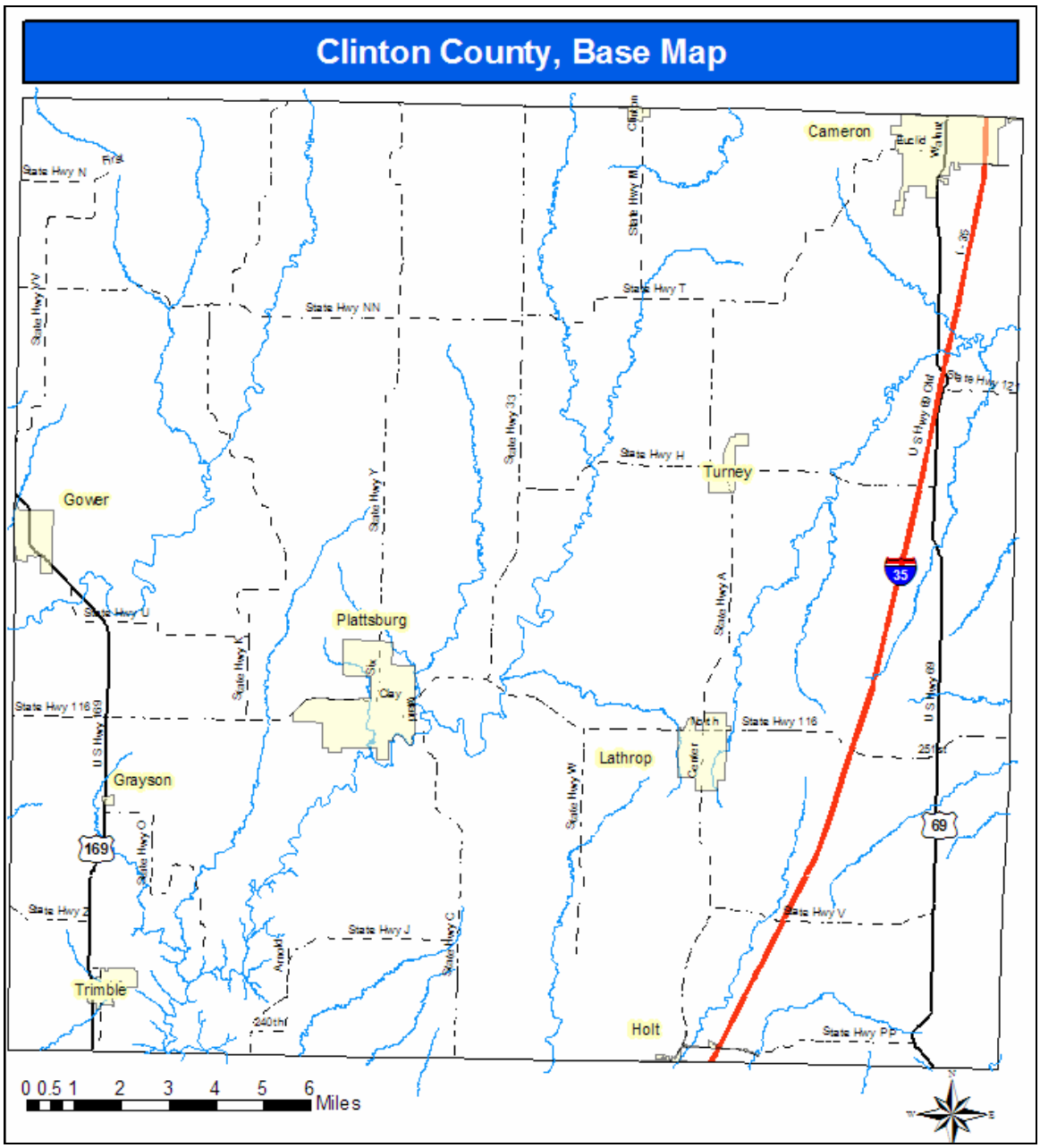


Figure 1-3

Media Relations

The *Clinton County Leader*, published in Plattsburg, is the primary newspaper of Clinton County. In addition, the *Lathrop News* and the *Cameron Citizen Observer and Shopper* provide coverage throughout the county. All three newspapers cover adequate planning issues, including emergency management.

Two radio stations provide local coverage to the Clinton County area, one AM and one FM, both being located in Cameron. Although there are no local television stations in the area, Clinton County receives several stations from the Kansas City area. A listing of relevant media outlets is included below.

Newspapers
Cameron Citizen Observer and Shopper
The Clinton County Leader
Lathrop News

News Radio Stations
KKWK-FM, Cameron
KMRN-AM, Cameron

Television Stations

KCPT-PBS	Kansas City
KCTV-CBS	Kansas City
KCWE-UPN	Kansas City
KMBC-ABC	Kansas City
KSHB-NBC	Kansas City
WDAF-FOX	Kansas City
KQTV-ABC	St. Joseph

The media plan for increasing hazard mitigation awareness will be initiated through the appropriate local agencies as specific hazard seasons occur. At these times, residents are more attuned to receiving prevention information. Various prevention instructions from the FEMA website will be the main source of information to be distributed through the media.

Demographic Information

The 2000 Census was used to construct a profile of the average Clinton County resident. The average age of this person is 37.7, has a median household income of $41,629, a median family income of $48,244, and resides in a single-family owner-occupied home.

Table 1-2. Clinton County Population by Age Cohort

Age Cohort	Population	Percent
Under 5 years old	1,247	6.6
5-9 Years	1,318	6.9
10-14 Years	1,549	8.2
15-19 Years	1,468	7.7
20-24 Years	896	4.7
25-29 Years	1,022	5.4
30-34 Years	1,189	6.3
35-39 Years	1,566	8.3
40-44 Years	1,578	8.3
45-49 Years	1,320	7.0
50-54 Years	1,244	6.6
55-59 Years	1,061	5.6
60-64 Years	842	4.4
65-69 Years	717	3.8
70-74 Years	573	3.0
75-79 Years	494	2.6
80-84 Years	396	2.1
85-89 Years	285	1.5
90 + Years	214	1.1

Within the county, 86.1% of the population has a high school diploma, and 65.5% are in the labor force. Although the residents work primarily within Clinton County, those traveling to work have a thirty-minute or less commute.

Clinton County remains predominately white according to the 2000 Census. The Census shows the presence of non-white races making up 2.2% of the population. Table 1-2 illustrates the age cohorts for the county, while Table 1-3 shows ethnic diversity in the area.

Table 1-3. Ethnic Diversity

Race	Census		% of Total
	1990	2000	For 2000
White	16,122	18,329	96.5%
Black	336	288	1.5%
Am Indian/Alaskan	73	65	0.3%
Asian/Pacific Islander	22	32	0.1%
Other	42	51	0.3%

Economy, Employment, and Industry

The 2000 U.S. Census reported the county had a labor force (workers 16 and over) of 9,530, or 65.5% of the county's total population. Nearly 7.3% of the population was below the federal poverty level. The current unemployment rate is 2.9% compared to Missouri's rate of 4.7%.

Primary Industries

Continued automation in the manufacturing process has helped drive up the demand for the higher wages of skilled labor while requiring less employees to operate the systems. The driving forces in the economy in the area include construction and related machinery, pharmaceuticals, agricultural equipment, fabricated metal products, refrigeration and service industry machinery, and electrical equipment industries. Employment within the county, as of Census 2000, consists of 13.2% manufacturing, 19.6% education / health / social services, 12.4% retail trade, 9.6% construction, and 13.6 government. The remaining 31.6% includes finance, insurance, real estate, transportation, public utilities, wholesale trade, agriculture,

Table 1-4. Clinton County Economic Indicators

	Number	Percent
Civilian Labor Force	9,513	65.4
Employed	9,092	62.5
Unemployed	421	2.9%
INDUSTRY EMPLOYEES		
Agriculture, forestry, fishing, hunting, mining	312	3.4
Construction	870	9.6
Manufacturing	1,204	13.2
Wholesale Trade	301	3.3
Retail Trade	1,124	12.4
Transport, warehouse, utilities	783	8.6
Information	154	1.7
Finance, insurance, real estate, rental, leasing	495	5.4
Professional, scientific, management, administrative, waste mgt. Services	415	4.6
Educational, health, social	1,780	19.6
Arts, entertainment, recreation, accommodation	686	7.5
Other service (except public administration)	450	4.9
Public Administration	518	5.7
Per capita income (dollars)	$19,056	N/A
Individuals below poverty level	1,728	9.3

forestry, fishing and mining. Table 1-4 depicts the economic indicators for Clinton County, with information being collected from Census 2000.

Access to Employment

More than half of the county's workforce commutes outside the county, with the average time spent commuting being thirty minutes. Persons who commute typically work in the St. Joseph or Kansas City area. In the event of a natural disaster confined to Clinton County, the county's out-commuters are likely to retain their access to employment.

Codes and Regulations

Missouri state law dictates the powers and structure of county governments. Clinton County operates as a third-class county and has limited powers in regard to building regulations. They do have regulations in place for zoning, subdivision, floodplain, and stormwater, as well as a comprehensive plan for the county.

Existing Community Plans

Comprehensive plan: The comprehensive plan serves as a guide for the planned and orderly growth of Clinton County, focusing primarily on unincorporated regions. The plan sets out the key planning issues that are relevant to anticipated growth to the year 2020 and long-range planning objectives. Zoning changes, subdivision approvals, redevelopment and new development proposals should align with the plan. To ensure that the County is proactive to land use changes and development trends, the plan will be reviewed approximately every five years.

Clinton County Emergency Operations Plan (EOP): The purpose of the Clinton County Emergency Operations Plan is to reduce or prevent the loss of lives and damage to property in Clinton County. The EOP provides guidance during emergency situations, including chain of command, public information, communications, public warning, fire and rescue, law enforcement, emergency medical care, temporary shelter, evacuation, damage assessment, and preservation of records. The plan is reviewed periodically and revised as needed.

Comprehensive Economic Development Strategy (CEDS): The Mo-Kan Economic Development District, consisting of Andrew, Buchanan, Clinton, and DeKalb counties in Missouri and Atchison and Doniphan counties in Kansas, maintains the CEDS, which provides demographic, economic, and developmental analyses for the area. The CEDS is reviewed annually, with a major revision every five years.

MoDOT State Transportation Improvement Plan (STIP): The STIP provides both short- and long-term planning for the surface transportation network. Major projects within Clinton County listed on the STIP include replacing a bridge over the Little Platte River on Route H near

Turney, mill and relay of asphalt on portions of Interstate 35, and replacing a bridge on U.S. Route 69 over the Crooked River.

Land Use

The county is dominated by two primary types of land use, row crop and pasture (cool weather grassland). See Figure 1-4 for an illustration of Clinton County Land Use.

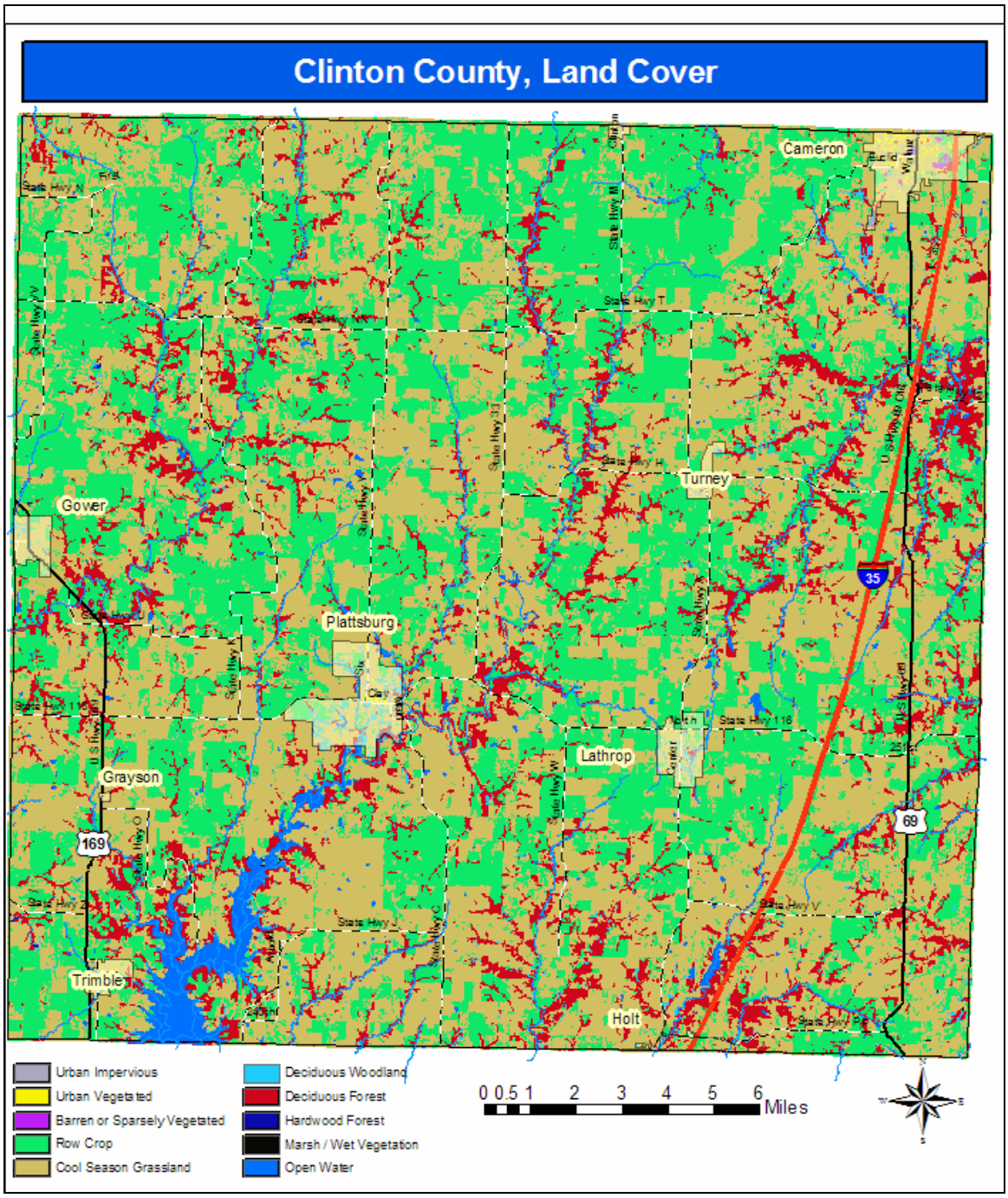


Figure 1-4

Development Trends

Clinton County's significant population growth over the past two decades is projected to continue at a substantial rate in all age groups through the year 2020. The county's population growth is primarily due to its location. Being located near the City of St. Joseph and Kansas City provides people the opportunity to reap the benefits of the city, and at the same time be able to live in a smaller and quieter area. Interstate 35 provides an efficient route to the Kansas City Metropolitan Area, and has led to increased development, particularly in the southern portion of the county. It is forecast that as Kansas City continues to experience de-urbanization of the central city core, homeowners will continue to radiate out along major transportation corridors, including Interstate 35 and U.S. Highway 169. Already, communities such as Trimble and Plattsburg are dealing with residential development, both in and adjacent to municipal limits, consisting of several hundred homes. Obviously, this is a development trend that will need to be continually addressed. Population trends for Clinton County municipalities are illustrated in Figure 1-5. (U.S. Census information for Grayson is not available).

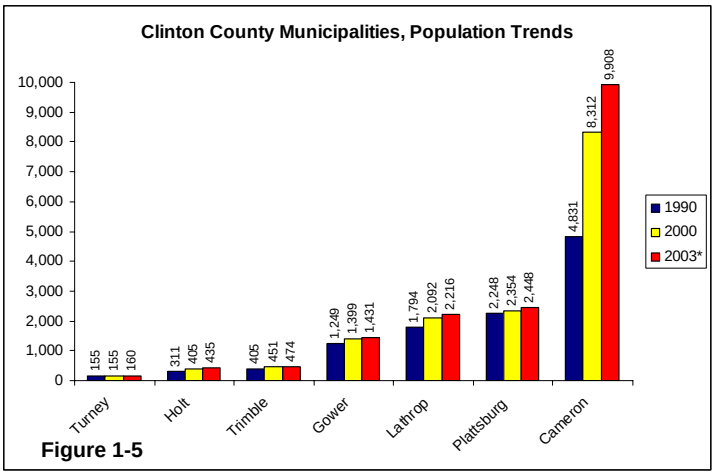


Figure 1-5

Floodplain Management

Clinton County is fortunate in that a relatively small portion of the county lies within the 100-year floodplain. Situated on a flat plateau and crossed by no rivers and few major streams, Clinton County is often spared significant damage during heavy rain events. Nonetheless, the county participates in the National Flood Insurance Program, and has development policies in place to discourage development in the floodplain. There are seven NFIP policies currently in effect in Clinton County, including four in the City of Holt, one in the City of Lathrop, and one in the City of Trimble. Figure 1-6 illustrates the Clinton County 100-year floodplain.

Wetlands Issues

The topography and soil content are not conducive to formation of large wetlands. However, numerous small wetlands exist in varying degrees of quality.

Environmental Concerns

The topography form of Clinton County is moderately dissected plains, and includes Pennsylvanian-Age Bedrock and thin limestone. Since the area is susceptible to heavy rainfall and has clay found in its topography, the stormwater runoff frequently creates erosion problems. Hazardous material sites, from gas stations to various commercial and industrial sites, exist within the county. Natural disasters could precipitate a release of hazardous materials at any of these sites. No federal Superfund sites lie within the county.

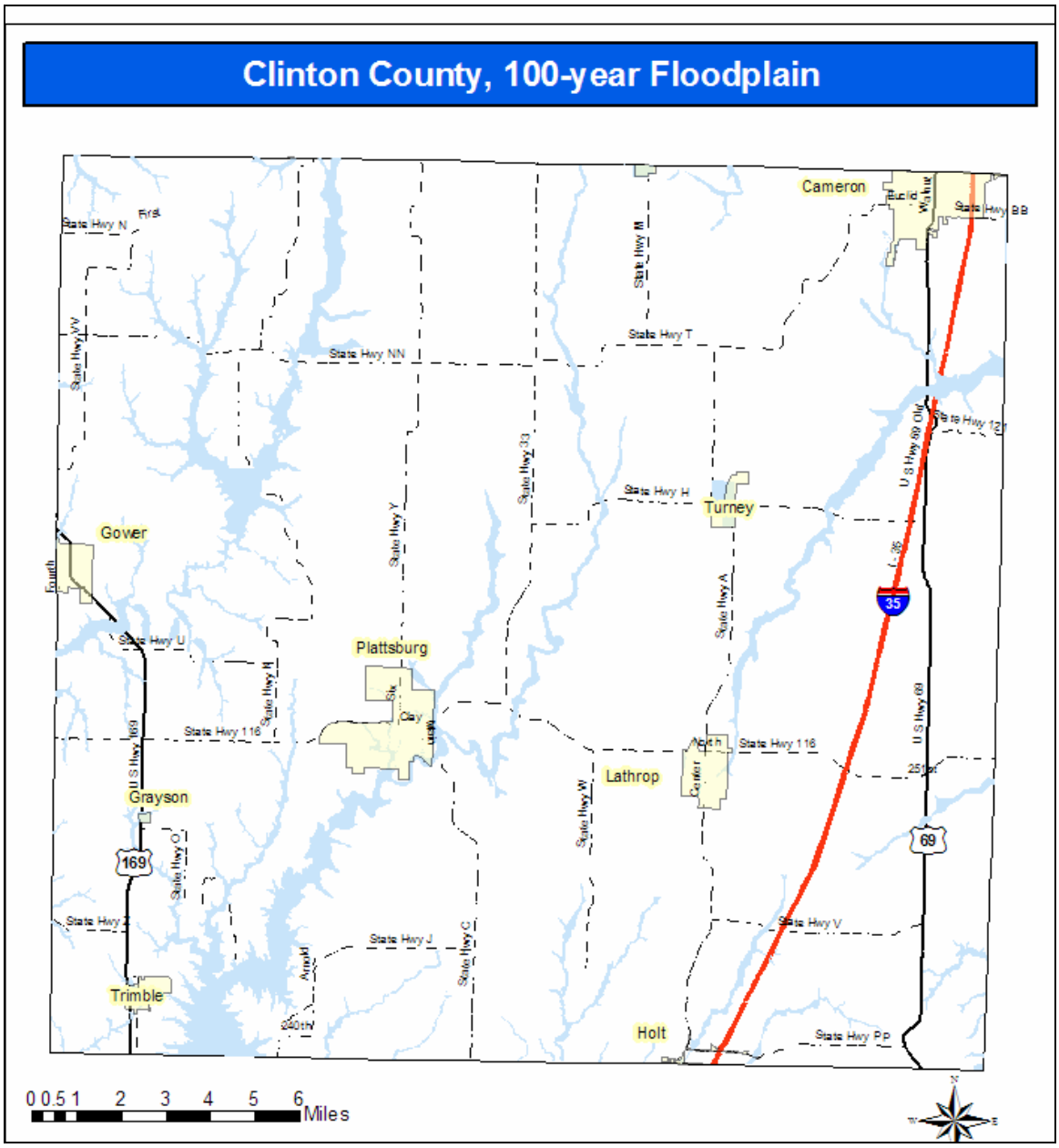


Figure 1-6

Endangered Species, and Archaeological Sites

Endangered and threatened species within Clinton County include the bald eagle and the Indiana bat. The Archeological Society of Missouri (ASM) has recorded 76 archeological sites in Clinton County. The exact locations cannot be shown in order to protect the individual resources. These categories may require special attention in the mitigation planning phase, depending on the locations.

Identified Assets

This section provides a survey of existing fixed assets such as infrastructure, critical facilities, employment centers, commercial centers and recreation centers, which may require special consideration during a natural disaster.

Inventory of infrastructure

Infrastructures include transportation, communications, water/sewer, electricity and natural gas, solid waste disposal, law enforcement, fire protection, emergency medical services, and emergency management.

Roadways

Roadways continue to be the main source of transportation within the region that facilitates the movement of people and goods. The Missouri Department of Transportation (MoDOT) provides and maintains all federal and state roadways. The MoDOT Northwest district headquarters is located in St. Joseph and includes 11 counties, of which Clinton County is included. The Northwest district covers a land area of approximately 6,049 square miles and has a total population of about 193,000. The district has a total of 3,141 center line miles of state highways to maintain.

Clinton County has several primary highways that provide transportation corridors within the county and into the surrounding counties. Among these are U.S. Highway 169, U.S. Highway 69, State Route 33, State Route 116, State Route C, and State Route A. Interstate 35 also crosses the county and is a major transportation corridor for the Midwest. U.S. 169/69 and the state routes function as major thoroughfares for regional access and local collector access.

Railroads

There are no passenger railroads located in Clinton County. However, the Amtrak station in Kansas City located at Union Station provides Amtrak service to the area.

Airports

There are two airports located in Clinton County. Cameron Memorial airport is located in Cameron and the private-use Plattsburg Airpark is located in Plattsburg. Kansas City International airport is located approximately 40 miles from Clinton County and provides the area with multiple airlines and flight options.

Public Transportation

The public transportation within Clinton County is provided by OATS, Inc. This publicly-funded system provides door-to-door transportation service with flexible schedules to meet the needs of those who may have little or no alternative means of travel, regardless of age or disability.

Telecommunications

The following list of communication facilities is not all-inclusive, but represents the major providers of the county's communications infrastructure:

Telecommunication Service Providers
- Southwestern Bell
- Century Tel
- Lathrop Telephone Company

Wireless Communications Companies
- Alltel Communications
- AT&T Wireless Service
- Century Tel
- Cingular Wireless
- Nextel Communications
- Sprint PCS
- Southwestern Bell
- Verizon Wireless
- VoiceStream Wireless

Long Distance Carriers
- AT&T
- MCI
- Sprint

Internet Service Providers
- Lathrop Telephone Company
- Access Online (Cameron)
- M&K Enterprises (Lathrop)
- Saint Joseph Cablevision

Television Communications
- Six Kansas City based broadcast television stations
- One St. Joseph based broadcast television stations
- Multiple satellite television service providers

Sewer and Water Facilities

The county continues to improve its ability to service residents and businesses with public water and sewer. Four primary water districts serve the area: Clinton County Public Water Supply District (PWSD) #1, Clinton County PWSD #3, Clinton County PWSD #4, and DeKalb County PWSD #1.

Wastewater needs are serviced by either public sewer systems or individual septic tanks. Smaller communities within the county have relied on Community Development Block Grants (CDBG) and USDA-Rural Development to help fund wastewater infrastructure projects. The Missouri Department of Natural Resources (DNR) and the U.S. Department of Economic Development (EDA) also have contributed to funding water and sewer projects.

Electricity, Natural Gas, and Solid Waste Disposal

Auxier Electric, Northwest Electric Power Cooperation, and Platte-Clay Electric Company provide electric service to the county, and Ameren UE and Aquila provide natural gas service. The county's solid waste is collected by private haulers except for recyclable materials, which are collected by the county recycling trailer.

Law Enforcement

The Clinton County Sheriff's Department has 23 total persons on staff. This includes the sheriff, 6 patrol officers, 11 reserves, 4 jailors, and 1 investigator. City police departments are located in Cameron, Lathrop, Plattsburg, Gower, and Holt.

Emergency Medical Service

The Tri-County Ambulance District, located in Plattsburg, is the primary provider of emergency medical service for the county. The district has three vehicles and covers a 620 square mile area. They have seven full-time employees and 15 part-time employees. The Cameron Ambulance Service also provides emergency medical care for portions of the county, with two vehicles and nine employees.

Fire Protection

The following fire protection districts serve Clinton County:

- Plattsburg Fire Department
- Lathrop Fire Department
- Lathrop Fire Protection District (Turney)
- Holt Fire Department
- Cameron Fire Department
- Gower Fire Department
- Stewartsville Fire Department
- Osborn Fire Department

Emergency Services (911)

Clinton County is served by an interoperable 911 system. Any person requiring assistance can dial 911 anywhere in the county to be connected to emergency services. 911 calls are received in a central call center, and then routed to the appropriate organizations. During 2004, Clinton County was part of a multi-county Department of Homeland Security grant that funded the initial infrastructure to allow dispatchers to seamlessly transfer emergency calls to different jurisdictions.

Underground Infrastructure

Due to homeland security concerns, underground utilities are not mapped in this plan. As of March 2005, the following companies have underground utility lines in Clinton County, as reported by the Missouri One Call System:

- AmerenUE
- Aquila
- BP Products of America
- Century Tel
- Charter Communications
- Clay County PWSD #3
- Clinton County PWSD 1
- Clinton County PWSD 3
- Clinton County PWSD 4
- DeKalb PWSD 1
- Farmers Electric Cooperative
- Kinder-Morgan Pipeline LP
- Lathrop Telephone CO
- Lightcore
- Magellan Midstream Partners
- MCI WorldCom
- MediaCom
- Mid-America Pipeline
- MO Gas Energy
- Platte-Clay Electric Company
- Platte County PWSD 8
- Platte Pipeline
- Ray County PWSD 1
- Southwestern Bell
- Sprint Local
- United Electric Co-op
- WilTel Communications

To contact Missouri One Call utility location, telephone (800) 344-7483.

Inventory of Critical Facilities

Relevant facilities include medical facilities, schools, long-term care facilities, day care centers, and government structures. These facilities represent resources for care and shelter as well as populations requiring a higher level of care and installations critical to community services.

Medical Facilities

The Cameron Regional Medical Center is the only hospital located in Clinton County. Other nearby hospitals includes the Heartland Regional Medical Center in Saint Joseph, Missouri and Liberty Hospital in Liberty, Missouri. The following medical clinics and related facilities in Clinton County are listed below:

• Cameron Regional Medical Center	1600 E Evergreen	Cameron
• Clinton County Care and Rehab	253 E Hwy 116	Plattsburg
• Clinton County Health Department	106 Bush Hwy W	Plattsburg
• Family Medical Clinic	400 W Clay	Plattsburg
• Gower Medical Center	313 S 169 Hwy	Gower
• Lathrop Health Facility	702 Center St	Lathrop
• Lathrop Medical Clinic	705 Oak St	Lathrop
• Missouri Veterans Home	1111 Euclid Ave	Cameron
• Plattsburg Medical Clinic	400 Clay Ave	Plattsburg
• Oakridge Convalescence Center	205 E. Clay	Plattsburg

Schools, Long-term Care Facilities and Day Care Centers

Nine school districts serve portions of Clinton County. However, three districts, Cameron R-1, Clinton County R-3, and Lathrop R-2, cover the majority of the county. Buildings and enrollments for these three districts are listed in Table 1-5.

Table 1-5. School Districts, Buildings and Enrollment

	Buildings	2004 Enrollment	Address
Clinton County R-3	*3*	*829*	
	Plattsburg High School	250	800 Frost St., Plattsburg
	Clinton County R-3 Middle School	209	800 Frost St., Plattsburg
	Ellis Elementary School	370	603 Frost St., Plattsburg
Lathrop R-2	*3*	*890*	
	Lathrop High School	270	612 Center St., Lathrop
	Lathrop Middle School	213	700 Center St., Lathrop
	Lathrop Elementary School	407	700 Center St., Lathrop
Cameron R-1	*4*	*1,631*	
	Cameron High School	474	1022 S Chestnut, Cameron
	Cameron Middle School	548	915 S Park, Cameron
	Parkview Elementary	471	602 S Harris, Cameron
	Early Years Learning Center	175	423 N Chestnut, Cameron
East Buchanan C-1	*3*	*720 (535 in county)*	
	East Buchanan High School	229	100 Smith St., Gower
	East Buchanan Elementary School	306	100 Smith St., Gower

Source: http://www.dese.state.mo.us/

Numerous daycare and preschool facilities serve Clinton County, as listed below:

• Abc Bear Child Care Center	17211 NE 180th St	Holt
• Donna's Child Care	311 S Orange St	Cameron
• First Baptist Day Care	102 S 2nd St	Gower
• Pam's Homestyle Day Care	417 N Nettleton St	Cameron
• Step By Step Childcare	500 Whitney Ave	Gower
• Early Learning Preschool	309 Dawn Ave	Cameron
• Early Years Modular	423 N Chestnut	Cameron
• East Buchanan Pre School	211 S 3rd St	Gower
• First Baptist Church Preschool	501 W Broadway St	Plattsburg
• Head Start	902 W 4th St	Cameron
• Head Start	305 N 7th St	Plattsburg
• Learning Tree	403 W 4th St	Cameron
• Tiny Tigers Learning Center	104 Bush St	Plattsburg

The two major providers of long-term care in the area are Clinton County Care and Rehab and the Missouri Veterans Home. Long-term care facilities require special consideration during a natural disaster. These facilities fulfill a range of needs including retirement, assisted living, and intermediate and continuing care. Residents may have mobility and/or cognition issues that present special problems. Day care centers represent yet another population that requires special consideration. Most centers cater to children ages 2-5, although some day care centers serve older adults. These facilities represent specialized mitigation needs.

