Final September 2009

Rush County, KS

Multi-Hazard Mitigation Plan

amec

Rush County
Multi-Hazard Mitigation Plan

September 2009

Developed by Rush County with professional planning assistance from
AMEC Earth and Environmental
Hazard Mitigation and Emergency Management Program
Topeka, Kansas and Denver, Colorado

SPECIAL THANKS AND ACKNOWLEDGEMENTS

Rush County Hazard Mitigation Planning Committee

Name		Representing
David	Coltrain	Walnut Creek Extension
James	Fisher	Rush County Emergency Preparedness/City of Bison
Kathy	Janousek	Health Dept.
Bruce	Jones	City of LaCrosse
Jeff	Keener	City of Rush Center
Kim	Knieling	Health Dept.
Norman	Legleiter	Rush Co. Commissioner
Duane	Moeder	City of LaCrosse
Bruce	Reifschneider	Rush Co. Fire Dist. #4
Kara	Renz	City of Rush Center/USD 395
Ben	Rogers	Wet Walnut Watershed District 358
Steve	Samuelson	Kansas Department of Agriculture / Division of Water Resources
George	Stover	Rush County Memorial Hospital
Sue	Woods	City of Rush Center
John	Zeller	City of McCracken

Susan Belt, AMEC Earth and Environmental

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EXECUTIVE SUMMARY

The purpose of natural hazards mitigation is to reduce or eliminate long-term risk to people and property from natural hazards. Rush County and participating jurisdictions developed this multi-hazard mitigation plan to reduce future losses to the County and its communities resulting from natural hazards. The plan was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 and to achieve eligibility for the Federal Emergency Management Agency (FEMA) Flood Mitigation Assistance, Pre-Disaster Mitigation, and Hazard Mitigation Grant Programs.

The Rush County Multi-Hazard Mitigation Plan is a multi-jurisdictional plan that covers the following local governments that participated in the planning process:

- Rush County
- City of Bison
- City of La Crosse
- City of McCracken
- City of Rush Center
- Unified School District 395

In addition to these jurisdictions that officially participated in the planning process, the following local organizations contributed to the planning effort: Walnut Creek Extension, Rush County Fire District #4, Wet Walnut Watershed District 358, and Rush County Memorial Hospital. Although representatives were unable to attend the planning meetings, the three rural electric cooperatives that service the planning area were contacted to solicit action ideas for the mitigation strategy. Midwest Energy, Inc provided action ideas to be incorporated in the mitigation strategy section of the plan. Although Western Cooperative Electric Association and Lane Scott Electric Cooperative did not provide action ideas specific to their service areas in Rush County, they expressed their support of the mitigation planning effort.

The Cities of Alexander, Liebenthal, Otis, and Timken as well as Unified School District 403 did not respond to the invitations to participate in the meetings and planning process. During the plan maintenance and revision process, outlined in detail in Chapter 5, all jurisdictions will again be invited to officially participate in the planning process for future plan updates.

The County's planning process followed a methodology prescribed by FEMA, which began with the formation of a Hazard Mitigation Planning Committee (HMPC) comprised of key stakeholders from Rush County and participating jurisdictions. The representative from the Kansas Department of Agriculture, Division of Water Resources is the only representative from the invited state and federal agencies that attended the planning meetings. Please see Appendix B for a complete list of invited agencies/organizations. The HMPC conducted a risk assessment that identified and profiled hazards that pose a risk to Rush County, assessed the County's vulnerability to these hazards, and examined the capabilities in place to mitigate them. The County is vulnerable to several hazards that are identified, profiled, and analyzed in this plan. Tornadoes, floods, winter storm, and windstorm are among the hazards that can have a significant impact on the County.

Based upon the risk assessment, the HMPC identified goals for reducing risk from hazards. The goals of this multi-hazard mitigation plan are to:

- Goal #1: Improve the level of responder, government, business, and citizen awareness and preparedness for disaster in Rush County.
- Goal #2: Adopt new or modify existing policies / regulations that will reduce the potential damaging effects of natural hazards in Rush County.
- Goal #3: Reduce or eliminate the impact of disasters to residents and property in Rush County through mitigation actions.

To meet the identified goals, the plan recommends the mitigation actions detailed in Chapter 4. The HMPC developed an implementation plan for each action, which identifies priority level, background information, ideas for implementation, responsible agency, timeline, cost estimate, potential funding sources, and more. These additional details are also provided in Chapter 4.

The multi-hazard mitigation plan has been formally adopted by the Rush County Commissioners and the governing bodies of each participating jurisdiction and will be updated within a five-year timeframe. *This will be accomplished AFTER FEMA provides approval pending adoption.*

PREREQUISITES

44 CFR requirement 201.6(c)(5): The local hazard mitigation plan shall include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan. For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.

***Note to Reviewers**: When this plan has been reviewed and approved pending adoption by FEMA Region VII the adoption resolutions will be signed by the participating jurisdictions and added to Appendix E. A model resolution is provided.*

The following jurisdictions participated in the development of this plan and have adopted the multi-jurisdictional plan. Resolutions of Adoptions are included in Appendix E.

- Rush County
- City of Bison
- City of La Crosse
- City of McCracken
- City of Rush Center
- Unified School District 395

Model Resolution

Resolution # _____ **Adopting the Rush County Multi-Hazard Mitigation Plan**

Whereas, the (Name of Government/District/Organization seeking FEMA approval of hazard mitigation plan) recognizes the threat that natural hazards pose to people and property within our community; and

Whereas, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

Whereas, the U.S. Congress passed the Disaster Mitigation Act of 2000 ("Disaster Mitigation Act") emphasizing the need for pre-disaster mitigation of potential hazards;

Whereas, the Disaster Mitigation Act made available hazard mitigation grants to state and local governments; and

Whereas, an adopted Multi-Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

Whereas, the (Name of Government/District/Organization) fully participated in the FEMA-prescribed mitigation planning process to prepare this Multi-Hazard Mitigation Plan; and

Whereas, the Kansas Division of Emergency Management and the Federal Emergency Management Agency Region VII officials have reviewed the "Rush County Multi-Hazard Mitigation Plan," and approved it contingent upon this official adoption of the participating governing body; and

Whereas, the (Name of Government/District/Organization) desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Rush County Multi-Hazard Mitigation Plan; and

Whereas, adoption by the governing body for the (Name of Government/District/Organization) demonstrates the jurisdictions' commitment to fulfilling the mitigation goals and objectives outlined in this Multi-Hazard Mitigation Plan.

Whereas, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

Now, therefore, be it resolved, that the (Name of Government/District/Organization) adopts the "Rush County Multi-Hazard Mitigation Plan" as an official plan; and

Be it further resolved, the (Name of Government/District/Organization) will submit this Adoption Resolution to the Kansas Division of Emergency Management and Federal Emergency Management Agency Region VII officials to enable the plan's final approval.

Passed: _____

_____

Certifying Official

1 INTRODUCTION AND PLANNING PROCESS

1.1 Purpose

Rush County and five other jurisdictions prepared this local hazard mitigation plan to guide hazard mitigation planning to better protect the people and property of the County from the effects of hazard events. This plan demonstrates the communities' commitment to reducing risks from hazards and serves as a tool to help decision makers direct mitigation activities and resources. This plan was also developed to make Rush County and participating jurisdictions eligible for certain federal disaster assistance, specifically, the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program, Pre-Disaster Mitigation program, and Flood Mitigation Assistance program.

1.2 Background and Scope

Each year in the United States, natural disasters take the lives of hundreds of people and injure thousands more. Nationwide, taxpayers pay billions of dollars annually to help communities, organizations, businesses, and individuals recover from disasters. These monies only partially reflect the true cost of disasters, because additional expenses to insurance companies and nongovernmental organizations are not reimbursed by tax dollars. Many natural disasters are predictable, and much of the damage caused by these events can be alleviated or even eliminated.

Hazard mitigation is defined by FEMA as "any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event." The results of a three-year, congressionally mandated independent study to assess future savings from mitigation activities provides evidence that mitigation activities are highly cost-effective. On average, each dollar spent on mitigation saves society an average of $4 in avoided future losses in addition to saving lives and preventing injuries (National Institute of Building Science Multi-Hazard Mitigation Council 2005).

Hazard mitigation planning is the process through which hazards that threaten communities are identified, likely impacts of those hazards are determined, mitigation goals are set, and appropriate strategies to lessen impacts are determined, prioritized, and implemented. This plan documents Rush County's hazard mitigation planning process and identifies relevant hazards, vulnerabilities, and strategies the County and participating jurisdictions will use to decrease vulnerability and increase resiliency and sustainability in Rush County.

The Rush County Multi-Hazard Mitigation Plan is a multi-jurisdictional plan that geographically covers the participating jurisdictions within Rush County's boundaries (hereinafter referred to as the planning area). The following six jurisdictions participated in the planning process:

- Rush County
- City of Bison
- City of La Crosse
- City of McCracken
- City of Rush Center
- Unified School District 395

In addition to these jurisdictions that officially participated in the planning process, the following local organizations contributed to the planning effort: Walnut Creek Extension, Rush County Fire District #4, Wet Walnut Watershed District 358, and Rush County Memorial Hospital. Although representatives were unable to attend the planning meetings, the three rural electric cooperatives that service the planning area were contacted to solicit action ideas for the mitigation strategy. Midwest Energy, Inc provided action ideas to be incorporated in the mitigation strategy section of the plan. Although Western Cooperative Electric Association and Lane Scott Electric Cooperative did not provide action ideas specific to their service areas in Rush County, they expressed their support of the mitigation planning effort.

This plan was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 (Public Law 106-390) and the implementing regulations set forth by the Interim Final Rule published in the *Federal Register* on February 26, 2002, (44 CFR §201.6) and finalized on October 31, 2007. (Hereafter, these requirements and regulations will be referred to collectively as the Disaster Mitigation Act.) While the act emphasized the need for mitigation plans and more coordinated mitigation planning and implementation efforts, the regulations established the requirements that local hazard mitigation plans must meet in order for a local jurisdiction to be eligible for certain federal disaster assistance and hazard mitigation funding under the Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288).

Information in this plan will be used to help guide and coordinate mitigation activities and decisions for local land use policy in the future. Proactive mitigation planning will help reduce the cost of disaster response and recovery to communities and their residents by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruptions. The Rush County planning area has been affected by hazards in the past and the participating jurisdictions are therefore committed to reducing future impacts from hazard events and becoming eligible for mitigation-related federal funding.

1.3 Plan Organization

The Rush County Multi-Hazard Mitigation Plan is organized as follows:

- Executive Summary
- Prerequisites
- Chapter 1: Introduction and Planning Process
- Chapter 2: Planning Area Profile and Capabilities
- Chapter 3: Risk Assessment
- Chapter 4: Mitigation Strategy
- Chapter 5: Plan Implementation and Maintenance
- Appendices

1.4 Planning Process

44 CFR Requirement 201.6(c)(1): [The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

In September 2008, Rush County contracted with AMEC Earth and Environmental (AMEC) to facilitate the development of a multi-jurisdictional, multi-hazard mitigation plan. Rush County Emergency Management took the lead in developing this plan with AMEC's assistance. AMEC's role was to:

- Assist in establishing the Hazard Mitigation Planning Committee (HMPC) as defined by the Disaster Mitigation Act (DMA),
- Ensure the developed plan meets the DMA requirements as established by federal regulations and following FEMA's planning guidance,
- Facilitate the entire planning process,
- Identify the data requirements that HMPC participants could provide and conduct the research and documentation necessary to augment that data,
- Assist in facilitating the public input process,
- Produce the draft and final plan documents, and
- Coordinate the Kansas Division of Emergency Management and FEMA Region VII plan reviews.

1.4.1 Multi-Jurisdictional Participation

44 CFR Requirement §201.6(a)(3): Multi-jurisdictional plans may be accepted, as appropriate, as long as each jurisdiction has participated in the process and has officially adopted the plan.

Rush County Emergency Management invited all incorporated cities, the two school districts that service the County, various county departments, the watershed district representative, media, rural electric cooperative representatives, and fire department personnel to participate in the multi-jurisdictional Rush County Multi-Hazard Mitigation Plan. In addition, AMEC provided meeting invitation notices to various state and federal agencies. The list of invited entities is included in Appendix B. The jurisdictions that elected to participate in this plan are listed above in section 1.2. The Disaster Mitigation Act requires that each jurisdiction participate in the planning process and officially adopt the multi-jurisdictional hazard mitigation plan. Each jurisdiction that chose to participate in the planning process and development of the plan was required to meet plan participation requirements defined at the beginning of the process, which included the following:

- Designate a representative to serve on the HMPC
- Participate in at least one of two HMPC meetings by either direct representation or authorized representation

- Provide information to support the plan development by completing and returning the AMEC Data Collection Guide
- Identify mitigation actions for the plan (at least one)
- Review and comment on plan drafts
- Inform the public, local officials, and other interested parties about the planning process and provide an opportunity for them to comment on the plan
- Formally adopt the mitigation plan

All six of the jurisdictions listed as official participants in this plan met all of these participation requirements.

Table 1.1 shows the representation of each participating jurisdiction at the planning meetings; sign-in sheets are included in Appendix B: Planning Process Documentation. Please note that two members of the HMPC represented more than one jurisdiction. The Rush County Emergency Manager is also the Mayor of Bison and one of the three representatives that attended for Rush Center also represented USD 395.

Table 1.1. Jurisdictional Participation in Planning Process

Jurisdiction	HMPC Kick-off Meeting	HMPC Meeting #2	Data Collection Guide	Action(s)
Rush County	X	X	X	X
City of Bison	X	X	X	X
City of La Crosse	X	X	X	X
City of McCracken		X	X	X
City of Rush Center		X	X	X
USD 395		X	X	X

1.4.2 The 12-Step Planning Process

AMEC and Rush County Emergency Management worked together to establish the framework and process for this planning effort using FEMA's *Local Multi-Hazard Mitigation Planning Guidance* (2008) and the State and Local Mitigation Planning How-To Guides (2001), which include *Multi-Jurisdictional Mitigation Planning* (2006). The plan is structured around a four-phase process:

1) Organize resources
2) Assess risks
3) Develop the mitigation plan
4) Implement the plan and monitor progress

Into this process, AMEC integrated a modified detailed 12-step planning process used for FEMA's Community Rating System (CRS) and Flood Mitigation Assistance programs. Thus, the modified 12-step process used for this plan meets the funding eligibility requirements of the Hazard Mitigation Grant Program, Pre-Disaster Mitigation program, Community Rating System, and Flood Mitigation Assistance program. Table 1.2 shows how the modified 12-step process fits into FEMA's four-phase process.

Table 1.2. Mitigation Planning Process Used to Develop the Rush County Multi-Hazard Mitigation Plan

DMA Process	Modified CRS Process
1) Organize Resources	
201.6(c)(1)	1) Organize the Planning Effort
201.6(b)(1)	2) Involve the Public
201.6(b)(2) and (3)	3) Coordinate with Other Departments and Agencies
2) Assess Risks	
201.6(c)(2)(i), (iii)	4) Identify the Hazards
201.6(c)(2)(i), (iii)	5) Profile the Hazards
201.6(c)(2)(ii), (iii)	6) Identify Assets
201.6(c)(2)(ii), (iii)	7) Estimate Losses
3) Develop the Mitigation Plan	
201.6(c)(3)(i)	8) Set Goals
201.6(c)(3)(ii)	9) Review Possible Activities
201.6(c)(3)(iii)	10) Draft an Action Plan
4) Implement the Plan and Monitor Progress	
201.6(c)(5)	11) Adopt the Plan
201.6(c)(4)	12) Implement, Evaluate, and Revise the Plan

Phase I Organize Resources

Step 1: Organize the Planning Effort

The planning process resulting in the preparation of this plan document officially began with a kickoff meeting in La Crosse, Kansas, on February 24, 2009. Rush County Emergency Management mailed letters of invitation to the kickoff meeting to organizations listed in section 1.4.1. In addition, AMEC notified state, federal and other potentially interested parties via e-mail. These invite lists are included in Appendix B.