Government-Owned Structures

County buildings include county and city government centers, police stations, fire stations, ambulance bases, and the county's 911 Emergency Operations Center. The following is a list of such facilities located in Clinton County.

• Cameron Ambulance Service	122 W 1st	Cameron
• Cameron Ambulance Service	101 N Chestnut	Cameron
• Tri-County Ambulance	100 S Hwy Y	Plattsburg
• Cameron Chamber of Commerce	205 N Main	Cameron
• Cameron City Hall	205 N Main	Cameron
• City of Holt	P.O. Box 170	Holt
• Gower City Hall	94 N 4th St	Gower
• Lathrop Chamber of Commerce	707 Oak St	Lathrop
• Lathrop City Hall	707 Oak St	Lathrop
• Osborn City Hall	P.O. Box 67	Osborn
• Plattsburg Chamber of Commerce	101 S Main	Plattsburg
• Trimble City Hall	201 N Port Arthur Rd	Trimble
• Village of Turney	P.O. Box 63	Turney
• City of Cameron Fire Department	205 N Main	Cameron
• City of Lathrop Fire Department	P.O. Box 5	Lathrop
• City of Plattsburg Fire Department	P.O. Box 166	Plattsburg
• City of Trimble Fire Department	P.O. Box 99	Trimble
• Gower Fire District	407A N 169 Hwy	Gower

• Holt Fire Department	260 State Route 33	Holt
• Osborn Fire Department		Osborn
• Clinton County Jail	207 N Main	Plattsburg
• Cameron City Library	312 N Chestnut	Cameron
• Lathrop Library and Museum	117 Pine St	Lathrop
• Cameron Light and Water Plant	1100 W 8th St	Cameron
• Cameron Police Department	205 N Main	Cameron
• Gower Police Department	94 N 4th St	Gower
• Holt Police Department	430 Main St	Holt
• Lathrop Police Department	117 Pine St	Lathrop
• Plattsburg Police Department	207 N Main	Plattsburg
• U.S. Post Office	123 E 4th St	Cameron
• U.S. Post Office	99 N 3rd St	Gower
• U.S. Post Office	606 Oak St	Lathrop
• U.S. Post Office	RR1	Osborn
• U.S. Post Office	105 S Main	Plattsburg
• U.S. Post Office	217 S Port Arthur Rd	Trimble

Inventory of large employment, commercial and recreational centers

Relevant facilities include those that concentrate large groups of people together in a single location.

Large industrial/commercial centers

Although there are no significant industrial or commercial development centers in Clinton County, there are local organizations that employ over 50 people, requiring specific mitigation actions. These facilities include the Clinton R-3, Lathrop R-2, and Cameron R-1 School Districts, the Cameron Regional Hospital, regional “big-box” stores (i.e. Wal-Mart), local utility companies, grocery stores, hotels/motels, and certain popular restaurants.

Large Recreational Centers

County and municipal events draw large numbers to Clinton County, largely due to the many parks that are available throughout the area. Below is a list of some of the parks that can be utilized in Clinton County.

• Beaver Park	Cameron
• BF Moore Park	Gower
• Earl Park	Cameron
• Fireman's Park (Chautauqua Park)	Plattsburg
• Gower City Park	Gower
• Kelsey Park	Cameron
• Lathrop Baseball/Softball Park	Lathrop
• McCorkle Park	Cameron
• Mini-Park	Cameron
• Perkins Park	Plattsburg
• Plattsburg City Park	Plattsburg

- Plaza Park Plattsburg
- Ted Moore City Park Plattsburg

There are community centers available in the county to be used for community activities and events. The following list provides name and location information for community centers in the area.

- Brazelton Community Center 707 Oak St Lathrop
- Friends of the Community 117 W Maple Plattsburg
- Gower Good Times 94 S 3rd St Gower
- Cameron Community Building Ashland Avenue Cameron

Inventory of Housing Structures

The Clinton County housing supply is generally tight; especially for homes at or below the $86,400 average single-family house. Of the total 7,877 housing units, 7,152 are occupied housing units, 3,959 are single-family units, 533 are mobile homes, and 3,250 are multi-family units. Of the homes in the area, 24.7% were built in 1939 or earlier, while 20.2% of the homes built were constructed from 1970-1979.

Table 1-6. Clinton County Housing Categories

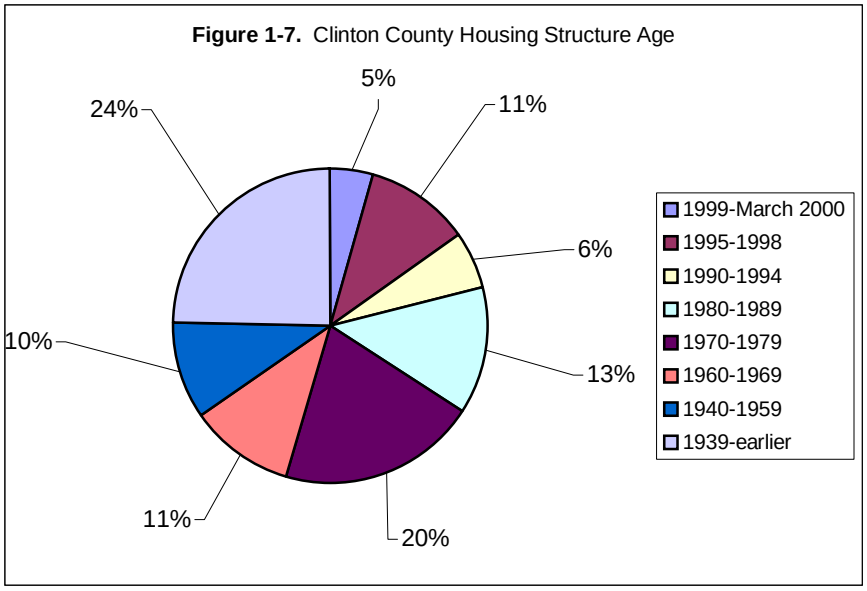
Housing Types	Number	Percent
Single-family	3,959	50.5
Multi-family	3,250	41
Mobile Homes	533	6.8
Miscellaneous types	135	1.7
Total Housing Units	7,877	100

Source: U.S. Census 2000

Total Inventory of Structures

The total Clinton County assessed valuation for 2003 was $199,000,746, with this figure including real property, personal property, and state assessed utilities according to the Missouri Department of Revenue.

Figure 1-7. Clinton County Housing Structure Age



Community Profiles

The tables below provide a comparison of characteristics within Clinton County's incorporated and unincorporated areas.

Cameron

Total Population	8,312
Classification	City-third class
Leadership Structure	Mayor/Council
Median Household Income, 1999	$40,540
Total Housing Units	2,280
Housing Unit, Median Year Built	1939
Median Gross Rent	$418
Median Owner-Occupied Housing Values	$77,300
Master Plan	Yes
Emergency Operations Plan	Yes
Zoning Regulations	Yes
Building Regulations	Yes
Subdivision Regulations	Yes
Stormwater Regulations	Yes
Floodplain Regulations	Yes
Water Service	PWSD #3
Sewer Service	Cameron
Electric Service	Platte-Clay Electric
Fire Service	Cameron Fire Department
Ambulance Service	Cameron Ambulance District
Rivers, Streams	Upper Grand River Basin, Lower Missouri River Basin
Major Arterials	Hwy 36, I-35

Gower

Total Population	1,399
Classification	City-fourth class
Leadership Structure	Mayor/Council
Median Household Income, 1999	$48,125
Total Housing Units	549
Housing Unit, Median Year Built	1975
Median Gross Rent	$450
Median Owner-Occupied Housing Values	$81,800
Master Plan	No
Emergency Operations Plan	Yes
Zoning Regulations	Yes
Building Regulations	Yes
Subdivision Regulations	Yes
Stormwater Regulations	No
Floodplain Regulations	Yes
Water Service	Gower
Sewer Service	Gower
Electric Service	Aquila
Fire Service	Gower Fire Department
Ambulance Service	Tri-County Ambulance
Rivers, Streams	Dick's Creek, Platte River Branch
Major Arterials	Hwy 169

Grayson

Classification	Village
Leadership Structure	Chairman
Ambulance Service	Tri-County Ambulance
Rivers, Streams	Dick's Creek, Platte River Branch
Major Arterials	Hwy 169

Holt

Total Population	440
Classification	City-fourth class
Leadership Structure	Mayor/City Clerk
Median Household Income, 1999	$38,438
Total Housing Units	165
Housing Unit, Median Year Built	1939
Median Gross Rent	$290
Median Owner-Occupied Housing Value	$79,600
Master Plan	No
Emergency Operations Plan	Yes
Zoning Regulations	Yes
Building Regulations	Yes
Subdivision Regulations	Yes
Stormwater Regulations	Yes
Floodplain Regulations	Yes
Water Service	PWSD #3
Sewer Service	Holt
Electric Service	Platte-Clay Electric, Ameren UE
Fire Service	Holt Fire Department
Ambulance Service	Tri-County Ambulance
Rivers, Streams	Little Platte River, Roberts Branch Creek, Linn Branch Creek, Castile Creek
Major Arterials	I-35, Hwy 69, Hwy 33

Lathrop

Total Population	2,092
Classification	City-Fourth Class
Leadership Structure	Mayor/Council
Median Household Income, 1999	$39,537
Total Housing Units	827
Housing Unit, Median Year Built	1975
Median Gross Rent	$429
Median Owner-Occupied Housing Value	$81,300
Master Plan	No
Emergency Operations Plan	No
Zoning Regulations	Yes
Building Regulations	Yes
Subdivision Regulations	Yes
Stormwater Regulations	Yes
Floodplain Regulations	Yes
Water Service	Lathrop
Sewer Service	Lathrop
Electric Service	Ameren UE
Fire Service	Lathrop Fire Department

Ambulance Service	Tri-County Ambulance
Rivers, Streams	Little Platte River, Roberts Branch Creek, Linn Branch Creek, Castile Creek
Major Arterials	Hwy 33, Hwy M-116

Plattsburg

Total Population	2,354
Classification	City-Fourth Class
Leadership Structure	Mayor/Council
Median Household Income, 1999	$37,417
Total Housing Units	1,002
Housing Units, Median Year Built	1939
Median Gross Rent	$380
Median Owner-Occupied Housing Value	$89,200
Master Plan	No
Emergency Operations Plan	No
Zoning Regulations	Yes
Building Regulations	Yes
Subdivision Regulations	Yes
Stormwater Regulations	Yes
Floodplain Regulations	Yes
Water Service	Plattsburg
Sewer Service	Plattsburg
Electric Service	Ameren UE
Fire Service	Plattsburg Fire Department
Ambulance Service	Tri-County Ambulance
Rivers, Streams	Little Platte River, Roberts Branch Creek,Linn Branch Creek, Castile Creek
Major Arterials	Hwy 116, Hwy 169

Trimble

Total Population	451
Classification	City-Fourth Class
Leadership Structure	Mayor/Council
Median Household Income, 1999	$38,571
Total Housing Units	199
Housing Unit, Median Year Built	1985
Median Gross Rent	$433
Median Owner-Occupied Housing Value	$86,700
Master Plan	No (In the process)
Emergency Operations Plan	No
Zoning Regulations	Yes
Building Regulations	Yes
Subdivision Regulations	Yes
Stormwater Regulations	Yes
Floodplain Regulations	Yes
Water Service	PWSD #1
Sewer Service	Trimble
Electric Service	Platte-Clay Electric Coop. and Aquila
Fire Service	Edgerton/Trimble District
Ambulance Service	Tri-County Ambulance
Rivers, Streams	Dick's Creek, Platte River Branch
Major Arterials	Hwy 169

Turney

Total Population	155
Classification	Village
Leadership Structure	Chairman/Board
Median Household Income, 1999	$36,528
Total Housing Units	74
Housing Unit, Median Year Built	1975
Median Gross Rent	$508
Median Owner-Occupied Housing Value	$56,000
Master Plan	No
Emergency Operations Plan	No
Zoning Regulations	Yes
Building Regulations	Yes
Subdivision Regulations	No
Stormwater Regulations	No
Floodplain Regulations	No
Water Service	PWSD #4
Sewer Service	Turney
Electric Service	Ameren UE
Fire Service	Lathrop Fire Protection District
Ambulance Service	Tri-County Ambulance
Rivers, Streams	Little Platte River, Roberts Branch Creek, Linn Branch Creek, Castile Creek
Major Arterials	Route H, Route A

All Cities

Total Population	15,203
Classification	Various
Leadership Structure	Various
Median Household Income, 1999	$34,894.50
Total Housing Units	5,096
Housing Unit, Median Year Built	1939
Median Gross Rent	$363.50
Median Owner-Occupied Housing Value	$68,987.50
Master Plan	1 Yes, 6 No
Emergency Operations Plan	3 Yes, 4 No
Zoning Regulations	7 Yes
Building Regulations	7 Yes
Subdivision Regulations	6 Yes, 1 No
Stormwater Regulations	5 Yes, 2 No
Floodplain Regulations	6 Yes, 1 No
*Water Service	3 Cities Provide Water, 4 is provided Through a PWSD
Sewer Service	7 Cities Provide Sewer Service
Electric Service	1 city provides electric service, 4 Ameren UE, 3 Platte-Clay, 2 Aquila
Fire Service	7 Cities Provide Fire Service
Ambulance Service	Tri-County Ambulance and Cameron Ambulance service provides EMS service to the county.

* More than one water company is provided in some cities.

Clinton County

Total Population	18,979
Classification	Third Class
Leadership Structure	County Commission
Median Household Income, 1999	$41,629
Total Housing Units	7,152
Housing Unit, Median Year Built	1939
Median Gross Rent	$442
Median Owner-Occupied Housing Value	$86,400
Master Plan	Yes
Emergency Operations Plan	Yes
Zoning Regulations	Yes
Building Regulations	No
Subdivision Regulations	Yes
Stormwater Regulations	Yes
Floodplain Regulations	Yes
Water Service	PWSD #1, #3, #4, DeKalb #1
Sewer Service	Municipal or septic tanks
Electric Service	Platte-Clay Electric, Ameren UE, Aquila
Fire Service	Plattsburg, Gower, Lathrop, Holt, Cameron
Ambulance Service	Tri-County Ambulance, Cameron
Rivers, Streams	Little Platte River, Roberts Branch Creek, Linn Branch Creek, Castile Creek, Upper Grand River Basin, Lower Missouri River Basin, Dick's Creek, Platte River Branch
Major Arterials	Interstate 35, U.S. Highway 169, Highway 69, M-116, C Highway, A Highway

Section 2

Risk Assessment

Community-wide Hazard Profile and List of Hazards Identified

Using both historic data and personal, first-hand knowledge, the Clinton County Hazard Mitigation Committee compiled a list of the hazards most likely to have a negative impact on the county. In ranked order, the hazards associated with severe thunderstorms (hail, high wind, lightning) are noted as the most likely to endanger lives and property of Clinton County residents, followed by tornadoes, severe winter weather (ice, heavy snowfall, extreme cold), drought, heat wave, and fire. Other hazards to be addressed, though not identified as primary threats to the county, include flooding (including flash floods), dam failure, and earthquake.

These disasters can precipitate cascading hazards, or those hazards caused as a result of a natural disaster. Cascading hazards could include interruption of power supply, water supply, business and transportation. Natural disasters can also cause civil unrest, computer failure and environmental health hazards. Any of these, in combination could possibly impact emergency response activities. Examples of specific disasters include nuclear power plant damage, hazardous materials release, mass transportation accidents, and disease outbreak due to unsanitary conditions. Table 2-1 shows the relationship between identified hazards for Clinton County and categories of possible cascading disasters.

Table 2-1. Cascading Hazards Resulting from Natural Disasters

Natural Hazard	Power and Communications Interruption	Water Supply Interruption	Business Interruption	Civil Unrest	Computer Failure and/or Loss of Records	Transportation Interruption	Health and/or Environmental Hazards
Tornado	**P**	**P**	**P**	**P**	**P**	**P**	**P**
Thunderstorm	**P**	**s**	**P**		**P**		
Flood	**s**	**s**	**s**			**s**	**P**
Winter Weather	**P**	**P**	**P**		**s**	**P**	**s**
Drought		**P**					**s**
Heat Wave	**s**	**s**					**s**
Earthquake	**P**	**P**	**P**	**P**	**P**	**P**	**P**
Dam Failure		**P**					**P**
Fire		**s**					**P**

P = Primary/Major Impact *s = Secondary/Minor Impact*

Natural Hazard Identification / Elimination Process

Many sources were searched for data relating to natural hazards. Primary sources included FEMA, SEMA, National Climate Data Center (NCDC), and National Oceanic and

Atmospheric Administration (NOAA). US Geological Survey (USGS) and Center for Earthquake Research (CER) were major sources for earthquake information. Missouri DNR's Dam Safety Division provided data regarding dams. The Missouri Department of Conservation provided the majority of the fire information relevant to Clinton County. Other sources included county officials; existing county, regional and state plans; reports on the floods of 1993 and 1995; position papers on transportation issues; and input from local officials and residents.

To identify the hazards relevant to Clinton County, the above sources were searched for incidents of all possible natural hazards occurring within the county. Some hazards are regional in scope and, therefore, included in the hazard profiles. Location-Specific hazards not found through the information search were further investigated to determine whether there would be a future possibility of occurrence. Hazard event histories, repetitive loss information, and conversations with local residents were used to identify relevant hazards.

Hazards Not Included and Reasons for Elimination

Landslides and land subsidence, according to the USGS website, are not likely to occur within Clinton County due to the type of soil and substructure in northwest Missouri. Further, the risk of coastal storms, hurricanes, tsunamis, avalanche, and volcanic activity does not exist within the county due to its location, soil profile, and geologic structure.

Severity Scales

To simplify natural hazard events and provide a common frame of reference, the following scales are used in this section:

Magnitude

- **Negligible**: Less than 10% of the County will be affected by the next event.
- **Limited:** 10% - 25% of the County will be affected by the next event.
- **Critical:** 25% - 50% of the County will be affected by the next event.
- **Catastrophic:** More than 50% of the County will be affected by the next event.

Frequency

- **Unlikely:** Less than 1% probability of occurrence in next 100 years.
- **Possible:** Between 1% and 10% probability of occurrence in the next year, or at least one chance in the next 100 years.
- **Likely:** Between 10% and 100% probability of occurrence in the next year, or at least one chance in the next 10 years.
- **Highly Likely:** Near 100% probability of occurrence in the next year.

Identified Natural Hazards

Severe Thunderstorms

A thunderstorm is formed from a combination of moisture, rapidly rising warm air and a force capable of lifting air such as a warm and cold front, a sea breeze or a mountain. On average, the United States experiences 100,000 thunderstorms each year, and nearly 1,800 thunderstorms are in progress over the surface of the earth at any given moment. There are several hazards associated with severe thunderstorms, including high winds, large hail, damaging lighting, and torrential rains. Any of these hazards individually, or in combination, can have a significant negative impact on a location. A fifth hazard associated with thunderstorms, tornadoes, is discussed in the next section.

Hail is a common hazard that occurs in conjunction with severe thunderstorms. Hail forms in severe thunderstorms that have significant vertical development (> 30000'). In such strong thunderstorms, water droplets will become caught in a powerful updraft, sending it to the top of the thunderstorm, where it freezes. As it begins to fall through the storm, it gains a layer of liquid water before being blown back to the top, to freeze again. This process continues until the hailstone is too heavy to be supported by the updraft, at which point it falls to the ground. There is a direct connection between the severity of the thunderstorm and the size of the hailstones it is capable of producing. Hail-producing thunderstorms are common during the spring in the Midwest. Between January 1, 1950 and December 31, 2004, Clinton County recorded 87 hail events:

Table 2-2. Clinton County Hail Events, 1950 - 2004

Location or County	Date	Time	Mag
1 Rural Clinton County	05/15/1966	1645	1.50 in.
2 Rural Clinton County	01/24/1967	1200	1.75 in.
3 Rural Clinton County	05/08/1968	1802	0.75 in.
4 Rural Clinton County	05/15/1968	1440	1.00 in.
5 Rural Clinton County	06/26/1969	1905	1.00 in.
6 Rural Clinton County	05/10/1970	1415	1.25 in.
7 Rural Clinton County	05/29/1976	2030	1.50 in.
8 Rural Clinton County	04/16/1982	1345	0.75 in.
9 Rural Clinton County	09/10/1984	0908	4.50 in.
10 Rural Clinton County	05/26/1985	1720	1.50 in.
11 Rural Clinton County	05/08/1988	1145	0.75 in.
12 Rural Clinton County	05/18/1989	1410	1.75 in.
13 Rural Clinton County	05/18/1989	1510	0.75 in.
14 Rural Clinton County	05/24/1989	2042	0.75 in.
15 Rural Clinton County	04/28/1991	1812	0.75 in.
16 Rural Clinton County	05/04/1991	1410	1.25 in.
17 Rural Clinton County	05/04/1991	1510	1.25 in.

18 Lathrop	04/19/1993	0125	1.75 in.
19 Cameron	09/21/1993	2345	1.75 in.
20 Trimble	04/14/1994	2300	0.75 in.
21 Cameron	06/25/1994	2020	0.75 in.
22 Lathrop	06/25/1994	2025	1.75 in.
23 Perrin	07/01/1994	2130	0.75 in.
24 Cameron	04/08/1995	2035	1.00 in.
25 Plattsburg	04/08/1995	2125	0.75 in.
26 Holt	04/16/1995	1745	0.75 in.
27 Wallace State Park	07/04/1995	0135	1.75 in.
28 Gower	07/25/1995	1525	1.75 in.
29 Plattsburg	07/25/1995	1540	2.50 in.
30 Lathrop	07/25/1995	1555	1.25 in.
31 Gower	07/25/1995	1615	1.75 in.
32 Plattsburg	07/25/1995	1622	1.00 in.
33 Cameron	06/16/1996	06:15 PM	0.88 in.
34 Perrin	05/23/1998	05:05 PM	0.75 in.
35 Cameron	05/23/1998	05:56 PM	0.75 in.
36 Cameron	06/10/1998	11:05 AM	1.00 in.
37 Cameron	06/12/1998	11:43 PM	1.75 in.
38 Cameron	06/13/1998	11:43 PM	1.75 in.
39 Gower	04/02/1999	08:13 PM	0.75 in.
40 Grayson	04/02/1999	08:20 PM	0.75 in.
41 Perrin	04/02/1999	08:55 PM	0.88 in.
42 Plattsburg	02/29/2000	03:16 PM	0.75 in.
43 Cameron	03/26/2000	03:50 PM	0.88 in.
44 Plattsburg	04/19/2000	07:00 PM	1.00 in.
45 Gower	04/19/2000	07:25 PM	1.00 in.
46 Cameron	04/19/2000	07:27 PM	0.75 in.
47 Gower	05/11/2000	08:05 PM	1.25 in.
48 Cameron	06/25/2000	06:50 PM	0.75 in.
49 Plattsburg	06/25/2000	06:53 PM	1.00 in.
50 Plattsburg	06/25/2000	06:55 PM	1.50 in.
51 Cameron	09/11/2000	05:05 PM	0.75 in.
52 Cameron	09/22/2000	04:34 PM	0.75 in.
53 Plattsburg	09/22/2000	07:10 PM	1.00 in.
54 Trimble	05/06/2001	02:45 PM	0.75 in.
55 Plattsburg	05/11/2001	12:00 AM	0.75 in.
56 Cameron	06/16/2001	08:10 PM	1.00 in.
57 Cameron	06/16/2001	08:20 PM	1.75 in.
58 Gower	08/30/2001	01:45 PM	0.75 in.
59 Cameron	08/30/2001	12:49 PM	0.88 in.
60 Hemple	09/20/2001	06:00 PM	0.75 in.
61 Cameron	05/06/2002	12:39 AM	1.75 in.
62 Plattsburg	07/28/2002	03:40 PM	0.75 in.

63 Cameron	04/28/2003	03:45 AM	1.75 in.
64 Cameron	04/28/2003	03:53 AM	0.88 in.
65 Plattsburg	04/28/2003	04:13 AM	0.88 in.
66 Lathrop	04/28/2003	04:30 AM	1.00 in.
67 Plattsburg	04/28/2003	05:40 AM	0.88 in.
68 Plattsburg	04/30/2003	06:45 PM	0.88 in.
69 Plattsburg	04/30/2003	06:50 PM	1.75 in.
70 Lathrop	04/30/2003	07:02 PM	1.25 in.
71 Lathrop	04/30/2003	07:03 PM	1.00 in.
72 Lathrop	04/30/2003	07:10 PM	1.75 in.
73 Cameron	04/30/2003	08:26 PM	0.88 in.
74 Trimble	05/04/2003	04:15 PM	0.75 in.
75 Turney	05/24/2004	03:57 PM	1.75 in.
76 Gower	05/29/2004	06:05 PM	0.88 in.
77 Trimble	05/29/2004	06:10 PM	2.75 in.
78 Trimble	05/29/2004	06:15 PM	1.75 in.
79 Trimble	05/29/2004	06:20 PM	1.75 in.
80 Gower	05/29/2004	06:33 PM	2.75 in.
81 Trimble	05/29/2004	06:35 PM	1.75 in.
82 Plattsburg	05/29/2004	06:36 PM	0.88 in.
83 Plattsburg	05/29/2004	07:25 PM	1.00 in.
84 Turney	05/29/2004	07:45 PM	1.00 in.
85 Cameron	05/29/2004	08:30 PM	0.88 in.
86 Lathrop	07/13/2004	06:50 PM	0.88 in.
87 Plattsburg	09/17/2004	11:40 PM	1.00 in.
Source: National Climatic Data Center. http://www.ncdc.noaa.gov			

Straight-line winds are another damaging hazard associated with severe thunderstorms. These winds, which are created either by storm outflow or downdraft and can exceed hurricane-force (74mph) speeds, are responsible for the majority of thunderstorm damage in the United States. Between January 1, 1950 and December 31, 2004, Clinton County recorded 41 thunderstorm wind events:

Table 2-3. Clinton County Thunderstorm Events, 1950 - 2004

Location or County	Date	Time	Type	Mag
1 Rural Clinton County	05/18/1959	2145	Tstm Wind	60 kts.
2 Rural Clinton County	05/15/1963	0600	Tstm Wind	N/A
3 Rural Clinton County	05/08/1968	1802	Tstm Wind	N/A
4 Rural Clinton County	05/23/1971	1953	Tstm Wind	52 kts.
5 Rural Clinton County	06/06/1971	2245	Tstm Wind	N/A
6 Rural Clinton County	05/07/1973	1205	Tstm Wind	N/A
7 Rural Clinton County	06/16/1973	1600	Tstm Wind	N/A
8 Rural Clinton County	05/13/1974	1830	Tstm Wind	N/A
9 Rural Clinton County	04/02/1978	0030	Tstm Wind	N/A
10 Rural Clinton County	09/16/1978	1735	Tstm Wind	61 kts.

11 Rural Clinton County	04/11/1979	1930	Tstm Wind	N/A
12 Rural Clinton County	06/10/1986	1845	Tstm Wind	N/A
13 Rural Clinton County	06/10/1986	1845	Tstm Wind	N/A
14 Rural Clinton County	06/12/1987	1840	Tstm Wind	N/A
15 Rural Clinton County	03/27/1991	0200	Tstm Wind	52 kts.
16 Cameron	09/21/1993	2230	Tstm Wind	N/A
17 Cameron	04/14/1994	2230	Tstm Wind	N/A
18 Holt	06/16/1994	0730	Tstm Wind	N/A
19 Gower	06/25/1994	2010	Tstm Wind	N/A
20 Cameron	06/16/1996	07:00 PM	Tstm Wind	60 kts.
21 Plattsburg	06/13/1998	11:56 PM	Tstm Wind	60 kts.
22 Turney	06/28/1998	09:54 PM	Tstm Wind	N/A
23 Cameron	10/04/1998	05:40 PM	Tstm Wind	70 kts.
24 Lathrop	07/23/1999	02:10 PM	Tstm Wind	60 kts.
25 Lathrop	06/13/2000	07:15 PM	Tstm Wind	52 kts.
26 Gower	06/25/2000	06:39 PM	Tstm Wind	52 kts.
27 Lathrop	06/25/2000	06:45 PM	Tstm Wind	60 kts.
28 Plattsburg	06/25/2000	06:46 PM	Tstm Wind	52 kts.
29 Lathrop	08/07/2000	02:40 PM	Tstm Wind	60 kts.
30 Plattsburg	08/19/2000	09:39 PM	Tstm Wind	53 kts.
31 Trimble	10/14/2000	12:47 PM	Tstm Wind	60 kts.
32 Lathrop	06/14/2001	02:00 PM	Tstm Wind	61 kts.
33 Lathrop	06/20/2001	09:25 PM	Tstm Wind	52 kts.
34 Plattsburg	03/08/2002	10:58 PM	Tstm Wind	52 kts.
35 Cameron	05/06/2002	05:22 AM	Tstm Wind	56 kts.
36 Gower	05/08/2002	06:12 PM	Tstm Wind	70 kts.
37 Converse	06/25/2003	01:35 PM	Tstm Wind	52 kts.
38 Cameron	06/25/2003	01:45 PM	Tstm Wind	61 kts.
39 Lathrop	06/12/2004	09:00 PM	Tstm Wind	61 kts.
40 Lathrop	06/12/2004	09:15 PM	Tstm Wind	61 kts.
41 Grayson	07/16/2004	01:45 AM	Tstm Wind	61 kts.
Source: National Climatic Data Center. http://www.ncdc.noaa.gov				

Description of Hazard: Thunderstorms, High wind and Hail
Historical Statistics: Over 100 high wind and hail events have been reported in Clinton County since 1950.
Statement of Future Probable Severity: Wind and hail events are a common occurrence in Clinton County, and as such, residents are generally well versed in protecting their lives and property from these hazards. The impact on the health of residents will likely be *Negligible*, while the most severe hail storms can result in *Critical* damage to crops and structures. Overall, the next thunderstorm event will likely result in *Limited* impact.
Statement of Probable Risk: A high wind or hail event for Clinton County in any given year is *Highly Likely*.
Statement of Next Disaster's Likely Adverse Impact on the Local Area: Thunderstorm hazards are generally considered path hazards, with areas along or adjacent to the storm path receiving some degree of damage, correspondent to the severity of the storm.

Recommendations – Severe Thunderstorms

1. Clinton County and its local governments should require a NOAA weather radio in continuous operation in all facilities offering public accommodations.

2. Clinton County, its local governments and regional emergency services organizations should encourage electric and telecommunications utilities to anchor or strengthen above-ground transmission lines, poles and similar structures.

3. Clinton County and its local governments should adopt the most current edition of a model building code to address structural and architectural issues related to tornadoes and high wind events.

4. Early warnings are possibly the best hope for residents when severe weather strikes. While more than two hours warning is typically not possible, citizens must immediately be aware when a city will be facing a severe weather incident.

5. Communities that do not already possess warning systems should plan to purchase a system. Storm shelters are another important means of mitigating the effects of tornados and severe thunderstorms.

6. A community-wide shelter program should be adopted for residents who may not have adequate shelter in their homes. Residents should also be encouraged to build their own storm shelters to prepare for emergencies.