A Hazard Mitigation Planning Committee (HMPC) was created that includes representatives from each participating jurisdiction, departments of the County (including the county-owned hospital), and other local and state organizations responsible for making decisions in the plan and agreeing upon the final contents. Although various state and federal agencies were notified of the meeting dates, no federal agencies attended the planning meetings. The only state agency that attended any planning meetings was the Kansas Department of Agriculture, Division of Water Resources. Kickoff meeting attendees discussed potential participants and made decisions about

additional stakeholders to invite to participate on the HMPC. The agencies and organizations that participated in the planning meetings included the following:

- City of Bison
- City of McCracken
- City of La Crosse
- City of Rush Center
- Rush County Emergency Preparedness
- Rush County Commission
- Rush County Memorial Hospital
- Rush County Health Department
- Rush County Fire District #4
- Unified School District 395
- Wet Walnut Watershed District 358
- KS Department of Ag, Division of Water Resources
- Walnut Creek Extension

A complete list of all representatives of the agencies and organizations that participated on the Rush County HMPC is provided in Appendix B.

The HMPC contributed to this planning process by:

- providing facilities for meetings,
- attending and participating in meetings,
- collecting data,
- managing administrative details,
- making decisions on plan process and content,
- submitting mitigation action implementation worksheets,
- reviewing drafts, and
- coordinating and assisting with public involvement and plan adoptions.

The HMPC communicated during the planning process with a combination of face-to-face meetings, phone interviews, and email correspondence. The meeting schedule and topics are listed in Table 1.3. The sign-in sheets, agendas, and meeting minutes for each of the meetings are included in Appendix B.

Table 1.3. Schedule of HMPC Meetings

Meeting	Topic	Date
HMPC #1	Kickoff meeting: introduction to DMA, the planning process, and hazard identification. Distribution of data collection guide to jurisdictions. Preliminary hazard ranking results.	February 24, 2009
HMPC #2	Review of draft Risk Assessment, Development of plan goals. Mitigation action identification and prioritization. Determine process to monitor, evaluate, and update plan.	May 6, 2009

During the kickoff meeting, AMEC presented information on the scope and purpose of the plan, participation requirements of HMPC members, and the proposed project work plan and schedule. Plans for public involvement (Step 2) and coordination with other agencies and departments (Step 3) were discussed. AMEC also introduced hazard identification requirements and data needs. The HMPC discussed past events and impacts and future probability for each of the hazards suggested by FEMA and the Kansas Division of Emergency Management for consideration in a local hazard mitigation plan. The HMPC refined the list of hazards to make it relevant to Rush County.

Participants were given the AMEC Data Collection Guide to facilitate the collection of information needed to support the plan, such as data on historic hazard events, values at risk, and current capabilities. Each participating jurisdiction completed and returned the worksheets in the Data Collection Guide document to AMEC. AMEC integrated this information into the plan, supporting the development of Chapters 2 and 3.

Step 2: Plan for Public Involvement

44 CFR Requirement 201.6(b): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: (1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval.

At the kickoff meeting, the HMPC discussed options for soliciting public input on the mitigation plan. The committee discussed holding a public meeting and determined from past experience that this would not be an effective way to reach out to the public. The committee determined that the most effective way to inform the public about the planning effort underway and achieve their input would be dissemination of a survey.

During the drafting stage, each committee member distributed a public survey to members of the public and key stakeholders in their own jurisdiction. This survey was developed specific to the Rush County Mitigation Plan and provided a brief plan summary as well as a questionnaire to capture public and stakeholder input.

The survey, provided in Appendix B, asked the public to indicate the level of risk, or extent of potential impacts, in Rush County that they perceive for each hazard. They were asked to rate the impacts of each hazard profiled in this plan as 1=negligible, 2=limited, 3=moderate, 4=critical,

or 5=catastrophic. 37 surveys were completed resulting in the ranking order provided in Table 1.4 from greatest perceived impacts to least perceived impacts. To provide a comparison, the magnitude level determined by the Hazard Mitigation Planning Committee is provided in the far right column. Additional elements were considered by the committee to determine the overall planning significance. The complete hazard ranking methodology used by the committee as well as the results are discussed in detail in Chapter 3.

Table 1.4 Public Perception of Hazard Impacts (High to Low)

Public Hazard Ranking	Average Public Impact Rating	HMPC Magnitude Ranking
Tornado	4.14	2
Drought	3.86	2
Hail Storm	3.81	3
Winter Storm	3.68	3
Utility Infrastructure	3.46	3
Wind Storm	3.35	2
Agricultural Infestation	3.27	2
Extreme Temperatures	3.19	1
Lightning	3.05	1
Soil Erosion / Dust	2.92	2
Wildfire	2.92	3
Flood	2.78	2

*Note—the public did not rate the dam and levee failure hazard

In the survey, the public was also asked to review the types of mitigation actions determined by the State of Kansas as the priority project types for use of FEMA mitigation funds. The survey asked the public to place a check next to the types of mitigation actions that they felt could benefit their community. Table 1.5 provides the compiled results of this question.

Table 1.5 Public Prioritization of State Mitigation Priorities

Project Type	Total Public "votes"
Acquisition/Demolition/Elevation of Flood Prone Structures	11
Community Shelters, Shelters for Schools and Public Buildings	29
Power Line Upgrades	23
Protection of Critical Facilities	22

The public was also asked to review the types of mitigation actions being considered by the Rush County Hazard Mitigation Planning Committee for inclusion in the plan's mitigation strategy. The survey asked the public to place a check next to the THREE types of mitigation actions that they felt should have the highest priority in the plan. Table 1.6 provides the compiled results of this question.

Table 1.6 Public Prioritization of Rush County Mitigation Actions

Project Type	Total Public "votes"
Indoor/Outdoor Warning Sirens	19
Power Line Maintenance/Upgrades	20
Participation in the NFIP	3
Floodprone Property Buyout	0
Installation of Generators	23
Planning	10
Public Education on Natural Hazards	10
Wildfire Mitigation	1
Saferoom Construction	12
Culvert Upgrades	12

Some specific comments made by members of the public regarding other issues that the planning committee should consider are provided below:

"Our town needs more generators."

"Each community needs a shelter."

The public was also given an opportunity to provide input on a draft of the complete plan prior to its submittal to the State and FEMA. From August 31 to September 11, 2009, Rush County provided the plan draft for review and comment on the Rush County website at:

http://www.rushcountykansas.org/MV2Base.asp?VarCN=13

In hard copy at the following locations:

Rush County Courthouse
715 Elm St
La Crosse, KS 67548
(785) 222-3417

Rush County Emergency Management Office
804 W. 1st
La Crosse, KS 67548
Phone: 785.222.3537

Barnard Library
521 Elm St
La Crosse, KS 67548-9713
(785) 222-2826

Bison Library
202 Main St
Bison, KS 67520-9792
(785) 356-4803

McCracken Public Library
303 Main / P. O. Box 125
McCracken, KS 67556
(785) 394-2444

Otis Community Library
122 S Main St
Otis, KS 67565
(785) 387-2287

The jurisdictions announced the availability of the draft plan and the public comment period in the *Rush County News*. A copy of the article is provided in Appendix B.

The HMPC invited other targeted stakeholders to comment on the draft plan via an e-mail letter, which is described in greater detail in Step 3: Coordinate with Other Departments and Agencies. Minor comments were received and incorporated.

Step 3: Coordinate with Other Departments and Agencies

44 CFR Requirement 201.6(b): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: (2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process. (3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

There are numerous organizations whose goals and interests interface with hazard mitigation in Rush County. Coordination with these organizations and other community planning efforts is vital to the success of this plan. Rush County Emergency Management invited other local, state, and federal departments and agencies to the kickoff meeting to learn about the hazard mitigation planning initiative. In addition, AMEC provided notification to additional state and federal agencies. Several of the agencies participated throughout the planning process on the HMPC and were listed previously in Step 1: Organize the Planning Effort.

In addition, the HMPC developed a list of neighboring communities and local and regional agencies involved in hazard mitigation activities, as well as other interests, to invite by letter to review and comment on the draft of the Rush County Multi-Hazard Mitigation Plan prior to submittal to the state and FEMA. These include emergency management officials of adjacent counties, members of academic organizations, and state and federal agencies. A copy of the e-mail letter that was sent and the address list is provided in Appendix B. Due to the large planning area included in this effort and the vast number of other potential stakeholders in the business community, private non-profit organizations, and the general public, the news article and surveys distributed by each jurisdiction were utilized to ensure notification, inclusion, and opportunity for involvement from these sectors.

As part of the coordination with other agencies, the HMPC collected and reviewed existing technical data, reports, and plans. These included the Kansas State Hazard Mitigation Plan, Rush County Basic Operations Plan (June 2008), Rush County Economic Development plan, reports from the National Flood Insurance Program's Community Information System, Dam Inundation Maps and Emergency Action Plans for state-regulated dams in the county, as well as other data from state and federal agencies. This information was used in the development of the hazard identification, vulnerability assessment, and capability assessment and in the formation of goals, objectives, and mitigation actions. These sources are documented throughout the plan and in Appendix A: References.

Phase 2 Assess Risk

Step 4: Identify the Hazards

AMEC assisted the HMPC in a process to identify the natural hazards that have impacted or could impact communities in Rush County. At the kickoff meeting, the HMPC examined the history of disaster declarations in Rush County, the list of hazards suggested by FEMA for consideration, and additional hazards included in the Kansas State Plan. The committee then worked through this list of all potential hazards that could affect the planning area. They discussed past hazard events, types of damage, and where additional information might be found. There were several hazards that the committee chose to exclude from further review. Justification is provided for each hazard removed from further review in Section 3.1.

Step 5: Profile the Hazards

During the kick-off meeting, the HMPC refined the list of hazards to make the analysis relevant to Rush County, discussed past events and impacts and came to consensus on the probability, magnitude, warning time, and duration level for each hazard. Prior to the meeting, a profile of each of these hazards had been developed. Web resources, existing reports and plans, and existing geographic information systems (GIS) layers were used to compile information about past hazard events. After this meeting, the preliminary research and supplementary information and results of discussion by the HMPC, was compiled to develop complete hazard profiles detailing the location, previous occurrences, probability of future occurrences, and magnitude/severity of each hazard. The data collection guide distributed at the kickoff meeting was returned to AMEC by each participating jurisdiction and also provided supplemental jurisdictional-specific information to identify hazards and vulnerabilities. More information on the methodology and resources used to identify and profile the hazards can be found in Sections 3.1 and 3.2.

Step 6: Identify Assets

After profiling the hazards that could affect Rush County, the HMPC collected information to describe the likely impacts of future hazard events on the participating jurisdictions. This step included two parts: a vulnerability assessment and a capability assessment.

Vulnerability Assessment—Participating jurisdictions inventoried their assets at risk to natural hazards—overall and in identified hazard areas. These assets included total number and value of structures; critical facilities and infrastructure; natural, historic, and cultural assets; economic assets; and vulnerable populations. The HMPC also considered development trends in known hazard areas. FEMA's loss estimation computer software, HAZUS-MH, was utilized to provide information on populations at risk as well as estimated numbers and values of buildings at risk. The assets at risk were discussed for the planning area as a whole for those hazards that do not vary geographically. Additionally, utilizing the HAZUS-MH tool, assets at risk to a 100-year flood in Rush County were discussed separately as this hazard varies across the planning area**,**

Capability Assessment—This assessment consisted of identifying the existing mitigation capabilities of participating jurisdictions. This involved collecting information about existing government programs, policies, regulations, ordinances, and plans that mitigate or could be used to mitigate risk from hazards. Participating jurisdictions collected information on their regulatory, personnel, fiscal, and technical capabilities, as well as previous and ongoing mitigation initiatives. This information is included in Chapter 2 Planning Area Profile and Capabilities.

Step 7: Estimate Losses

Where sufficient information was available, a variety of methods was used to estimate losses for each profiled hazard that received a moderate or high planning significance level. For the flood hazard, FEMA's loss estimation computer software, HAZUS-MH was utilized to estimate losses in the planning area as a result of a 100-year flood event. The methodology is described in detail for each hazard analysis that included a loss estimate. This information can be found in Section 3.3.3

Results of the preliminary risk assessment were presented and comments discussed during the kick-off meeting. AMEC provided the draft risk assessment to the HMPC at the second meeting on May 6, 2009 for review and comment by the committee. Several comments, corrections, and suggestions were provided to AMEC and incorporated into the risk assessment as appropriate.

Phase 3 Develop the Mitigation Plan

Step 8: Set Goals

AMEC facilitated a brainstorming and discussion session with the HMPC during their second and final meeting to identify goals for the overall multi-jurisdictional mitigation plan. To focus the committee on the issues brought out by the risk assessment, key issues were summarized for each hazard profiled. Then the HMPC discussed the definition and purpose of goal statements and reviewed examples of goals from the State Mitigation Plan and other local plans. The committee also discussed the purposes and goals of other plans already in use in Rush County such as the local emergency operations plan and other risk management plans such as Emergency Action Plans for dam breach scenarios. Then, as a group, the HMPC achieved consensus on the final goals for the multi-jurisdictional plan, which are described in Chapter 4.

Step 9: Review Possible Activities

At the final meeting the HMPC reviewed a handout summarizing the Kansas Division of Emergency Management HMGP funding priorities as well as a handout describing the types of mitigation projects generally recognized by FEMA. The group discussed the types of mitigation actions/projects that could be done by the jurisdictions in Rush County. Consideration was given to the identified key issues that were developed from the risk assessment and the anticipated success for each project type. Committee members discussed issues such as how many shelter projects the county could reasonably support and where best to place shelters if funds were

limited. Projects such as emergency preparedness drills were discussed, but were given low priority because the response-related mitigation actions occur on a routine basis as requirements of other plans. Complex projects that would necessitate use of large numbers of county resources were also discussed. This opportunity to discuss a broad range of mitigation alternatives allowed the jurisdictions wishing to complete projects to understand the overall priorities of the committee and to allow for discussion of the types of project most beneficial to each jurisdiction. Projects were discussed within the context of the priorities and likelihood of success/failure for each was determined. As part of this discussion, consideration was given to the potential cost of each project in relation to the anticipated future cost savings. Following the project/action discussion, action forms were distributed to all committee members along with a modified form of the STAPLEE process to evaluate each action. These completed worksheets were returned to AMEC. Each participating jurisdiction prioritized the projects they submitted by indicating high, moderate, or low local priority.

Step 10: Draft the Plan

A complete draft of the plan was made available online and in hard copy for review and comment by the public and other agencies and interested stakeholders. This review period was from August 31 – September 11, 2009. Methods for inviting interested parties and the public to review and comment on the plan were discussed in Steps 2 and 3, and materials are provided in Appendix B. Comments were integrated into a final draft for submittal to the Kansas Division of Emergency Management and FEMA Region VII.

Phase 4 Implement the Plan and Monitor Progress

Step 11: Adopt the Plan

To secure buy-in and officially implement the plan, the governing bodies of each participating jurisdiction adopted the plan. Scanned copies of resolutions of adoption are included in Appendix E of this plan.

Step 12: Implement, Evaluate, and Revise the Plan

The HMPC developed and agreed upon an overall strategy for plan implementation and for monitoring and maintaining the plan over time during Meeting #2. This strategy is described in Chapter 5 Plan Maintenance Process.

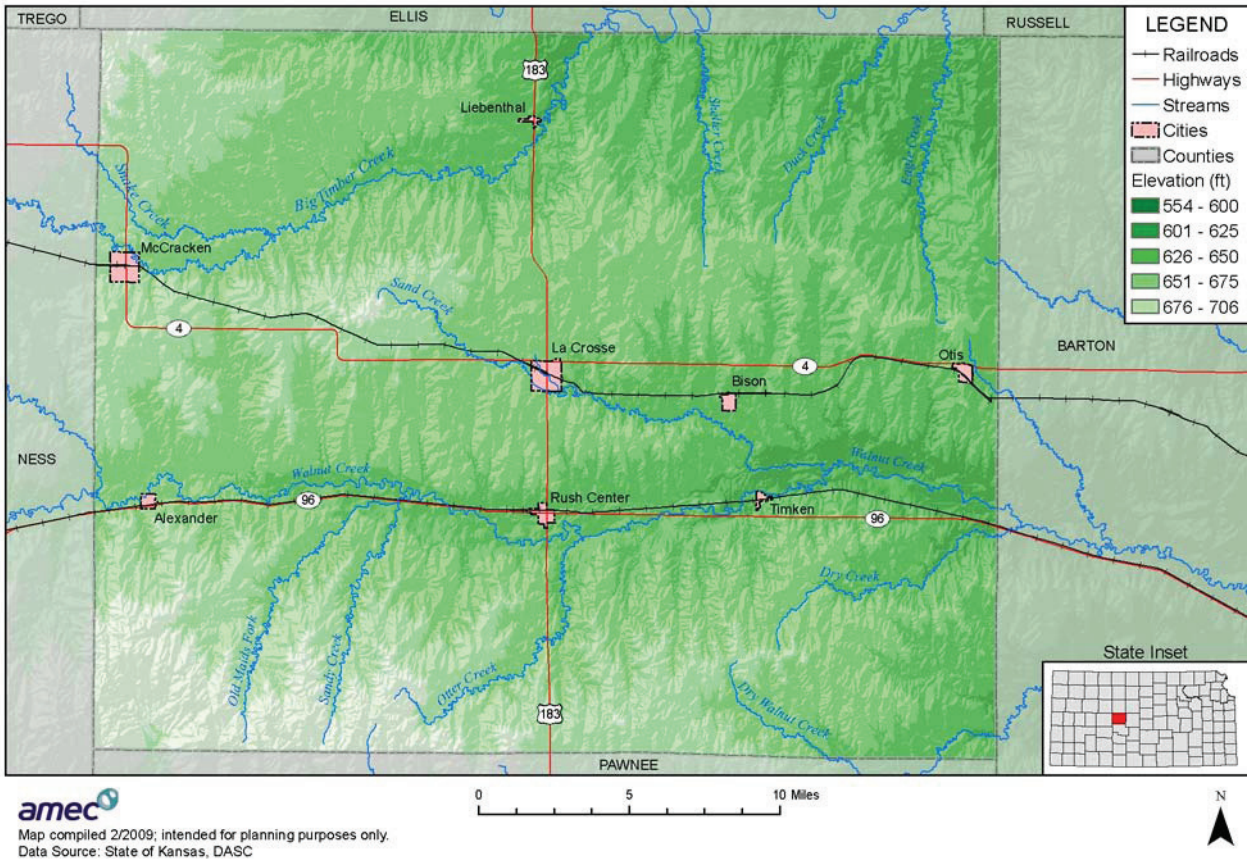
2 PLANNING AREA PROFILE AND CAPABILITIES

Chapter 2 provides a general profile of Rush County followed by descriptions of each of the jurisdictions participating in this plan and their existing mitigation capabilities.

2.1 Rush County Planning Area Profile

Figure 2.1 provides a map of the Rush County planning area.

Figure 2.1. Rush County Planning Area



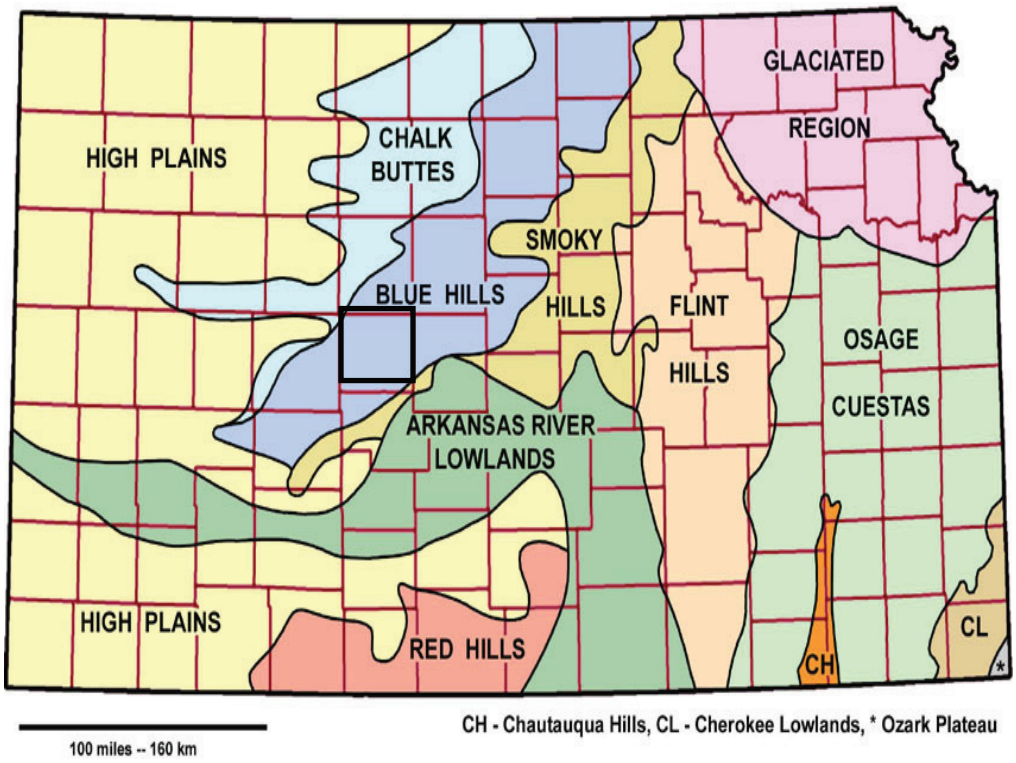
2.1.1 Geography and Topography

Rush County is located in central Kansas, slightly west of the center of the state. Rush County is bounded by six neighboring counties; on the north by Ellis County, on the north east corner by Russell County, on the east by Barton County, on the south by Pawnee County, on the west by

Ness County, and on the northwest corner by Trego County. The County Seat is the City of La Crosse, also the largest city in the county. The land area of Rush County is 718 square miles.

As shown in Figure 2.2, the County is in the Blue Hills physiographic region that comes down from north-central Kansas across a narrow band extending southwest. This region is underlain by chalk, limestone and shale bedrock.

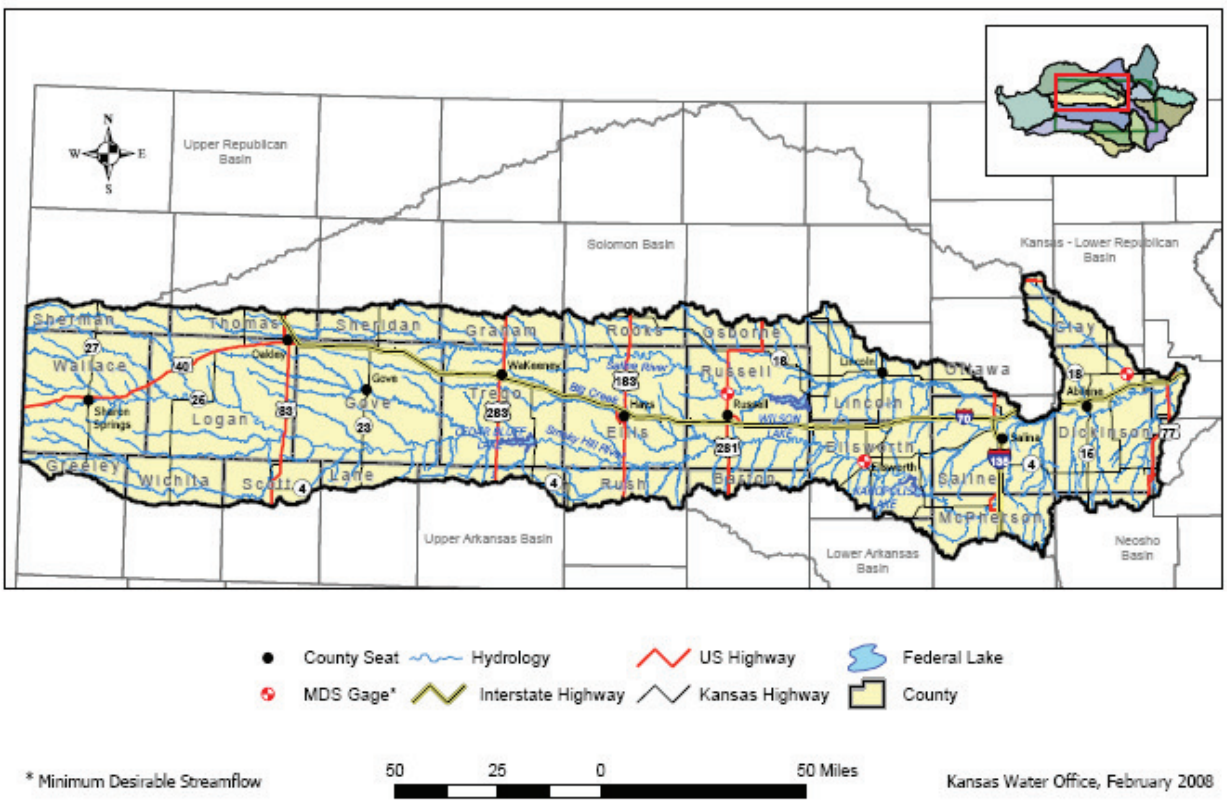
Figure 2.2 Physiographic Regions of Kansas



Source: Image by J.S. Aber; http://archaicgeo.angelfire.com

The State of Kansas is divided in to 12 major drainage basins. Sections of Rush County are included in two of the major drainage basins. Approximately the north third of Rush County is in Smoky Hill River drainage basin (Figure 2.3). Big Timber Creek is the largest tributary to the Smoky Hill River in Rush County; it heads in northeastern Ness County, enters Rush County in the vicinity of McCracken, and enters Ellis County northeast of Liebenthal. Other Smoky Hill tributaries in Rush County include Shelter Creek, Duck Creek, and Eagle Creek.

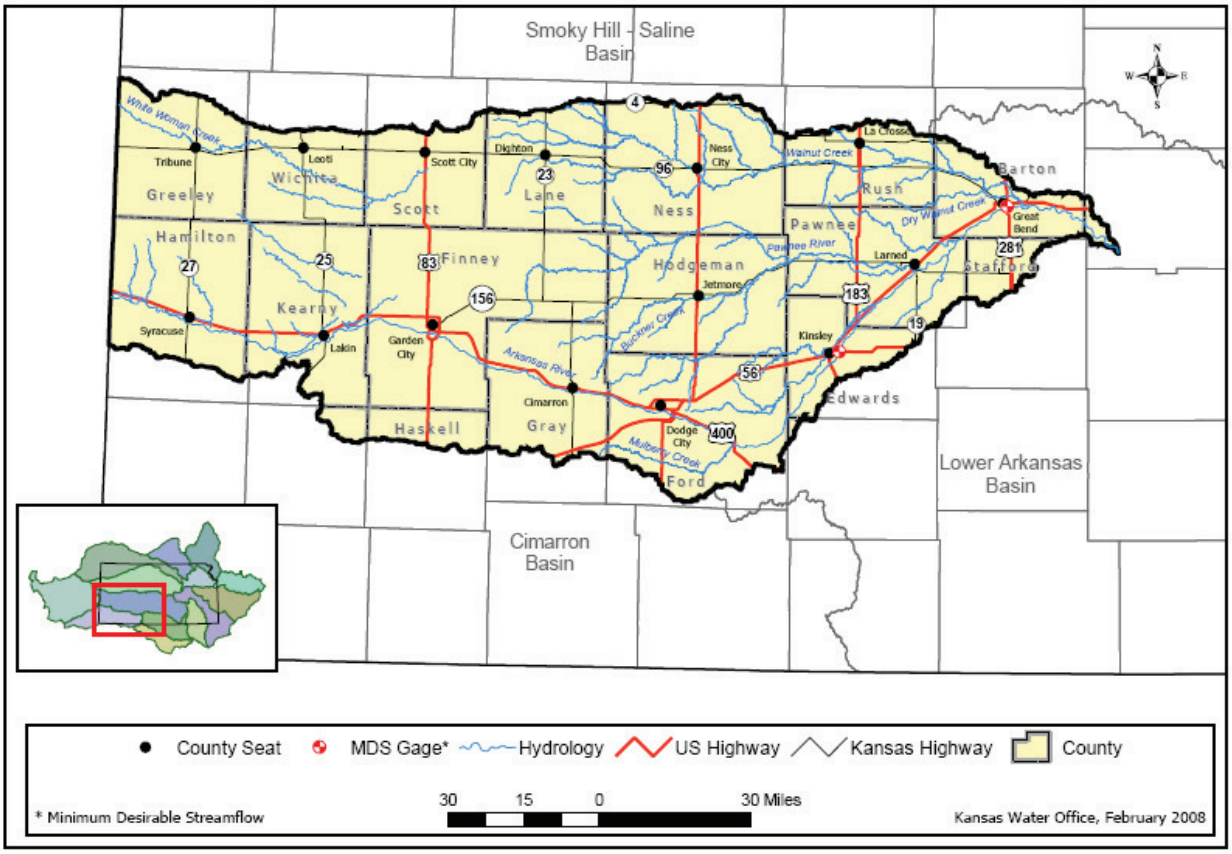
Figure 2.3 Smoky-Hill Saline Basin



Source: Kansas Water Office, Water Plan, January 2009
http://www.kwo.org/Kansas%20Water%20Plan/SWP/KWP_2008/Vol_III_Docs/SHS/SHS_Atlas/map_ss_KWP_basemap_whole_020108_tr.pdf

The southern two-thirds of Rush County is in the Arkansas River drainage basin (Figure 2.4). The major stream in this part of the county is Walnut Creek, which heads in western Lane County about 55 miles west of where it enters Rush County near Alexander. Walnut Creek flows eastward across Rush County and enters Barton County east of Shaffer. Major tributaries to Walnut Creek from the south include Old Maid Fork, Sandy Creek, and Otter Creek. Alexander Dry Creek and Sand Creek are the major tributaries to Walnut Creek from the north. Dry Walnut and Dry Creeks trend east-northeast in the southeast quarter of Rush County and enter Walnut Creek in Barton County. Along the south side of Rush County are headwater areas for some tributaries of Pawnee River (Kansas Geological Survey Bulletin 207 by Jesse M. McNellis, 1973, http://www.kgs.ku.edu/General/Geology/Rush/02_intro.html)

Figure 2.4 Upper Arkansas Basin



Source: Kansas Water Office, Water Plan, January 2009
http://www.kwo.org/Kansas%20Water%20Plan/SWP/KWP_2008/Vol_III_Docs/UARK/UARK_Atlas/map_ua_KWP_basemap_020108_tr.pdf

2.1.2 Climate

The climate regime for the Midwestern region of the United States that includes Rush County is a transition area between semi-arid and humid continental areas. It is characterized by moderate precipitation levels and continental weather patterns supporting temperate grasslands, savannahs, and shrublands.