7. Local governments should encourage residents to purchase weather radios to ensure that everyone has sufficient access to information in times of severe weather.

8. Encouraging tree trimming by electric companies, and enact tree-trimming ordinances that may help offset the damages of breaking tree limbs.

Tornadoes

Tornadoes are violently rotating columns of air extending from a thunderstorm to the ground. Though most often associated with the central United States, tornadoes have been documented in all 50 states. Tornadoes can also occur at any time of the year, although the peak season for tornadoes in northwest Missouri is the spring and summer. Tornadoes can occur at any time of the day, though they are most likely to occur between 3:00 p.m. and 9:00 p.m. Eighty percent of all tornadoes strike between noon and midnight. The average period of a tornado's ground contact is 30 minutes, covering an average distance of 15 miles. In a review of Missouri tornadoes occurring between 1950 and 1996, the National Weather Service calculated a mean path length of 2.27 miles and a mean path area of 0.14 square miles.

The weather conditions conducive to the formation of tornadoes often produce a variety of other dangerous storm-related weather conditions, such as severe thunderstorms, downbursts, straight line winds, lightning, hail and heavy rains. A tornado is spawned by a thunderstorm, and produced when cool air overtops a layer of warm air, forcing the warm air to rise rapidly. The damage from a tornado is a result of the high wind velocity and wind-blown debris.

Tornadoes are often formed from the largest thunderstorms, and the most destructive tornadoes are formed by "supercells," which are, according to NOAA's Storm Prediction Center (SPC), "rotating thunderstorms with a well-defined radar circulation called a mesocyclone."

When a tornado threatens, individuals need to have a safe place to go and adequate time to get there. Even with advances in meteorology, warning times may be short or non existent. Lives are saved when individuals receive and understand the warning, know what to do, and know the safest place to go. Source: http://www.fema.gov/hazards/tornadoes/

Tornadoes are classified according to the Fujita Tornado Damage Scale, commonly referred to as F- Scale. Developed by Dr. T. Theodore Fujita, a renowned severe storm researcher, the F-Scale is a damage scale for winds, including tornadoes. The F-Scale ranks tornadoes by relating the degree of damage to the intensity of the wind. Although wind speeds on the F-Scale have never been scientifically tested or proven, and despite the many variables affecting tornado damage (i.e., the sturdiness of a structure, wind direction, wind duration, battering by flying debris, etc.), the F-Scale is the only widely used method of rating tornadoes. Table 2-4 lists the wind speed and potential damage associated with F-Scale ratings.

Table 2-4. The Fujita Tornado Scale	
Maximum Wind Speeds	Typical Effects
F0 Category Tornado 40-72 mph	Gale Tornado. Light Damage: Some damage to chimneys; breaks twigs and branches off tress; pushes over shallow-rooted trees; damages signboards; some windows broken; hurricane wind speed begins at 73 mph.
F1 Category Tornado 73-112 mph	Moderate Tornado. Moderate damage: Peels surfaces off roofs; mobile homes pushed off foundations or overturned; outbuildings demolished; moving autos pushed off the roads; trees snapped or broken.
F2 Category Tornado 113-157 mph	Significant Tornado. Considerable damage: Roofs torn off frame houses; mobile homes demolished; frame houses with weak foundations lifted and moved; boxcars pushed over; large trees snapped or uprooted; light-object missiles generated.
F3 Category Tornado 158-206 mph	Severe Tornado. Severe damage: Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forests uprooted; heavy cars lifted off the ground and thrown; weak pavement blown off roads.
F4 Category Tornado 207-260 mph	Devastating Tornado. Devastating damage: Well constructed homes leveled; structures with weak foundations blown off some distance; cars thrown and disintegrated; large missiles generated; trees in forest uprooted and carried some distance away.
F5 Category Tornado 261-318 mph	Incredible Tornado. Incredible damage: Strong frame houses lifted off foundations and carried considerable distance to disintegrate; automobile-sized missiles fly through the air in excess of 300 ft (100 m); trees debarked; incredible phenomena will occur.
F6-F12 Category Tornadoes Greater than 319 mph	The maximum wind speeds of tornadoes are not expected to reach the F6 wind speeds.
http://www.ncdc.noaa.gov/oa/satellite/satelliteseye/educational/fujita.html	

The Fujita Scale may not be a perfect system for linking damage to wind speed, but it has distinct advantages over other measurement tools. It is simple enough to use in daily practice without involving much additional expenditure of time or money. From a practical point of view, it is doubtful that any other system would have found its way into widespread accepted use, even to this day. The entire premise of estimating wind speeds from damage to non-engineered structures is very subjective and is difficult to defend from various meteorological perspectives. The F- scale rates the intensity of the tornado, and measures both the path length and the path width.

A key point to remember is this: *the size of a tornado is not necessarily an indication of its intensity.* Large tornadoes *can* be weak, and small tornadoes *can* be violent. The Fujita Scale is based on *damage*, not the appearance of the funnel. Storm spotters, storm chasers and other weather observers often try to estimate the intensity of a tornado when they are in the field, basing their judgment on the rotational speed and amount of debris being generated as well as the width. However, the official estimate is made *after* the tornado has passed. Personnel from the National Weather Service office that issued the warning survey the site to determine the F-

Scale rating. Sometimes they call in experts from out of the area. Aerial surveys are occasionally done after violent tornadoes to determine the exact damage track.

FEMA has found that enhancing construction minimizes property damage to homes in areas prone to hurricane force winds, and those same techniques can be just as effective in guarding against damage from moderate to severe tornadoes. Also, proper construction techniques and materials based on the most current model building codes can be used in both new construction and existing construction to reduce the damage from low to moderate intensity tornadoes.

Tornadoes can topple buildings, roll mobile homes, uproot trees, hurl people and animals through the air for hundreds of yards, and fill the air with lethal wind-born debris. Tornadoes do their destructive work through the combined action of their strong rotary winds and the impact of wind-born debris. Contrary to popular opinion, buildings do not "explode" as a result of a reduced atmospheric pressure associated with a tornado. Instead, the force of the winds pushes the windward wall of the building inward. The roof is lifted and the other walls fall outward. Opening a window, once thought to minimize damage by allowing inside and outside pressure to equalize, is not effective or recommended. Research during the 1970's discovered that the pressure drop was responsible for only a small fraction of the destructive force of a tornado. All buildings have some ventilation, and it is believed this ventilation is enough to overcome the pressure difference in all except the most violent storms.

Tornadoes travel at an average speed of 30 miles per hour, but speeds ranging from 0 to 70 miles per hour have been reported, and are not uncommon. Most tornadoes move from the southwest to the northwest due to the Coriolis Effect, but the direction may be erratic and subject to sudden change.

Tornadoes are a fact of life in Missouri; the question is not whether the event will happen, but when and where. Tornadoes strike in a random fashion, making the task of calculating a recurrence interval futile.

Clinton County has been fortunate over the years in regards to destruction caused by tornadoes. Although tornadoes have touched down within the city limits of several cities, damage was limited, as they have hit sparsely populated areas of these cities. Because of Clinton County's location and its inherent climate, the threat of tornadoes is a reality for which community leaders must plan. Between January 1, 1950 and December 31, 2004, Clinton County recorded 19 tornado events, with no deaths or injuries reported:

Table 2-5. Clinton County Tornado Events, 1950 - 2004

Location or County	Date	Time	Type	Mag	Property Damage
1 Rural Clinton County	03/14/1955	1710	Tornado	F3	250K
2 Rural Clinton County	06/07/1957	2000	Tornado	F0	0K
3 Rural Clinton County	05/18/1959	2300	Tornado	F1	3K
4 Rural Clinton County	05/15/1963	0001	Tornado	F1	0K

5 Rural Clinton County	04/12/1964	1745	Tornado	F1	3K
6 Rural Clinton County	01/24/1967	1235	Tornado	F2	25K
7 Rural Clinton County	04/21/1967	1230	Tornado	F1	0K
8 Rural Clinton County	04/21/1967	1300	Tornado	F1	3K
9 Rural Clinton County	05/18/1971	1420	Tornado	F2	25K
10 Rural Clinton County	11/01/1971	1730	Tornado	F1	25K
11 Rural Clinton County	04/19/1973	1800	Tornado	F2	3K
12 Rural Clinton County	04/11/1979	1925	Tornado	F2	0K
13 Rural Clinton County	05/30/1985	1828	Tornado	F0	0K
14 Rural Clinton County	06/21/1985	1809	Tornado	F0	0K
15 Kearney To	05/06/1993	1958	Tornado	F0	5K
16 Cameron	05/06/1993	2110	Tornado	F1	50K
17 Plattsburg	05/08/2002	06:20 PM	Tornado	F0	0
18 Gower	05/29/2004	06:35 PM	Tornado	F0	0
19 Plattsburg	05/29/2004	07:40 PM	Tornado	F1	20K
Source: National Climatic Data Center. http://www.ncdc.noaa.gov					

Description of Hazard: Tornado

Historical Statistics: Nineteen tornadoes have been reported in Clinton County since 1950, all of which being categorized F3 or lower.

Statement of Future Probable Severity: The nature of tornadoes makes prediction of severity very difficult. Small tornadoes (F1 or F0) would likely result in *Negligible* or *Limited* damage, while stronger events may reach the *Catastrophic* level. Most likely, the next tornado event in the county will *Negligible*.

Statement of Probable Risk: Despite the historic statistics, Clinton County, as a function of its geographic location, remains at risk for any size of tornado during any given tornado season. The *probable* risk, however, is that the county is likely to be impacted by a small tornado once per season. The occurrence of a small (F-0 – F-1) is *Likely*, whereas a larger tornado is *Possible*.

Statement of Next Disaster's Likely Adverse Impact on the Local Area: As tornadoes are path hazards, properties along and adjacent to the movement path will be significantly impacted, while areas outside of the damage zone will have little direct impact. Larger areas, however, may be impacted by disruption in electrical service and transportation routes.

Recommendations – Tornadoes

1. Clinton County and its local governments and/or regional emergency services organizations should conduct a public education campaign to inform citizens across the region of the benefits of constructing tornado safe rooms in their homes to reduce the potential for loss of life associated with tornadoes.

2. Clinton County and its local governments and regional emergency services organizations should work with chambers of commerce, school districts, corporations, churches, etc. to

encourage the construction of community tornado shelters in office complexes, factories, apartment complexes, schools, mobile home parks, sports stadiums and other facilities where large numbers of people live, work or congregate.

3. Clinton County and its local governments should offer residential and commercial builders and developers tax incentives to encourage the construction of safe rooms or community tornado shelters in new homes and commercial/retail buildings.

4. Clinton County and its local governments and other public entities should incorporate the design of shelters in the construction of new public facilities like libraries, community centers, etc.

5. Clinton County and its local governments and other public entities should retrofit or add shelters to existing public facilities with inadequate protection from tornadoes and high wind.

6. Clinton County and its local governments should require a NOAA weather radio in continuous operation in all facilities offering public accommodations.

7. Clinton County, its local governments and other public entities assess their existing facilities for the location of suitable "safe areas." If available, these "safe areas" should be clearly marked and employees and visitors should be informed of their location in public facilities.

8. Clinton County, its local governments and regional emergency services organizations should encourage electric and telecommunications utilities to anchor or strengthen above-ground transmission lines, poles and similar structures.

9. Clinton County and its local governments should adopt the most current edition of a model building code to address structural and architectural issues related to tornadoes and high wind events.

10. To minimize the creation of windborne debris or "missiles" in tornado or high wind events, local governments should review and, if necessary, enhance regulations related to the design and installation of architectural features on buildings.

11. To minimize injuries and damage from broken glass during a tornado, local governments should require the use of tempered or shatter-resistant glass in the windows of new public facilities (e.g., day care centers), and retrofit existing facilities with similar materials.

12. Clinton County and its emergency responders should keep an up-to-date list of addresses with shelters, to assist Fire departments and Emergency Services agencies in checking after a tornado to see if people are trapped.

13. Clinton County and its local governments should determine how to accommodate individuals with special needs both in the emergency plan for the shelter and in the design of the shelter, including complying with the American with Disabilities Act (ADA.)

Severe Winter Weather

Severe winter weather can present itself as extreme cold, high winds, sleet, freezing rain, heavy snow, ice storms, or any combination of these. The occurrence of severe winter weather is normally more common the nearer one is to the northwest corner of the state.

> "In December of 1994, an ice storm hit Northwest Missouri. Devastation to the area trees, some hundreds of years old, was massive. Power lines were down throughout Clinton County and all of St. Joseph's light and power customers were without power for periods of four hours up to five days. The St. Joseph Fire Department reported answering a record number of alarms in a 24 hour period and an entire shift was called in for overtime. Several homes were lost to fires, and hundreds called in reporting downed power lines and meter heads pulled off the sides of their homes." – St. Joseph Project Impact 2000

On January 31, 2002, a powerful and moisture-laden storm cell stretched across central Missouri and unleashed an ice storm that had not been experienced in recent memory. The severity of the storm led to a Presidential Disaster Declaration.

Storms of this kind can cause injury, death and property damage. If the storm itself doesn't kill or directly injure, the cascading effects of limited personal and emergency services, mobility, loss of utilities, increased dependence on non-standard heating and increased hazardous driving conditions can quickly turn a winter storm into a killer.

Most storm-related deaths are indirectly related to the actual cold or precipitation from the storm. Severe winter weather-related fatalities are caused by a variety of situations that occur in this type of weather. They can range from over-exertion during snow shoveling, traffic accidents due to adverse driving conditions such as icy roads, house fires caused by unattended auxiliary electrical heaters and carbon monoxide poisoning caused by improperly vented fireplaces. Hypothermia is the most direct cause of death and injuries from winter storms, but it is relatively rare. Other direct impacts are often economic. These are difficult to measure, but the ice storm of January 31, 2002 caused nearly one billion dollars worth of damage, lost productivity and personal injury.

Agriculture can both benefit and be harmed by a winter storm. A winter storm can bring needed moisture for crops and concurrently kill entire herds of cattle depending upon its timing and severity.

Local governments can become easily overwhelmed if snowfall levels greatly exceed budgeted snow removal resources. In addition, they can be brought to a breaking point if a severe event causes catastrophic levels of damage. Millions of dollars can be spent to restore utilities and governmental services and remove disaster related debris.

Individual assistance for citizens and businesses under Federal Disaster Declarations and Federal Public Assistance for local governments is often made available to disaster stricken areas if the need outstrips local resources.

There are three basic types of severe winter precipitation:

1. **Freezing Rain** - This type of rainfall occurs when the ground surface temperature is below water's freezing point. Rain falls in a liquid state and solidifies upon impact. Freezing rain can destroy trees, power and communications lines, and buildings, as well as making it extremely difficult to operate a vehicle or walk on.

2. **Sleet** – This form of precipitation freezes before hitting the ground. Sleet is not nearly as dangerous as freezing rain, but after some accumulation can cause hazardous conditions.

3. **Snow** – This form of precipitation results from accumulation of small ice crystals around microscopic airborne particulate matter. The crystals build in the tops of clouds until they become too heavy to remain suspended in the air.

A winter storm can range from a half-hour of wind and heavy snow on an otherwise mild day to the onset of 10 or more days of sub-zero temperatures accompanied by heavy snowfall and raging winds. Each occurrence requires different responses by civil authorities and differing levels of resources. The National Weather Service winter weather-warning program uses a multi-tier concept to increase public awareness:

Table 2-6. National Weather Service (NWS) Definitions of Winter Weather Watch and Warnings

Hazardous Weather Outlook	Issued daily and is used to indicate that a hazardous weather event may develop in the latter portion (day 4 - 7) of the forecast.
Winter Storm Watch	A watch is used when the risk of hazardous winter weather has increased significantly, there is a strong possibility it will reach warning criteria, and falls in the 12 to 48 hour portion of the forecast.
Winter Storm Warning	These products are issued when a hazardous winter weather event is occurring, is imminent, or has a very high probability of occurrence. The event is considered to be life threatening. Some of the criteria needed include: Heavy Snow: In most of Missouri; 6 inches in 12 hours. Ice Storm: ice accumulation of 1/4 inch or more It is also issued when a combination of winter events will create life-threatening conditions. Each single event may not reach warning criteria, but the combination of events creates a life-threatening situation
Winter Advisory	These are issued for lesser events that while presenting an inconvenience do not pose an immediate threat of death, injury, or significant property damage. Example; snowfall below the warning criteria, very light freezing rain or drizzle. If caution is exercised, these situations should not become life threatening. Often the greatest hazard is to motorists.
Blizzard Warning	Snow and strong winds will combine to produce a blinding snow (near zero visibility), deep drifts and life-threatening wind chill

Hypothermia can occur during longer periods of exposure when the body temperature drops below 95 F. A person will become disorientated, confused, and shiver uncontrollably, eventually leading to drowsiness and apparent exhaustion. In severe cases, death is possible.

Wind Chill is the term used to describe the rate of heat loss on the human body resulting from the combined effect of low temperature and wind. As winds increase, heat is carried away from the body at a faster rate, driving down the skin temperature and eventually the internal body temperature. While exposure to low wind chills can be life threatening to both humans and animals alike, the only effect that wind chill has on inanimate objects, such as vehicles, is that it shortens the time it takes the object to cool to the actual air temperature. It cannot cool the object to below that temperature. For example, if the wind chill is 20 degrees, and the air temperature is 35, water will not freeze. Water will freeze only when the air temperature reaches 32 degrees.

Figure 2-1. Wind Chill Chart

Wind Speed	Temperature										
0	35	30	25	20	15	10	5	0	-5	-10	-15
5	31	25	19	13	7	1	-5	-11	-16	-22	-28
10	27	21	15	9	3	-4	-10	-16	-22	-28	-35
15	25	19	13	6	0	-7	-13	-19	-26	-32	-39
20	24	17	11	4	-2	-9	-15	-22	-29	-35	**-42**
25	23	16	9	3	-4	-11	-17	-24	-31	-37	**-44**
30	22	15	8	1	-5	-12	-19	-26	-33	-39	**-46**
35	21	14	7	0	-7	-14	-21	-27	-34	**-41**	**-48**

Clinton County has several population groups that may be more likely to be affected by a severe winter weather event. With a significant number of elderly and people living under the poverty level, Clinton County could see greater negative impacts from a disaster than a community with different demographics. NOAA notes that in deaths related to exposure to cold, 50% were over 60 years old, over 75% were male and about 20% occur in the home. People 65 years of age or older are vulnerable to extreme cold, with 52% percent of the reported cases occurring in persons of this age group. Between December 6, 1994 and December 31, 2004, 16 snow and ice events were reported in Clinton County:

Table 2-7. Clinton County Snow and Ice Events, 1994 - 2004

Date	Time	Type
12/06/1994	0600	Ice Storm
11/11/1995	0100	Snow/ice
12/08/1995	0400	Snow
01/27/1997	04:00 AM	Heavy Snow
02/21/1997	05:00 AM	Winter Storm
12/21/1997	05:00 AM	Ice Storm
01/04/1998	05:00 AM	Ice Storm
12/10/2000	11:00 PM	Winter Storm
01/28/2001	02:00 AM	Winter Storm
02/09/2001	02:00 AM	Winter Storm
02/27/2001	06:00 AM	Winter Storm
01/30/2002	05:00 AM	Winter Storm
03/01/2002	01:45 PM	Heavy Snow
12/09/2003	11:00 PM	Winter Storm
01/25/2004	07:30 AM	Winter Storm
02/05/2004	03:00 PM	Winter Storm

Source: National Climatic Data Center. http://www.ncdc.noaa.gov

Description of Hazard: Severe Winter Weather
Historical Statistics: Sixteen significant snow/cold events have been reported in Clinton County in the last decade.
Statement of Future Probable Severity: Clinton County residents are accustomed to winter weather events, and as such, the severity of most events will be limited to *Negligible*; however, severe events (especially ice storms) could likely reach the *Critical* range.
Statement of Probable Risk: Clinton County lies within the interior continent, and as such, routinely experiences severe winter weather. Minor events are *Highly Likely* in any given winter, while moderate and severe events are *Possible*.
Statement of Next Disaster's Likely Adverse Impact on the Local Area: Winter storms tend to be region-wide, and it is likely that most storms will impact the entire county. Minor storms (less than 4" of snow) will likely disrupt travel for less than a day, while major storms (greater than 4" of snow, significant icing) may disrupt travel and electrical service for extended periods.

Recommendations – Severe Winter Weather

1. Clinton County and its local governments, in conjunction with the American Red Cross, should develop an inventory of facilities with generators/emergency power across the metropolitan area that can be used as shelters in the event of severe winter weather.

2. Clinton County and its local governments should stockpile sand, salt and other materials necessary to reduce or eliminate ice on roadways. Local governments should consider the development of a regional "pool" of these resources or the establishment of mutual aid for these materials and their delivery resources (i.e., trucks, crews, etc.).

3. Clinton County and its local governments should develop and conduct a public education and awareness campaign on properly winterizing homes.

4. Clinton County and its local governments, in conjunction with community service organizations, should provide materials and volunteer labor to assist at-risk groups with winterizing their homes.

5. Utility companies should develop and implement programs to reduce, eliminate or defer home heating costs for low income and at-risk people in the community.

6. Clinton County and its local governments should develop and implement official "snow day" plans and policies for non-essential personnel. Businesses should be encouraged to do the same. These measures may reduce the number of people on the roadways during periods of severe winter weather.

7. Citizens should be encouraged to assemble a disaster supply kit. Store drinking water, canned/no-cook food, non-electric can opener, first aid kit, battery-powered radio, flashlight and extra batteries where you can get them easily, even in the dark. They should also include winter specific items such as rock salt, sand and other snow removal equipment.

8. Citizens should be encouraged to prepare for the possibility that they will need to stay in their homes for several days after a winter storm. Citizens should be encouraged to make sure that they have sufficient heating fuel as well as emergency heating equipment in the event of electricity loss.

9. Citizens should be encouraged to remember house fires pose an additional risk, as more people turn to alternate heating sources without taking the necessary safety precautions. As such, they should be encouraged to keep fire extinguishers on hand, and make sure everyone in their house knows how to use them. In addition, citizens should be encouraged to annually check fireplaces for structural faults and obstructions.

10. Citizens should be encouraged to know ahead of time what they should do to help elderly or disabled friends and neighbors or employees.

11. Citizens should be encouraged to place a winter emergency kit in each car that includes a shovel, windshield scraper, flashlight, battery powered radio, extra batteries, water, snack food, extra hats and mittens, blanket, tow chain or rope, road salt and sand, booster cables, emergency flares and fluorescent distress flag. Citizens should be encouraged to learn how to shut off water valves in case a pipe bursts.

Drought

Drought is a natural climactic condition that has confronted mankind throughout documented human history. To be considered a drought the average balance of precipitation, ground and surface water supplies and evapo-transpiration should be low over an extended period of time. If precipitation averages out for a year normally, but is received at the wrong times by certain communities they may perceive a drought as being more severe than otherwise indicated by statistical measurements. High winds, low humidity, and heat waves often increase the perception of conditions, and can aggravate a drought's severity. SEMA's State Hazard Mitigation Plan describes drought as not only affecting farmers, but also affecting the entire nation's economy:

> *…Its impact can adversely affect a small town's water supply, the corner grocery store, commodity markets and a big city's tourism. On average, drought costs the U.S. economy about $7-$9 billion a year, according to the National Drought Mitigation Center. While there's no cost estimate for the current Drought of 1999-2000, which has gripped Missouri and much of the nation, losses from the Great Drought of 1988-'89 have been assessed at $39 billion.*

Each of these examples of drought affects one or more economic arenas in our communities. Given a significant level of severity, a drought can decimate a city, county or even a multi-state region. The Dustbowl days of drought still exist in the memories of some Clinton County residents. The National Drought Mitigation Center, in Lincoln, Nebraska, wrote the following regarding the Dustbowl era.

> *In the 1930s, drought covered virtually the entire Plains for almost a decade (Warrick, 1980). The drought's direct effect is most often remembered as agricultural. Many crops were damaged by deficient rainfall, high temperatures, and high winds, as well as insect infestations and dust storms that accompanied these conditions. The resulting agricultural depression contributed to the Great*

Depression's bank closures, business losses, increased unemployment, and other physical and emotional hardships. Although records focus on other problems, the lack of precipitation would also have affected wildlife and plant life, and would have created water shortages for domestic needs.

Effects of the Plains drought sent economic and social ripples throughout the country. For example, millions of people migrated from the drought areas, often heading west, in search of work. These newcomers were often in direct competition for jobs with longer-established residents, which created conflict between the groups. In addition, because of poverty and high unemployment, migrants added to local relief efforts, sometimes overburdening relief and health agencies. Source: http://www.drought.unl.edu/whatis/dustbowl.htm

Types of Drought

FEMA defines a drought as a period of prolonged dryness. The most current standards categorize drought into three classes of drought. These are:

1. **Agricultural Drought**, defined by soil moisture deficiencies and affecting the agricultural economy most directly.
2. **Hydrological Drought**, defined by declining surface and groundwater supplies and affecting the perceived availability of water supplies for activities other than agriculture.
3. **Meteorological Drought** defined by precipitation deficiencies and measured by the Palmer Drought Severity Index.

Measuring Drought

To a farmer, a drought is a period of moisture deficiency that affects the crops under cultivation. Even two weeks without rainfall can stress many crops during certain periods of the growing season. To a meteorologist, a drought is a prolonged period of moisture deficiency. A drought lasting 1-3 months is considered to be short term; 4-6 months is a significant drought, and more than six months can devastate a local agriculture-based economy. To a water manager, a drought is a deficiency in a water supply availability and water quality. To a hydrologist, a drought is a period of low precipitation and stream flow. Drinking water suppliers may consider themselves in a drought status when demand for their water reaches a certain percentage of their maximum capacity to deliver the product. When temperature reaches a certain level and demand outpaces production, or it looks as if stores will be depleted before recharge occurs, drinking water suppliers may decide to invoke special rules designed to limit consumption.

A good measure of drought is the Standardized Precipitation Index (SPI). SPI is an index based on the probability of precipitation for any time scale. Many drought planners appreciate the SPI's versatility. The SPI can be computed for different time scales, can provide early warning of drought and help assess drought severity, and is less complex than the Palmer Index. The SPI is designed to quantify the precipitation deficit for multiple time scales. These time scales reflect the impact of drought on the availability of the different water resources. Soil moisture conditions

respond to precipitation anomalies on a relatively short scale. Groundwater, streamflow and reservoir storage reflect the longer-term precipitation anomalies.

The SPI calculation for any location is based on the long-term precipitation record for a desired period. Positive SPI values indicate greater than average precipitation, and negative values indicate less than average precipitation. Because the SPI is normalized, wetter and drier climates can be represented in the same way, and wet periods can also be monitored using the SPI. The positive total of the SPI for all the months within a drought can be called the drought's "magnitude."

Table 2-8. SPI Values

2.0+	Extremely Wet
1.5 to 1.99	Very Wet
1.0 to 1.49	Moderately Wet
-.99 to .99	Near Normal
-1.0 to -1.49	Moderately Dry
-1.5 to -1.99	Severely Dry
-2 and less	Extremely Dry

Source: http://www.drought.unl.edu/whatis/indices.htm

By understanding a region's SPI value and history, communities can plan for the increasing impacts of a drought as they enter into it.

Another tool, more readily understood by non-professionals, is the Palmer Drought Severity Index (PDSI), which is published jointly by NOAA and the USDA (primarily for agricultural uses). The PDSI is a measure of the water supply and soil moisture. Soil, even when it appears cracked and dry, has some moisture bound to the soil particles. The availability of this bound moisture to plants and the recent levels of precipitation are factored to determine the local PDSI. Many people in the agriculture and water utility communities use this index daily in their decision-making. When the PDSI is examined regionally, a sense of local drought conditions can be obtained.

Table 2-9. Palmer Drought Severity Index

Above 4.0		Extreme Moist Spell
3.0 to 3.9		Very Moist Spell
2.0 to 2.9		Unusually Moist Spell
1.0 to 1.9		Moist Spell
0.5 to 0.9		Incipient Moist Spell
0.4 to -0.4		Near Normal Conditions
-0.5 to -0.9		Incipient Drought
-1.0 to -1.9		Mild Drought
-2.0 to -2.9		Moderate Drought
-3.0 to -3.9		Severe Drought
Below -4.0		Extreme Drought

Source: http://www.drought.unl.edu/whatis/indices.htm

Besides the PDSI, there are a variety of other types of humidity, precipitation, crop-specific, and specialty drought level indexes. Drought is often difficult to predict. Furthermore, it is the one natural disaster that comes on the slowest, yet can have the most significant economic impact if it becomes extreme.

Local Susceptibility

The State of Missouri is divided into six regions of similar climate conditions to classify drought susceptibility: This is further refined into three categories of susceptibility: Slight, Moderate, and High Susceptibility. Clinton County falls into the High Susceptibility category.

Further, Clinton County falls in the Highly Likely probable risk scale, as the majority of the county's agricultural production areas lie in the High Susceptibility to Drought Zone on the State of Missouri's Drought Susceptibility map. The effects include crop and livestock failures, drinking water supply depletion, and economic disruptions. While the underlying geology of water saturated alluvium allows for ample groundwater supplies, these supplies take time to develop and can be considerably more expensive to tap than surface waters. They can also be of poorer quality than surface water drinking supply sources. Source: 2002 Missouri Drought Plan.

Historical Occurrences

On February 27, 2003 Governor Bob Holden declared 29 Missouri counties as disasters due to drought, including Clinton County. Drought had gripped the northern and western portions of the state since the previous summer. Governor Holden asked for the disaster designations in September in order to help Missouri farmers whose corn yields in 2002 were down by 28 bushels per acre or 21 percent from 2001. The soybean crop was off four bushels per acre or 11 percent from the year before. A recent state report estimated crop and livestock loss in 2002 at $251 million because of the drought. Because of the economic multiplier effect, causing reduced spending and economic activity, stemming from the agricultural loss, it was believed that the drought caused a $209 million shortfall in state revenue collections. Source: http://www.memphisdemocrat.com/2003/news/030227_drought.shtml

Description of Hazard: Drought
Historical Statistics: Drought occurs regularly in Clinton County
Statement of Future Probable Severity: As minor droughts occur with some frequency in Clinton County, its population is generally well-equipped to deal with such events. As such, any future drought event would most likely fall in the *Negligible* category, although an extended drought may result in *Limited* to *Critical* impacts.
Statement of Probable Risk: A minor drought with negligible effects is *Likely* in any given year, while an extended drought is *Possible*.
Statement of Next Disaster's Likely Adverse Impact on Local Areas: Depending upon the form and duration of the next drought, the likely impact would include increased limitations on water use by domestic and commercial users, and adverse impacts upon the agricultural aspects of our local economy. In addition, there would be economic impact on the tertiary sectors of the economy that depend upon the agriculture community. While conditions are extremely unlikely to reach to the levels encountered during the Dust Bowl era, a deep and long drought could cause catastrophic effects.

Recommendations – Drought

1. Local governments in Clinton County should conduct water conservation awareness programs.

2. Local governments in Clinton County should develop water conservation ordinances.

3. Local governments in Clinton County should develop web pages, brochures or pamphlets describing water conservation technologies and agricultural drought management strategies. This public education and awareness effort could also be developed on a regional basis.

4. Local governments in Clinton County should develop a drought plan. Missouri's 2002 Drought Plan, developed by MDNR, can serve as a useful guide for the development of local or regional drought plans.

5. Local governments in Clinton County and water suppliers should encourage voluntary water conservation practices and customers to use water conservation devices.

6. Local governments in Clinton County and/or water suppliers (i.e., water districts) should offer economic incentives to encourage water conservation, e.g., through modification of water rate structures.

Heat Wave

Heat kills human beings by pushing their bodies beyond their natural limits. The body's internal thermostat produces perspiration that evaporates and cools the body under normal circumstances. However, evaporation is slowed in extreme heat and high humidity and the body must work extra hard to maintain a normal temperature. Most heat disorders occur when the victim has been overexposed to heat or has over exercised for his or her age and physical condition. Stagnant atmospheric conditions and poor air quality can also contribute to other heat-related illnesses.

Temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks are defined as extreme heat. Humid or muggy conditions, which add to the discomfort of high temperatures, occur when a "dome" of high atmospheric pressure traps hazy, damp air near the ground. Excessively dry and hot conditions can provoke dust storms and low visibility, and increase the local fire risk. Droughts occur when a long period passes without substantial rainfall. A heat wave combined with a drought is a very dangerous situation.

> *In a normal year, approximately 175 Americans die from extreme heat. Young children, elderly people, and those who are sick or overweight are more likely to become victims. Between 1936 and 1975, nearly 20,000 people succumbed to the effects of heat and solar radiation. Because men sweat more than women, men are more susceptible to heat illness because they become more quickly dehydrated. Sunburn can significantly slow the skin's ability to release excess heat. People living in urban areas may be at a greater risk from the effects of a prolonged heat wave than people living in rural regions. An increased health problem can occur when stagnant atmospheric conditions trap pollutants in urban areas, thus adding contaminated air to excessively hot temperatures.*

Description of the Hazard from SEMA State Hazard Mitigation Plan:

The National Weather Service defines a heat wave as three consecutive days of 90°F plus temperatures. These high temperatures generally occur between June and September, but are most prevalent in the months of July and August, based on a 30-year average compiled by the NWS from 1961-1990. Missouri experiences about 40 days per year above 90°F degrees. July leads the statewide mean with 15 days above 90°F degrees, followed by August with an average of 12 days over 90°F. June and September average six days and four days respectively for temperatures above 90°F during the same 30-year period. This is based on local climatological data from NWS stations at Kansas City, Columbia, Springfield, and St. Louis. As these regional reports indicate, all of Missouri is subject to heat waves during the summer months.

Ambient temperature however, is not the only factor to consider when assessing the likely effect of heat. Relative humidity must also be considered, along with exposure, wind, and activity. The NWS has devised a Heat Index (HI), which is a combination of air temperature and relative humidity, and is more reflective of how hot it really feels. These Heat Index values were devised for shady, light wind conditions. Exposure to full sunshine can increase HI values by up to 15°F. Strong winds, particularly strong very hot, dry air can cause rapid evaporation of perspiration, and dangerously increase body temperature.

Figure 2-2. Heat Index – Apparent Temperature

Temp	Relative Humidity												
°F	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%
110	136												
108	130	137											
106	124	130	137										
104	119	124	131	137									
102	114	119	124	130	137								
100	109	114	118	124	129	136							
98	105	109	113	117	123	128	134						
96	101	104	108	112	116	121	126	132					
94	97	100	102	106	110	114	119	124	129	135			
92	94	96	99	101	105	108	112	116	121	126	131		
90	91	93	95	98	100	103	106	109	113	117	122	127	132
88	88	89	91	93	95	98	100	103	106	110	113	117	121
86	85	87	88	89	91	93	95	97	100	102	105	108	112
84	83	84	85	86	88	89	90	92	94	96	98	100	103
82	81	82	83	84	84	85	86	88	89	90	91	93	95
80	80	80	81	81	82	82	83	84	84	85	86	86	87

A variety of human physiological effects may result from the effects of a heat wave. These are:

Table 2-10. Heat Effects on the Human Body
Sunburn: Symptoms: Skin redness and pain, possible swelling, blisters, fever, headaches. First Aid: Take a shower, using soap, to remove oils that may block pores preventing the body from cooling naturally. If blisters occur, apply dry, sterile dressings and get medical attention.
Heat Cramps: Symptoms: Painful spasms usually in leg and abdominal muscles. Heavy sweating. First Aid: Firm pressure on cramping muscles or gentle massage to relieve spasm. Give sips of water. If nausea occurs, discontinue.
Heat Exhaustion: Symptoms: Heavy sweating, weakness, skin cold, pale and clammy. Weak pulse. Normal temperature possible. Fainting, vomiting. First Aid: Get victim to lie down in a cool place. Loosen clothing. Apply cool, wet cloths. Fan or move victim to air-conditioned place. Give sips of water. If nausea occurs, discontinue. If vomiting occurs, seek immediate medical attention.
Heat Stroke (Sun Stroke): Symptoms: High body temperature (106+). Hot, dry skin. Rapid, strong pulse. Possible unconsciousness. Victim will likely not sweat. First Aid: Heat stroke is a severe medical emergency. Call 9-1-1 or emergency medical services or get the victim to a hospital immediately. Delay can be fatal. Move victim to a cooler environment. Try a cool bath or sponging to reduce body temperature. Use extreme caution. Remove clothing. Use fans and/or air conditioners. Do Not Give Fluids.

The NWS has developed a Heat Index/Heat Disorder Chart that relates ranges of the heat index with specific disorders, particularly for people in higher risk groups. The severity of heat disorders tends to increase with age. Heat cramps in a 17-year-old can become heat exhaustion for someone in their forties, and may result in a fatal stroke for someone in their sixties. Population groups at risk of becoming very sick from heat waves are: older people, children, overweight or underweight people, people with limited independence due to physical or mental disorders, or stress, people in institutional settings without air conditioning, people working in heat under stress (firefighters, police, EMS), people in urban environments, where heat retention in asphalt, concrete and masonry is a factor (heat island effect), people with low income who lack resources for air conditioning, transportation, medical care, etc., people with increased risk from work or leisure activities, people who work outdoors (utility, construction crews, etc.), military personnel and trainees, athletes, people who live alone, people who are homeless, people who do not speak English, people who cannot read, people who are culturally, socially or geographically isolated, and the medically handicapped.

Description of Hazard: Heat Wave
Historical Statistics: Frequent heat waves of varying strength routinely occur in Clinton County.
Statement of Future Probable Severity: As the residents of Clinton County are accustomed to heat events, any future severity would likely be *Negligible* to *Limited*.
Statement of Probable Risk: As a consequence of being located in the interior of the continent, minor heat events can are *Highly Likely*. Prolonged heat events, though not as common, are *Possible*, perhaps as often as four times a decade.
Statement of Next Disaster's Likely Adverse Impact on the Local Area: Minor heat events (excessive heat lasting less than three days) have little impact on Clinton County. Prolonged events, however, can result in crop damage, water shortages, and adversely impact the health of populations susceptible to heat (the elderly, children, and the impoverished).

Recommendations

1. Clinton County and its local governments should encourage the media to publish a special newspaper section or conduct periodic broadcasts with emergency information on extreme heat when conditions warrant. The phone numbers, websites, etc. of local emergency services offices, the American Red Cross and hospitals should be included.

2. Clinton County, its local governments, and community service organizations should sponsor a program to encourage people to think of those who require special assistance, such as elderly people, infants or people with disabilities during severe weather conditions. This effort can be incorporated into Neighborhood Watch or similar programs.

3. Clinton County and its local governments should develop heat emergency plans. Kansas City's heat emergency plan can serve as a model for other local plans.

4. Clinton County and its local governments should create a program to provide air conditioners or fans to those people in their community who do not have them and are at risk during a heat wave.

5. Clinton County and its local governments should designate certain air-conditioned facilities as "heat emergency shelters" and encourage people without air conditioning to use them during a heat wave.

6. Clinton County and its local governments should temporarily reduce or eliminate fees for public swimming pools during extended periods of extreme heat.

7. The media can raise awareness about extreme heat and drought by providing important information to the community. Here are some suggestions: Publish a special section with emergency information on extreme heat. Localize the information by including the phone numbers of local emergency services offices, the American Red Cross, and hospitals. During a drought, run a weeklong series suggesting ways that individuals can conserve

water and energy in their homes and their workplaces. Sponsor a "Helping Your Neighbors" program through your local school system to encourage children to think of those persons who require special assistance such as elderly people, infants or people with disabilities during severe weather conditions.

Urban and Wildfire

The majority of wildfires in the world are thought to be started by people. However, the greatest cause of wild land fires is lightning. Eight million lightning strikes occur worldwide each day. One percent of these strikes result in wild land fires. In fact, dry lightning is responsible for 80 percent of all fires in wild land areas. Dry lightning occurs during thunderstorms when the humidity levels are low that rain evaporates before it reaches the ground. Even though the rain does not reach the ground, the lightning does.

In the United States, about 2.5 million acres of developed lands and wild lands burn every year. Often the carelessness of people leads to fires in wild lands. Campers who neglect to properly extinguish campfires cause some wild land fires, while others are the result of lit cigarettes tossed onto the dry ground. Arsonists can contribute to other occurrences.

For the most part, grass, brush and forest fires are natural events that have occurred periodically throughout history. There are three major classes of wild land fires: ground fires, surface fires and crown fires. Ground fires spread across the grass and low-lying vegetation. Surface fires burn the trunks of trees as well as the grass and low-lying vegetation. During crown fires, the flames move across the ground, up the trees, and across the tops of the trees. Crown fires are the most dangerous and destructive class of wild land fire. Fire danger is based upon the burning index (BI). The burning index takes into account the fuel moisture, relative humidity, wind speed,

Table 2-11. Fire Danger Categories

Low Fire Danger	Open burning is usually safe with proper containers and precautions under low fire danger conditions. However, residents should always check on local ordinances that prohibit open burning under any conditions. Escaped fires are easy to extinguish. No fire crew staffing is planned for low fire danger conditions.	**Burning index <20.**
Moderate Fire Danger	Open burning is usually safe with the proper precautions under moderate fire danger conditions. Burning should be done in the early morning and late evening to avoid windier conditions at midday. Escaped fires can be contained with proper fire-fighting equipment. Partial fire crew staffing is planned for moderate fire danger.	**Burning index = 21-30.**
High Fire Danger	Any open burning is discouraged during high fire danger. Windy conditions, low humidity and dry fuels contribute to high fire danger. Fires escape control easily and containment is difficult, endangering human safety and property. Partial or full fire staffing is planned, depending on local burning conditions.	**Burning index = 31-45.**
Extreme Fire Danger	Open burning should not be attempted during extreme fire danger. Local authorities may impose burning bans. High winds and extended dry periods lead to extreme burning conditions. Open fires can quickly escape and are very difficult to control. Spot fires occur ahead of the main fire, and erratic burning conditions make fires difficult to control even for experienced fire fighters. Full fire crew staffing in planned for extreme burning conditions.	**Burning index >45.**

temperature and recent precipitation. The burning index is the basis for fire suppression crew staffing levels. The Missouri Department of Conservation relies upon the local news media to help warn citizens of high fire danger. A set of standardized fire danger adjectives (Table 2-11) has been developed for fire warnings. These adjectives include a brief description of burning conditions, open burning suggestions for homeowners and fire crew staffing levels. Residents should always check with their local fire department or District Forester for local burning conditions.

Rural fire departments and fire districts recommend if you live in an outlying or more rural area, consider these additional steps:

- Create at least a 30-ft. safety zone or firebreak around your home.
- Limit the use of flammable plants in landscape design. Choose fire resistant varieties.
- Plant trees and large shrubs in sparse, separate areas.
- Limit the use of trees and shrubs that have large volumes of foliage and branches.
- Limit the use of plants that have shaggy bark or dry leaves that shed annually.
- Limit the use of plants that develop dry or dead undergrowth.
- Limit the placement of plants next to structures, under eaves, overhangs, decks, etc.
- Limit the use of plants placed at the bases of trees or large shrubs.
- Remove ladder fuels (plants that provide a link between the ground and tree limbs).

Other suggestions include:

- Conduct regular maintenance to reduce the opportunity for brush fires.
- Remove low hanging branches. Also, remove tree limbs around chimneys.
- Keep the roof clear. Sweep gutters and eaves, and wash the roof on a regular basis to get rid of dry needles and leaves.
- Control the height of ground vegetation and mow the grass often.
- Remove dead and accumulated vegetation, and dispose of it properly.
- Provide enough water to keep plants healthy and green. Keep irrigation systems in good working order.
- Top trees only when necessary as topping creates too many lower branches that can increase the fire danger.
- Remove or thin the dead wood and the older trees beyond 100 feet from the house.
- Store and use flammable liquids properly.
- ALWAYS dispose of cigarettes carefully.

Description of Hazard: Wild Fires
Historical Statistics: No significant urban or wild fire has occurred within Clinton County since 1950.
Statement of Future Probable Severity: Any fire event in the county is likely to be contained in rural grassland areas, the severity being *Negligible*.
Statement of Probable Risk: While grass fires are a common occurrence in Clinton County (particularly during periods of drought), the county is adequately covered by fire districts to quickly address any future events. The probability of a fire event in any given year is *Likely*.
Statement of Next Disaster's Likely Adverse Impact on the Local Area: Lacking dense woodland growth or a significant number of wood shingle structures, any future fire event will likely impact only the immediate area.

Recommendations

1. Clinton County citizens that live in areas near timber or tall grass should be encouraged to remove vegetation, yard debris, and other combustible materials that may be near structures.
2. Some roofing materials, including asphalt shingles and especially wood shakes, are less resistant to fire than others. When wildfires and brush fires spread to houses, it is often because burning branches, leaves, and other debris buoyed by the heated air and carried by the windfall on roofs. City and County Codes can be changed to require fire-resistant roofing materials.

Flood

Floods are the most common and the most costly disaster in the United States after fire. Many communities experience some sort of flooding after periods of heavy rain or winter snow thaws. Floods can develop slowly or occur in a matter of seconds. SEMA's State Hazard Analysis describes floods this way:

> *Floods are the number one weather-related killer in the United States. Between 1993 and 1999, Missouri recorded more than 75 deaths attributed to flooding. A flood is partial or complete inundation of normally dry land areas. Riverine flooding is defined as the overflow of rivers, streams, drains, and lakes due to excessive rainfall, rapid snowmelt or ice. There are several types of riverine floods–including headwater, backwater, interior drainage, and flash flooding, which is characterized by rapid accumulation or runoff of surface waters from any source. This type of flooding impacts smaller rivers, creeks and streams, and can also occur as a result of dams being breached or overtopped. Because flash floods can develop in just a matter of hours, most flood related deaths result from this type of flooding event.*

Flat areas next to rivers and streams, that carry excess water during high flow events, are called floodplains. Unfortunately, these areas are sometimes among the most desirable areas for construction of buildings and habitation. Many of these floodplain areas handle all but the most excessive floodwaters without damage to human settlements. However, construction has continually encroached into the floodplain, and developments have suffered flood-related disasters.

The 100-year floodplain is that area in which a flood has a one percent chance of occurring each year. In other words, the area within the boundary of the 100-year floodplain should, on average, be flooded at least once every hundred years. These floodplains exist within an area called a watersheds, or drainage basins. Drainage basins are the complete area drained by a river or stream. The State of Missouri is drained by the major drainage basins of the Arkansas, Missouri, Mississippi and White Rivers. Clinton County is drained wholly by the Missouri River basin, which drains much of the nation.

In some instances, flooding may not be caused directly by a river, stream or lake overflowing its banks. It may simply result from a combination of excessive rainfall and/or snowmelt, saturated ground and inadequate drainage. Under these circumstances, water will find the lowest elevations. Often these areas are not in an identified floodplain. This type of flooding is called sheet flooding and it becomes increasingly prevalent as development outstrips the ability of natural drainage.

Flooding can also occur when storm and sanitary sewers cannot handle tremendous water flow following storm events. As a result, water backs into basements, which damages mechanical systems and creates serious public health and safety concerns.

Intense storms dropping large amounts of rain within a brief period cause flash floods which occur with little or no warning, and can reach full intensity in only a few minutes, while an overabundance of surface water up-stream from the affected area causes riverine floods with slower onsets.

Table 2-12. NWS - Response Level Activity

Flood Watch	Flash flooding or flooding is possible within the designated area
Flood Warning	Flash flooding or flooding has been reported or is imminent; take the necessary precautions at once
Flood Advisory	Flooding of small streams, streets and low-lying areas, such as railroad underpasses and urban storm drains, is occurring

Different variables cause susceptibility to a stream flood. Variables include topography, ground saturation, previous rainfall amounts, soil types, drainage, basis size, drainage patterns of streams and vegetative cover. Soil overly saturated with moisture greatly contributes to flooding, as further water absorption in these areas is not possible. In those situations, additional rainfall results in more runoff. When vegetative ground cover is removed and replaced with extensive amounts of asphalt, concrete, and buildings during urbanization and

development, flash floods are common. In this circumstance, water finds its way into adjacent streams and flooding may occur either slowly or become a flash flood as a result. The National Weather Service has three response levels for alerting the public as to the danger of floods (See Table 2-12).

Flood mitigation includes any activities that prevent an emergency, reduce the chance of an emergency happening, or lessen the damaging effects of unavoidable emergencies. Research in mitigation alternatives will help reduce the amount of structural damage to structures, financial losses and crop damage should a flood or flash flood occur. Such mitigation steps include engaging in floodplain management activities, constructing barriers such as levees, and purchasing flood insurance. Source: http://www.fema.gov/hazards/floods/

Historical Occurrences

Historically, Clinton County has not been subject to significant damage from floods and flood-related events. This is largely a function of the county's geography. The lack of any major water body or river, and a relatively high elevation compared to surrounding counties largely precludes flooding in the county. Any flooding that does occur in the county is predominantly caused by intense rainfall associated with passing thunderstorms. These rainfall events can cause minor localized flooding in urban areas and over low-water crossings. Since 1993, the National Climatic Data Center has recorded 12 flood events that have impacted Clinton County:

Table 2-13. Clinton County Flood Events, 1993 - 2004

Location or County	Date	Time	Type
1 Cameron	05/07/1993	0130	Flash Flood
2 Rural Clinton County	11/14/1993	0300	River Flood
3 Rural Clinton County	07/02/1994	0030	Flash Flood
4 North Central Missouri	05/07/1995	1800	River Flood
5 Perrin	06/16/1996	07:10 PM	Flash Flood
6 Rural Clinton County	04/01/1998	12:00 AM	Flood
7 Rural Clinton County	04/08/1998	12:00 AM	Flood
8 Rural Clinton County	04/27/1998	12:00 AM	Flood
9 Rural Clinton County	08/01/1998	12:00 AM	Flood
10 Rural Clinton County	11/01/1998	12:00 AM	Flood
11 Plattsburg	05/29/2004	08:30 PM	Flash Flood
12 Perrin	09/18/2004	03:30 AM	Flash Flood
Source: National Climatic Data Center. http://www.ncdc.noaa.gov			

National Flood Insurance Program and FEMA Repetitive Loss Structures

Clinton County participates in the National Flood Insurance Program. As of July 31, 2004, no properties in Clinton County or within any Clinton County municipalities were listed on the FEMA Repetitive Flood Loss Table.

Description of Hazard: Flooding
Historical Statistics: Clinton County rarely has damaging floods..
Statement of Future Probable Severity: Due to the absence of any major river or water body in the county, any future flooding event will likely have *Negligible* impact.
Statement of Probable Risk: Given Clinton County's hydrology and elevation, future significant flooding events are *Unlikely*.
Statement of Next Disaster's Likely Adverse Impact on the Local Area: A majority of the population of Clinton County lives outside of the 100-year floodplain. This, coupled with the rarity of flood events indicates a *Negligible* impact for the next event.

Recommendations

1. Clinton County and its local governments should consider the construction of detention basins, small lakes, and greenways or riparian corridors to channel and catch storm water, thereby reducing the likelihood of flooding. As an additional benefit, these areas serve as recreational facilities and wildlife habitats.

2. Clinton County and its local governments should enact ordinances prohibiting residential and commercial development in flood plains or flood-prone areas.

3. Clinton County and its local governments should consider alternative uses for flood-prone areas, such as sports fields, parks, wildlife habitats, etc.

4. Clinton County and its local governments should continue to participate in the National Flood Insurance Program (NFIP).

5. Utility providers should assess their facilities, distribution systems, etc. for vulnerability to flooding and, if necessary, retrofit or modify them to decrease their vulnerability.

6. Businesses and homeowners in flood-prone areas should be encouraged to elevate mechanical systems (i.e., furnaces, hot water heaters, electrical panels, etc.).

7. Water and wastewater districts should elevate vulnerable equipment, electrical controls and other equipment at wastewater treatment plants, potable water treatment plants and pump stations.

8. Clinton County and its local governments should ensure they have the latest copies of flood insurance rate maps, flood plain maps and similar documents.

9. Clinton County and its local governments should develop comprehensive land use plans that specifically address development in flood-prone areas and recommend strategies for decreasing the jurisdiction's vulnerability to flooding.

Earthquake

The earth's crust is made up of gigantic plates that float on the semi-liquid inner core of the earth. These plates form the lithosphere and vary in thickness from 6 1/2 miles to 40 miles, with an average thickness of 20 miles. The plates are always in motion, although the motion is very slow, and are not noticeable without instrumentation. Where the plates join or have volcanic activity they form long linear boundaries. The stress is built up and stored at the boundary of these tectonic plates. The sudden release of stress is often felt as an earthquake. The Federal Emergency Management Agency (FEMA) describes earthquake as:

> *[a] sudden, rapid shaking of the Earth caused by the breaking and shifting of rock beneath the Earth's surface. This shaking can cause buildings and bridges to collapse; disrupt gas, electric, and phone service; and sometimes trigger landslides, avalanches, flash floods, fires, and huge, destructive ocean waves (tsunamis). Buildings with foundations resting on unconsolidated landfill, old waterways, or other unstable soil are most at risk. Buildings or trailers and manufactured homes not tied to a reinforced foundation anchored to the ground are also at risk since they can be shaken off their mountings during an earthquake. Earthquakes can occur at any time of the year.* Source: http://www.fema.gov/hazards/earthquakes/

The tremors associated with earthquakes can be very brief or can last as long as five minutes. They can reoccur quickly or in ever-increasing intervals, even stretching over several months. The larger shock waves can cause ground failure, landslides, liquefaction, uplifts and sand blows.

The Richter scale is one of the most commonly mentioned intensity scales. The following passage from the USGS describes the Richter scale:

> *At first, the Richter Scale could be applied only to the records from instruments of identical manufacture. Now, instruments are carefully calibrated with respect to each other. Thus, magnitude can be computed from the record of any calibrated seismograph. A seismograph is an instrument that makes a record of the strength, time, and direction of earthquakes.*
>
> *Earthquakes with magnitude of about 2.0 or less are usually called microearthquakes; they are not commonly felt by people and are generally recorded only on local seismographs. Events with magnitudes of about 4.5 or greater--there are several thousand such shocks annually--are strong enough to be recorded by sensitive seismographs all over the world. Great earthquakes, such as the 1964 Good Friday earthquake in Alaska, have magnitudes of 8.0 or higher. On the average, one earthquake of such size occurs somewhere in the world each year. Although the Richter Scale has no upper limit, the largest known shocks have had magnitudes in the 8.8 to 8.9 range. Recently, another scale called the moment magnitude scale has been devised for more precise study of great earthquakes.*
>
> *The Richter Scale is not used to express damage. An earthquake in a densely populated area which results in many deaths and considerable damage may have the same magnitude as a shock in a remote area that does nothing more than frighten the wildlife. Large-magnitude earthquakes that occur beneath the oceans may not even be felt by humans.*

Thus, another scale is needed to describe the potential of a fault event to cause damage. The Mercalli Intensity Scale gets far less attention, but is a better representative of the impact an event can have upon an area (Table 2-14).

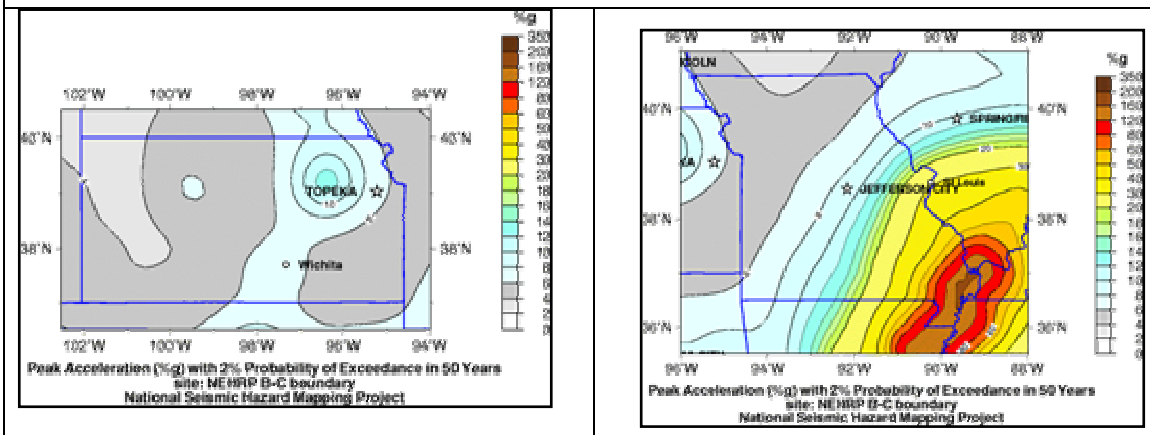
Table 2-14. Abbreviated description of the 12 levels of Modified Mercalli intensity.	
1	Not felt except by a very few under especially favorable conditions.
2	Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing.
3	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration similar to the passing of a truck. Duration estimated.
4	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.
5	Felt by nearly everyone; many awakened. some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
6	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
7	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damase in poorly built or badly designed structures; some chimneys broken.
8	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chmineys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
9	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.
10	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rail bent.
11	Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
12	Damage total. Lines of sight and level are distorted. Objects thrown into the air.
Source: http://pubs.usgs.gov/gip/earthq4/severitygip.html	

Damages from earthquakes occur from one of several causes. Ground shaking is the most common phenomenon. Different kinds of seismic waves propagate outward in all directions from the focus. The frequency of any given wave can range from 0.1 to 30 Hertz. Buildings vibrate because of ground shaking, and damage takes place if the buildings cannot withstand these vibrations. Depending on the type of waves, the motion may be horizontal, vertical, or a mixture of the two. Because the different types of waves have different frequencies of vibration, they are weakened differently as they pass through the ground. High frequency waves arrive before the others, which leads observers to notice different ground motions at different times. Low-frequency waves tend to travel farther, arrive later, and are more likely to cause tall buildings to vibrate. Buildings are more susceptible to damage from horizontal motion than from vertical motion, so more damage may come from one type of wave than from another. Also, different frequencies affect buildings differently.

Surface faulting is the second cause of earthquake damage. This phenomenon is defined as the offset or tearing of the earth's surface by a differential movement across a fault. Structures built across the fault tend to be damaged if the fault is active. Surface faulting may be an issue in Missouri as faults in the southeast region are considered to be active.

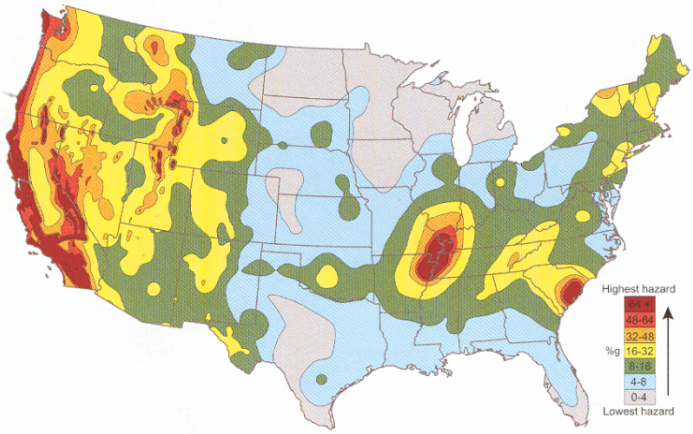
Tectonic uplift and subsidence is the third earthquake phenomenon. In the 1964 Alaska earthquake, structures were leveled to sea level, resulting in permanent or intermittent inundation. Tectonic uplift caused shallowing of harbors and waterways.

Figure 2-3. Area Peak Acceleration Expectations for the Next 50 Years



Earthquake induced failures is the fourth earthquake damage-causing phenomenon. One effect in this group is liquefaction. During strong shaking, areas having clay-free sands, silts, and groundwater within 30 feet of the surface can temporarily lose strength and behave like fluids. Structures found on these materials can settle, tip or be ripped apart as the ground spreads laterally or flows.

Figure 2-4. National Seismic Hazard Zones



There are two primary fault areas that may have some effect upon Clinton County; the New Madrid fault in southeast Missouri and the Nemaha fault in eastern Kansas. Clinton County faces a greater earthquake risk from the Nemaha Fault, which runs from Oklahoma City, Oklahoma to Lincoln, Nebraska. The fault is located approximately 80 miles west of Clinton County. The Nemaha uplift is of concern to Clinton County because it runs parallel to the Missouri/Kansas border from Lincoln, Nebraska to Oklahoma City, Oklahoma. The earthquake history of this

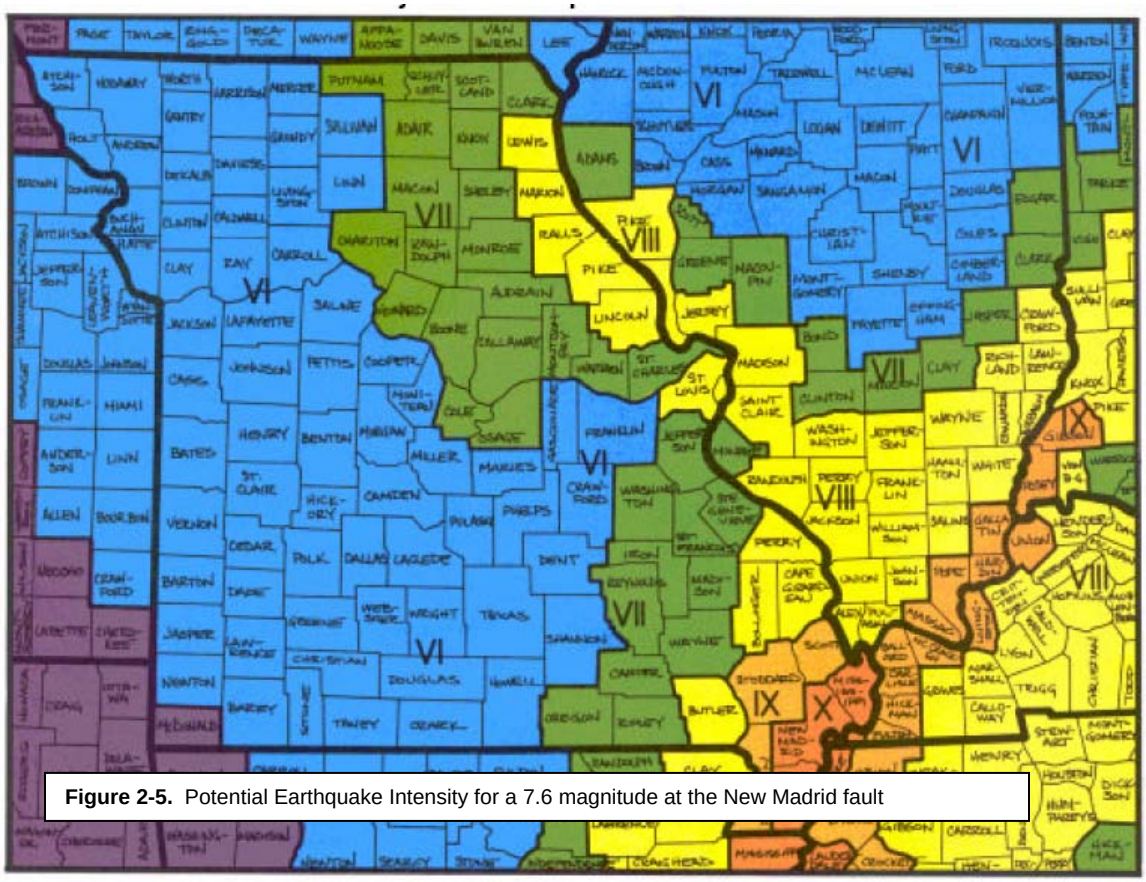


Figure 2-5. Potential Earthquake Intensity for a 7.6 magnitude at the New Madrid fault

region is not as severe as the historic New Madrid fault zone, but there have been several earthquakes that have affected the Missouri side of the line.