The Kansas State University Weather Data Library reports an annual precipitation average of 23.51 inches per year in Bison, Kansas for the period 2000-2008, with a high of 34.5 inches in 2008 and a low of 16.10 inches in 2002. Precipitation totals for the months of December through February are generally the lowest of the year. Additional specific climate information was obtained for La Crosse, Kansas and is provided in Table 2.1 below and is fairly representative of the planning area. According to this climate information the planning area averages about 205 sunny days per year and average high temperatures in July are more than six degrees hotter than the national average. The comfort index for La Crosse is 32 out of 100 where higher is more

comfortable. This index is based on humidity during the hot months. The U.S. average comfort index is 44.

Table 2.1. La Crosse, Kansas Annual Climate Averages

Climate	La Crosse, KS Rush County	United States
Annual Rainfall (inches)	24	36.6
Annual Snowfall (inches)	18.3	25.2
Precipitation Days (annual total)	70	101
Sunny Days (annual total)	245	205
Average July High Temperature (°F)	92.7	86.5
Average January Low Temperature (°F)	15.2	20.8

Source: Kansas State University Research and Extension, http://www.oznet.ksu.edu/wdl/precip%20files/rh_p.asp; Sperlings, http://www.bestplaces.net/city/La_Crosse-Kansas.aspx#

2.1.3 Population/Demographics

According to the Kansas Division of the Budget, the July 1, 2007 population estimate for Rush County was 3,211. Population density based on this estimate is 4.47 people per square mile (718 total square miles in the county). County population decreased 16 percent from 1990 to 2007. Population and housing unit changes for each of the incorporated cities and the unincorporated County are provided in Table 2.2.

Table 2.2 Change in Population and Housing Units

Location	1990 Population	2000 Population	2007 Population	Percent Change 1990-2007	1990 Housing Units	2000 Housing Units	Percent Change 1990-2000
Alexander	85	75	66	-22%	47	42	-11%
Bison	252	235	207	-18%	122	120	-2%
La Crosse	1,427	1,376	1,234	-14%	711	720	1%
Liebenthal	112	111	101	-10%	58	56	-3%
McCracken	231	211	191	-17%	137	139	1%
Otis	385	325	300	-22%	183	170	-7%
Rush Center	177	176	163	-8%	97	99	2%
Timken	87	83	76	-13%	52	51	-2%
Rush County	3,842	3,551	3,211	-16%	1,999	1,928	-4%

Source: Source: U.S. Census Bureau; http://budget.ks.gov/files/FY2010/KS_Certified_Population_July2008.xls

La Crosse, the County Seat, is the county's largest city with a 2007 estimated population of 1,234.

Selected U.S. Census 2000 demographic and social characteristics for Rush County are shown in Table 2.3. Characteristics for Rush County are for the entire county including totals from incorporated areas.

Table 2.3. Rush County Demographic and Social Characteristics

Jurisdiction	Under 5 Years (%)	65 Years and Over (%)	Average Household Size	High School Graduates (%)	Bachelor Degree or Higher (%)	Persons Below Poverty (%)
U.S.	6.8	12.4	2.6	80.4	24.4	12.4
Kansas	7.0	13.3	2.5	86.0	25.8	11.1
Alexander	5.3	29.3	2.21	87.5	20.0	31.9
Bison	8.1	20.0	2.42	95.5	21.3	5.3
La Crosse	5.2	27.3	2.20	80.5	14.7	9.7
Liebenthal	4.5	18.0	2.31	64.4	20.3	11.1
McCracken	4.3	28.4	1.99	84.7	23.7	13.7
Otis	5.5	21.2	2.20	86.2	13.3	6.5
Rush Center	3.4	26.7	2.12	72.5	6.9	5.6
Timken	8.4	22.9	2.08	78.0	10.0	10.4
Rush County	4.8	25.3	2.24	82.8	16.4	9.7

Source: U.S. Census Bureau, www.census.gov/, State and County QuickFacts, Census 2000.

2.1.4 History

In 1869 the first settlers in Rush County lived along the Walnut Creek near a trading post and stockade on the Fort Hays-Fort Dodge Trail, now the present town of Alexander. The prairie was active with coyotes, buffalo, deer, pheasants, and prairie chickens. By 1874, the area from Walnut City west to Alexander, was a well settled area under the protection of the cavalry units of Fort Larned, Fort Hays, Fort Dodge, and Fort Scott.

Rush County was surveyed in 1867 and organized on December 5, 1874. The county was named in honor of Captain Alexander Rush, Company H of the 2nd Kansas Colored Infantry. Walnut City was designated as the county seat and the city's name was later changed to Rush Center. Within two years the county was re-surveyed and the southern tier of townships was given to neighboring Pawnee County in 1876. This changed the center of the county from Rush Center to La Crosse. During the period between the organization of the county in 1874 and the beginning of construction of the court house in La Crosse in 1888 the county seat was moved back and forth between Rush Center and La Crosse five times. In 1888, La Crosse became the permanent county seat with the construction of the courthouse (Rush County, Kansas: A Century in Story & Pictures, published by the Rush County Historical Society, 1976).

2.1.5 Economy/Industry

According to the 2000 U.S. Census, the industries that employed the highest percentage of Rush County's labor force were; educational, health and social services (24.0 percent), agriculture, forestry, fishing and hunting, and mining (14.8 percent), and manufacturing (12.8 percent).

The 2000 census reported 1,697 in the civilian labor force with 2.7 percent county unemployment rate. The reported statewide unemployment rate was 4.2 percent for that period. In 2007, the Bureau of Labor Statistics reported Rush County unemployment at 3.5 percent compared to the state unemployment rate of 4.1 percent that same year.

Table 2.4 lists selected economic characteristics for Rush County and incorporated cities from the 2000 U.S. Census.

Table 2.4. Rush County Economic Characteristics by Jurisdiction, 2000

Jurisdiction	Median Household Income ($)	Median Home Value ($)	Median Monthly Mortgage ($)	Population 16+ in Labor Force (%)	Top Three Employing Industries
U.S.	41,994	119,600	1,088	63.9	Educational, health, social services (19.9%), manufacturing (14.1%), retail trade (11.7%)
Kansas	40,624	83,500	888	67.5	Educational, health, social services (21.9%), manufacturing (15.0%), retail trade (11.5%)
Rush Co.	31,268	32,200	544	1,697	Educational, health, social services (24%), agriculture, forestry, fishing and hunting, and mining (14.8%, manufacturing (12.8%)
Alexander	12,083	27,500	350	40	Agriculture, forestry, fishing and hunting, and mining (34%), educational, health and social services (21.1%), wholesale trade (15.8%)
Bison	33,333	31,800	486	114	Educational, health and social services (20.2%), agriculture, forestry, fishing and hunting, and mining (14%), manufacturing (12.3%)
La Crosse	31,435	41,700	584	648	Educational, health and social services (26.9%), manufacturing (17.8%), retail trade (8.8%)
Liebenthal	21,875	21,300	825	39	Educational, health and social services (28.9%), construction (15.8%), other services (13.2%)
McCracken	29,750	15,900	523	102	Educational, health and social services (25.8%), transportation and warehousing, and utilities (15.1%), agriculture, forestry, fishing and hunting, and mining (12.9%)

Jurisdiction	Median Household Income ($)	Median Home Value ($)	Median Monthly Mortgage ($)	Population 16+ in Labor Force (%)	Top Three Employing Industries
Otis	27,109	29,100	533	174	Educational, health and social services (27.5%), manufacturing (20.5%), finance, insurance, real estate, and rental and leasing (8.2%)
Rush Center	31,500	29,200	530	87	Arts, entertainment, recreation, accommodation and food services (20.7), transportation and warehousing, and utilities (13.8%), Educational, health and social services (13.8%)
Timken	25,500	12,500	460	40	Manufacturing (25.7%), educational, health and social services (20.0%), construction (17.1%)

Source: U.S. Census 2000; http://factfinder.census.gov/

Information from the Kansas Center for Community and Economic Development (KCCED) reports the number of business establishments in Rush County decreased from 101 to 96 from 2000-2006. In 2006, 86 businesses had 1-19 employees, 7 had 20-99 employees, and 3 businesses had more than 100 employees.

According to reported data from 2006, payrolls from manufacturing establishments constitute the highest percentage of the county payroll total (39.12 percent), followed by wholesale trade (19.67 percent) and health care and social assistance (12.37 percent).

2.1.6 Agriculture

Agriculture is a major component of the economy of Rush County. In 2006, overall value of crops harvested was $47,212,000 and the value of cattle and mild products was $8,657,900. Table 2.5 below shows the production value and percentage of the county total for the main agricultural products in Rush County.

Table 2.5. Rush County Agricultural Production Value, 2007-2008

Crop	Farm Value ($)	Percent of Total Annual Production Value
Cattle	8,657,900	15
Wheat	20,320,000	36
Soybeans	1,429,900	3
Hay	5,766,400	10
Sorghum	16,256,800	29
Corn	2,822,500	5
Other	616,400	2

Source: Kansas Agricultural Statistics Service, Kansas Farm Facts-2007-2008 County Profiles

Table 2.6 provides harvest and yield information for crops in Rush County for 2007. During this period, the value of cattle inventory in the county was estimated to be $21,660,000.

Table 2.6. Rush County Crop Production, 2007-2008

Commodity	Harvested (acres)	Yield (bushels/acre)	Total Production (bushels/tons)
Wheat	105,100	31	3,206,000
Corn	5,000	140	698,000
Sorghum	49,800	80	4,002,300
Soybeans	3,700	37	136,000
Hay	20,600	2.8	58,300

Source: Kansas Agricultural Statistics Service, Kansas Farm Facts-2007-2008 County Profiles

2.2 Jurisdictional Descriptions and Capabilities

The mitigation capabilities for each of the jurisdictions participating in the plan are profiled in the section that follows. These profiles include an overview of the jurisdiction and its organizational structure; a description of staff, fiscal, and technical resources; and information regarding existing hazard mitigation capabilities such as adopted plans policies and regulations, if any. The descriptions and capabilities assessments are based on available and applicable data, including information provided by the jurisdictions collected during the planning process.

For the purposes of this section, participating jurisdictions are grouped as follows: unincorporated county, incorporated cities, and unified school districts. Table 2.7 is a listing of participating jurisdictions and their groupings.

Table 2.7 Hazard Mitigation Plan Participating Jurisdictions by Group

Category	Jurisdiction
County	
	Rush County
Cities	
	Bison
	La Crosse
	McCracken
	Rush Center
School Districts	
	USD 395 La Crosse

In the subsections that follow, Sections 2.2.1 and 2.2.2 summarize mitigation capabilities for Rush County and participating cities respectively. Section 2.2.3 summarizes mitigation capabilities for the participating school district.

2.2.1 Unincorporated Rush County

Overview

The jurisdiction of Rush County includes all unincorporated areas within the County boundaries. Rush County has a three-member elected commission. The Rush County government includes the following departments and offices.

- County Commissioners
- County Clerk
- County Appraiser
- County Attorney
- Walnut Creek Extension District Office
- Economic Development
- Health Department
- Highway Department
- Noxious Weed Department
- Public Transportation
- Register of Deeds Office
- Treasurers Office
- Public Safety
  - Emergency Management
  - Emergency Medical Services
  - Sheriff's Department

Technical and Fiscal Resources

Rush County has staff resources in emergency management in the Public Safety Department, and GIS services in the Appraiser's Office. The emergency management office provides grant writing services. Personnel resources for planning and engineering are contracted as needed. The County has a 911 central dispatch center located in the Sheriff's office that is manned 24/7 as well as outdoor warning sirens throughout the county that are remotely activated through the dispatch center. Each incorporated city in Rush County has at least one warning siren; La Crosse and Otis each have two warning sirens. Table 2.8 outlines Rush County personnel resources in 2008.

Table 2.8 Rush County Administrative and Technical Resources

Personnel Resources	Department/Position	Comments
Planner/Engineer with knowledge of land development/land management practices	Contracted as needed	
Planner/engineer/scientist with understanding of natural hazards	Contracted as needed	

Personnel Resources	Department/Position	Comments
Personnel skilled in GIS	County Appraisers Department	
Emergency Manager	Public Safety Department	
Grant Writer	Emergency Management	
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	Emergency Management Sheriff	Outdoor warning signals in each town are remotely activated by dispatch with local ability to override.

Source: HMPC

Fiscal tools or resources that the County could potentially use to help fund mitigation activities include the following:

- Capital improvements project funding
- Taxes for specific purposes
- Debt through general obligation bonds
- Debt through special tax bonds

Existing Plans and Policies

Rush County is currently not a member of the National Flood Insurance Program. The Unincorporated County has a building code with countywide zoning ordinance. The County Commission has the responsibility of approving all building permits in the county as the cities have adopted a countywide zoning plan. This includes a dam breach inundation zoning ordinance which prohibits development in dam inundation areas. All cities have adopted this zoning plan. The County has a Basic Emergency Operations Plan approved by the Kansas Division of Emergency Management on June 24, 2008, maintained by the Emergency Management Office as well as an Economic Development Plan maintained by the Economic Development Department. The County also has an erosion/sediment control program through the Natural Resources Conservation Service/NPDES (National Pollution Discharge Elimination System). The fire department ISO rating for the unincorporated areas of the county is a 10.

Other Mitigation Activities

The County provides annual severe weather training to interested citizens through the National Oceanic Atmospheric Administration (NOAA). In addition, the County has prepared and provided informational materials to the public about potential hazards and survival tips.

Rush County received a grant to purchase a semi-truck and trailer to serve as a Mobile Emergency Operations Center and Haz-Mat and Disaster Response unit.

The La Crosse/Brookdale Township and City of La Crosse fire departments merged at the beginning of 2009 to become Rush County Fire District #4. The City of La Crosse will contract with the new fire department to provide fire protection for the city.

Fire District #4 has just completed construction of a 6,000 sq. ft. fire station that will house the 5 pieces of equipment owned by the district.

In 2006, Fire District #5 received a 95%/5% grant to purchase a new 1250 gallon per minute pumper truck.

The three ambulance districts in Rush County merged to become Rush County Ambulance District. EMS service is provided by one unit housed in Otis, two units in La Crosse, and one unit stationed in McCracken.

2.2.2 Cities

Four incorporated cities participated in the planning development process: Bison, La Crosse, McCracken, and Rush Center. The amount of information regarding mitigation capabilities of these participating incorporated cities varies, but each supports the mitigation goals of the county overall. Descriptions of each participating city are provided below as reported by each city in the data collection guide and Table 2.9 at the end of this section summarizes the mitigation related capabilities of these cities.

City of Bison

Overview

The City of Bison is located in eastern central Rush County just south of Highway 4 and had a 2007 population estimate of 207. Bison was established in 1888 and incorporated in 1911. The town of Bison is named in honor of the buffalo, owner of the prairie land before the railroads came. The first homestead was in 1876. The location of Bison was determined by the Missouri-Pacific Railroad Townsite Company.

Bison is governed by a Mayor and five-member City Council. City Departments and officials include the following:

- City Maintenance
- City Clerk
- City Treasurer
- Utilities Department (water & sewer)

Technical and Fiscal Resources

The City of Bison does not participate in the National Flood Insurance Program. The City has an outdoor warning system. The City utilizes a part-time building official as needed. Grant writing duties are carried out by the City treasurer and the County Emergency Manager who also provides emergency management services for the City. The County Appraiser provides GIS services. Planning and engineering services are contracted as needed.

Fiscal tools or resources that the City could potentially use to help fund mitigation activities include the following:

- Community Development Block Grants
- Capital improvements project funding
- Taxes for specific purposes
- Fees for water, sewer, gas or electric services
- Debt through general obligation bonds
- Withhold spending in hazard prone areas

Existing Plans and Policies

Rush County and the incorporated cities have adopted a county-wide zoning plan. However, Bison does not have a separate building code. A Building Inspector performs site plan review requirements. The Mayor serves on the County Economic Development Council and participated in the Economic Development plan which includes specific development goals for Bison. The City utilizes the County Emergency Operations Plan. The Fire Department ISO rating is an 8.