Figure 2-3 illustrates the potential magnitude to be expected in the next 50 years from each of the aforementioned faults. It is clear that the Clinton County area is located in a zone of low damage potential but caution is warranted before dismissing the threat of earthquakes entirely.

The most feared earthquake region is the southeast corner of the state, which has a higher potential for significant damage. The New Madrid seismic zone has a record of earthquakes in Missouri prior to the nineteenth century. While the written record is virtually nonexistent, there is ample geologic evidence that the New Madrid seismic zone has a long history of activity.

The most likely potential earthquake event that could cause noticeable damage in Clinton County would be a severe earthquake event in the New Madrid area. The New Madrid fault can

be seen clearly in Figure 2-4 as the red area in southeast Missouri and northeast Arkansas. The Nemaha fault is the bowling pin shaped green area in eastern Kansas and southeast Nebraska.

The potential for a seismic event is still present in Clinton County; in fact, the nearby City of St. Joseph has not discounted its vulnerability. In 1997, the Department of Natural Resources and the DGLS created a seismatic survey of the St. Joseph area. The survey was completed to explore a potential surface rupture in south St. Joseph, which is within 30 miles of western Clinton County. This potential surface rupture indicates the existence of an earthquake feature. Research to date has not concluded where the potential surface rupture originated or if it is active. According to a study completed by DuBois and Wilson, the City of St. Joseph has a potential seismic risk of 2 on the Mercalli scale. The State of Missouri offers Figure 2-5 as the projected earthquake intensity estimate for the state. For a 7.6-magnitude earthquake located anywhere along the New Madrid fault, Clinton County is located within the VI intensity range, indicating slight damage.

Description of Hazard: Earthquake
Historical Statistics: Infrequent minor earth movements.
Statement of Future Probable Severity. Given the USGS risk map, any future earthquake event in Clinton County would likely fall in the *Negligible* range, although a significant event emanating from the Nemaha fault cannot be discounted, which could result in more severe damage.
Statement of Probable Risk: Given the low occurrence of earthquake events and the distance from major fault lines, the probable risk for Clinton County is *Unlikely*.
Statement of Next Disaster's Likely Adverse Impact on the Community: An earthquake's impact on Clinton County is difficult to ascertain, since the effects of the earthquake would depend on its intensity. A small or moderate event stemming from New Madrid may result in no damage, while a significant event centered on the Nemaha fault may cause structural damage throughout the county.
.

Recommendations

1. Clinton County governments should consider adopting building codes that address earthquake safety measures- Particularly for retrofits to older masonry buildings.

2. Clinton County regional emergency services organizations should develop a public education campaign to inform people about protecting their homes and businesses from earthquake damage.

3. Clinton County governments should develop an inventory of facilities with generators/emergency power across the county that can be used as shelters in the event of an earthquake.

4. Clinton County governments and other public entities should incorporate the design of temporary shelters in the construction of new public facilities (e.g., libraries, community centers, etc.)

5. Clinton County governments should audit building codes to prohibit the construction of unreinforced masonry buildings.

6. Existing public buildings constructed of unreinforced masonry should be identified and considered for retrofitting or modification to meet codes for minimum earthquake protection.

Dam Failure

Dams are structures designed to hold or divert water away from areas. Dams have been utilized since the beginning of agricultural-based societies. The collected water was stored for drinking, agriculture and electrical power generation. Today, dams are used worldwide and are generally safe, however there are times these man-made structures fail, resulting in flooding. The National Dam Safety Act defines a dam as:

…an artificial barrier which impounds or diverts water and: (1) is more than 6 feet high and stores 50 acre feet or more of water] or (2) is 25 feet or more high and stores more than 15 acre feet [of water]…

There are more than 80,000 dams in the United States. In Missouri, 4,100 of these dams come under the regulation of the state. Missouri's Department of Natural Resources (DNR) – Water Resources

Table 2-15. Clinton County Dams

Dam	Missouri ID	Year Completed	Hazard Level
MCGINNESS LAKE DAM	MO10121	1906	SIGNIFICANT
PLATTSBURG OLD RESERVOIR DAM	MO10267	1938	SIGNIFICANT
SIX MILE LANE LAKE DAM	MO10266	1958	HIGH
FREEMANS FARM DAM NUMBER FOUR	MO10277	1977	SIGNIFICANT
LATHROP LAKE AND FOREST CLUB DAM	MO10294	1936	SIGNIFICANT
GOWER RESERVOIR DAM	MO10788	1967	LOW
MORSE LAKE DAM	MO10696	1971	LOW
LAKE ARROWHEAD DAM	MO11016	1975	HIGH
NEWBY LAKE DAM	MO10635	1951	LOW
BURLINGTON RESERVOIR DAM	MO10554	1800	LOW
FREEMAN FARM NUMBER TWO DAM	MO11113	1976	SIGNIFICANT
SPRING LAKE DAM	MO11122	1974	HIGH
EVERETT QUARRIES LAKE DAM	MO11116	1949	LOW
LAKE CONCORD DAM	MO11115	1974	LOW
FREEMAN FARM NUMBER THREE DAM	MO11112	1977	SIGNIFICANT
FREEMAN FARMS DAM NUMBER ONE	MO11114	1972	LOW
LAKE,JOSEPH LAKE DAM	MO11110	1974	LOW
SKIPTON LAKE DAM	MO11242	1965	LOW
CROUCH LAKE DAM WEST	MO11909	1976	LOW
CROUCH LAKE DAM EAST	MO11910	1976	LOW
WOODS DAM	MO11822	1955	LOW
ZURBUCHEN LAKE DAM	MO11821	1976	LOW
JONES LAKE DAM-SEC 10	MO11109	1976	LOW
ZURBUCHEN LAKE DAM	MO50075	1976	SIGNIFICANT
JOSEPH LAKE DAM	MO50073	1974	SIGNIFICANT
MALLEN LAKE DAM	MO50074	1979	SIGNIFICANT

Source: Missouri Department of Natural Resources

Division is the regulating authority for these dams. There are four regulated and 21 non-regulated dams in Clinton County. The majority of these dams are owned by local governments, water districts, homeowners associations or private individuals.

Whether regulated or not, dam owners are responsible for the maintenance, safety and monitoring of their dams. Dam materials vary from compacted earth to reinforced concrete and rock. No dams in Clinton County are used for power generation. The majority of the county's dams are earthen. The dams are listed in Table 2-15.

Dams can fail for a variety of reasons. The following are some of the most common causes of dam failure.

1. **Piping Failure** – piping failures are usually caused by embankment leakage, foundation leakage and/or the deterioration of structures on the dam.
2. **Erosion Failure** – erosion of dams is generally caused by the inadequate capacity of a spillway, resulting in overtopping of the dam or flow erosion and/or inadequate slope protection.
3. **Structural Failure** – structural failures of dams may be caused by an earthquake, slope instability or poor construction

Dam failures are typically related to, and can cascade from, other natural events. Flash floods, earthquakes, and landslides can cause a dam failure, or accelerate the failure of an already weakened structure. Dam failures can result in the loss of crops, livestock, structures, homes, life and property. Many communities use dams for the storage of drinking water, recreation and natural habitat and the loss of a dam could have a significant effect upon a community. Source: http://www.fema.gov/hazards/damsafety/

There have been 26 recorded dam failures in Missouri over the last 100 years. One drowning is recorded among all of these disasters. There are no known instances of dam failure in Clinton County.

Three categories are generally used to categorize the potential for loss of life and property in the event of dam failure. These categories include:

1. **Low** - Dam failure could result in only minimal property damage.
2. **Significant** – Dam failure could possibly result in the loss of life and appreciable property damage.
3. **High** – Dam failure could result in lives lost and extensive property damage.

Description of Hazard: Dam Failure
Historical Statistics: No dams have failed in Clinton County
Statement of Future Probable Severity: Three dams in Clinton County are listed as high-risk and, in the event of failure, would likely result in *Limited to Negligible* severity. Any other dam failure in Clinton County would likely result in *Negligible* severity.
Statement of Probable Risk: Given the lack of historic dam failures in the county and the regulation of dams greater than 35 feet, the future probably risk is *Unlikely*.
Statement of Next Disaster's Likely Adverse Impact on Local Areas: A dam failure would be a spot hazard, only impacting property immediately downstream of the dam.

Recommendations

1. Clinton County should develop a Geographic Information System data layer to indicate the location and inundation zones of all dams within the county. This map should be referenced during the issuance of a building permit, subdivision plat and conferences with developers.

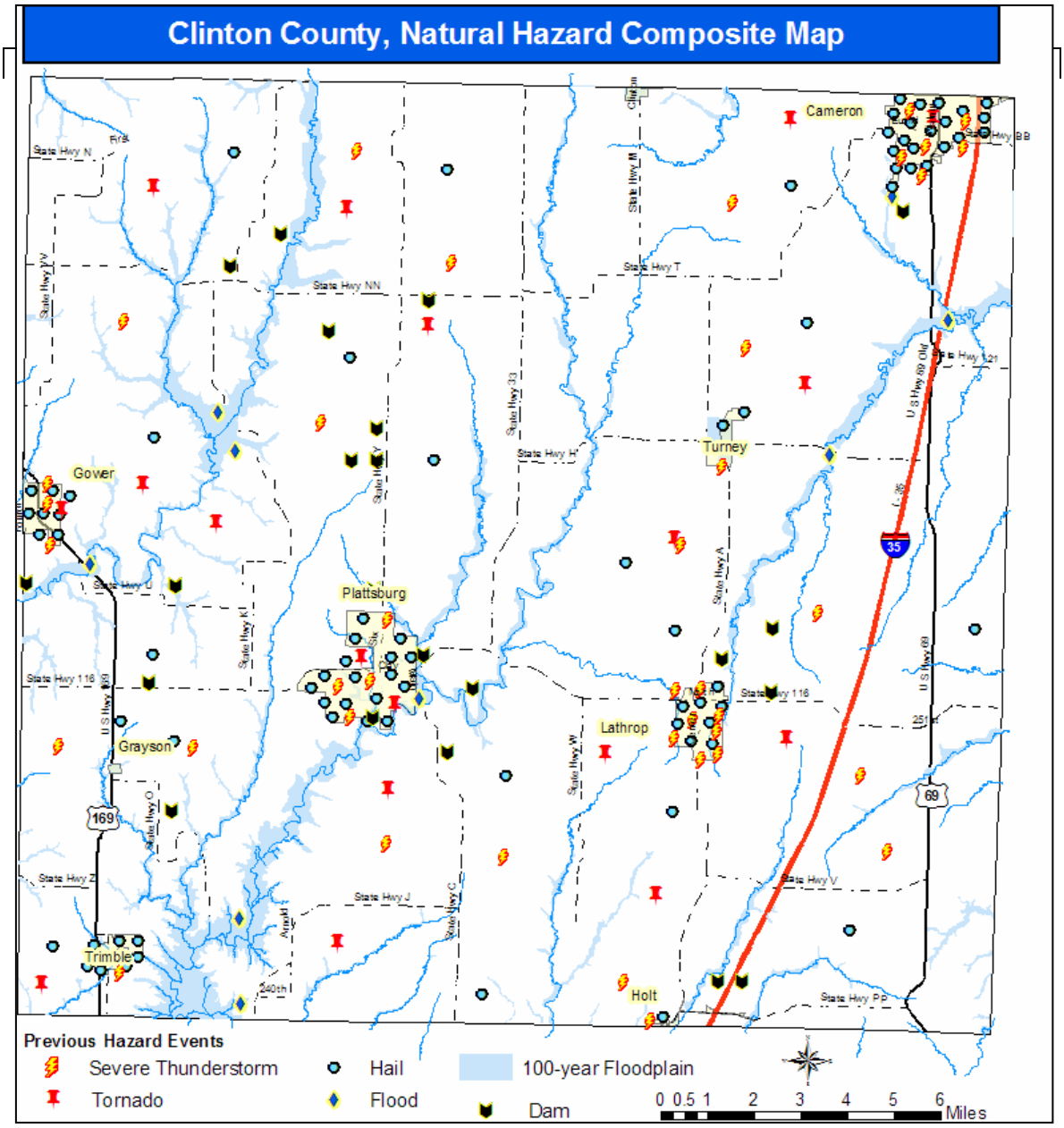
2. Clinton County's emergency services or public works organizations should conduct a public education campaign to inform dam owners and citizens living near the inundation zones of dams about the need to properly maintain and upgrade these structures, particularly those that are more than 50 years old.

3. Use Geographic Information Systems to map all the residences in inundation zones that could be notified during a pre-dam failure scenario.

4. For dams not regulated by the state, Clinton County land use officials should encourage dam owners to inspect their dams annually. If a dam is found to be in need of repair it should be monitored until it is repaired. If no repairs are forthcoming, the county should seek a judicial order requiring the dam's repair.

Multi-jurisdictional Risk Assessment in the County and Municipalities

All municipalities and government subunits within Clinton County participated in the creation of this hazard mitigation plan, and unless otherwise noted, the actions prescribed within pertain to all jurisdictions without bias. Clinton County hazards strongly tend to be either geographically random or regional in scope. While the county routinely experiences hail storms, small tornadoes and extreme temperatures, it has not experienced any catastrophic natural disaster is the past 50 years. There are no identified communities or specific regions of the county that require special mitigation consideration.


Clinton County, Natural Hazard Composite Map
Cameron
Turney
Gower
Plattsburg
Lathrop
Grayson
Trimble
Holt
Previous Hazard Events
Severe Thunderstorm
Tornado
Hail
Flood
Dam
100-year Floodplain
0 0.5 1 2 3 4 5 6
Miles

Hazard Profile Worksheets

HAZARD: Severe Thunderstorms

POTENTIAL MAGNITUDE (Percentage of the jurisdiction that can be affected):

- ☐ **Catastrophic**: More than 50%
- ☐ **Critical**: 25 to 50%
- ■ **Limited**: 10 to 25%
- ☐ **Negligible**: Less than 10%

FREQUENCY OF OCCURRENCE:

- ■ **Highly Likely**: Near 100% probability in next year.
- ☐ **Likely**: Between 10 and 100% probability in next year, or at least one chance in 10 years.
- ☐ **Possible**: Between 1 and 10% probability in next year, or at least one chance in next 100 years.
- ☐ **Unlikely**: Less than 1% probability in next 100 years.

SEASONAL PATTERN:

Highest risk would be during March through September, which is the regional severe storm season.

AREAS LIKELY TO BE AFFECTED MOST (BY SECTOR):

The storms can affect the entire county, but damage is normally along a specific path.

PROBABLE DURATION:

Each individual storm may only last from 30 minutes to a few hours, but several storms can line up and come in waves.

POTENTIAL SPEED OF ONSET

(Probable amount of warning time):

- ☐ Minimal (or no) warning.
- ■ 6 to 12 hours warning.
- ☐ 12 to 24 hours warning.
- ☐ More than 24 hours warning.

EXISTING WARNING SYSTEMS:

The National Weather Service provides excellent warning information to the media and directly to citizens through a variety of outlets. Outdoor sirens are utilized in some communities, but their usage should be expanded.

COMPLETE VULNERABILTY ANALYSIS

The entire county (100%) is vulnerable to severe thunderstorms. The next major event will likely impact 10% of the county, damaging 844 structures valued at $76,704,180.

HAZARD: Tornadoes

POTENTIAL MAGNITUDE (Percentage of the jurisdiction that can be affected):

- ☐ **Catastrophic**: More than 50%
- ☐ **Critical**: 25 to 50%
- ■ **Limited**: 10 to 25%
- ☐ **Negligible**: Less than 10%

FREQUENCY OF OCCURRENCE:

- ☐ **Highly Likely**: Near 100% probability in next year.
- ■ **Likely**: Between 10 and 100% probability in next year, or at least one chance in 10 years.
- ☐ **Possible**: Between 1 and 10% probability in next year, or at least one chance in next 100 years.
- ☐ **Unlikely**: Less than 1% probability in next 100 years.

SEASONAL PATTERN:

Small tornados occur in Clinton County nearly every severe weather season.

AREAS LIKELY TO BE AFFECTED MOST (BY SECTOR):

All locations in Clinton County are susceptible to a tornado.

PROBABLE DURATION:

A severe outbreak could keep tornados on the ground for a period of an hour or two.

POTENTIAL SPEED OF ONSET

(Probable amount of warning time):

- ■ Minimal (or no) warning.
- ☐ 6 to 12 hours warning.
- ☐ 12 to 24 hours warning.
- ☐ More than 24 hours warning.

EXISTING WARNING SYSTEMS:

The National Weather Service provides excellent warning information to the media and directly to citizens through a variety of outlets. Outdoor sirens are utilized in some communities, but their usage should be expanded.

COMPLETE VULNERABILTY ANALYSIS

The entire county (100%) is vulnerable to tornadoes. The next major event will likely impact 5% of the county, damaging 423 structures valued at $38,617,428.

HAZARD: Severe Winter Weather

POTENTIAL MAGNITUDE (Percentage of the jurisdiction that can be affected):

- ☐ **Catastrophic**: More than 50%
- ■ **Critical**: 25 to 50%
- ☐ **Limited**: 10 to 25%
- ☐ **Negligible**: Less than 10%

FREQUENCY OF OCCURRENCE:

- ☐ **Highly Likely**: Near 100% probability in next year.
- ■ **Likely**: Between 10 and 100% probability in next year, or at least one chance in 10 years.
- ☐ **Possible**: Between 1 and 10% probability in next year, or at least one chance in next 100 years.
- ☐ **Unlikely**: Less than 1% probability in next 100 years.

SEASONAL PATTERN:

November through February is the regional season.

AREAS LIKELY TO BE AFFECTED MOST (BY SECTOR):

The storms usually affect the entire county, but severe damage may be contained along a specific path.

PROBABLE DURATION:

Each individual storm may only last a few hours, but several storms can line up and come in waves.

POTENTIAL SPEED OF ONSET

(Probable amount of warning time):

- ☐ Minimal (or no) warning.
- ☐ 6 to 12 hours warning.
- ☐ 12 to 24 hours warning.
- ■ More than 24 hours warning.

EXISTING WARNING SYSTEMS:

The National Weather Service provides excellent warning information to the media and directly to citizens through a variety of outlets.

COMPLETE VULNERABILTY ANALYSIS

The entire county (100%) is vulnerable to severe winter weather. The next major event will likely damage 25 structures valued at $3,351,328.

HAZARD: Drought

POTENTIAL MAGNITUDE (Percentage of the jurisdiction that can be affected):

- ☐ **Catastrophic**: More than 50%
- ☐ **Critical**: 25 to 50%
- ■ **Limited**: 10 to 25%
- ☐ **Negligible**: Less than 10%

FREQUENCY OF OCCURRENCE:

- ☐ **Highly Likely**: Near 100% probability in next year.
- ■ **Likely**: Between 10 and 100% probability in next year, or at least one chance in 10 years.
- ☐ **Possible**: Between 1 and 10% probability in next year, or at least one chance in next 100 years.
- ☐ **Unlikely**: Less than 1% probability in next 100 years.

SEASONAL PATTERN:

Drought is traditionally a summer occurrence. However some droughts can be prolonged and even exist as a year-round condition.

AREAS LIKELY TO BE AFFECTED MOST (BY SECTOR):

Drought is an area-wide phenomenon.

PROBABLE DURATION:

Drought can last from a few weeks to several months. Long-term climate changes could make drought a lasting condition.

POTENTIAL SPEED OF ONSET

(Probable amount of warning time):

- ☐ Minimal (or no) warning.
- ☐ 6 to 12 hours warning.
- ☐ 12 to 24 hours warning.
- ■ More than 24 hours warning.

EXISTING WARNING SYSTEMS:

The Missouri Department of Natural Resources monitors drought conditions and this information is widely available.

COMPLETE VULNERABILTY ANALYSIS

The entire county (100%) is vulnerable to drought. The next major event will likely damage 8 structures valued at $1,005,904.

HAZARD: Heat Waves

POTENTIAL MAGNITUDE (Percentage of the jurisdiction that can be affected):

- ■ **Catastrophic**: More than 50%
- ☐ **Critical**: 25 to 50%
- ☐ **Limited**: 10 to 25%
- ☐ **Negligible**: Less than 10%

FREQUENCY OF OCCURRENCE:

- ☐ **Highly Likely**: Near 100% probability in next year.
- ☐ **Likely**: Between 10 and 100% probability in next year, or at least one chance in 10 years.
- ■ **Possible**: Between 1 and 10% probability in next year, or at least one chance in next 100 years.
- ☐ **Unlikely**: Less than 1% probability in next 100 years.

SEASONAL PATTERN:

Heat waves are typically their most destructive in June, July and August.

AREAS LIKELY TO BE AFFECTED MOST (BY SECTOR):

Heat waves are area-wide phenomena.

PROBABLE DURATION:

Extreme heat conditions can last several weeks.

POTENTIAL SPEED OF ONSET

(Probable amount of warning time):

- ☐ Minimal (or no) warning.
- ☐ 6 to 12 hours warning.
- ☐ 12 to 24 hours warning.
- ■ More than 24 hours warning.

EXISTING WARNING SYSTEMS:

The National Weather Service provides excellent warning information to the media and directly to citizens through a variety of outlets.

COMPLETE VULNERABILTY ANALYSIS

The entire county (100%) is vulnerable to heat wave. The next major event will likely damage 8 structures valued at $1,005,904.

HAZARD: Urban and Wild Fires

POTENTIAL MAGNITUDE (Percentage of the jurisdiction that can be affected):

- ☐ **Catastrophic**: More than 50%
- ☐ **Critica**l: 25 to 50%
- ☐ **Limited**: 10 to 25%
- ■ **Negligible**: Less than 10%

FREQUENCY OF OCCURRENCE:

- ☐ **Highly Likely**: Near 100% probability in next year.
- ☐ **Likely**: Between 10 and 100% probability in next year, or at least one chance in 10 years.
- ■ **Possible**: Between 1 and 10% probability in next year, or at least one chance in next 100 years.
- ☐ **Unlikely**: Less than 1% probability in next 100 years.

SEASONAL PATTERN:

Fires often accompany heat waves and drought., and are most frequently seen during the summer months.

AREAS LIKELY TO BE AFFECTED MOST (BY SECTOR):

Woodland areas in transition zones between urban and rural areas are the most vulnerable.

PROBABLE DURATION:

In extreme conditions wild fires could burn for a period of days. Most last a few hours.

POTENTIAL SPEED OF ONSET

(Probable amount of warning time):

- ■ Minimal (or no) warning.
- ☐ 6 to 12 hours warning.
- ☐ 12 to 24 hours warning.
- ☐ More than 24 hours warning.

EXISTING WARNING SYSTEMS:

No general wild fire warning systems exist in Clinton County

COMPLETE VULNERABILTY ANALYSIS

Half of the county (50%) is vulnerable to wildfire. The next major event will likely impact 1% of the county, damaging 85 structures valued at $7,733,138.

HAZARD: Floods

POTENTIAL MAGNITUDE (Percentage of the jurisdiction that can be affected):

- ☐ **Catastrophic**: More than 50%
- ☐ **Critica**l: 25 to 50%
- ☐ **Limited**: 10 to 25%
- ■ **Negligible**: Less than 10%

FREQUENCY OF OCCURRENCE:

- ☐ **Highly Likely**: Near 100% probability in next year.
- ☐ **Likely**: Between 10 and 100% probability in next year, or at least one chance in 10 years.
- ■ **Possible**: Between 1 and 10% probability in next year, or at least one chance in next 100 years.
- ☐ **Unlikely**: Less than 1% probability in next 100 years.

SEASONAL PATTERN:

Highest risk would be during April, May, June, July, September and November, which are the regional rainy seasons.

AREAS LIKELY TO BE AFFECTED MOST (BY SECTOR):

All areas in the 100-year flood plain and in low-lying urban areas.

PROBABLE DURATION:

Flash flooding is of a duration measured in hours. River flooding can last up to for several weeks.

POTENTIAL SPEED OF ONSET

(Probable amount of warning time):

- ☐ Minimal (or no) warning.
- ■ 6 to 12 hours warning.
- ☐ 12 to 24 hours warning.
- ☐ More than 24 hours warning.

EXISTING WARNING SYSTEMS:

The National Weather Service provides excellent warning information to the media and directly to citizens through a variety of outlets.

COMPLETE VULNERABILTY ANALYSIS

Approximately 8% of the county is vulnerable to flood. The next major event will likely impact 3% of the county, damaging 252 structures valued at $22,952,938.

HAZARD: Earthquakes

POTENTIAL MAGNITUDE (Percentage of the jurisdiction that can be affected):

- ☐ **Catastrophic**: More than 50%
- ☐ **Critica**l: 25 to 50%
- ☐ **Limited**: 10 to 25%
- ■ **Negligible**: Less than 10%

FREQUENCY OF OCCURRENCE:

- ☐ **Highly Likely**: Near 100% probability in next year.
- ☐ **Likely**: Between 10 and 100% probability in next year, or at least one chance in 10 years.
- ☐ **Possible**: Between 1 and 10% probability in next year, or at least one chance in next 100 years.
- ■ **Unlikely**: Less than 1% probability in next 100 years.

SEASONAL PATTERN:

No perceivable seasonal pattern has been established.

AREAS LIKELY TO BE AFFECTED MOST (BY SECTOR):

An earthquake of consequence is likely to affect a very large region.

PROBABLE DURATION:

Earthquakes can be of a few seconds duration to lasting several minutes with periodic aftershocks and increased reoccurrence.

POTENTIAL SPEED OF ONSET

(Probable amount of warning time):

- ■ Minimal (or no) warning.
- ☐ 6 to 12 hours warning.
- ☐ 12 to 24 hours warning.
- ☐ More than 24 hours warning.

EXISTING WARNING SYSTEMS:

Accurate earthquake warnings are not generally available.

COMPLETE VULNERABILTY ANALYSIS

The entire county (100%) is vulnerable to earthquake. The next major event will likely impact 5% of the county, damaging 423 structures valued at $38,617,428.

HAZARD: Dam Failure

POTENTIAL MAGNITUDE (Percentage of the jurisdiction that can be affected):

- ☐ **Catastrophic**: More than 50%
- ☐ **Critical**: 25 to 50%
- ☐ **Limited**: 10 to 25%
- ■ **Negligible**: Less than 10%

FREQUENCY OF OCCURRENCE:

- ☐ **Highly Likely**: Near 100% probability in next year.
- ☐ **Likely**: Between 10 and 100% probability in next year; one chance in 10 years.
- ☐ **Possible**: Between 1 and 10% probability in next year; one chance in next 100 years.
- ■ **Unlikely**: Less than 1% probability in next 100 years.

SEASONAL PATTERN:

Dam failure would likely accompany heavy rains or earthquakes. Highest risk would be during April, May, June, July, September and November, which are the regional rainy seasons.

AREAS LIKELY TO BE AFFECTED MOST (BY SECTOR):

Larger and older dams pose the most significant risks. Areas below these dams are the most likely to be affected.

PROBABLE DURATION:

Dam failures are of short duration and are over very quickly, most in a matter of minutes.

POTENTIAL SPEED OF ONSET

(Probable amount of warning time):

- ■ Minimal (or no) warning.
- ☐ 6 to 12 hours warning.
- ☐ 12 to 24 hours warning.
- ☐ More than 24 hours warning.

EXISTING WARNING SYSTEMS:

No site-specific systems exist for dam failure. Storm prediction and a dam inspection system could provide a general sense of potential impending failures.

COMPLETE VULNERABILTY ANALYSIS

Approximately 1% of the county is vulnerable to flood. The next major event will likely damage 7 structures valued at $767,000.

Table 2-16. Clinton County Hazard Identification and Analysis

Hazard	Frequency	Magnitude	Warning Time	Severity	Risk Priority (1 = low)
Dam Failure	Unlikely Unlikely Possible Possible	Catastrophic Critical Limited Negligible	Minimal 6 – 12 hours 12 – 24 hours 24+ hours	Catastrophic Critical Limited Negligible	1
Notes:	No dams have ever failed in Clinton County; residents living below significant dams (>35') should be made aware of emergency procedures.				
Drought	Possible Possible Likely V. Likely	Catastrophic Critical Limited Negligible	Several Days	Catastrophic Critical Limited Negligible	3
Notes:	Located on the eastern edge of the Great Plains, Clinton County is always susceptible to drought in some form; municipalities should have policies in place to limit water consumption during a drought event.				
Earthquake	Unlikely Unlikely Possible Possible	Catastrophic Critical Limited Negligible	Minimal	Catastrophic Critical Limited Negligible	1
Notes:	The Nemaha Fault complex lies west of Clinton County in eastern Kansas. While no earthquake has historically caused considerable damage in the county, a significant event remains a possibility. Community education regarding proper actions to take during an earthquake should be ubiquitous throughout the area.				
Flood	Unlikely Unlikely Possible Likely	Catastrophic Critical Limited Negligible	6 – 12 hours 6 – 12 hours 12 – 24 hours 24+ hours	Catastrophic Critical Limited Negligible	1
Notes:	Residents of Clinton County, and particularly those living within the 100-year flood plain, should have escape routes and shelter locations identified.				
Heat Wave	Possible Possible Likely Likely	Catastrophic Critical Limited Negligible	Several Days	Catastrophic Critical Limited Negligible	3
Notes:	Heat waves, similar to drought, can occur during any summer in Clinton County as a result of its location within the interior of the continent. Residents should be aware of the detrimental effects of excessive heat, and should be encouraged to check on individuals susceptible to heat-related illness, such as children and the elderly.				