Other Mitigation Activities

The City provides mitigation-related materials to citizens.

City of La Crosse

Overview

La Crosse, the County Seat of Rush County was established in 1876 and incorporated in 1886 and is centrally located in the County along Highway 4. When Rush County was re-surveyed in 1876, the county offices were moved to La Crosse from Rush Center, much to the dismay of Rush Center's citizens. The present court house was built in 1888 and became the permanent home of the county offices. This building is now listed on the National Register of Historic Buildings. La Crosse is known throughout the nation as the 'Barbed Wire Capital of the World' and hosts the Annual Barbed Wire Convention every spring. The Barbed Wire Museum, The Post Rock Museum, The Rush County Historical Museum, and a plaque honoring Howard R. Barnard (1863-1948), pioneer educator, founder of consolidated schools, and the school bus system, are located in Grass Park (the old Varney homestead) at the south side of town.

The 2007 population estimate for La Crosse was 1,234. The City is governed by a City Manager and 5 member City Council. City officials and departments include:

- City Clerk
- City Treasurer
- City Attorney (on retainer)
- Water and Sewer Department

- Street Department
- Electric Department
- Police Department

Technical and Fiscal Resources

The City joined the NFIP in 1990 and the City Manager serves as the floodplain administrator. The City Manager also serves as the building official, city emergency manager, and grant writer. Planning, engineering, and GIS services are contracted as needed.

Fiscal tools or resources that the City could potentially use to help fund mitigation activities include the following:

- Community Development Block Grants
- Capital Improvements project funding
- Taxes for specific purposes
- Fees for water, sewer, gas or electric services
- Debt through general obligation bonds
- Debt through special tax bonds
- Withhold spending in hazard prone areas

Existing Plans and Policies

La Crosse enforces their floodplain ordinance as well as the county-wide zoning ordinance which, among other things, controls development in dam breach inundation areas. The city has a building code with site plan review requirements and a capital improvements plan. As with other cities in the county, the city is included in the countywide economic development plan. The city utilizes the County Emergency Operations Plan.

Other Mitigation Activities

None identified

City of McCracken

Overview

McCracken is located in northwester Rush County along Highway 4. The town was organized in 1886 along the soon to be completed Missouri-Pacific Railroad. The town was named in honor of J. K. McCracken, one of the first trustees. The founders of the town knew that Eastern newspapers were promoting the new railroad town sites, and that settlers and businessmen from the East would come to McCracken and build their businesses in town, or set up their farms nearby. Within the first year, McCracken boasted a bank, two grocery stores, a newspaper, drug store, theater, and numerous other businesses. Soon after, two physicians moved to town and set up practice. McCracken's business section was twice destroyed by fire. In 1905, half of the business section of the town lay in ashes after a fire swept through the east side of Main Street. A

second fire struck McCracken in January 1909, wiping out most of the buildings and businesses on the west side of Main Street ("Rush County, Kansas: A Century in Story & Pictures", published by the Rush County Historical Society, 1976).

The 2007 population estimate for McCracken was 191. The City is governed by a Mayor and two-member City Council and has the following other officials:

- City Clerk-Part Time

Technical and Fiscal Resources

McCracken is not currently a participant of the National Flood Insurance Program. However, as a result of this planning effort, the City has voted to complete the process to join. Through this process, the City will identify a position to serve as floodplain manager. As for other technical resources, the City relies on consultants for planning and engineering services. The County Appraiser provides GIS services and the County Emergency Manager provides emergency management services. There is a part time building official as needed and grant writing services are contracted out to Great Plains Development, Inc.

Fiscal tools or resources that the City could potentially use to help fund mitigation activities include the following:

- Community Development Block Grants
- Capital improvements project funding
- Authority to levee taxes for specific purposes
- Fees for water and sewer services
- Incur debt through general obligation bonds
- Incur debt through special tax bonds
- Withhold spending in hazard prone areas

Existing Plans and Policies

The City of McCracken adheres to the County-wide zoning plan and is a participant in the Rush county Economic Development Group. The City did not report a specific building code enforced other than the County wide zoning plan. The City does not have a separate local emergency operations plan as they utilize the County plan.

Other Mitigation Activities

None reported.

City of Rush Center

Overview

The City of Rush Center is located in south central Rush County approximately 4 miles south of La Crosse along Highway 4. In the early pioneer days, Rush Center was the county seat and it

was here that the county was organized. The rich bottom lands of the Walnut Valley gave the promise of bountiful crops and the residents aspired to make Rush Center a trade center of this region. The settlement was first known as Walnut City, and in 1874 the name was changed to Rush Centre with a spelling change in 1895.

As early as 1874 many business houses and dwellings had been erected. In 1875 the first school district in the county was organized in Rush Center. By 1878 one store carried insurance of $40,000 and the population was more than 1500 citizens. The county was re-surveyed in 1876 and six miles were cut off the south boundary of the 1867 county survey and given to the north side of Pawnee County. This put the center of the county four miles north of Rush Center, and on the future Missouri Pacific Railroad Line. The new town of La Crosse was platted immediately. A "tug of war" between Rush Center and La Crosse for the courthouse caused the records to move, by wagon, back and forth between the villages, sometimes under threat and gunfire but no physical harm. This event is celebrated every year in the two mile long St. Patrick's Day Parade. "The Courthouse" is carried by wagon back to Rush Center every March 17th.

The 2007 population estimate for Rush Center was 163. The City is governed by a Mayor and 5-member City Council. Other city staff and include:

- City Clerk

Technical and Fiscal Resources

Rush Center joined the regular phase of the National Flood Insurance Program in May of 1988. The City Clerk serves as the city's floodplain manager and provides grant writing services. The city utilizes the county for GIS services as well as emergency management duties. For planning and engineering services, the City contracts these services as needed.

Fiscal tools or resources that the City could potentially use to help fund mitigation activities include the following:

- Community Development Block Grants
- Capital improvements project funding
- Taxes for specific purposes
- Fees for water and sewer services
- Debt through general obligation bonds
- Withhold spending in hazard prone areas

Existing Plans and Policies

The City of Rush Center has adopted the countywide zoning ordinance and has a floodplain management ordinance. The City participated in the development of the County Economic Development Plan and utilizes the County Emergency Operations Plan to respond to and recover from emergencies. The fire department's ISO rating is 8.

Other Mitigation Activities

None reported.

Table 2.9 Rush County and Participating Cities: Summary of Mitigation Capabilities

Capability	Rush County	Bison	La Crosse	McCracken	Rush Center
Master Plan	N	N	N	N	N
Emergency Operations Plan	Y	N	Y	Y	N
Economic Development Plan/Policy	Y	Y	Y	Y	Y
Capital Improvements Plan	N	N	Y	N	N
Building Code	Y	N	Y	N	N
Building Code Year	Not Reported	N/A	Not Reported	N	N/A
Fire Department ISO Rating	10	8	7	Not Reported	8
Stormwater Management Ordinance	N	N	N	N	N
Floodplain Management Ordinance	N	N	Y	Y	Y
Zoning Ordinance	Y	Y	Y	Y	Y
Subdivision Ordinance	N	N	N	N	N
Site plan review requirements	N	Y	Y	Y	N
Erosion Management Ordinance	Y	N	N	N	N
National Flood Insurance Program Participant	N	N	Y	Pending	Y
Flood insurance study	N	N	N	N	N
Elevation Certificates Maintained	N	N	N	N	N

2.2.3 School Districts

There are two Unified School Districts in Rush County—Unified School District 395-Lacrosse and Unified School District 403-Otis-Bison. However, Unified School District 395-La Crosse is the only school district that is participating in this hazard mitigation plan. As a public institution, the school district shares an interest in public safety and in achieving Rush County's mitigation goals. Figure 2.5 provides the boundaries of the school districts in Rush County. The school buildings within each district are identified by the red dots.

Figure 2.5 Rush County School District Boundaries

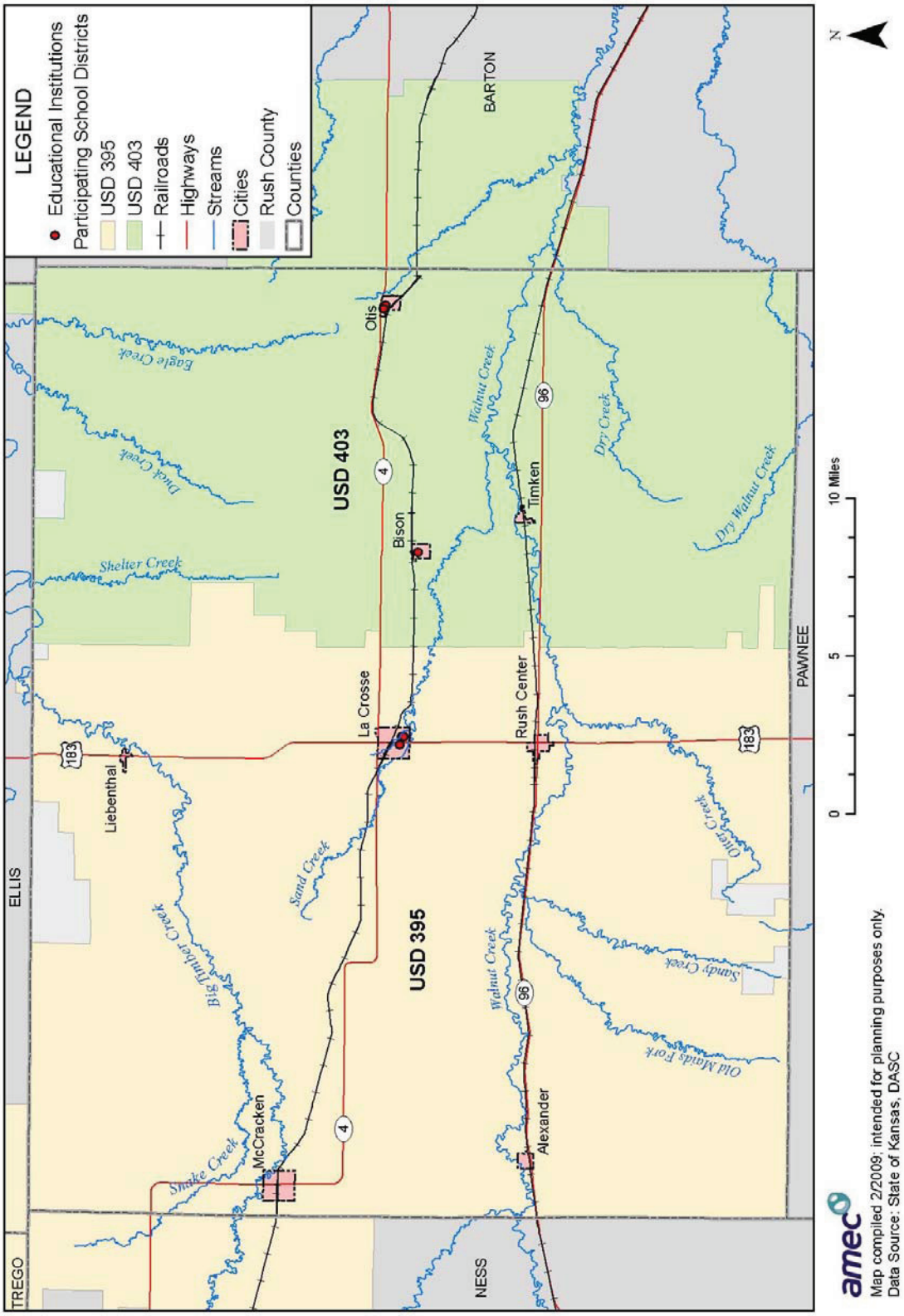


Table 2.10. USD 395 Reported 2007-2008 Enrollment

USD 395 La Crosse Public Schools	2007-2008 Enrolment Total 318
La Crosse Elementary	149
La Crosse High	112
La Crosse Middle School	57

Source: Kansas State Department of Education Report Card, http://online.ksde.org/rcard/index.aspx

Technical and Fiscal Resources

The school Principals and Superintendent serve as building officials for the school buildings. The Superintendent serves as emergency manager for the schools as well as the Public Information Officer. The school district has access to the following identified financial resources for hazard mitigation

- Capital improvements project funding
- Local Funds
- Private activities/donations
- State and federal funds

Existing Plans and Policies

USD 395 has a Capital Improvement Plan dated June 30, 2009 as well as a School Emergency Plan, including a weapons policy dated July 1, 2009

Other Mitigation Activities

The school district conducts fire evacuation and tornado sheltering exercises monthly and the school buildings are all equipped with NOAA weather radios and emergency and public address notification systems. All buildings are also equipped with "Bull Dog" security systems and lock-down security training is conducted for staff and students.

3 RISK ASSESSMENT

44 CFR Requirement §201.6(c)(2): [The plan shall include] A risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.

The risk assessment process identifies and profiles relevant hazards and assesses the exposure of lives, property, and infrastructure to these hazards. The goal of the risk assessment is to estimate the potential loss in Rush County, including loss of life, personal injury, property damage, and economic loss, from a hazard event. The risk assessment process allows communities in Rush County to better understand their potential risk to natural hazards and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events.

The risk assessment for Rush County and its jurisdictions followed the methodology described in the FEMA publication 386-2, *Understanding Your Risks: Identifying Hazards and Estimating Losses* (2002), which includes a four-step process:

- Identify Hazards
- Profile Hazard Events
- Inventory Assets
- Estimate Losses

This chapter is divided into four parts: hazard identification, hazard profiles, vulnerability assessment, and Summary of Key Issues.

- **Section 3.1 Hazard Identification** identifies the hazards that threaten the planning area and describes why some hazards have been omitted from further consideration.
- **Section 3.2 Hazard Profiles** discusses the threat to the planning area and describes previous occurrences of hazard events and the probability of future occurrence.
- **Section 3.3 Vulnerability Assessment** assesses the County's total exposure to natural hazards, considering critical facilities and other community assets at risk, and assessing growth and development trends. Hazards that vary geographically across the planning area are addressed in greater detail. This section includes steps 3 and 4 from above.
- **Section 3.4 Summary of Key Issues** provides a summary of the key issues or problems identified in the Risk Assessment.

Multi-Jurisdictional Risk Assessment

For this multi-jurisdictional plan, the risk assessment assesses each jurisdiction's risks where they deviate from the risks facing the entire planning area. Rush County is 718 square miles and is fairly uniform in terms of climate and topography as well as construction characteristics and development trends. Accordingly, overall hazards and vulnerability do not vary greatly across the planning area for most hazards. Weather-related hazards, such as drought, extreme heat, hailstorm, lightning, tornado, windstorm, and winter storm, affect the entire planning area.

The hazards that do vary across the planning area include dam failure, flood, and wildfire. In Section 3.1, Hazard Identification, Table 3.2 indicates with a checkmark the hazards identified for each participating jurisdiction. In Section 3.2, Hazard Profiles, the Geographic Location section discusses how the hazard varies among jurisdictions across the planning area. The Previous Occurrences section lists the best available data on where past events have occurred and the associated losses to particular jurisdictions. Section 3.3.2, Community Asset Inventory, describes critical facilities and other community assets by jurisdiction. Section 3.3.3, Vulnerability by Hazard, identifies structures and estimates potential losses by jurisdiction where data is available and hazard areas are identified for hazards of moderate and high planning significance. Table 3.32 in Section 3.2.15 summarizes the planning significance rating for each hazard by jurisdiction.

The previous chapter, Chapter 2 Planning Area Profile and Capabilities, discussed the existing mitigation capabilities of each jurisdiction, such as plans and policies, personnel, and financial resources, which are or could be used to implement measures to reduce hazard losses.