Severe Thunder-storm	Possible Possible Likely V. Likely	Catastrophic Critical Limited Negligible	30 min–1 hour 6 – 12 hours 6 – 12 hours 24+ hours	Catastrophic Critical Limited Negligible	5
Notes:	Severe thunderstorms are a regular occurrence in Clinton County, bringing hazards in the form of lightning, hail, strong winds, and torrential rains. Residents should be educated on how best to deal with these hazards when they occur.				
Severe Winter Weather	Possible Possible Likely Likely	Catastrophic Critical Limited Negligible	12 – 24 hours 12 – 24 hours 24+ hours 24+ hours	Catastrophic Critical Limited Negligible	4
Notes:	Just as severe thunderstorms are a regular occurrence during warm months, severe winter weather is an accepted fact of life living in the interior of the continent. Residents should keep an emergency kit in their homes that can provide limited food, water, and first aid in the event of extended (3+days) isolation as a result of severe winter weather.				
Tornado	Possible Possible Likely Likely	Catastrophic Critical Limited Negligible	Minimal, up to an hour	Catastrophic Critical Limited Negligible	5
Notes:	Though not a frequent occurrence for any one location, tornadoes regularly form in the Midwest during the spring and summer months. Residents should know proper safety procedures in the event of tornadic activity. In addition, public officials should be proper safety procedures in place for public areas, such as schools and parks.				
Urban and Wild Fire	Unlikely Unlikely Unlikely Possible	Catastrophic Critical Limited Negligible	6 – 12 hours 12 – 24 hours 12 – 24 hours 24+ hours	Catastrophic Critical Limited Negligible	1
Notes:	Lacking both the persistent drought conditions (low ambient air moisture) and the presence of substantial stands of forest, Clinton County does not have a significant risk of Urban or Wild fire events. However, seasons of severe drought could pose increased fire risk. Public officials should take steps to protect lives and property in such an event.				

Vulnerability Assessment Worksheets

This section details loss estimates for each hazard affecting the county. Loss estimates were calculated using a combination of information from the community profile, historical loss data in the hazard profiles, information from the county assessors, and general knowledge of the jurisdiction.

- The number of buildings was estimated based on information from the County Assessors office and the U.S. Census Bureau.
- Dollar figures were primarily based upon the assessed valuation per structures and adjusted for realistic value.

Severe Thunderstorm

This estimate is based on a thunderstorm or thunderstorm complex that impacts 10% of the county. Damage can be the result of heavy rain, damaging winds, hail, and lighting.

Table 2-17. Severe Thunderstorm	**Developed Land (Current**		**Undeveloped Land (Future)**	
	# of Buildings Affected	*Estimated Damage*	*# of Buildings Affected*	*Estimated Damage*
Residential	788	$68,083,200	985	$85,014,000
Commercial	32	$4,800,000	40	$6,000,000
Industrial	15	$2,775,000	19	$3,515,000
Public Government & Infrastructure	7	$612,766	9	$787,842
Medical	1	$233,214	1	$233,214
Schools/Colleges	1	$200,000	1	$200,000
Total	**844**	**$76,704,180.00**	**1055**	**$95,750,056.00**

Tornado

This estimate is based on an F3 tornado impacting 5% of the county.

Table 2-18. Tornado	**Developed Land (Current**		**Undeveloped Land (Future)**	
	# of Buildings Affected	*Estimated Damage*	*# of Buildings Affected*	*Estimated Damage*
Residential	394	$34,041,600	493	$42,595,200
Commercial	16	$2,400,000	20	$3,000,000
Industrial	8	$1,480,000	10	$1,850,000
Public Government & Infrastructure	3	$262,614	4	$350,152
Medical	1	$233,214	2	$466,428
Schools/Colleges	1	$200,000	2	$400,000
Total	**423**	**$38,617,428.00**	**531**	**$48,661,780.00**

Severe Winter Weather

This estimate is based on a prolonged period of below-freezing temperatures and significant frozen precipitation. While such an event would likely impact the entire county, many structures do not suffer direct damage from this type of occurrence.

Table 2-19. Winter Weather	**Developed Land (Current**		**Undeveloped Land (Future)**	
	# of Buildings Affected	*Estimated Damage*	*# of Buildings Affected*	*Estimated Damage*
Residential	11	$950,400	13	$1,123,200
Commercial	5	$750,000	6	$900,000
Industrial	3	$555,000	4	$740,000
Public Government & Infrastructure	3	$262,614	4	$350,152
Hospitals	1	$233,314	1	$233,314
Schools/Colleges	3	$600,000	4	$800,000
Total	**25**	**$3,351,328.00**	**32**	**$4,146,666.00**

Drought and Heat Wave

The damages associated with extreme summer heat and lack of precipitation differs from the direct structural damages caused by other hazards. Collateral damage from power shortages and decreased water reserves may impact Clinton County buildings, but the impact of these events are more acutely realized with damage to crop yields and as a threat to the health of people and livestock. The toll on human life in Missouri as a result of heat events has been minor, presumably due to the increased availability of air conditioning and increased public awareness of the hazards of extreme heat. A severe, prolonged heat event is estimated to result in up to five deaths and 30 heat injuries in Clinton County.

Table 2-20. Drought/Heat Wave	**Developed Land (Current**		**Undeveloped Land (Future)**	
	# of Buildings Affected	*Estimated Damage*	*# of Buildings Affected*	*Estimated Damage*
Residential	0	$0	0	$0
Commercial	1	$150,000	1	$150,000
Industrial	1	$185,000	1	$185,000
Public Government & Infrastructure	5	$437,690	6	$525,228
Medical	1	$233,214	1	$233,314
Schools/Colleges	0	$0	0	$0
Total	**8**	**$1,005,904.00**	**9**	**$1,093,542.00**

Urban and Wildfires

Urban and wildfires have not posed a significant threat to Clinton County since 1950. Occasional grass/bush fires occur in rural parts of the county, but county fire protection district personnel are specifically trained in fighting these types of fires, and often have them under control is relatively short time. Further helping the situation is that nearly all land within the county is accessible by road, further reducing the risk of a widespread fire event. Regarding urban fires, every municipality within Clinton County either has a fire department or is provided

fire protection by regional fire protection districts. If any urban fire event is beyond the capabilities of a given fire department, standing mutual aid agreements allow neighboring fire agencies to offer assistance. The table below shows the estimated losses with a significant fire impacting 1% of the county.

Table 2-21. Fire	**Developed Land (Current**		**Undeveloped Land (Future)**	
	# of Buildings Affected	*Estimated Damage*	*# of Buildings Affected*	*Estimated Damage*
Residential	79	$6,825,600	99	$8,553,600
Commercial	3	$450,000	4	$600,000
Industrial	2	$370,000	2	$370,000
Public Government & Infrastructure	1	$87,538	1	$87,538
Medical	0	$0	1	$233,214
Schools/Colleges	0	$0	1	$200,000
Total	**85**	**$7,733,138.00**	**108**	**$10,044,352.00**

Earthquake

Based on an earthquake with a 5.0 magnitude (on the Mercalli Scale) emanating from the New Madrid fault in Southeast Missouri, Clinton County would most likely not be significantly impacted; both the Midwest soil strata and distance from the fault preclude any significant damage. A substantial earthquake sourced on the Nemaha fault in northeastern Kansas could conceivably cause moderate damage in Clinton County, but such an event (greater than 6.0 on the Mercalli Scale) has never been recorded at the fault. The table below shows the estimated losses with a 7.0 quake, affecting 5% of the county.

Table 2-22. Earthquake	**Developed Land (Current)**		**Undeveloped Land (Future)**	
	# of Buildings Affected	*Estimated Damage*	*# of Buildings Affected*	*Estimated Damage*
Residential	394	$34,041,600	493	$42,595,200
Commercial	16	$2,400,000	20	$3,000,000
Industrial	8	$1,480,000	10	$1,850,000
Public Government & Infrastructure	3	$262,614	4	$350,152
Medical	1	$233,214	2	$466,428
Schools/Colleges	1	$200,000	2	$400,000
Total	**423**	**$38,617,428.00**	**531**	**$48,661,780.00**

Dam Failure

While there are a few non-regulated dams in Clinton County which have been designated as a high risk by the Missouri Department of Natural Resources, no dam failure in the county would endanger a significant land area or population.

Table 2-23. Dam Failure	**Developed Land (Current**		**Undeveloped Land (Future)**	
	# of Buildings Affected	*Estimated Damage*	*# of Buildings Affected*	*Estimated Damage*
Residential	5	$432,000	6	$518,400
Commercial	1	$150,000	1	$150,000
Industrial	1	$185,000	1	$185,000
Public Government & Infrastructure	0	$0	0	$0
Medical	0	$0	0	$0
Schools/Colleges	0	$0	0	$0
Total	**7**	**$767,000.00**	**8**	**$853,400.00**

Flood

The table below represents the estimated losses associated with a flood event impacting 3% of the county.

Table 2-24. Flood	**Developed Land (Current**		**Undeveloped Land (Future)**	
	# of Buildings Affected	*Estimated Damage*	*# of Buildings Affected*	*Estimated Damage*
Residential	236	$20,390,400	295	$25,488,000
Commercial	9	$1,350,000	11	$1,650,000
Industrial	5	$925,000	6	$1,110,000
Public Government & Infrastructure	1	$87,538	1	$87,538
Medical	0	0	0	$0
Schools/Colleges	1	$200,000	1	$200,000
Total	**252**	**$22,952,938.00**	**314**	**$28,535,538.00**

Vulnerability Assessment, Total Clinton County Assets

Table 2-25	Developed Land (Current)			Undeveloped Land (Future)	
Type of Facility	Total Buildings	Approximate Value		Projected # of Buildings	Approximate Projected Value
Residential	7877	$680,572,800		9846	$850,694,400
Commercial	315	$47,250,000		394	$591,00,000
Industrial	152	$28,120,000		190	$351,50,000
Key Non-Profit Service Facilities	17	$1,105,000		21	$1,365,000
Public Buildings & Critical Facilities	22	$990,000		27	$1,215,000
Other City Government	15	$675,000		19	$855,000
Sewage Treatment Plant	5	$750,000		6	$900,000
Water Treatment Plant	7	$1,050,000		9	$1,350,000
Roads	-	$600,000		-	$750,000
Police	7	$875,000		9	$1,125,000
Fire	9	$1,350,000		11	$1,650,000
Schools	13	$2,600,000		16	$3,200,000
Communications	5	$575,000		6	$690,000
Hospital/Medical/Dental	9	$765,000		11	$935,000
Nursing Homes	5	$2,500,000		6	$3,000,000
Total	**8458**	**$769,777,800.00**		**10571**	**$867,780,342.00**

Section 3

City / County Capability Assessment

Mitigation Management Policies

The Clinton County Emergency Management Agency (EMA) is charged with preparing for disasters. The EMA appoints a part-time Emergency Management Coordinator. The Coordinator's duties include:

- Planning, organizing and directing County's emergency management plan with other government and business officials.
- Outreach, including speaking before various groups to promote interest and cooperation in emergency situations.
- Advises and assists businesses in industrial emergency management programs.
- Meets with state & federal officials to coordinate County program
- Prepares necessary documentation to affected agencies.
- Responsible for planning & coordination of County's disaster drills.

Additionally, the Coordinator, working with others, advises the County Commission on mitigation measures and implementing those measures deemed appropriate by the Commission. In general, the county's policies encourage collaboration between Clinton County agencies as well as cooperation between other county agencies and those of neighboring jurisdictions. In addition, the county utilizes a Local Emergency Planning Committee (LEPC) to facilitate disaster preparedness and response.

Existing Plans

The Emergency Operation Plan (EOP) of the county is approved by the County Commission. It identifies facilities and resources that require special security during a disaster, and promotes the development and maintenance of mutual aid agreements with nearby agencies and requires participation in drills and exercises. In addition, the plan identifies vulnerabilities in county-administered road, water and wastewater facilities and includes an evacuation plan. During a natural hazard event, the EOP provides detailed information to emergency responders.

Mitigation Programs

The primary mitigation programs are the county's floodplain management regulations, and participation in, and administration of, the National Flood Insurance Program (NFIP). Additional information on NFIP can be found at their website: http://www.fema.gov/nfip.

The county's floodplain regulations are aimed at substantially restricting any new development in the floodplain. The current ordinance requires one foot of additional freeboard for new structures and for the elevation of major construction on existing structures. For structures outside the identified flood hazard areas, a two-foot minimum elevation above grade is required.

The county is able to receive National Weather Service warnings and all equipment is activated by radio. In an emergency situation, nearly half of the county's population could be alerted within 30 minutes, responders within 5 minutes, and key officials within 15 minutes.

School students have received limited to substantial curricular training about hazards and emergency programs. Businesses, preschools, private organizations, youth groups, community leaders, and average citizens have had limited emergency management training. Industry and labor groups have had no training in the past five years. However, since 2001, public sector employees have had considerable training. Funds from SEMA have helped pay for these activities.

The EMA director has received training within the last five years, and other emergency response personnel have received extensive training. Emergency Operation Center (EOC) staff has received limited training, but volunteer staff has not received training during the past five years.

Geographic Information System (GIS) capabilities will be completed within the next year. This capability will facilitate the development of limited hazard area base maps, which will be available to interested parties.

City/County Capabilities

The capabilities of emergency management, fire protection, law enforcement, and emergency medical services are detailed at the end of Section I. The EOC in Clinton County meets FEMA established guidelines for an EOC. As one might gather, the criteria for the Emergency Operation Center is a place from which key officials can direct and control an emergency response. However, the EOC is not equipped for an extended emergency and there is not a backup facility.

The EOC has survivable communications from primary and other operating forces, the Emergency Alert System, commercial and public broadcast stations, SEMA, adjacent jurisdictions, and the incorporated areas within the county. The communications and warning equipment are tested on a scheduled basis. Warning sirens are located throughout Plattsburg, Cameron and many of the surrounding communities. The EMA and Mo-Kan Regional Council are currently working with the United State Department of Agriculture-Rural Development to expand the coverage for warning sirens.

The cities and county have limited communication abilities, both fixed and mobile, to coordinate the scene of an emergency. Mobile communication is accomplished predominately through UHF radio.

Sufficient fire equipment and vehicles are available to city and county agencies. Equipment available for police, rescue, mass care, and information/ communications is generally adequate, although various equipment upgrades would be prudent. The ambulance district that

serves the county provides complete triage care. The EMA director has received thorough training in professional development, emergency response planning, emergency response operations, exercises, disaster response and recovery, and disaster mitigation within the last five years. Emergency response personnel have received considerable training in the past five years. Appropriate officials have had limited training on hazard mitigation.

Responsibilities and Authorities

The chief elected official (CEO) has the legal basis for the following:

- Authorization to order an evacuation
- Redirect funds for emergency use
- Order a curfew; and
- Commandeer facilities and/or equipment and materials.

The CEO for Clinton County is the presiding commissioner, while the chief elected official for municipalities is the mayor. The Governor for Missouri, SEMA and FEMA may supersede the local CEO.

The CEO's responsibilities include:

- Safeguarding vital records (although limited to records needed to reconstitute local government)
- Analysis of the possible impacts of potential disasters
- Providing a multi-hazard emergency operations plan
- Encouraging the limited completion of mutual aid agreements with neighboring jurisdictions; and
- Protection of people with special needs.

Intergovernmental and Interagency Coordination

The Clinton County Local Emergency Planning Committee (LEPC) meets monthly and serves to maintain coordination among fire, law enforcement, emergency medical, and public health officers from the county, and incorporated areas and adjacent jurisdictions. LEPCs are crucial to the success of the Emergency Planning.

Appointed by State Emergency Response Commissions (SERCs), local planning committees must consist of representatives of all of the following groups and organizations: elected state and local officials; law enforcement, civil defense, firefighting, first aid, health, local environmental, and transportation agencies; hospitals; broadcast and print media; community groups; and representatives of facilities subject to the emergency planning and community right-to-know requirements. Incidentally, in Missouri, the SERC is known as the Missouri Emergency Response Commission -- or MERC.

The LEPC's initial task was to develop an emergency plan to prepare for and respond to chemical emergencies. The Environmental Protection Agency's list of extremely hazardous substances can provide the focus for setting priorities. The plan must be reviewed annually, tested, and updated. Because the LEPC's members represent the community, they are to be familiar with factors that affect public safety, the environment, and the economy of the community.

An emergency plan must include the identity and location of hazardous materials, procedures for immediate response to chemical accidents, ways to notify the public about actions they must take, names of coordinators at plants, and schedules and procedures for testing the plan. The SERC reviews the plan, and the LEPC must test the plan through emergency exercises and update it at least annually.

The LEPC has other responsibilities besides developing an emergency response plan. It receives emergency release and hazardous chemical inventory information submitted by local facilities, and must make this information available to the public upon request. To obtain facility information from the LEPC, interested persons may go to the SEMA website *http://www.sema.state.mo.us/lepc1.htm* to find their nearest LEPC and the contact information. Request for information is typically required to be in writing and the appeal must state the nature of the request. The LEPC may charge a nominal fee for this service.

LEPCs have the authority to request additional information from facilities for their own planning purposes or on behalf of others. In addition, LEPCs can visit facilities in the community to find out what they are doing to reduce hazards, prepare for accidents, and reduce hazardous inventories and releases. Finally, LEPCs can take civil actions against facilities if they fail to provide the information required under the act.

In addition to its formal responsibilities, the LEPC serves as a focal point in the community for information and discussions about hazardous substances, emergency planning, and health and environmental risks due to hazardous substances. Citizens can expect the LEPC to reply to questions about chemical hazards and risk management actions.

The LEPC can most effectively carry out its responsibilities as a community forum by taking steps to educate the public about chemical risks, and working with facilities to minimize those risks. However, the LEPC's ability to improve the safety and health of its community is only as effective as the support it receives from an informed and active citizenry.

Commitments to a Comprehensive Mitigation Program

On a comprehensive basis, the county maintains and regularly updates the Emergency Operation Plan that includes mitigation measures for all hazards, both natural and manmade. In addition, the county has demonstrated a desire to safeguard the lives and property of Clinton County residents by completing this hazard mitigation plan.

County Laws, Regulations and Policies Related to Development in Hazard Prone Areas

Clinton County's floodplain management ordinance is based on policies to protect the general welfare and health of residents and visitors of the county. The ordinance is designed to safeguard health, safety and property in times of flooding by restricting avoidable increases in flood height or velocity, mitigating losses at time of construction of public facilities and protecting individuals from buying land unsuited for the intended use due to flood hazard. Additionally, the county's floodplain ordinance meets the requirements set forth by National Flood Insurance Program (NFIP).

County Laws, Regulations and Policies Related to Hazard Mitigation in General

Ordinances specifically related to Floodplain Management can be found in the Clinton County regulations.

How Local Risk Assessments are Incorporated and Prioritized into Local Planning

Clinton County is currently assessing capabilities to mitigate the impacts of flash flooding, tornadoes, and severe thunderstorms. In addition, the County recognizes the danger and economic impact of severe winter storms. Clearing snow and ice from roadways is the main priority during winter storms. The County Road and Bridge Department removes ice and snow from all county-maintained roads to minimize accidents and ensure access to employment. MoDOT clears those not maintained by individual communities or Clinton County.

Current Criteria Used to Prioritize Mitigation Funding

Mitigation funding is based primarily upon the combination of expected damage and death/injury impacts. For example, low-lying areas within the 100-year flood plain will receive special mitigation consideration when the county prioritizes mitigation projects.

Another facet of the county's mitigation concerns is the intensity of development pressures along and as a result of Interstate 35. The comprehensive plan calls for concentrating new land use and economic development in and around higher-density areas to provide greater access to infrastructures and emergency measures.

Integration Of Hazard Mitigation With The City/County Department's Plans

The County EMA committee includes representatives from the fire district, law enforcement, emergency medical, the public, news media, and health organizations. The cities rely on the County's EOP. In addition, the Local Emergency Planning Committee meets monthly; more often if needed.

How the County Determines Cost-Effectiveness of Mitigation Programs

The State's administrative plan governs how projects are selected for funding. However, proposed projects must meet certain minimum criteria. These criteria are designed to ensure that the most cost-effective and appropriate projects are selected for funding. Both the law and the regulations require that the projects are part of an overall mitigation strategy for the disaster area.

The State prioritizes and selects project applications developed and submitted by local jurisdictions. The State forwards applications consistent with State mitigation planning objectives to FEMA for eligibility review. Funding for this grant program is limited and States and local communities must make difficult decisions as to the most effective use of grant funds.

The County examines each mitigation program on a case-by-case basis. The determination depends on the scope of damages, estimated savings in future hazard events, the type of mitigation project, and the probable hazard to human life in future events. FEMA-funded mitigation projects must meet the benefit/cost analysis criteria required by FEMA. FEMA has established five issues a community must consider when determining the eligibility of a proposed project:

- Does your project conform to your State's Hazard Mitigation Plan?
- Does your project provide a beneficial impact on the disaster area?
- Does your application meet the environmental requirements?
- Does your project solve a problem independently?
- Is your project cost-effective?

The Disaster Mitigation Act of 2000 authorizes up to 7% of the Hazard Mitigation Grant Program (HMGP) ceiling to be used for the development of State, Indian Tribal, and/or local mitigation plans that meet the planning criteria outlined in 44 CFR Part 201. A benefit-cost analysis is not required for the use of the 7% planning funds.

Mitigation Funding Options Including Current and Potential Sources Of Federal, State, Local, Private

The County and incorporated areas have historically relied upon federal disaster declarations in cases of heavy widespread damages. Sources have included FEMA, SEMA, the Missouri Department of Natural Resources, Department of Economic Development (DED), and various other grant programs. In addition, investments in infrastructures that have mitigating effects have been funded from sources such as local tax revenues. Other funding options being considered for the future include the grant sources identified in SEMA’s Regional Planning Commission Hazard Mitigation Planning Guide – 2002.

How County Government Meets Requirements for Hazard Mitigation Funding Programs

Clinton County’s EOP and municipalities work towards meeting the requirements set forth by both FEMA and SEMA in regards to Hazard Mitigation funding programs.

Recommendations for Improvement

Recommended improvements include expanding mutual aid agreements among neighboring jurisdictions, improving the capabilities of the EOC, and adding warning sirens. Other recommendations include educating the public regarding the link between stormwater runoff and flash floods, encouraging the availability of tornado shelters in mobile home parks and back-up residential electrical generators, promoting drought-resistant farming techniques and designing methods to reduce impervious surfaces. In addition, it includes working with DNR to promote dam maintenance, and generally increasing education for public safety.

One method of helping communities respond to disasters is to ask Missouri's Structural Assessment and Visual Evaluation (SAVE) Coalition for assistance. SAVE facilitates the use of volunteer engineers, architects and qualified building inspectors who perform damage assessments of homes following disasters such as earthquakes, floods and tornadoes. The SAVE Coalition can provide sound advice to communities and citizens concerning the safety of reentering their homes following a disaster, with the added intent of minimizing the need for sheltering by allowing people back to their homes as soon as safely feasible. Missouri statute RSMo 44.023 provides immunity from liability for those working in disaster volunteer programs.

The Missouri Seismic Safety Commission (under Missouri statutes RSMo 44.227, 44.229, 44.231, 44.233, 44.235, and 44.227) has developed a Strategic Plan for Earthquake Safety in Missouri that contains a number of recommendations for earthquake mitigation. The commission also sponsors Earthquake Awareness activities each year, including exhibitions at the State Capitol. The Clinton County Hazard Mitigation Committee may want to investigate bringing these programs to a local venue.

Community Policies and Development Trends

Table 3-1. Community Regulations

Jurisdiction	Comprehensive Land Use Plan	Zoning	Building Codes	EOP	Subdivision Regulations	Stormwater Regulations	Flood Plain Regulations
Cameron	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Gower	No	Yes	Yes	Yes	Yes	No	Yes
Grayson	No	No	No	No	No	No	No
Holt	No	Yes	Yes	Yes	Yes	Yes	Yes
Lathrop	No	Yes	Yes	No	Yes	Yes	Yes
Plattsburg	No	Yes	Yes	No	Yes	Yes	Yes
Trimble	No	Yes	Yes	No	Yes	Yes	Yes
Turney	No	Yes	Yes	No	No	No	No
Clinton County	Yes	Yes	No	Yes	Yes	Yes	Yes

Section 4

Mitigation Planning

Definition of Mitigation

The Federal Emergency Management Agency (FEMA) defines mitigation as "sustained action taken to reduce or eliminate the long-term risk to people and property from hazards and their effects." The jurisdictions within Clinton County that participated in this process have the goal of taking the appropriate level of mitigation actions to meet their responsibilities for the health and safety of the residents of Clinton County. The goals of disaster mitigation planning, like those of disaster preparedness and disaster response, is to reduce or eliminate loss of lives and property in the next event.

Categories of Mitigation

Mitigation includes any activities that prevent an emergency, reduce the occurrence of emergencies, or lessen their damaging effects. Efforts by federal, state, and local governments can restrict development in vulnerable areas, direct new development to less vulnerable areas and promote ways to safeguard existing development in hazard-prone areas. Individuals also can participate by practicing sound personal safety and property damage prevention measures.

There are six categories of mitigation that can produce safer environments:

Prevention: Prevention tools include regulatory methods such as planning and zoning, building regulations, open space planning, land development regulations, and stormwater management.

Property Protection: Property protection measures reduce the risk of building damage through acquisition of land, relocation of buildings, modification of at-risk structures, and flood proofing at-risk structures.

Natural Resource Protection: Natural resource protection can reduce hazard impacts through measures such as erosion and sediment control or wetlands protection.

Emergency Services: Emergency services measures include warning, response capacity, critical facilities protection, and health and safety maintenance.

Structural Projects: Structural mitigation controls natural hazards through projects such as reservoirs, levees, diversions, channel modifications and storm sewers.

Public Information: Public information includes providing hazard maps and information, outreach programs, real estate disclosure, technical assistance and education.

Mitigation versus Preparedness, Response and Recovery

Mitigation does not include other emergency functions such as preparedness, response, or recovery. Preparedness deals with improving capabilities before a disaster strikes, response refers to a disaster-onset activity to immediately save lives and protect property, and recovery is a post-disaster activity to return all systems to a normal status. Though fundamentally important to the emergency planning process, these activities are beyond the scope of this plan and will not be discussed.

Mitigation Plan Benefits

Hazard mitigation planning is a tool communities may use to:

- Reduce death, injury and property losses.
- Identify specific problems and appropriate solutions.
- Achieve multiple objectives in a sustainable and efficient manner.
- Reduce future risks.
- Prioritize post-disaster projects.
- Enhance funding opportunities through federal, state and local programs.
- Promote public participation and ownership of solutions.

Goals, Objectives, Strategy and Coordination

Clinton County's mitigation goals were derived from existing goals in the Comprehensive Plan, the Clinton County Emergency Operations Plan, the Mo-Kan Region Comprehensive Economic Development Strategy (CEDS), and from direct input from the Clinton County Hazard Mitigation Committee. Mitigation goals and objectives are:

Goal 1: Protect the Lives, Property and Livelihoods of All Citizens.

Objective 1.1: Protect the lives and property of Clinton County residents.

- Action 1.1.1: Have video and audio Public Service Announcements (PSA) pre-made, delivered to the media, and are ready to be broadcast during emergencies and disasters. *Jurisdiction(s): Clinton County*
- Action 1.1.2: Local governments should encourage residents to purchase weather radios to ensure that everyone has sufficient access to information in times of severe weather. *Jurisdictions(s): Clinton County, Cameron, Gower, Grayson, Holt, Lathrop, Plattsburg, Trimble, Turney*
- Action 1.1.3: Encourage the incorporation and design of safe rooms in the construction of new public facilities like libraries, community centers, etc. *Jurisdiction(s): Clinton County, Cameron, Plattsburg, Lathrop, Trimble*
- Action 1.1.4: Incorporating hazard buffer zones into subdivision platting regulations. *Jurisdiction(s): Clinton County, Cameron, Plattsburg, Lathrop, Trimble*
- Action 1.1.5: Maintain an up-to-date list of addresses with shelters to assist fire departments and emergency services agencies to locate survivors after natural hazard event. *Jurisdictions(s): Clinton County, Cameron, Gower, Grayson, Holt, Lathrop, Plattsburg, Trimble, Turney*

- Action 1.1.6: Create a program to provide air conditioners and/or fans to those people in their community who do not have them and are at risk during a heat wave. *Jurisdiction(s): Clinton County, Cameron, Plattsburg, Lathrop*
- Action 1.1.7: Designate certain air-conditioned facilities as "heat emergency shelters" and encourage people without air conditioning to use them in a heat wave. *Jurisdiction(s): Clinton County, Cameron, Plattsburg, Lathrop*
- Action 1.1.8: Businesses should be encouraged to implement "snow-day" policies, which may reduce the number of people on the roadways during periods of severe winter weather. *Jurisdiction(s): Clinton County, Cameron, Plattsburg, Lathrop*
- Action 1.1.9: Offer residential and commercial builders and developers tax incentives to encourage the construction of safe rooms or community tornado shelters in new homes and commercial/retail buildings. *Jurisdiction(s): Clinton County, Cameron, Plattsburg, Lathrop*
- Action 1.1.10: Assess existing public facilities for the location of suitable "safe areas." If available, these "safe areas" should be clearly marked and employees and visitors should be informed of their location in public facilities. *Jurisdiction(s): Clinton County, Cameron, Plattsburg, Lathrop*
- Action 1.1.11: Review emergency access routes and evacuation routes; mitigate any problem areas. *Jurisdiction(s): Clinton County, Cameron, Plattsburg, Lathrop, Trimble*

Objective 1.2: Provide sufficient warning of impending disasters.

- Action 1.2.1: Require by ordinance a NOAA weather radio in continuous operation in all facilities offering public accommodations. *Jurisdictions(s): Clinton County, Cameron, Gower, Holt, Lathrop, Plattsburg, Trimble, Turney*
- Action 1.2.2: Cities that do not already possess warning systems should purchase a system. *Jurisdiction(s): Clinton County, Gower, Holt, Trimble, Turney, Grayson*

Objective 1.3: Identify the citizens most vulnerable to disasters and plan accordingly.

- Action 1.3.1: Citizens should be encouraged to know ahead of time what they should do to help elderly or disabled friends and neighbors or employees during times of natural hazard. *Clinton County, Cameron, Gower, Grayson, Holt, Lathrop, Plattsburg, Trimble, Turney*
- Action 1.3.2: Determine how to accommodate individuals with special needs in emergency shelters, including complying with the American with Disabilities Act (ADA.) *Jurisdiction(s): Clinton County*
- Action 1.3.3: Provide materials and volunteer labor to assist at-risk groups in winterizing their homes. *Clinton County, Cameron, Gower, Holt, Lathrop, Plattsburg, Trimble, Turney*
- Action 1.3.4: Develop an inventory of facilities with generators/emergency power that can be used as shelters in the event of natural disasters. *Jurisdiction(s): Clinton County, Cameron, Plattsburg, Lathrop*

Goal 2: Manage Growth in Designated Hazard Areas Through Sustainable Policies, Principles and Practices.

Objective 2.1: Decrease the impact of natural hazards.

- Action 2.1.1: Develop an ongoing "buyout" program for the highest risk properties located the highest-risk flood areas. *Jurisdiction(s): Clinton County, Cameron, Plattsburg, Lathrop*
- Action 2.1.2: Continue to participate in the National Flood Insurance Program (NFIP). *Jurisdictions(s): Clinton County, Cameron, Gower, Holt, Lathrop, Plattsburg, Trimble, Turney*
- Action 2.1.3: Conduct a public education campaign to inform dam owners and citizens living near the inundation zones of dams about the need to properly maintain and upgrade these structures, particularly those that are more than 50 years old. *Jurisdiction(s): Clinton County*

Objective 2.2: Decrease the cost of the next disaster.

- Action 2.2.1: Consider alternative uses for flood-prone areas, such as sports fields, parks, wildlife habitats, etc and incorporate this in land use plan updates. *Jurisdiction(s): Clinton County, Cameron, Plattsburg, Lathrop*
- Action 2.2.2: Develop a countywide multi jurisdiction comprehensive stormwater / watershed management plan. *Jurisdiction(s): Clinton County*
- Action 2.2.3: Amend municipal ordinances to include a section mandating the building of a wind-resistant shelter with a capacity suitable to handle the expected population in any new trailer park, or park undergoing renovation or expansion. *Jurisdiction(s): Clinton County, Cameron, Plattsburg, Lathrop*

Objective 2.3: Increase Clinton County's economic resistance to disasters.

- Action 2.3.1: Encourage up-to-date commercial and industrial disaster plans that are coordinated with community disaster plans. *Jurisdiction(s): Clinton County, Cameron, Plattsburg, Lathrop*
- Action 2.3.2: Determine how long large businesses and employers can operate without individual services. *Jurisdiction(s): Clinton County, Cameron, Plattsburg, Lathrop*
- Action 2.3.3: Emergency lists should be developed and maintained with names and phone numbers of plant managers and other large employers. *Jurisdiction(s): Clinton County, Cameron, Plattsburg, Lathrop*

Goal 3: Ensure Continued Operation of Government and Emergency Functions in a Disaster.

Objective 3.1: Increase disaster mitigation management capability in local governments.

- Action 3.1.1: Maintain a publicly accessible list of names, positions, contact information, roles, and responsibilities for all public safety positions and departments. *Jurisdictions(s): Clinton County, Cameron, Gower, Holt, Lathrop, Plattsburg, Trimble, Turney*
- Action 3.1.2: Execute and maintain mutual aid agreements with all relevant agencies. *Jurisdictions(s): Clinton County, Cameron, Gower, Holt, Lathrop, Plattsburg, Trimble, Turney*
- Action 3.1.3: Make all GIS hazard information available online to county and municipal permitting departments. *Jurisdiction(s): Clinton County*
- Action 3.1.4: Develop a website for the Local Emergency Planning Committee. *Jurisdiction(s): Clinton County*
- Action 3.1.5: Encourage property owners, businesses and occupants in hazard areas to participate in mitigation policy formulation. *Jurisdiction(s): Clinton County*
- Action 3.1.6: Inform all city / county department heads and major employers of the county mitigation plan. *Jurisdictions(s): Clinton County, Cameron, Gower, Holt, Lathrop, Plattsburg, Trimble, Turney*
- Action 3.1.7: Craft new plans or update existing comprehensive land use plans to specifically address development in hazard-prone areas and recommend strategies for decreasing the jurisdiction's vulnerability to hazards. *Jurisdiction(s): Clinton County, Cameron, Plattsburg, Lathrop*

Objective: 3.2: Strengthen critical infrastructure.

- Action 3.2.1: Determine the impact the loss of government records would have and plan to safeguard the most important records accordingly. *Jurisdictions(s): Clinton County, Cameron, Gower, Holt, Lathrop, Plattsburg, Trimble, Turney*
- Action 3.2.2: Encourage electric and telecommunications utilities to anchor or strengthen aboveground transmission lines, poles and similar structures. *Jurisdiction(s): Clinton County*
- Action 3.2.3: Encouraging tree trimming by electric companies may help offset the damages by strong winds breaking tree limbs. *Jurisdiction(s): Clinton County*

- Action 3.2.4: Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructures. *Jurisdictions(s): Clinton County, Cameron, Gower, Holt, Lathrop, Plattsburg, Trimble, Turney*
- Action 3.2.5: Utility providers should assess their facilities, distribution systems, etc. for vulnerability to natural hazards and, if necessary, retrofit or modify them to decrease their vulnerability. *Jurisdiction(s): Clinton County*
- Action 3.2.6: Encourage water and wastewater districts should elevate vulnerable equipment, electrical controls and other equipment at wastewater treatment plants, potable water treatment plants and pump stations. *Jurisdiction(s): Clinton County*

Goal 4: Ensure Access to Information Hazard Preparation and Recovery.

Objective 4.1: Increase knowledge among citizens about disaster safety.

- Action 4.1.1: Develop an ongoing campaign to educate the community about seasonal hazards, and coordinate this campaign with a variety of advertising resources in order to reach the maximum number of people in a timely manner. *Jurisdictions(s): Clinton County, Cameron, Gower, Holt, Lathrop, Plattsburg, Trimble, Turney*
- Action 4.1.2: Publish detailed hazard maps on all city and county websites and provide paper copies to the public. *Jurisdiction(s): Clinton County, Cameron, Plattsburg, Lathrop*
- Action 4.1.3: Educate grade school-age children in disaster preparedness and how to survive disasters. *Jurisdiction(s): Clinton County*
- Action 4.1.4: Businesses and homeowners in flood-prone areas should be encouraged to elevate mechanical systems (i.e., furnaces, hot water heaters, electrical panels, etc.). *Jurisdiction(s): Clinton County*
- Action 4.1.5: Citizens should be encouraged to assemble a home disaster supply kit and to prepare to be homebound for up to three days in an emergency situation. *Jurisdiction(s): Clinton County*
- Action 4.1.6: Citizens should be encouraged to learn how to winterize their homes, shut off water valves in case a pipe bursts, and prepare for extreme cold. *Jurisdiction(s): Clinton County*
- Action 4.1.7: Citizens that live in areas near timber or tall grass should be encouraged to remove vegetation, yard debris, and other combustible materials that may be near structures. *Jurisdictions(s): Clinton County, Cameron, Gower, Holt, Lathrop, Plattsburg, Trimble, Turney*

Analysis and Prioritization of Mitigation Actions

Clinton County's mitigation actions promote and/or support the development of local hazard mitigation plans, projects and activities. Examples include targeting repetitive flood loss properties for buyout and instituting additional environmental measures (such as watershed protection) as well as encouraging local building codes, emergency operation plans, comprehensive plans, planning and zoning ordinances, floodplain ordinances, local disaster plans, local mitigation plans, and commercial/industrial disaster plans.

Clinton County Five-Year Action Matrix

Clinton County's mitigation actions promote and/or support the development of local hazard mitigation plans, projects and activities. Examples include targeting repetitive flood loss properties for buyout and instituting additional environmental measures (such as watershed protection) as well as encouraging local building codes, emergency operation plans, master

plans, planning and zoning ordinances, floodplain ordinances, local disaster plans, local mitigation plans, and commercial/industrial disaster plans.

The following matrix provides an analysis and prioritization of the county's natural hazard mitigation goals, objectives and actions. The matrix also illustrates the relationship between the state's identified hazards and the county's mitigation actions. All actions will be coordinated, where applicable, with Missouri's mitigation actions.

Matrix Key

Categories of Mitigation

The following list delineates mitigation recommendations that include the six categories of mitigation:

- Prevention
- Property Protection
- Natural Resource Protection
- Emergency Services
- Structural Projects
- Public Information

Evaluation Methods

Each action item must have a quantifiable component to be considered complete or established. The following are the anticipated methods that will be used to determine completeness or if an action item has been effectively established.

Evaluation Method	
LEPC Rev.	The LEPC will review the action item and note in their minutes if it is complete or established
Maps	Maps depicting the hazard or exclusion zone have been completed.
Ordinance	An ordinance has been considered by Clinton County.
Reports	A report has been prepared and given to the Clinton County Commission by the lead agency.
Records	The proper records have been made and are available for inspection on this action item.

Lead Agencies for Each Action Item

The table below defines the terms used in the larger item table where an agency is assigned to the lead agency for each mitigation action item.

Lead Action Item Agency	
CC-Emrg	Clinton County Emergency Management
CC-Admin	Clinton County Commission / Administration
CC-Shrf	Clinton County Sheriff's Department
CC-PZ	Clinton County Planning & Zoning
LEPC	Local Emergency Planning Committee
Mo-Kan	Mo-Kan Regional Council
NGO	Non-Profit or other community organization

Table 4-3. Clinton County, Five-Year Action Plan Matrix

Action	Type of Strategy	New, Revision, Ongoing	Priority Rank and Estimated Target Date	Probable Lead Organizer	Potential Funding Sources	Evaluation	Natural Hazard								
							Dam Failure	Drought	Earthquake	Flood	Heat Wave	Thunderstorm	Winter	Tornado	Fire
Goal 1: Protect the Lives, Property and Livelihoods of All Citizens.															
Objective 1.1. Protect the lives and property of Clinton County residents.															
Action 1.1.1: Have video and audio Public Service Announcements (PSA) pre-made, delivered to the media, and are ready to be broadcast during emergencies and disasters.	Public Information	New	High 2007	CC-Admin	Grants, Internal, Private	CC-Admin	X	X	X	X	X	X	X	X	X
Action 1.1.2: Local governments should encourage residents to purchase weather radios to ensure that everyone has sufficient access to information in times of severe weather.	Prevention, Public Information	New	High 2007	CC-Emrg	Internal, Private	CC-Admin				X		X	X	X	
Action 1.1.3: Encourage the incorporation and design of safe rooms in the construction of new public facilities like libraries, community centers, etc.	Prevention	New	High 2007	CC-PZ	Internal	CC-Admin			X			X		X	
Action 1.1.4: Incorporating hazard buffer zones into subdivision platting regulations.	Prevention	New	Medium 2007	CC-PZ	Internal	CC-Admin	X			X					X
Action 1.1.5: Maintain an up-to-date list of addresses with shelters to assist fire departments and emergency services agencies to locate survivors after natural hazard event.	Emergency Services	Ongoing	High 2006	CC-Emrg	Internal	CC-Admin			X			X	X	X	X
Action 1.1.6: Create a program to provide air conditioners and/or fans to those people in their community who do not have them and are at risk during a heat wave.	Prevention	New	Medium 2007	NGO	Private	CC-Emrg, Records					X				
Action 1.1.7: Designate certain air-conditioned facilities as "heat emergency shelters" and encourage people without air conditioning to use them in a heat wave.	Prevention, Public Information	New	Medium 2007	NGO	Private, Internal	Maps, Records CC-Admin					X				

Clinton County, Five-Year Action Plan Matrix																
							Natural Hazard									
Action	**Type of Strategy**	**New, Revision, Ongoing**	**Priority Rank and Estimated Target Date**	**Probable Lead Organizer**	**Potential Funding Sources**	**Evaluation**	Dam Failure	Drought	Earthquake	Flood	Heat Wave	Thunderstorm	Winter	Tornado	Fire
Action 1.1.8: Businesses should be encouraged to implement "snow-day" policies, which may reduce the number of people on the roadways during periods of severe winter weather.	Prevention	New	Low 2007	CC-Admin	Internal, Private	CC-Admin							X		
Action 1.1.9: Offer residential and commercial builders and developers tax incentives to encourage the construction of safe rooms or community tornado shelters in new homes and commercial/retail buildings.	Prevention	New	Low 2008	CC-PZ	Internal	CC-Admin, Ordinance			X			X		X	
Action 1.1.10: Assess existing public facilities for the location of suitable "safe areas." If available, these "safe areas" should be clearly marked and employees and visitors should be informed of their location in public facilities.	Prevention	Ongoing	Medium 2007	CC-Emrg	Internal, Private	CC-Admin, Maps			X			X		X	
Action 1.1.11: Review emergency access routes and evacuation routes; mitigate any problem areas.	Emergency Services	Ongoing	High 2006	CC-Shrf	Internal	CC-Admin, Maps	X			X			X		
Objective 1.2. Provide sufficient warning of impending disasters.																
Action 1.2.1: Require by ordinance a NOAA weather radio in continuous operation in all facilities offering public accommodations.	Public Information	New	High 2006	CC-Admin	Internal	Ordinance				X		X	X	X	
Action 1.2.2: Cities that do not already possess warning systems should purchase a system.	Public Information, Prevention	Ongoing	High 2006	Mo-Kan, Community	Grants, Internal, Private	Mo-Kan, Maps						X		X	

Clinton County, Five-Year Action Plan Matrix																
							Natural Hazard									
Action	**Type of Strategy**	**New, Revision, Ongoing**	**Priority Rank and Estimated Target Date**	**Probable Lead Organizer**	**Potential Funding Sources**	**Evaluation**	Dam Failure	Drought	Earthquake	Flood	Heat Wave	Thunderstorm	Winter	Tornado	Fire
Objective 1.3. Identify the citizens most vulnerable to disasters and plan accordingly.																
Action 1.3.1: Citizens should be encouraged to know ahead of time what they should do to help elderly or disabled friends and neighbors or employees during times of natural hazard.	Public Information	New	High 2005	CC-Admin, CC-Emrg	Internal	CC-Admin			X	X	X	X	X	X	X
Action 1.3.2: Determine how to accommodate individuals with special needs in emergency shelters, including complying with the American with Disabilities Act (ADA.)	Public Information, Emergency Services	New	High 2006	CC-Admin, CC-Emrg	Internal, Grants	CC-Admin					X	X	X	X	
Action 1.3.3: Provide materials and volunteer labor to assist at-risk groups in winterizing their homes.	Prevention	New	Medium 2007	NGO	Private	Records							X		
Action 1.3.4: Develop an inventory of facilities with generators/emergency power that can be used as shelters in the event of natural disasters.	Emergency Services	Ongoing	High 2005	CC-Emrg, CC-Admin	Internal	Records, CC-Admin			X			X	X	X	
Action 1.3.5: Citizens should be encouraged to know ahead of time what they should do to help elderly or disabled friends and neighbors or employees during times of natural hazard.	Public Information	New	High 2005	LEPC	Internal	LEPC			X	X	X	X	X	X	X

Clinton County, Five-Year Action Plan Matrix																
Action	**Type of Strategy**	**New, Revision, Ongoing**	**Priority Rank and Estimated Target Date**	**Probable Lead Organizer**	**Potential Funding Sources**	**Evaluation**	Dam Failure	Drought	Earthquake	Flood	Heat Wave	Thunderstorm	Winter	Tornado	Fire
Goal 2: Manage Growth in Designated Hazard Areas Through Sustainable Policies, Principles and Practices.																
Objective 2.1: Decrease the impact of natural hazards.																
Action 2.1.1: Develop an ongoing "buyout" program for the highest risk properties located the highest-risk flood areas.	Prevention	Revision	Medium 2007	CC-PZ	Grants, Internal	Maps, Ordinance, Records	X			X					
Action 2.1.2: Continue to participate in the National Flood Insurance Program (NFIP).	Prevention, Property Protection, Natural Resources	Ongoing	High 2005	CC-Admin	Internal	Ordinance				X					
Action 2.1.3: Conduct a public education campaign to inform dam owners and citizens living near the inundation zones of dams about the need to properly maintain and upgrade these structures, particularly those that are more than 50 years old.	Prevention, Property Protection	New	Medium 2006	CC-PZ	Internal, Private	CC-Admin, Maps	X			X					
Objective 2.2. Decrease the cost of the next disaster.																
Action 2.2.1: Consider alternative uses for flood-prone areas, such as sports fields, parks, wildlife habitats, etc and incorporate this in land use plan updates.	Prevention, Property Protection	Revision	Low 2008	CC-PZ	Internal	CC-Admin, Maps				X					
Action 2.2.2: Develop a countywide multi jurisdiction comprehensive stormwater / watershed management plan.	Property Protection, Natural Resources	New	Low 2007	Mo-Kan, NGO	Internal, Private	Mo-Kan, Maps	X			X		X			
Action 2.2.3: Amend municipal ordinances to include a section mandating the building of a wind-resistant shelter with a capacity suitable to handle the expected population in any new trailer park, or park undergoing renovation or expansion.	Prevention	New	High 2006	CC-Admin, CC-PZ	Internal, Private	CC-Admin, Ordinance						X		X	

Clinton County, Five-Year Action Plan Matrix																
							Natural Hazard									
Action	**Type of Strategy**	**New, Revision, Ongoing**	**Priority Rank and Estimated Target Date**	**Probable Lead Organizer**	**Potential Funding Sources**	**Evaluation**	Dam Failure	Drought	Earthquake	Flood	Heat Wave	Thunderstorm	Winter	Tornado	Fire
Objective 2.3: Increase Clinton County's economic resistance to disasters.																
Action 2.3.1: Encourage up-to-date commercial and industrial disaster plans that are coordinated with community disaster plans.	Prevention	Ongoing	Medium 2006	NGO	Internal	Records			X	X		X	X	X		
Action 2.3.2: Determine how long large businesses and employers can operate without individual services.	Emergency Services	New	Low 2007	NGO	Private	Records			X	X		X	X	X	X	
Action 2.3.3: Emergency lists should be developed and maintained with names and phone numbers of plant managers and other large employers.	Emergency Services	Ongoing	High 2005	CC-Shrf	Private	CC-Shrf Records	X		X	X		X	X	X	X	
Goal 3: Ensure Continued Operation of Government and Emergency Functions in a Disaster.																
Objective 3.1. Increase disaster mitigation management capability in local governments.																
Action 3.1.1: Maintain a publicly accessible list of names, positions, contact information, roles, and responsibilities for all public safety positions and departments.	Emergency Services	Ongoing	High 2005	CC-Shrf	Internal	CC-Admin	X	X	X	X	X	X	X	X	X	
Action 3.1.2: Execute and maintain mutual aid agreements with all relevant agencies.	Emergency Services	Ongoing	High 2005	CC-Admin CC-Emrg	Internal	CC-Admin		X	X			X	X	X	X	
Action 3.1.3: Make all GIS hazard information available online to county and municipal permitting departments.	Prevention	New	Medium 2007	CC-Admin	Internal	Maps, CC-Admin	X		X	X		X	X	X		
Action 3.1.4: Develop a website for the Local Emergency Planning Committee.	Public Information	New	Low 2008	LEPC	Internal	LEPC	X	X	X	X	X	X	X	X	X	

Clinton County, Five-Year Action Plan Matrix

Action	Type of Strategy	New, Revision, Ongoing	Priority Rank and Estimated Target Date	Probable Lead Organizer	Potential Funding Sources	Evaluation	Dam Failure	Drought	Earthquake	Flood	Heat Wave	Thunderstorm	Winter	Tornado	Fire
Action 3.1.5: Encourage property owners, businesses and occupants in hazard areas to participate in mitigation policy formulation.	Prevention	New	Medium 2007	CC-Admin	Internal, Grants	Records	X	X	X	X	X	X	X	X	X
Action 3.1.6: Inform all city / county department heads and major employers of the county mitigation plan.	Public Information	New	Medium 2006	CC-Admin	Internal	Records	X	X	X	X	X	X	X	X	X
Action 3.1.7: Craft new plans or update existing comprehensive land use plans to specifically address development in hazard-prone areas and recommend strategies for decreasing the jurisdiction's vulnerability to hazards.	Prevention, Property Protection	Revision	Medium 2006	CC-Admin	Internal, Grants	CC-Admin	X			X					
Objective: 3.2: Strengthen critical infrastructure.															
Action 3.2.1: Determine the impact the loss of government records would have and plan to safeguard the most important records accordingly.	Prevention	Revision	High 2005	CC-Admin	Internal	CC-Admin, Records			X	X		X	X	X	X
Action 3.2.2: Encourage electric and telecommunications utilities to anchor or strengthen aboveground transmission lines, poles and similar structures.	Prevention	New	High 2006	CC-Admin	Internal	CC-Admin						X	X	X	
Action 3.2.3: Encouraging tree trimming by electric companies may help offset the damages by strong winds breaking tree limbs.	Prevention, Property Protection	New	High 2006	CC-Admin	Internal	CC-Admin						X	X	X	
Action 3.2.4: Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructures.	Prevention, Structural Projects	Ongoing	Medium 2007	CC-Admin	Internal, Grants	CC-Admin			X	X		X	X	X	X

Clinton County, Five-Year Action Plan Matrix

Action	Type of Strategy	New, Revision, Ongoing	Priority Rank and Estimated Target Date	Probable Lead Organizer	Potential Funding Sources	Evaluation	Dam Failure	Drought	Earthquake	Flood	Heat Wave	Thunderstorm	Winter	Tornado	Fire
Action 3.2.5: Utility providers should assess their facilities, distribution systems, etc. for vulnerability to natural hazards and, if necessary, retrofit or modify them to decrease their vulnerability.	Prevention, Structural Projects	Ongoing	High 2006	NGO, CC-Admin	Private	CC-Admin	X	X	X	X	X	X	X	X	X
Action 3.2.6: Encourage water and wastewater districts should elevate vulnerable equipment, electrical controls and other equipment at wastewater treatment plants, potable water treatment plants and pump stations.	Prevention, Structural Projects	Ongoing	High 2006	CC-Admin	Grants, Internal	CC-Admin	X	X		X		X		X	
Goal 4: Ensure Access to Information Hazard Preparation and Recovery.															
Objective 4.1: Increase knowledge among citizens about disaster safety.															
Action 4.1.1: Develop an ongoing campaign to educate the community about seasonal hazards, and coordinate this campaign with a variety of advertising resources in order to reach the maximum number of people in a timely manner.	Public Information	New	High 2006	CC-Emrg	Internal	CC-Admin			X	X	X	X	X	X	X
Action 4.1.2: Publish detailed hazard maps on all city and county websites and provide paper copies to the public.	Public Information	New	Medium 2007	CC-Admin Mo-Kan	Internal, Private	CC-Admin Maps				X		X	X	X	
Action 4.1.3: Educate grade school-age children in disaster preparedness and how to survive disasters.	Public Information	Ongoing	High 2005	CC-Emrg, CC-Shrf,	Internal, Private, Grants	CC-Admin			X	X	X	X	X	X	X
Action 4.1.4: Businesses and homeowners in flood-prone areas should be encouraged to elevate mechanical systems (i.e., furnaces, hot water heaters, electrical panels, etc.).	Public Information	New	Low 2006	CC-PZ	Internal, Private	CC-Admin				X					

Clinton County, Five-Year Action Plan Matrix															
Action	**Type of Strategy**	**New, Revision, Ongoing**	**Priority Rank and Estimated Target Date**	**Probable Lead Organizer**	**Potential Funding Sources**	**Evaluation**	Dam Failure	Drought	Earthquake	Flood	Heat Wave	Thunderstorm	Winter	Tornado	Fire
Action 4.1.5: Citizens should be encouraged to assemble a home disaster supply kit and to prepare to be homebound for up to three days in an emergency situation.	Public Information	New	High 2005	CC-Emrg	Internal	CC-Admin			X			X	X	X	
Action 4.1.6: Citizens should be encouraged to learn how to winterize their homes, shut off water valves in case a pipe bursts, and prepare for extreme cold.	Public Information, Prevention	New	High 2005	CC-Admin, NGO	Internal, Private	CC-Admin							X		
Action 4.1.7: Citizens that live in areas near timber or tall grass should be encouraged to remove vegetation, yard debris, and other combustible materials that may be near structures.	Public Information, Prevention	New	Medium 2006	CC-PZ	Internal	CC-Admin		X							X

THIS PAGE LEFT INTENTIONALLY BLANK

Evaluation

The following table provides an analysis of the county's proposed mitigation actions. Each action was reviewed according to the STAPLEE criteria. STAPLEE criteria include: **s**ocial, **t**echnical, **a**dministrative, **p**olitical, **l**egal, **e**conomic and **e**nvironmental considerations. The "X" in the columns indicates the action would have a positive effect.

Table 4-4. Social, Technical, Administrative, Political, Legal, Economic and Environmental Criteria	**S**	**T**	**A**	**P**	**L**	**E**	**E**
Goal 1: Protect the Lives, Property and Livelihoods of All Citizens.							
Objective 1.1: Protect the lives and property of Clinton County Residents.							
Action 1.1.1: Have video and audio Public Service Announcements (PSA) pre-made, delivered to the media, and are ready to be broadcast during emergencies and disasters.	X	X					X
Action 1.1.2: Local governments should encourage residents to purchase weather radios to ensure that everyone has sufficient access to information in times of severe weather.	X	X				X	X
Action 1.1.3: Encourage the incorporation and design of safe rooms in the construction of new public facilities like libraries, community centers, etc.	X					X	X
Action 1.1.4: Incorporating hazard buffer zones into subdivision platting regulations.	X						X
Action 1.1.5: Maintain an up-to-date list of addresses with shelters to assist fire departments and emergency services agencies to locate survivors after a tornado or high winds disaster.	X		X				X
Action 1.1.6: Create a program to provide air conditioners to those people in their community who do not have them and are at risk during a heat wave.	X	X				X	X
Action 1.1.7: Designate certain air-conditioned facilities as "heat emergency shelters" and encourage people without air conditioning to use them in a heat wave.	X						X
Action 1.1.8: Businesses should be encouraged to implement "snow-day" policies for their employees that mirror official plans These measures may reduce the number of people on the roadways during periods of severe winter weather.	X		X				
Action 1.1.9: Offer residential and commercial builders and developers tax incentives to encourage the construction of safe rooms or community tornado shelters in new homes and commercial/retail buildings.	X					X	
Action 1.1.10: Assess existing public facilities for the location of suitable "safe areas." If available, these "safe areas" should be clearly marked and employees and visitors should be informed of their location in public facilities.	X						
Action 1.11: Review emergency access routes and evacuation routes and mitigate any problem areas.	X						X
Objective 1.2: Provide sufficient warning of impending disasters.							
Action 1.2.1: Require by ordinance a NOAA weather radio in continuous operation in all facilities offering public accommodations.	X	X	X				
Action 1.2.2: Cities that do not already possess warning systems should purchase a system.	X	X	X				X
Objective 1.3: Identify the citizens most vulnerable to disasters and plan accordingly.							
Action 1.3.1: Citizens should be encouraged to know ahead of time what they should do to help elderly or disabled friends and neighbors or employees during times of natural hazard.	X						

Table 4-4. Social, Technical, Administrative, Political, Legal, Economic and Environmental Criteria	**S**	**T**	**A**	**P**	**L**	**E**	**E**
Action 1.3.2: Determine how to accommodate individuals with special needs both in emergency shelters, including complying with the American with Disabilities Act (ADA.)	X						
Action 1.3.3: Provide materials and volunteer labor to assist at-risk groups in winterizing their homes.	X	X					
Action 1.3.4: Develop an inventory of facilities with generators/emergency power that can be used as shelters in the event of natural disasters	X	X					
Goal 2: Manage Growth in Designated Hazard Areas Through Sustainable Policies, Principles and Practices.							
Objective 2.1: Decrease the impact of natural hazards.							
Action 2.1.1: Develop an ongoing "buyout" program for the highest risk properties located the highest-risk flood areas.						X	
Action 2.1.2: Continue to participate in the National Flood Insurance Program (NFIP).	X			X			X
Action 2.1.3: Conduct a public education campaign to inform dam owners and citizens living near the inundation zones of dams about the need to properly maintain and upgrade these structures, particularly those that are more than 50 years old.	X						X
Objective 2.2: Decrease the cost of the next disaster.							
Action 2.2.1: Consider alternative uses for flood-prone areas, such as sports fields, parks, wildlife habitats, etc and incorporate this in all comprehensive land use plan updates.	X					X	X
Action 2.2.2: Develop a countywide multi-jurisdiction comprehensive stormwater management plan.	X		X	X			X
Action 2.2.3: Amend municipal ordinances to include a section mandating the building of a wind-resistant shelter with a capacity suitable to handle the expected population in any new trailer park, or park undergoing renovation or expansion.	X			X			X
Objective 2.3: Increase Clinton County's economic resistance to disasters.							
Action 2.3.1: Encourage up-to-date commercial and industrial disaster plans that are coordinated with community disaster plans.	X	X				X	
Action 2.3.2: Determine how long large businesses and employers can operate without individual services.			X			X	
Action 2.3.3: Emergency lists should be developed and maintained with names and phone numbers of plan managers and other large employers.			X				
Goal 3: Ensure Continued Operation of Government and Emergency Functions in a Disaster.							
Objective 3.1: Increase disaster mitigation management capability in local governments.							
Action 3.1.1: Maintain a publicly accessible list of names, positions, contact information, roles, and responsibilities for all public safety positions and departments.	X		X				
Action 3.1.2: Execute and maintain mutual aid agreements with all relevant agencies.	X		X				
Action 3.1.3: Make all GIS hazard information available online to county and municipal permitting departments.	X	X	X				
Action 3.1.4: Develop a website for the Local Emergency Planning Committee.	X	X					
Action 3.1.5: Encourage property owners, businesses and occupants in hazard areas to participate in mitigation policy formulation.	X						
Action 3.1.6: Inform all city / county department heads and major employers of the disaster mitigation plan.	X		X				

Table 4-4. Social, Technical, Administrative, Political, Legal, Economic and Environmental Criteria	**S**	**T**	**A**	**P**	**L**	**E**	**E**
Action 3.1.7: Craft new plans or update existing comprehensive land use plans to specifically address development in hazard-prone areas and recommend strategies for decreasing the jurisdiction's vulnerability to hazards.	X		X				
Objective: 3.2: Strengthen critical infrastructure.							
Action 3.2.1: Determine the impact the loss of government records would have and plan to safeguard the most important records accordingly.			X		X		
Action 3.2.2: Encourage electric and telecommunications utilities to anchor or strengthen aboveground transmission lines, poles and similar structures.		X					
Action 3.2.3: Encouraging tree trimming by electric companies may help offset the damages by strong winds breaking tree limbs.		X					
Action 3.2.4: Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructures.			X				
Action 3.2.5: Utility providers should assess their facilities, distribution systems, etc. for vulnerability to natural hazards and, if necessary, retrofit or modify them to decrease their vulnerability.		X	X				
Action 3.2.6: Encourage water and wastewater districts should elevate vulnerable equipment, electrical controls and other equipment at wastewater treatment plants, potable water treatment plants and pump stations.		X					X

Goal 4: Ensure Access to Information Hazard Preparation and Recovery.