3.1 Hazard Identification

Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the type…of all natural hazards that can affect the jurisdiction.

3.1.1 Methodology

The Hazard Mitigation Planning Committee (HMPC) reviewed data and discussed the impacts of each of the hazards included in the State of Kansas Hazard Mitigation Plan, which are listed alphabetically below:

- Agricultural Infestation
- Dam and Levee Failure
- Drought
- Earthquake
- Expansive Soils
- Extreme Temperatures
- Flood
- Fog
- Hailstorm
- Hazardous Materials
- Land Subsidence
- Landslide
- Lightning
- Major Disease Outbreak
- Radiological
- Soil Erosion and Dust
- Terrorism/Agri-Terrorism/Civil Disorder
- Tornado
- Utility/Infrastructure Failure
- Wildfire
- Windstorm
- Winter Storm

Data on the past impacts and future probability of these hazards in the Rush County planning area was collected from the following sources:

- Kansas Hazard Mitigation Plan (November 2007)
- Information on past hazard events from the Spatial Hazard Event and Loss Database (SHELDUS), a component of the University of South Carolina Hazards Research Lab that compiles county-level hazard data for 18 different natural hazard event types
- Information on past extreme weather and climate events from the National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center
- Disaster declaration history from the Federal Emergency Management Agency (FEMA), the Public Entity Risk Institute, and the USDA Farm Service Agency Disaster Declarations
- The National Drought Mitigation Center Drought Reporter
- Information provided by members of the Hazard Mitigation Planning Committee
- Community of Rush County, KS Hazard Mitigation Plan prepared using MitigationPlan.Com online planning tool.
- Hazard Analysis prepared by E-FM Consulting, 2004
- Various articles and publications available on the internet (sources are indicated where data is cited)

The HMPC eliminated some hazards from further profiling. Manmade and technological hazards were eliminated for two reasons. First, evaluation of these hazards is not necessary for plans to meet the requirements of the Disaster Mitigation Act of 2000. Secondly, these hazards are profiled and planned for in other plans such as the Local Emergency Operations Plan and Rush County Public Health Plans. In addition to manmade and technological hazards, the planning committee also eliminated earthquake, expansive soils, fog, landslide, and land subsidence because they do not occur in the planning area or their impacts were not considered significant in relation to other hazards. Table 3.1 lists all of the hazards in the State Plan that were eliminated from further review with an explanation.

Table 3.1 Hazards Not Profiled in the Plan

Hazard	Explanation for Omission
Earthquake	The HMPC determined that Rush County is not vulnerable to this hazard to a level that would warrant inclusion in this plan.
Expansive Soils	The HMPC determined that Rush County is not vulnerable to this hazard to a level that would warrant inclusion in this plan.
Fog	Although fog does occur in the planning area occasionally, the HMPC determined that the impacts are restricted primarily to traffic accidents and are difficult to mitigate.
Hazardous Materials	The HMPC determined this hazard is covered in sufficient detail in the Local Emergency Operations Plan. In addition, since this is a man-made hazard, it is not required for inclusion in mitigation plans prepared in accordance with the Disaster Mitigation Act of 2000.
Landslide	The planning committee determined that this hazard does not occur in the planning area due to the flat topography.
Land Subsidence	The HMPC determined that Rush County is not vulnerable to this hazard to a level that would warrant inclusion in this plan.
Major Disease Outbreak	The Rush county Health Department maintains a plan for the issues related to major disease outbreak. So the HMPC elected not to include this hazard in this plan as it would duplicate effort.

Hazard	Explanation for Omission
Radiological	The HMPC determined this hazard is covered in sufficient detail in the Local Emergency Operations Plan. In addition, since this is a man-made hazard, it is not required for inclusion in mitigation plans prepared in accordance with the Disaster Mitigation Act of 2000
Terrorism/Agri-Terrorism/Civil Disorder	The HMPC determined this hazard is covered in sufficient detail in the Local Emergency Operations Plan. In addition, since this is a man-made hazard, it is not required for inclusion in mitigation plans prepared in accordance with the Disaster Mitigation Act of 2000

After review of the hazards, the HMPC identified 13 natural hazards that significantly affect the planning area and organized these hazards to be consistent with the Kansas Hazard Mitigation Plan (2007). These hazards are listed below with an "X" indicating the affected jurisdictions in Table 3.2. Each of these hazards is profiled in further detail in the next section. Although the cities of Alexander, Liebenthal, Otis, and Timken did not participate in the development of this plan, the risk assessment includes data for these locations to ensure a comprehensive assessment of Rush County.

Table 3.2. Hazards Identified for Each Participating Jurisdiction

Hazard	Rush County	Alexander	Bison	Lacrosse	Liebenthal	McCracken	Otis	Rush Center	Timken
Agricultural Infestation	X	X	X	X	X	X	X	X	X
Dam and Levee Failure	X	X		X				X	X
Drought	X	X	X	X	X	X	X	X	X
Extreme Temperatures	X	X	X	X	X	X	X	X	X
Flood	X	X		X	X	X		X	X
Hailstorm	X	X	X	X	X	X	X	X	X
Lightning	X	X	X	X	X	X	X	X	X
Utility/Infrastructure Failure	X	X	X	X	X	X	X	X	X
Soil Erosion / Dust	X	X	X	X	X	X	X	X	X
Tornado	X	X	X	X	X	X	X	X	X
Wildfire	X	X	X	X	X	X	X	X	X
Windstorm	X	X	X	X	X	X	X	X	X
Winter Storm	X	X	X	X	X	X	X	X	X

3.1.2 Disaster Declaration History

One method used by the HMPC to identify hazards was to examine events that triggered federal and/or state disaster declarations. Federal and/or state declarations may be granted when the severity and magnitude of an event surpasses the ability of the local government to respond and recover. Disaster assistance is supplemental and sequential. When the local government's capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. Should the disaster be so severe that both the local and state governments' capacities are exceeded, a federal emergency or disaster declaration may be issued allowing for the provision of federal assistance.

The federal government may issue a disaster declaration through FEMA, the U.S. Department of Agriculture (USDA), and/or the Small Business Administration. FEMA also issues emergency declarations, which are more limited in scope and do not include the long-term federal recovery programs of major disaster declarations. Determinations for declaration type are based on scale and type of damages and institutions or industrial sectors affected.

A USDA disaster declaration certifies that the affected county has suffered at least a 30 percent loss in one or more crop or livestock areas and provides affected producers with access to low-interest loans and other programs to help mitigate disaster impacts. In accordance with the Consolidated Farm and Rural Development Act, counties neighboring those receiving disaster declarations are named as contiguous disaster counties and are eligible for the same assistance.

Table 3.3 lists federal disaster declarations received by Rush County. Each of the disaster events affected multiple counties; estimated damages reflect total losses to all counties.

Table 3.3 Disaster Declaration History in Rush County, 1955-Present

Declaration Number	Declaration Date	Disaster Description	Counties Included	Estimated Damage (2008 $)
Major Disaster Declarations				
1776	7/9/2008 (5/22-6/16)	Severe Storms, Flooding, and Tornadoes	Barber, Barton, Bourbon, Brown, Butler, Chautauqua, Cherokee, Clark, Clay, Comanche, Cowley, Crawford, Decatur, Dickinson, Edwards, Elk, Ellis, Ellsworth, Franklin, Gove, Graham, Harper, Haskell, Hodgeman, Jackson, Jewell, Kingman, Kiowa, Lane, Linn, Logan, Mitchell, Montgomery, Ness, Norton, Osborne, Pawnee, Phillips, Pratt, Reno, Republic, Riley, Rooks, **Rush**, Saline, Seward, Sheridan, Smith, Stafford, Sumner, Thomas, Trego, Wallace, Wilson	TBD
1741	2/1/2008	Severe Winter Storms	Atchison, Barber, Barton, Brown, Butler, Chase, Cherokee, Clark, Clay, Cloud, Comanche, Crawford, Dickinson, Doniphan, Edwards, Ellis, Ellsworth, Ford, Geary, Graham, Gove, Harvey, Hodgeman, Jackson, Jefferson, Jewell, Kingman, Kiowa, Labette, Leavenworth, Lincoln, Logan, Lyon, Marion, Marshall, McPherson, Miami, Mitchell, Morris, Nemaha, Osage, Osborne, Ottawa, Pawnee, Phillips, Pottawatomie, Pratt, Reno, Republic, Rice, Riley, Rooks, **Rush**, Russell, Saline, Sedgwick, Shawnee, Sheridan, Smith, Stafford, Thomas, Wabaunsee, Wallace, Washington, and Woodson	TBD

Declaration Number	Declaration Date	Disaster Description	Counties Included	Estimated Damage (2008 $)
1675	1/7/2007 (12/28-30/2006)	Severe Winter Storm	Cheyenne, Clark, Comanche, Decatur, Edwards, Ellis, Finney, Ford, Gove, Graham, Grant, Gray, Greeley, Hamilton, Haskell, Hodgeman, Jewell, Kearny, Kiowa, Lane, Logan, Meade, Morton, Ness, Norton, Osborne, Pawnee, Phillips, Rawlins, Rooks, **Rush**, Russell, Scott, Seward, Sheridan, Sherman, Smith, Stafford, Stanton, Stevens, Thomas, Trego, Wallace, Wichita	371,000,000
1626	1/26/2006 (11/27-28/2005)	Severe Winter Storm	Cheyenne, Decatur, Edwards, Gove, Graham, Hodgeman, Ness, Norton, Pawnee, Phillips, Rawlins, Rooks, **Rush**, Sheridan, Sherman, Thomas, Trego	32,700,820
1535	8/3/2004 (6/12-7/25/2004)	Severe Storms, Flooding, and Tornadoes	Barton, Butler, Cherokee, Decatur, Ellis, Geary, Graham, Jewell, Labette, Lyon, Marion, Mitchell, Morris, Ness, Osborne, Pawnee, Phillips, Rooks, **Rush**, Russell, Shawnee, Sheridan, Smith, Thomas, Trego, Wabaunsee, Wallace, Woodson, Wyandotte	12,376,235
1000	7/22/1993	Flooding, Severe Storms	Atchison, Barton, Brown, Chase, Cherokee, Clay, Cloud, Crawford, Dickinson, Doniphan, Douglas, Edwards, Ellis, Ellsworth, Geary, Graham, Harvey, Hodgeman, Jackson, Jefferson, Jewell, Johnson, Lane, Leavenworth, Lincoln, Lyon, Marion, Marshall, McPherson, Mitchell, Morris, Nemaha, Ness, Osage, Osborne, Ottawa, Pawnee, Pottawatomie, Reno, Republic, Rice, Riley, Rooks, **Rush**, Russell, Saline, Sedgwick, Shawnee, Sheridan, Smith, Stafford, Sumner, Thomas, Trego, Wabaunsee, Washington, Wyandotte	137,038,990
378	5/2/1973	Severe Storms, Flooding	Atchison, Barber, Barton, Bourbon, Brown, Butler, Chautauqua, Cherokee, Clark, Coffey, Crawford, Dickinson, Doniphan, Douglas, Edwards, Ellsworth, Ford, Franklin, Gray, Greenwood, Harper, Harvey, Haskell, Hodgeman, Jackson, Jefferson, Kingman, Kiowa, Labette, Leavenworth, Lincoln, Linn, Lyon, Marion, Marshall, McPherson, Meade, Miami, Montgomery , Morris, Nemaha, Ness, Osage, Osborne, Ottawa, Pawnee, Pottawatomie, Pratt, Reno, Republic, Rice, **Rush**, Russell, Saline, Sedgwick, Seward, Shawnee, Stafford, Stevens, Sumner, Wabaunsee,	8,829,200

Declaration Number	Declaration Date	Disaster Description	Counties Included	Estimated Damage (2008 $)
			Washington, Woodson, Wyandotte	
Emergency Declarations				
3282	12/12/2007	Severe Winter Storms	All	Not Available
3236	9/10/2005	Hurricane Katrina Evacuation	All	0

Source: Federal Emergency Management Agency, www.fema.gov/;
Note: Incident dates are in parentheses. Zero values (0) may indicate missing data.

Table 3.4 lists U.S. Department of Agriculture disaster declarations and their related causes for Rush County for the period 2005-2007.

Table 3.4. USDA Disaster Declarations in Rush County 2005-2007

Year	Number	Hail	Drought	Lightning	Tornadoes	Severe Storms	High Winds	Excessive Heat	Winter Storms	Excessive Moisture
2005	M1626								X	
2005	S2128		X				X	X	X	
2005	S2196	X		X	X	X	X			X
2006	M1675								X	
2006	S2413		X				X	X		
2007	M1675								X	
2007	M1699				X	X				X
2007	M1711					X				X
2007	S2525							X	X	
2007	S2593	X		X		X	X			X

Source: USDA Farm Service Agency, www.fsa.usda.gov, http://www.fsa.usda.gov/Internet/FSA_File/2005-2007_elig_co_031208.xls

3.2 Hazard Profiles

Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the…location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

3.2.1 Methodology

Each hazard identified in Section 3.1 Hazard Identification is profiled individually in this section. The level of information presented in the profiles varies by hazard based on the information available. With each update of this plan, new information will be incorporated to provide for better evaluation and prioritization of the hazards that affect Rush County.

The sources used to collect information for these profiles include those mentioned in Section 3.1.1 as well as those cited individually in each hazard section.

Detailed profiles for each of the identified hazards include information categorized as follows:

Hazard Description

This section consists of a general description of the hazard and the types of impacts it may have on a community. It also includes a ranking to indicate typical warning times and duration of hazard events. Definitions for these rankings are included in Table 3.5.

Geographic Location

This section describes the geographic extent or location of the hazard in the planning area. Where available, maps are utilized to indicate the areas of the planning area that are vulnerable to the subject hazard.

Previous Occurrences

This section includes information on historic incidents and their impacts based upon the sources described in Section 3.1 Hazard Identification and the information provided by the Hazard Mitigation Planning Committee.

Probability of Future Occurrence

The frequency of past events is used to gauge the likelihood of future occurrences. Where possible, the probability or chance of occurrence was calculated based on historical data. Probability was determined by dividing the number of events observed by the number of years and multiplying by 100. This gives the percent chance of the event happening in any given year. An example would be three droughts occurring over a 30-year period, which suggests a 10 percent chance of a drought occurring in any given year. The probability was assigned a rank as defined in Table 3.5.

Magnitude/Severity

The magnitude of the impact of a hazard event (past and perceived) is related directly to the vulnerability of the people, property, and the environment it affects. This is a function of when the event occurs, the location affected the resilience of the community, and the effectiveness of the emergency response and disaster recovery efforts.

The magnitude of each profiled hazard is classified in the following manner:

- **Level 4-Catastrophic**—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths
- **Level 3-Critical**—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability
- **Level 2-Limited**—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability
- **Level 1-Negligible**—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid

Hazard Summary

To maintain a consistent reporting format, the Rush County Hazard Mitigation Planning Committee (HMPC) used the methodology from the MitigationPlan.com planning tool to prioritize the hazards. This prioritization was based on a calculated priority risk index (CPRI)

that considered four elements of risk: probability, magnitude/severity, warning time, and duration. Table 3.5 defines the rankings for each element of risk. The CPRI for each hazard is provided in this Hazard Summary section.

Table 3.5 Calculated Priority Risk Index (CPRI) Element Definitions

Element/Level	Characteristics
Probability	
4 - Highly Likely	Event is probable within the calendar year. Event has up to 1 in 1 year chance of occurring (1/1=100%) History of events is greater than 33% likely per year. Event is "Highly Likely" to occur
3 – Likely	Event is probable within the next three years. Event has up to 1 in 3 years chance of occurring (1/3=33%) History of events is greater than 20% but less than or equal to 33% likely per year Event is "Likely" to occur
2 – Occasional	Event is probable within the next five years. Event has up to 1 in 5 years chance of occurring (1/5=20%) History of events is greater than 10% but less than or equal to 20% likely per year Event could "Possibly" occur
1 – Unlikely	Event is possible within the next 10 years Event has up to 1 in 10 years chance of occurring (1/10=10%) History of events is less than or equal to 10% likely per year Event is "Unlikely" but is possible of occurring
Magnitude / Severity**	
4 - Catastrophic	Multiple deaths Complete shutdown of facilities for 30 or more days More than 50 percent of property is severely damaged
3 – Critical	Injuries and/or illnesses result in permanent disability Complete shutdown of critical facilities for at least two weeks 25–50 percent of property is severely damaged
2 – Limited	Injuries and/or illnesses do not result in permanent disability Complete shutdown of critical facilities for more than one week 10–25 percent of property is severely damaged
1 – Negligible	Injuries and/or illnesses are treatable with first aid Minor quality of life lost Shutdown of critical facilities and services for 24 hours or less Less than 10 percent of property is severely damaged
Warning Time	
4	Less Than 6 Hours
3	6-12 Hours
2	12-24 Hours
1	24+ Hours
Duration	
4	More Than 1 Week
3	Less Than 1 Week
2	Less Than 1 Day
1	Less Than 6 Hours

Source: MitigationPlan.com

* Based on history, using the definitions given, the likelihood of future events is quantified.

** According to the severity associated with past events or the probable worst case scenario possible in the state.

Using the ranking described in the previous table, the formula used to determine each hazard's CPRI, which includes weighting factors defined by MitigationPlan.com, was:

(Probability x .45) + (Magnitude/Severity x .30) + (Warning Time x .15) + (Duration x .10) = CPRI

Based on their CPRI, the hazards were separated into three categories of planning significance; High (3.0-4.0), Moderate (2.0-2.9), and Low (1.1-1.9)

These terms relate to the level of planning analysis to be given to the particular hazard in the risk assessment process and are not meant to suggest that a hazard would have only limited impact. In order to focus on the most critical hazards, those assigned a level of significant or moderate were given more extensive attention in the remainder of this analysis (e.g., quantitative analysis or loss estimation), while those with a low planning significance were addressed in more general or qualitative ways.

Table 3.6 summarizes the results of the completed Hazard Profile Section using this methodology:

Table 3.6 Hazard Profile Summary for Rush County

Hazard	Warning Time	Duration	Magnitude/ Severity	Probability of Future Events	Calculated Priority Risk Index	Planning Significance
Agricultural Infestation	1	4	2	2	2.05	Moderate
Dam & Levee Failure	2	4	2	1	1.75	Low
Drought	1	4	2	3	2.50	Moderate
Extreme Temperatures	1	4	1	2	1.75	Low
Flood	4	2	2	2	2.30	Moderate
Hail Storm	4	1	3	4	3.40	High
Lighting	4	1	1	2	1.90	Low
Soil Erosion / Dust	1	4	2	2	2.05	Moderate
Tornado	4	1	2	3	2.65	Moderate
Utility Infrastructure	4	3	3	4	3.60	High
Wildfire	4	2	3	4	3.50	High
Wind Storm	2	2	2	4	2.90	Moderate
Winter Storm	2	3	3	4	3.30	High

Notes: Measures for Probability and Magnitude were determined by the Rush County HMPC. Warning times and duration for each hazard were discussed as presented in Appendix E of the Kansas Hazard Mitigation Plan and modified as deemed appropriate by the HMPC.

3.2.2 Agricultural Infestation

Description

Agricultural infestation is a naturally occurring infection of crops or livestock that renders them unfit for consumption or use. Typical causes can include insects, vermin, fungus, or diseases transferable amongst animals. The types and severity of agricultural infestations vary based on many factors, including cycles of heavy rains and drought. Because of the substantial importance of the agricultural industry in Kansas, agricultural infestation poses a risk to the economy of the entire state.

A certain level of agricultural infestation is normal for Kansas farmers and ranchers. The concern is when the level of an infestation escalates suddenly, or a new infestation appears that overwhelms local control efforts. The potential introduction of animal diseases, such as foot and mouth disease and bovine spongiform encephalopathy disease is a key concern. The Kansas Center for Community Economic Development (KCCED) reports that cattle and milk production in Rush County averaged $6.5 million per year from 2002-2006. The importance of this agricultural sector makes the potential for a contagious disease outbreak in livestock a continuing, significant threat to the economy of the County.

Field crops are also subject to various types of infestation. Wheat is susceptible to leaf rust, wheat streak mosaic, barley yellow dwarf virus, strawbreaker, and tan spot. Significant wheat crop losses due to these diseases are well documented in Kansas. Sorghum losses can occur when a crop is infected with sooty stripe early in the growing season. Gray leaf spot is a growing problem for corn crops. The KCCED reports that the average value of crop harvests in Rush County from 2002-2006 was nearly $25.5 million. The significance of this agricultural sector in the local economy makes crop infestation a serious concern.

Insect infestation can cause major losses to stored grain. The estimated damage to stored grain from the lesser grain borer, rice weevil, red flour beetle, and rusty grain beetle in the United States is approximately $500 million annually.

Onset of agricultural infestation can be rapid. Controlling an infestation's spread is critical to limiting impacts through methods including quarantine, culling, premature harvest and/or crop destruction when necessary. Duration is largely affected by the degree to which the infestation is aggressively controlled, but is generally more than one week. Maximizing warning time is also critical for this hazard, and is most affected by methodical and accurate monitoring and reporting of livestock and crop health and vigor, including both private individuals and responsible agencies.

Warning Time: Level 1—24 + hours

Duration: 4—more than one week

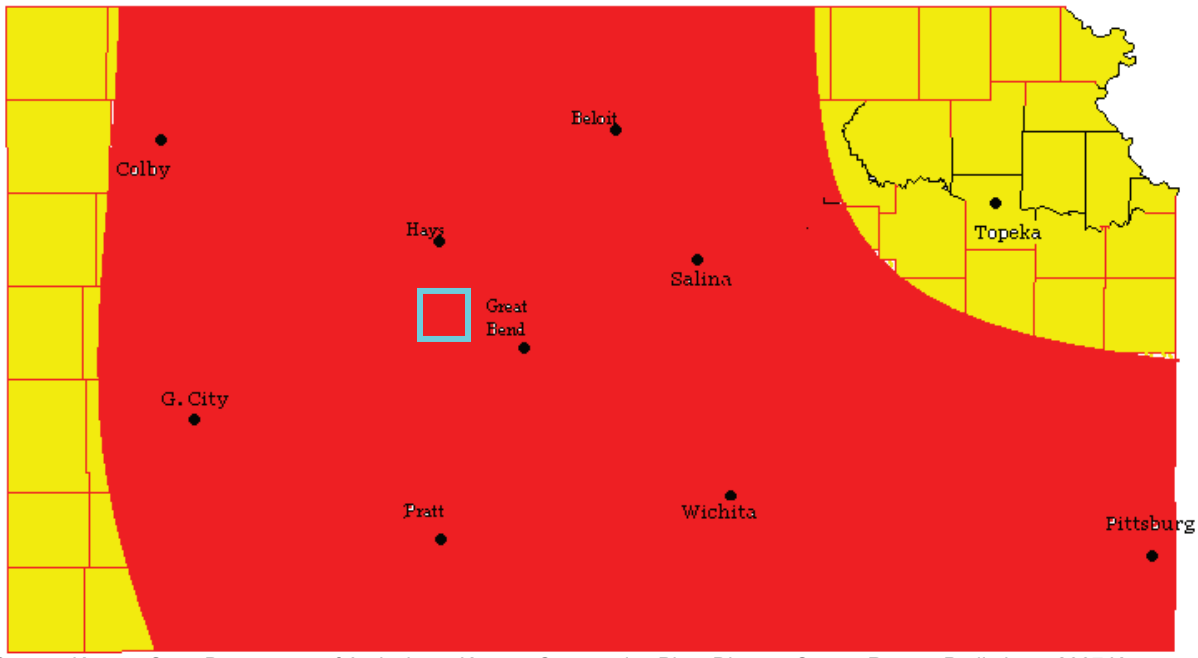
Geographic Location

All agricultural areas of the planning area are subject to agricultural infestations, though if a major infestation event were to occur the entire county would be affected, including urban areas. There are 416,000 acres classified as farm land in Rush County according to the 2006 Kansas Agricultural Statistics Service. This represents 90 percent of the total land area (459,520 acres) in the county.

On a statewide basis, annual wheat yield loss in Kansas has averaged 4.0 percent over the previous 20 years according to the Kansas State University Department of Plant Pathology. The western and northeastern parts of the state of Kansas were somewhat less susceptible to leaf rust

in 2007, a common disease affecting wheat crops. This geographic distribution for leaf rust corresponds with areas of the state with somewhat lower utilization of the land for crops and rangeland, and fewer feedlots. Figure 3.1shows areas of moderate (yellow) and severe (red) leaf rust disease pressure in 2007. Rush County is in the area of the state with severe leaf rust disease pressure in 2007.

Figure 3.1. Leaf Rust Disease Pressure, Kansas 2007



Source: Kansas State Department of Agriculture, Kansas Cooperative Plant Disease Survey Report: Preliminary 2007 Kansas Wheat Disease Loss Estimates, www.ksda.gov/plant_protection/content/183/cid/611
Notes: Red = High to Severe, Yellow = Moderate. Blue square indicates approximate location of Rush County

Other crop diseases and their primary locations include those listed in Table 3.7:

Table 3.7. Kansas Crop Disease Regions

Disease/Fungus	Primary Kansas Region	Primary Crop Affected
Septoria leaf disease	Eastern 2/3 of Kansas	Wheat, produce
Tan spot	Eastern 2/3 of Kansas	Wheat
Stripe rust	Entire state	Wheat
Powdery mildew	Eastern 2/3 of Kansas	Produce, vine crops
Scab	Eastern 2/3 of Kansas	Wheat

Source: USDA Agricultural Research Service

The USDA Agricultural Research Service notes the most serious global threat to wheat and cereal crops is stem rust race Ug99. This fungus is spreading across Africa, Asia, and the Middle East and is considered a serious threat to global food security.

There is one listing for Rush County on the Kansas Department of Agriculture Kansas Sensitive Crop Registry. A farm located on East Elm near Bison grows the following sensitive crops that could be adversely impacted by pesticide and/or fertilizer drift: grapes, fruit trees, tomatoes, and melons.

Previous Occurrences

During the three year period from 2005-2007, crop insurance claims paid as a result of agricultural infestation totaled $172,747. Table 3.8 summarizes the claims paid by year and type of infestation.

Table 3.8 Claims Paid in Rush County for Crop Loss as a Result of Agricultural Infestation (2005-2007)

Year	Crop	Infestation Type	Claims Paid ($)
2005	Soybeans	Insects	8,778
2005	Wheat	Plant Disease	1,489
2006	Grain Sorghum	Insects	739
2006	Wheat	Plant Disease	120,192
2007	Wheat	Plant Disease	40,034
2007	Soybeans	Plant Disease	1,515
Total			**172,747**

USDA Risk Management, 2009

Probability of Future Occurrences

Rush County experiences agricultural losses every year as a result of naturally-occurring agricultural infestation. However, the HMPC determined the probability for this hazard to be "occasional" as the more significant events causing large losses do not occur annually.

Occasional: Event is probable within the next five years.

Magnitude/Severity

The impacts of agricultural infestation would primarily be economic as the agricultural yield could be decreased. However, injuries and/or illness to humans are not likely. There is a small risk of illness from consumption of diseased food crops. However, existing measures in place by the USDA to inspect produce would prevent this, for the most part.

Limited— Injuries and/or illnesses do not result in permanent disability. 10–25 percent of property is severely damaged.

Hazard Summary

Calculated Priority Risk Index	Planning Significance
2.05	Moderate

3.2.3 Dam and Levee Failure

Description

A dam is defined as a barrier constructed across a watercourse for the purpose of storage, control, or diversion of water. Dams are typically constructed of earth, rock, concrete, or mine tailings. A dam failure is the collapse, breach, or other failure resulting in downstream flooding.

A dam impounds water in the upstream area, referred to as the reservoir. The amount of water impounded is measured in acre-feet. An acre-foot is the volume of water that covers an acre of land to a depth of one foot. As a function of upstream topography, even a very small dam may impound or detain many acre-feet of water. Two factors influence the potential severity of a full or partial dam failure: the amount of water impounded, and the density, type, and value of development and infrastructure located downstream.

The failure of dams or levees could result in injuries, loss of life, or damage to property, the environment, and the economy. While levees are built solely for flood protection, dams often serve multiple purposes, one of which may be flood control. Severe flooding and other storms can increase the potential that dams and levees will be damaged and fail as a result of the physical force of the flood waters or overtopping.

Dams and levees are usually engineered to withstand a flood with a computed risk of occurrence. If a larger flood occurs, then that structure will likely be overtopped. If during the overtopping, the dam fails or is washed out, the water behind is released as a flash flood. Failed dams can create floods that are catastrophic to life and property, in part because of the tremendous energy of the released water.

The hazard potential for dam failure is classified according to the following definitions accepted by the Interagency Committee on Dam Safety:

- **High Hazard Dam**—A dam located in an area where failure could result in any of the following: extensive loss of life, damage to more than one home, damage to industrial or commercial facilities, interruption of a public utility serving a large number of customers, damage to traffic on high-volume roads that meet the requirements for hazard class C dams or a high-volume railroad line, inundation of a frequently used recreation facility serving a relatively large number of persons, or two or more individual hazards described for significant hazard dams
- **Significant Hazard Dam**—A dam located in an area where failure could endanger a few lives, damage an isolated home, damage traffic on moderate volume roads that meet certain requirements, damage low-volume railroad tracks, interrupt the use or service of a utility serving a small number of customers, or inundate recreation facilities, including campground areas intermittently used for sleeping and serving a relatively small number of persons

- **Low Hazard Dam**—A dam located in an area where failure could damage only farm or other uninhabited buildings, agricultural or undeveloped land including hiking trails, or traffic on low-volume roads that meet the requirements for low hazard dams

Dam failures can result from any one or a combination of the following causes:

- Prolonged periods of rainfall and flooding, which causes most failures;
- Inadequate spillway capacity, resulting in excess overtopping flows;
- Internal erosion caused by embankment or foundation leakage or piping;
- Improper maintenance, including failure to remove trees, repair internal seepage problems, replace lost material from the cross section of the dam and abutments;
- Improper design, including the use of improper construction materials and construction practices;
- Negligent operation, including failure to remove or open gates or valves during high flow periods;
- Failure of upstream dams o the same waterway;
- Landslides into reservoirs, which cause surges that result in overtopping;
- High winds, which can cause significant wave action and result in substantial erosion; and
- Earthquakes, which typically cause longitudinal cracks at the tops of embankments and weaken entire structures.

Warning Time-Level 2— 12-24 hours

Duration -Level 4—less than 6 hours

Geographic Location

There are no accredited or provisionally accredited levees in Rush County. In addition, the planning committee did not identify any levees or levee systems in the planning area constructed to protect significant populations or improved property. Therefore, the remainder of this hazard profile will focus on dam failure.

According to data from the Kansas Department of Agriculture, Division of Water Resources, Water Structures Program, Rush County has 36 total state-regulated dams. Of those, none are high hazard dams and seven are significant hazard dams. The remaining 29 are low hazard dams.