Objective 4.1: Increase knowledge among citizens about disaster safety.							
Action 4.1.1: Develop an ongoing campaign to educate the community about seasonal hazards by adopting a disaster theme for each month of the year, and coordinate this campaign with a variety of advertising resources in order to reach an optimum number of people in a timely manner.	X						
Action 4.1.2: Publish detailed hazard maps on all city and county websites and provide paper copies to the public.	X						
Action 4.1.3: Educate grade school-age children in disaster preparedness and how to survive disasters.	X						
Action 4.1.4: Businesses and homeowners in flood-prone areas should be encouraged to elevate mechanical systems (i.e., furnaces, hot water heaters, electrical panels, etc.).	X	X					
Action 4.1.5: Citizens should be encouraged to assemble a home disaster supply kit and to prepare to be homebound for up to three days in an emergency situation.	X						
Action 4.1.6: Citizens should be encouraged to learn how to winterize their homes, shut off water valves, and prepare for extreme cold.	X	X					
Action 4.1.7: Citizens that live in areas near timber or tall grass should be encouraged to remove vegetation, yard debris, and other combustible materials that may be near structures.	X						X

Plan Implementation

Strategic Implementation

The goals, objectives, and actions of this plan necessitate group involvement, including individual communities, chambers of commerce, and large employers. All actions shown above were found to be cost-effective, environmentally sound and technically feasible. The following set of underlying operating principles will improve fiscal and operational efficiency, help maintain a

focus on the greater goal of overall community well-being and ensure implementation. Each action will be implemented according to the following strategies:

- Incorporate mitigation objectives into existing and future plans, regulations, programs and projects.
- Promote and encourage collaboration between agencies and departments to create a partnership and synergy that result in benefits that would not be possible through a single agency.
- Employ sustainable principles and techniques in the implementation of each objective to attain maximum benefits.
- Create and implement a prioritization process that includes fiscal, environmental, and sociological considerations.

Ensure Implementation through Inclusion in Adoption Resolution

The Clinton County Natural Hazard Mitigation Plan will be implemented under the direction of the Clinton County Commission, the governing body of each municipality, the Regional Planning Commission, a variety of intergovernmental committees, private agencies, non-governmental cooperatives and each of their respective staffs. The implementation process will include coordination among County departments and other relevant agencies or districts through the County's Emergency Management Agency. The County will set up a system to monitor progress and evaluate the effectiveness of implemented actions with revisions as needed. Every five years, the County will review the plan and include any needed updates. The updated plan will be submitted for SEMA/FEMA approval. Copies of the signed adoption resolutions are included in Appendix A.

In addition, the plan will be reviewed for any necessary updates following any major disasters that occur within the County.

Plan Maintenance

The plan maintenance section of this document details the formal process that will ensure that the Clinton County Hazard Mitigation Plan remains an active and relevant document. The plan maintenance process includes a schedule for monitoring and evaluating the Plan annually and producing a plan revision every five years. This section describes how the County will integrate public participation throughout the plan maintenance process. Finally, this section includes an explanation of how Clinton County government intends to incorporate the mitigation strategies outlined in this Plan into existing planning mechanisms such as the County Local Emergency Operations Plan, the CEDS, and floodplain management.

The results of this five-year review will be summarized in a report prepared for this Mitigation Plan under direction of the Clinton County Emergency Management Director and the

LEPC. The report will include an evaluation of the effectiveness and appropriateness of the Plan, and will recommend, as appropriate, any required changes or amendments to the Plan. The planning committee directed to review the Plan shall be composed of representatives from various governmental agencies, County officials, City employees, utility service employees, emergency responders and planners, regional planners and any concerned county residents. The committee shall be established when the five-year review period approaches and will meet as necessary to discuss mitigation updates.

Upon meeting, the committee members will also report on the status of their assigned projects. The Hazard Mitigation Committee should update the plan and submit it to the Committee members and State Hazard Mitigation Officer.

Plan Adoption

The Clinton County Commission will be responsible for adopting the Clinton County Hazard Mitigation Plan. This governing body has the authority to promote sound public policy regarding natural hazards. Once the plan has been adopted, the County Emergency Management Director will be responsible for submitting it to the State Hazard Mitigation Officer at Missouri State Emergency Management Agency. Missouri State Emergency Management will then submit the plan to the Federal Emergency Management Agency (FEMA) for review. This review will address the federal criteria outlined in FEMA Interim Final Rule 44 CFR Part 201. Upon acceptance by FEMA, Clinton County will gain eligibility for Hazard Mitigation Grant Program funds.

Monitoring, Evaluating and Updating

Clinton County has developed a method to ensure regular review and update of the Hazard Mitigation Plan. The Clinton County Emergency Management Director (EMD) will include hazard mitigation objectives in the weekly meeting with the County Commission as needed. If there is a need for a new committee to work on the plan, the County Commission will appoint such. As planning begins for each objective, the public will be encouraged to participate. The county will publicize the various objectives and the objective at hand by way of media coverage and published reminders.

The County Commission and the EMD will be responsible for monitoring and evaluating the progress of the mitigation strategies in the plan. They will review each goal and objective to determine their relevance to changing situations in the county, as well as changes in State or Federal policy, and to ensure that they are addressing current and expected conditions. They also will 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 processed worked well, any

difficulties encountered, how coordination efforts were proceeding, and which strategies should be revised.

The County EMD will then have three months to update and make changes to the plan before submitting it to the committee members and the State Hazard Mitigation Officer. If no changes are necessary, the State Hazard Mitigation Officer will be given a justification for this determination.

All meetings of the County Commission, City Councils and Boards of Aldermen are public and posted per the Sunshine Law of the State of Missouri. Mo-Kan Regional Council will continue to host any hazard mitigation announcements or information, as well as a copy of the latest plan, on the Mo-Kan website (www.mo-kan.org).

Five-Year Plan Review

This Hazard Mitigation Plan and its goals and objectives will be reviewed every five years to determine if there have been any significant changes in Clinton County or mitigation methods that would affect the Hazard Mitigation Plan. Higher than expected development, increased exposure to certain hazards, the development of new mitigation capabilities or techniques, and changes to Federal or State legislation are examples of changes that may affect the condition of the Plan. Further, following a disaster declaration, the Plan will need to be revised to reflect on lessons learned or to address specific circumstances arising out of the disaster. The first scheduled review is anticipated to occur in May of 2010.

Implementation through Existing Programs

Clinton County addresses regional planning and economic goals through its Comprehensive Economic Development Survey with Mo-Kan Regional Council. The Hazard Mitigation Plan provides a series of recommendations—several of which are closely related to the goals and objectives of existing planning programs. Clinton County will have the opportunity to implement recommended mitigation action items through existing programs and procedures.

Upon adoption, the Clinton County Hazard Mitigation Plan will serve as a baseline of information on the natural hazards that impact the county and each of its cities. These goals and objectives will help local governments and other organizations plan for natural hazard mitigation in their own planning documents. Within two years of formal adoption of the mitigation plan, the recommendations listed above should be incorporated into the process of existing planning mechanisms at the county level.

The meetings of the LEPC and Hazard Mitigation Planning Committee will provide an opportunity for committee members to report back on the progress made on the integration of mitigation planning elements into county/city planning documents and procedures.

Continued Public Involvement

Clinton County is dedicated to involving the public directly in review and updates of the Hazard Mitigation Plan. The LEPC and the Hazard Mitigation Planning Committee members are responsible for the annual review and update of the plan. The public will also have the opportunity to provide feedback about the Plan. Copies of the Plan will be catalogued and kept at all of the appropriate agencies in the County. A public meeting will also be held after each five-year evaluation or when deemed necessary by the Hazard Mitigation Planning Committee. The meetings will provide the public a forum for which they can express its concerns, opinions, or ideas about the Plan. The County will be responsible for publicizing the meetings and maintaining public involvement through the public access channel, webpage and newspapers.

Appendix A

City and County Resolutions

CITY RESOLUTION NO. _____

A RESOLUTION OF THE CITY OF HOLT, MISSOURI, ADOPTING AND APPROVING ALL ASPECTS PERTAINING TO THE CITY OF HOLT, IN THE MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN OF THE COUNTY OF CLINTON, AND THE EFFORT TO BECOME A DISASTER RESISTANT COMMUNITY.

WHEREAS, the City of Holt recognizes that no community is immune to disaster, and that we, the City, being located in a state that is vulnerable to disaster hazards, do desire to become more resistant to such disasters; and,

WHEREAS, the City of Holt has in the past, and will in the future continue to undertake measures to reduce the adverse impact of disasters in our community, to include (but not exclusively) participating in programs and activities with **SEMA, FEMA,** other state and federal agencies, other county governments, and other local jurisdictions within this County; and,

WHEREAS, by participating in the Natural Hazards Mitigation program, the City of Holt will be eligible to apply for post-disaster mitigation funds; and,

WHEREAS, the City of Holt will implement pertinent precepts of the mitigation plan by incorporation into other community plans and mechanisms where appropriate; and,

NOW, THEREFORE, BE IT RESOLVED BY THE CITY MAYOR AND THE CITY COUNCIL OF HOLT, MISSOURI that the effort to become more disaster resistant is deemed worthy of support and that all aspects pertaining to the City of Holt, in the Clinton County Multi-Jurisdictional Hazard Mitigation Plan, attached hereto and incorporated by reference herein be approved; and,

NOW, THEREFORE, BE IT RESOLVED BY THE CITY MAYOR AND THE CITY COUNCIL OF HOLT, MISSOURI that all aspects pertaining to the City of Holt, in the Clinton County Multi-Jurisdictional Hazard Mitigation Plan attached hereto, and incorporated by reference herein, shall be monitored, evaluated, updated and resubmitted to this governing body for re-adoption periodically (at least) every five years from the date of the last adoption, by the City of Holt.

This resolution shall be in full force and effect upon adoption.

ADOPTED this _____day of _____, 2005.

_____ _____

Mayor City Clerk

VILLAGE RESOLUTION NO. _____

A RESOLUTION OF THE VILLAGE OF TURNEY, MISSOURI, ADOPTING AND APPROVING ALL ASPECTS PERTAINING TO THE VILLAGE OF TURNEY, IN THE MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN OF THE COUNTY OF CLINTON, AND THE EFFORT TO BECOME A DISASTER RESISTANT COMMUNITY.

WHEREAS, the Village of Turney recognizes that no community is immune to disaster, and that we, the Village, being located in a state that is vulnerable to disaster hazards, do desire to become more resistant to such disasters; and,

WHEREAS, the Village of Turney has in the past, and will in the future continue to undertake measures to reduce the adverse impact of disasters in our community, to include (but not exclusively) participating in programs and activities with **SEMA, FEMA,** other state and federal agencies, other county governments, and other local jurisdictions within this County; and,

WHEREAS, by participating in the Natural Hazards Mitigation program, the Village of Turney will be eligible to apply for post-disaster mitigation funds; and,

WHEREAS, the Village of Turney will implement pertinent precepts of the mitigation plan by incorporation into other community plans and mechanisms where appropriate; and,

NOW, THEREFORE, BE IT RESOLVED BY THE VILLAGE CHAIRMAN AND THE VILLAGE BOARD OF TRUSTEES OF TURNEY, MISSOURI that the effort to become more disaster resistant is deemed worthy of support and that all aspects pertaining to the Village of Turney, in the Clinton County Multi-Jurisdictional Hazard Mitigation Plan, attached hereto and incorporated by reference herein be approved; and,

NOW, THEREFORE, BE IT RESOLVED BY THE VILLAGE CHAIRMAN AND THE VILLAGE BOARD OF TRUSTEES OF TURNEY, MISSOURI that all aspects pertaining to the Village of Turney, in the Clinton County Multi-Jurisdictional Hazard Mitigation Plan attached hereto, and incorporated by reference herein, shall be monitored, evaluated, updated and resubmitted to this governing body for re-adoption periodically (at least) every five years from the date of the last adoption, by the Village of Turney.

This Resolution shall be in full force and effect upon adoption.

ADOPTED this _____ day of _____, 2005.

_____ _____

Chairperson Village Clerk

VILLAGE RESOLUTION NO. _____

A RESOLUTION OF THE VILLAGE OF GRAYSON, MISSOURI, ADOPTING AND APPROVING ALL ASPECTS PERTAINING TO THE VILLAGE OF GRAYSON, IN THE MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN OF THE COUNTY OF CLINTON, AND THE EFFORT TO BECOME A DISASTER RESISTANT COMMUNITY.

WHEREAS, the Village of Grayson recognizes that no community is immune to disaster, and that we, the Village, being located in a state that is vulnerable to disaster hazards, do desire to become more resistant to such disasters; and,

WHEREAS, the Village of Grayson has in the past, and will in the future continue to undertake measures to reduce the adverse impact of disasters in our community, to include (but not exclusively) participating in programs and activities with **SEMA, FEMA,** other state and federal agencies, other county governments, and other local jurisdictions within this County; and,

WHEREAS, by participating in the Natural Hazards Mitigation program, the Village of Grayson will be eligible to apply for post-disaster mitigation funds; and,

WHEREAS, the Village of Grayson will implement pertinent precepts of the mitigation plan by incorporation into other community plans and mechanisms where appropriate; and,

NOW, THEREFORE, BE IT RESOLVED BY THE VILLAGE CHAIRMAN AND THE VILLAGE BOARD OF TRUSTEES OF GRAYSON, MISSOURI that the effort to become more disaster resistant is deemed worthy of support and that all aspects pertaining to the Village of Grayson, in the Clinton County Multi-Jurisdictional Hazard Mitigation Plan, attached hereto and incorporated by reference herein be approved; and,

NOW, THEREFORE, BE IT RESOLVED BY THE VILLAGE CHAIRMAN AND THE VILLAGE BOARD OF TRUSTEES OF GRAYSON, MISSOURI that all aspects pertaining to the Village of Grayson, in the Clinton County Multi-Jurisdictional Hazard Mitigation Plan attached hereto, and incorporated by reference herein, shall be monitored, evaluated, updated and resubmitted to this governing body for re-adoption periodically (at least) every five years from the date of the last adoption, by the Village of Grayson.

This Resolution shall be in full force and effect upon adoption.

ADOPTED this _____ day of _____, 2005.

_____ _____

Chairperson Village Clerk

COUNTY RESOLUTION NO. _____

A RESOLUTION OF THE COUNTY OF CLINTON, MISSOURI, ADOPTING AND APROVING ALL ASPECTS PERTAINING TO THE COUNTY, IN THE MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN OF THE COUNTY OF CLINTON, AND THE EFFORT TO BECOME A DISASTER RESISTANT COMMUNITY.

WHEREAS, the County of Clinton recognizes that no community is immune to disaster, and that we, the County, being located in a state that is vulnerable to disaster hazards, does desire to become more resistant to such disasters; and,

WHEREAS, the County of Clinton has in the past, and will in the future continue to undertake measures to reduce the adverse impact of disasters in our community, to include (but not exclusively) participating in programs and activities with **SEMA, FEMA,** other state and federal agencies, other county governments, and other local jurisdictions within this County; and,

WHEREAS, by participating in the Natural Hazards Mitigation program, the County of Clinton will be eligible to apply for post-disaster mitigation funds; and,

WHEREAS, the County of Clinton will implement pertinent precepts of the mitigation plan by incorporation into other community plans and mechanisms where appropriate; and,

NOW, THEREFORE, BE IT RESOLVED BY THE COUNTY COMMISSIONERS OF CLINTON COUNTY that the effort to become more disaster resistant is deemed worthy of support, and that all aspects pertaining to the County, in the Clinton County Multi-Jurisdictional Hazard Mitigation Plan attached hereto and incorporated by reference herein be approved; and,

NOW THEREFORE, BE IT RESOLVED BY THE COUNTY COMMISSIONERS OF CLINTON COUNTY, that all aspects pertaining to the County, in the Clinton County Multi-Jurisdictional Hazard Mitigation Plan attached hereto, and incorporated by reference herein, shall be monitored, evaluated, updated and resubmitted to this governing body for re-adoption periodically (at least) every five years from the date of the last adoption, by the Clinton County Commission.

This resolution shall be in full force and effect upon adoption.

ADOPTED this _____day of _____, 2005.

_____ _____

Presiding Commissioner First District Commissioner

_____

Second District Commissioner

CITY RESOLUTION NO. _____

A RESOLUTION OF THE CITY OF PLATTSBURG, MISSOURI, ADOPTING AND APPROVING ALL ASPECTS PERTAINING TO THE CITY OF PLATTSBURG, IN THE MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN OF THE COUNTY OF CLINTON, AND THE EFFORT TO BECOME A DISASTER RESISTANT COMMUNITY.

WHEREAS, the City of Plattsburg recognizes that no community is immune to disaster, and that we, the City, being located in a state that is vulnerable to disaster hazards, do desire to become more resistant to such disasters; and,

WHEREAS, the City of Plattsburg has in the past, and will in the future continue to undertake measures to reduce the adverse impact of disasters in our community, to include (but not exclusively) participating in programs and activities with **SEMA, FEMA,** other state and federal agencies, other county governments, and other local jurisdictions within this County; and,

WHEREAS, by participating in the Natural Hazards Mitigation program, the City of Plattsburg will be eligible to apply for post-disaster mitigation funds; and,

WHEREAS, the City of Plattsburg will implement pertinent precepts of the mitigation plan by incorporation into other community plans and mechanisms where appropriate; and,

NOW, THEREFORE, BE IT RESOLVED BY THE CITY MAYOR AND THE CITY COUNCIL OF PLATTSBURG, MISSOURI that the effort to become more disaster resistant is deemed worthy of support and that all aspects pertaining to the City of Plattsburg, in the Clinton County Multi-Jurisdictional Hazard Mitigation Plan, attached hereto and incorporated by reference herein be approved; and,

NOW, THEREFORE, BE IT RESOLVED BY THE CITY MAYOR AND THE CITY COUNCIL OF PLATTSBURG, MISSOURI that all aspects pertaining to the City of Plattsburg, in the Clinton County Multi-Jurisdictional Hazard Mitigation Plan attached hereto, and incorporated by reference herein, shall be monitored, evaluated, updated and resubmitted to this governing body for re-adoption periodically (at least) every five years from the date of the last adoption, by the City of Plattsburg.

This resolution shall be in full force and effect upon adoption.

ADOPTED this _____day of _____, 2005.

_____ _____

Mayor City Clerk

CITY RESOLUTION NO. _____

A RESOLUTION OF THE CITY OF GOWER, MISSOURI, ADOPTING AND APPROVING ALL ASPECTS PERTAINING TO THE CITY OF GOWER, IN THE MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN OF THE COUNTY OF CLINTON, AND THE EFFORT TO BECOME A DISASTER RESISTANT COMMUNITY.

WHEREAS, the City of Gower recognizes that no community is immune to disaster, and that we, the City, being located in a state that is vulnerable to disaster hazards, do desire to become more resistant to such disasters; and,

WHEREAS, the City of Gower has in the past, and will in the future continue to undertake measures to reduce the adverse impact of disasters in our community, to include (but not exclusively) participating in programs and activities with **SEMA, FEMA,** other state and federal agencies, other county governments, and other local jurisdictions within this County; and,

WHEREAS, by participating in the Natural Hazards Mitigation program, the City of Gower will be eligible to apply for post-disaster mitigation funds; and,

WHEREAS, the City of Gower will implement pertinent precepts of the mitigation plan by incorporation into other community plans and mechanisms where appropriate; and,

NOW, THEREFORE, BE IT RESOLVED BY THE CITY MAYOR AND THE CITY COUNCIL OF GOWER, MISSOURI that the effort to become more disaster resistant is deemed worthy of support and that all aspects pertaining to the City of Gower, in the Clinton County Multi-Jurisdictional Hazard Mitigation Plan, attached hereto and incorporated by reference herein be approved; and,

NOW, THEREFORE, BE IT RESOLVED BY THE CITY MAYOR AND THE CITY COUNCIL OF GOWER, MISSOURI that all aspects pertaining to the City of Gower, in the Clinton County Multi-Jurisdictional Hazard Mitigation Plan attached hereto, and incorporated by reference herein, shall be monitored, evaluated, updated and resubmitted to this governing body for re-adoption periodically (at least) every five years from the date of the last adoption, by the City of Gower.

This resolution shall be in full force and effect upon adoption.

ADOPTED this _____day of _____, 2005.

_____ _____

Mayor City Clerk

CITY RESOLUTION NO. _____

A RESOLUTION OF THE CITY OF TRIMBLE, MISSOURI, ADOPTING AND APPROVING ALL ASPECTS PERTAINING TO THE CITY OF TRIMBLE, IN THE MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN OF THE COUNTY OF CLINTON, AND THE EFFORT TO BECOME A DISASTER RESISTANT COMMUNITY.

WHEREAS, the City of Trimble recognizes that no community is immune to disaster, and that we, the City, being located in a state that is vulnerable to disaster hazards, do desire to become more resistant to such disasters; and,

WHEREAS, the City of Trimble has in the past, and will in the future continue to undertake measures to reduce the adverse impact of disasters in our community, to include (but not exclusively) participating in programs and activities with **SEMA, FEMA,** other state and federal agencies, other county governments, and other local jurisdictions within this County; and,

WHEREAS, by participating in the Natural Hazards Mitigation program, the City of Trimble will be eligible to apply for post-disaster mitigation funds; and,

WHEREAS, the City of Trimble will implement pertinent precepts of the mitigation plan by incorporation into other community plans and mechanisms where appropriate; and,

NOW, THEREFORE, BE IT RESOLVED BY THE CITY MAYOR AND THE CITY COUNCIL OF TRIMBLE, MISSOURI that the effort to become more disaster resistant is deemed worthy of support and that all aspects pertaining to the City of Trimble, in the Clinton County Multi-Jurisdictional Hazard Mitigation Plan, attached hereto and incorporated by reference herein be approved; and,

NOW, THEREFORE, BE IT RESOLVED BY THE CITY MAYOR AND THE CITY COUNCIL OF TRIMBLE, MISSOURI that all aspects pertaining to the City of Trimble, in the Clinton County Multi-Jurisdictional Hazard Mitigation Plan attached hereto, and incorporated by reference herein, shall be monitored, evaluated, updated and resubmitted to this governing body for re-adoption periodically (at least) every five years from the date of the last adoption, by the City of Trimble.

This resolution shall be in full force and effect upon adoption.

ADOPTED this _____day of _____, 2005.

_____ _____

Mayor City Clerk

CITY RESOLUTION NO. _____

A RESOLUTION OF THE CITY OF LATHROP, MISSOURI, ADOPTING AND APPROVING ALL ASPECTS PERTAINING TO THE CITY OF LATHROP, IN THE MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN OF THE COUNTY OF CLINTON, AND THE EFFORT TO BECOME A DISASTER RESISTANT COMMUNITY.

WHEREAS, the City of Lathrop recognizes that no community is immune to disaster, and that we, the City, being located in a state that is vulnerable to disaster hazards, do desire to become more resistant to such disasters; and,

WHEREAS, the City of Lathrop has in the past, and will in the future continue to undertake measures to reduce the adverse impact of disasters in our community, to include (but not exclusively) participating in programs and activities with **SEMA, FEMA,** other state and federal agencies, other county governments, and other local jurisdictions within this County; and,

WHEREAS, by participating in the Natural Hazards Mitigation program, the City of Lathrop will be eligible to apply for post-disaster mitigation funds; and,

WHEREAS, the City of Lathrop will implement pertinent precepts of the mitigation plan by incorporation into other community plans and mechanisms where appropriate; and,

NOW, THEREFORE, BE IT RESOLVED BY THE CITY MAYOR AND THE CITY COUNCIL OF LATHROP, MISSOURI that the effort to become more disaster resistant is deemed worthy of support and that all aspects pertaining to the City of Lathrop, in the Clinton County Multi-Jurisdictional Hazard Mitigation Plan, attached hereto and incorporated by reference herein be approved; and,

NOW, THEREFORE, BE IT RESOLVED BY THE CITY MAYOR AND THE CITY COUNCIL OF LATHROP, MISSOURI that all aspects pertaining to the City of Lathrop, in the Clinton County Multi-Jurisdictional Hazard Mitigation Plan attached hereto, and incorporated by reference herein, shall be monitored, evaluated, updated and resubmitted to this governing body for re-adoption periodically (at least) every five years from the date of the last adoption, by the City of Lathrop.

This resolution shall be in full force and effect upon adoption.

ADOPTED this _____day of _____, 2005.

_____ _____

Mayor City Clerk

CITY RESOLUTION NO. _____

A RESOLUTION OF THE CITY OF CAMERON, MISSOURI, ADOPTING AND APPROVING ALL ASPECTS PERTAINING TO THE CITY OF CAMERON, IN THE MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN OF THE COUNTY OF CLINTON, AND THE EFFORT TO BECOME A DISASTER RESISTANT COMMUNITY.

WHEREAS, the City of Cameron recognizes that no community is immune to disaster, and that we, the City, being located in a state that is vulnerable to disaster hazards, do desire to become more resistant to such disasters; and,

WHEREAS, the City of Cameron has in the past, and will in the future continue to undertake measures to reduce the adverse impact of disasters in our community, to include (but not exclusively) participating in programs and activities with **SEMA, FEMA,** other state and federal agencies, other county governments, and other local jurisdictions within this County; and,

WHEREAS, by participating in the Natural Hazards Mitigation program, the City of Cameron will be eligible to apply for post-disaster mitigation funds; and,

WHEREAS, the City of Cameron will implement pertinent precepts of the mitigation plan by incorporation into other community plans and mechanisms where appropriate; and,

NOW, THEREFORE, BE IT RESOLVED BY THE CITY MAYOR AND THE CITY COUNCIL OF CAMERON, MISSOURI that the effort to become more disaster resistant is deemed worthy of support and that all aspects pertaining to the City of Cameron, in the Clinton County Multi-Jurisdictional Hazard Mitigation Plan, attached hereto and incorporated by reference herein be approved; and,

NOW, THEREFORE, BE IT RESOLVED BY THE CITY MAYOR AND THE CITY COUNCIL OF CAMERON, MISSOURI that all aspects pertaining to the City of Cameron, in the Clinton County Multi-Jurisdictional Hazard Mitigation Plan attached hereto, and incorporated by reference herein, shall be monitored, evaluated, updated and resubmitted to this governing body for re-adoption periodically (at least) every five years from the date of the last adoption, by the City of Cameron.

This resolution shall be in full force and effect upon adoption.

ADOPTED this _____day of _____, 2005.

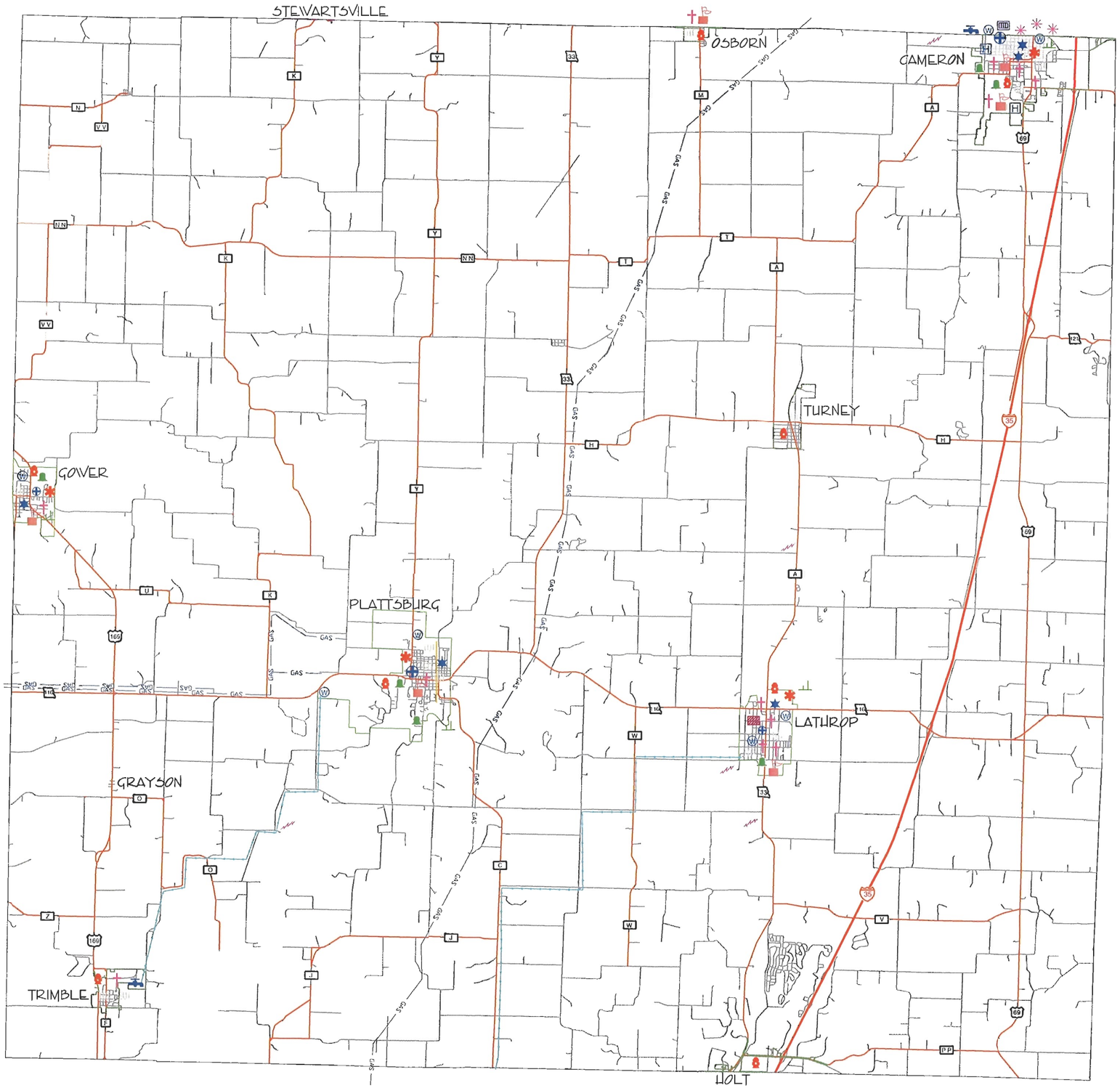
_____ _____

Mayor City Clerk

Appendix B

Vulnerability Map

Clinton County, Missouri
Special Vulnerabilities Map



Legend

- Police Station / Sheriff's Office
- Fire Station
- EMS / Ambulance Station
- Jail /Prison
- Major Employer (>15 employees)
- Nursing Home
- Public Building/Post Office
- Dam
- Mobile Home Community
- Wastewater Treatment Facility
- Water Tower
- Water Supply
- Electrical Substation/Power Plant
- Communications Tower
- Health Department/Clinic/Doctor's Office
- Hospital
- Church
- Public Building
- Military Facility
- School
- Major Water Line
- Major Gas Line

N W E

Clinton County, Missouri
Special Vulnerabilities Map

This map is intended for reference only, and is not for any legal use or conveyance.
Due to the possibility of incomplete data, no representation of accuracy is made.

MO-KAN REGIONAL COUNCIL
1302 FARRON ST • ST. JOSEPH, MO • 64501
816.233.3144 • www.mo-kan.org