The seven significant hazard dams are located as follows: FRD no 8 is located on Sand Creek northwest of La Crosse. FRD no 7 & 6 are located on tributaries to Sand Creek east of La Crosse along Hwy 4. FRD no 20 is south of Alexander on a tributary to Walnut Creek. FRD no 19 is south of Hwy 96 between Alexander and Rush Center on a tributary to Walnut Creek. FRD no 17 is on Old Maids Fork south of Alexander. FRD no 24 is northwest of Rush Center on a tributary to Walnut Creek.

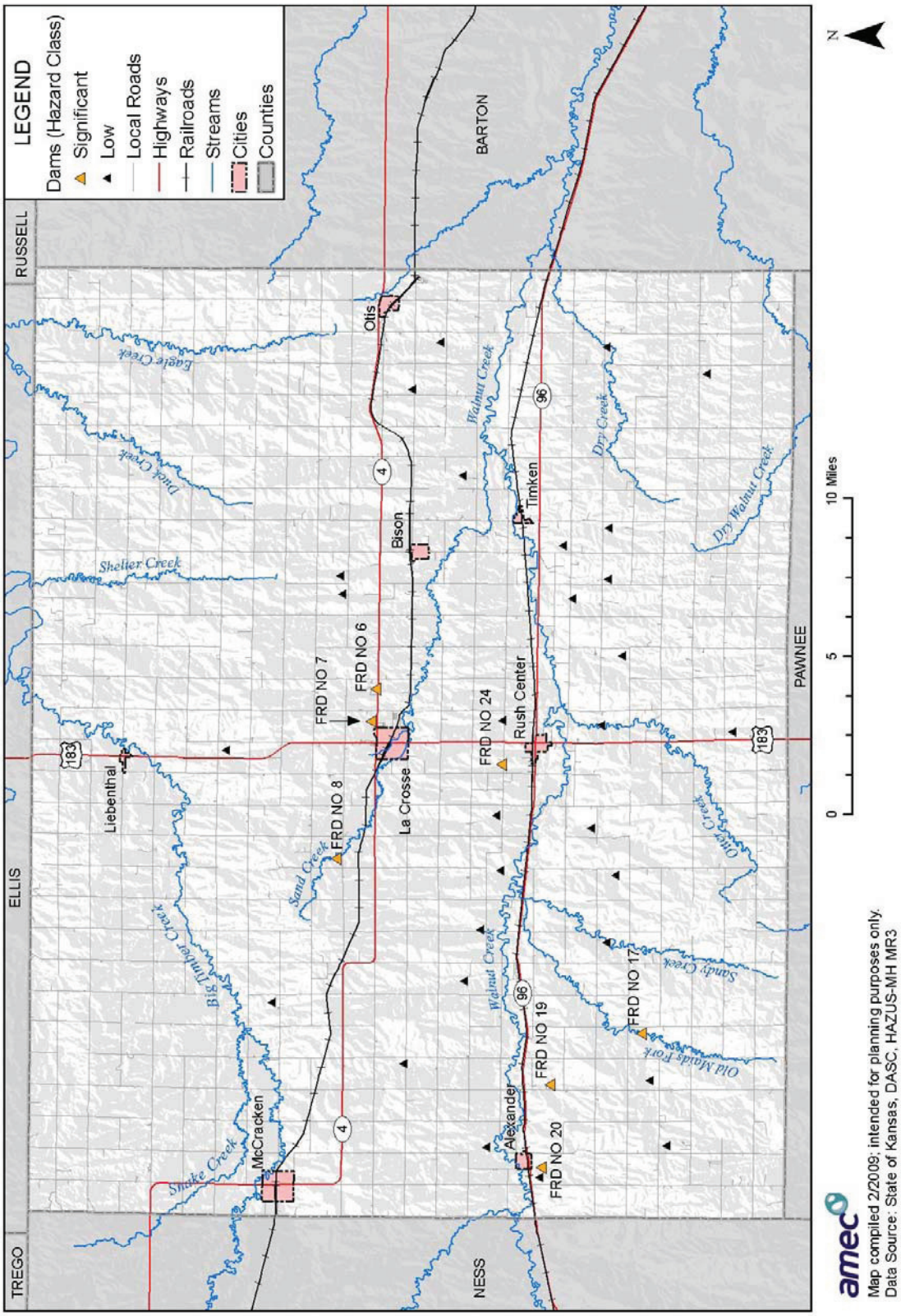
Table 3.9 below summarizes the significant hazard dams in Rush County.

Table 3.9 High and Significant Hazard State-regulated Dams with potential to impact Rush County

Dam Name	Location	Max Storage (acre ft)	Dam Hazard	Downstream Communities
FRD No 8	Rush County	1,151	Significant	La Crosse
FRD No 20	Rush County	2,018	Significant	Alexander, Rush Center, Timken
FRD No 24	Rush County	697	Significant	Rush Center, Timken
FRD No 6	Rush County	2,326	Significant	-
FRD No 7	Rush County	1,989	Significant	-
FRD No 17	Rush County	2,990	Significant	Rush Center, Timken
FRD No 19	Rush County	1,439	Significant	Rush Center, Timken

As indicated in the table above, the jurisdictions in the planning area that could be impacted by dam failure are La Crosse, Alexander, Rush Center, and Timken as well as surrounding areas in the unincorporated county. The other cities in the planning area are not vulnerable to dam failure.

Figure 3.2 Dams in Rush County



Previous Occurrences

There have been no reported previous occurrences of dam failure in Rush County.

Probability of Future Occurrences

Because dam failure is generally a secondary effect of other causes and hazards, calculating probability is difficult. Based on the past performance of these structures during flooding conditions, the HMPC determined that the probability of this hazard is "unlikely". Additionally, as reflected in table 3.10, all of the high and significant state-regulated dams have been inspected within the last five years with the exception of FRD No 6 which was inspected nearly six years ago. Frequent inspections can identify needed repairs or improvements that may be necessary to prevent failure.

Unlikely: Event is unlikely but is possible of occurring.

Magnitude/Severity

Based on the amounts of water retained and the distances from populated areas, the HMPC determined the magnitude of this hazard to be 'limited'. Table 3.10 below provides details considered in determining the potential magnitude in the event of failure. Additional considerations are discussed in the vulnerability section for dam and levee failure in Section 3.3.

Table 3.10 Rush County High and Significant Dams, Magnitude Considerations

Dam Name/County	River	Nearest Community (miles)	Length (ft)	Height (ft)	Maximum Discharge (cfs)	Max. Storage (acre feet)	Dam Hazard	Last Inspection
FRD No 8 Rush	Sand Creek Tributary	LaCrosse (4)	3165	19.8	1148	1151	S	10/25/06
FRD No 20 Rush	Walnut Creek Tributary	Alexander (1)	1440	34.7	5866	2018	S	10/28/04
FRD No 24 Rush	Walnut Creek Tributary	Rush Center (1)	1144	25	1625	697	s	11/01/05
FRD No 7 Rush	Sand Creek Tributary	Albert (19)	3674	24	3373	1989	S	10/28/04
FRD No 6 Rush	Sand Creek Tributary	Albert (18)	2643	26	2590	2326	S	10/23/03
FRD No 17 Rush	Old Maid's Fork Creek	Rush Center (10)	2605	37.7	8221	2990	S	11/01/05
FRD No. 19 Rush	Wet Walnut Creek Tributary	Timken (19)	1400	36	6299	1439	S	10/25/06

Limited—10-25 percent of property severely damaged; shutdown of facilities for more than one week; and/or injuries and/or illnesses do not result in permanent disability

Hazard Summary

Calculated Priority Risk Index	Planning Significance
1.75	Low

3.2.4 Drought

Description

Drought is generally defined as a condition of moisture levels significantly below normal for an extended period of time over a large area that adversely affects plants, animal life, and humans. It can also be defined in terms of meteorology, agriculture and hydrology. Although drought is not predictable, long-range outlooks may indicate an increased chance of drought, which can serve as a warning. A drought period can last for months, years, or even decades. It is rarely a direct cause of death, though the associated heat, dust, and stress can all contribute to increased mortality.

Periods of drought are normal occurrences in all parts of Kansas. Drought in Kansas is caused by severely inadequate amounts of precipitation that adversely affect farming and ranching, surface and ground water supplies, and uses of surface waters for navigation and recreation. Because of these impacts, drought can have significant economic and environmental impacts. Drought can also lead to increased probability and severity of wildfires and wind erosion.

The State of Kansas Operations Plan for the Governor's Drought Response Team utilizes a phased response to drought and identifies specific program actions related to each drought stage. The following provides a brief summary of this phased response approach. Additional detail is found in the Operations Plan.

Drought Watch – Impacts include some damage to crops and pastures, high rangeland fire danger and a growing threat of public water supply shortages. The Governor is notified and the Governor's Drought Response Team assembled. Open outdoor burning bans may be imposed. Public water systems may ask for voluntary water use restrictions.

Drought Warning – Crop and pasture losses are likely with some stock water shortages and very high rangeland fire danger. Public water supply shortages are present and some streamflow targets are not being met. Public water systems may impose mandatory water use restrictions. Urgent Kansas Water Marketing Program surplus water supply contracts can be authorized for municipal and industrial users. The Governor may request emergency haying and grazing authorization for Conservation Reserve Program acres.

Drought Emergency – Widespread major crop and pasture losses are accompanied by stock water shortages and extreme rangeland fire danger. Severe public water supply shortages are widespread with many streamflow targets not met. The Governor may declare an outdoor burning ban. Public water systems may impose additional mandatory water use restrictions. Emergency Kansas Water Marketing Program surplus water supply contracts can be authorized

for municipal and industrial users. Emergency water withdrawals from Corps of Engineers reservoirs and state fishing lakes can be authorized. Corps of Engineers emergency water assistance to municipalities is available if needed. The Governor may request a USDA Secretarial disaster designation for drought.

Warning Time: 1—more than 24 hours

Duration: 4—more than one week

Geographic Location

Drought tends to affect broad regions and the entire planning area is subject to drought occurrence at roughly equal probability. The impacts of prolonged drought are most significant in agricultural areas of the County. Over 90 percent of Rush County is used for agricultural purposes.

Drought can severely limit public water supplies due to depletion of natural water sources and greatly increased demand. Problems due to limited treatment capacity or limited distribution system capacity are an additional concern.

The Kansas Water Office (KWO) defines drought vulnerable suppliers as those that are likely to be the first to be adversely affected by drought. In 2000, 133 public water suppliers in Kansas were considered drought vulnerable due to one or more of the following limitations: basic source, single well source, treatment capacity, distribution system or contractual limitations. A 2006 assessment of public water suppliers by the KWO revealed that one supplier in Rush County is considered drought vulnerable: The Alexander water supply is listed as drought vulnerable. This means that the supplier's primary raw water source is particularly sensitive to drought as evidenced by depleted streamflow, depleted reservoir inflow and storage, or by declining water levels in wells. Restrictions imposed due to inability to use a well due to water quality problems were considered indicative of a basic source limitation.

Previous Occurrences

Historical information on previous periods of drought and drought impacts was obtained from two primary sources, the University of Nebraska's National Drought Mitigation Centers Drought Impact Reporter and the National Oceanic Atmospheric Administration (NOAA). The National Drought Mitigation Center developed the Drought Impact Reporter in response to the need for a national drought impact database for the United States. Information comes from a variety of sources: online drought-related news stories and scientific publications, members of the public who visit the website and submit a drought-related impact for their region, members of the media, and members of relevant government agencies. The database is being populated beginning with the most recent impacts and working backward in time.

The Drought Impact Reporter (http://droughtreporter.unl.edu/) contains information on 64 drought impacts from droughts that affected Rush County between 1950 and April 2009. The list

is not comprehensive. Most of the impacts, 34, were classified as "agriculture." Other impacts include, "fire" (5), "environment" (6), "water/energy" (9), and "other" (10). These categories are described as follows:

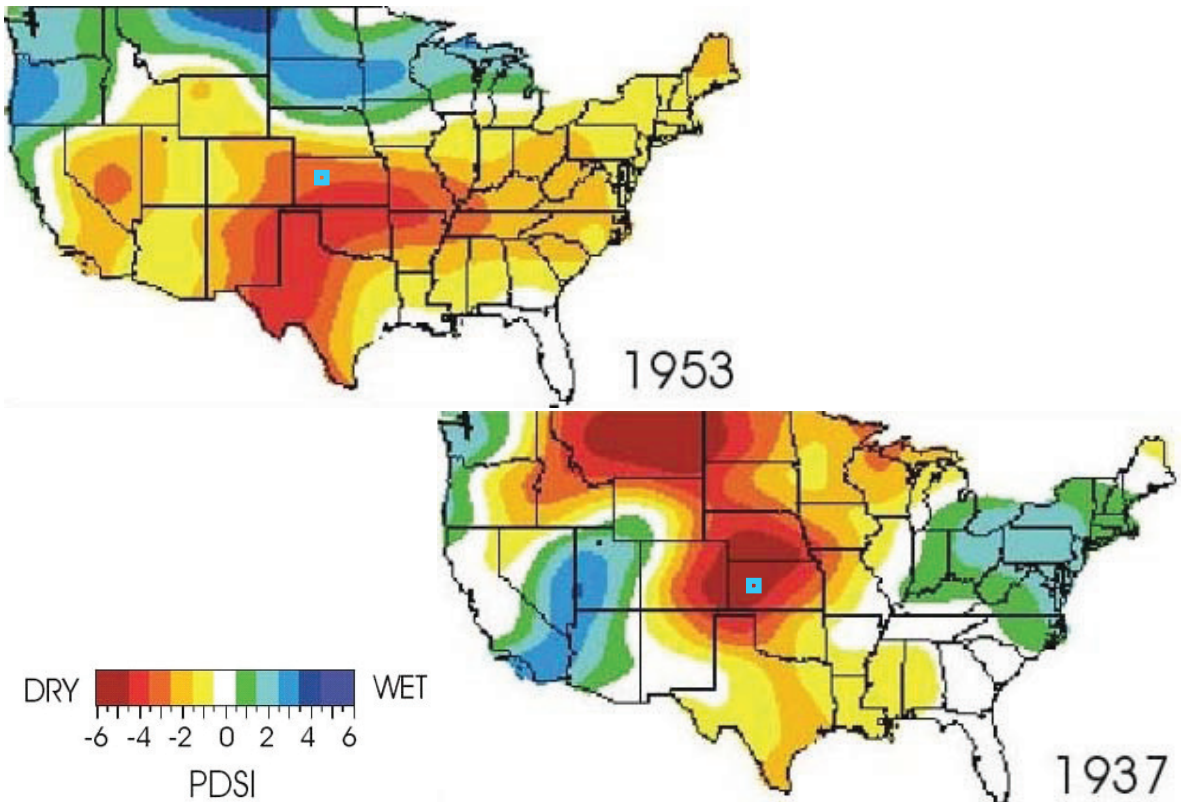
- **Agriculture**—Impacts associated with agriculture, farming, and ranching. Examples include damage to crop quality, income loss for farmers due to reduced crop yields, reduced productivity of cropland, insect infestation, plant disease, increased irrigation costs, cost of new or supplemental water resource development, reduced productivity of rangeland, forced reduction of foundation stock, closure/limitation of public lands to grazing, high cost/unavailability of water for livestock, and range fires.
- **Water/Energy**—Impacts associated with surface or subsurface water supplies (i.e., reservoirs or aquifers), stream levels or streamflow, hydropower generation, or navigation. Examples include lower water levels in reservoirs, lakes, and ponds; reduced flow from springs; reduced streamflow; loss of wetlands; estuarine impacts; increased groundwater depletion, land subsidence, reduced recharge; water quality effects; revenue shortfalls and/or windfall profits; cost of water transport or transfer; cost of new or supplemental water resource development; and loss from impaired navigability of streams, rivers, and canals.
- **Environment**—Impacts associated with wildlife, fisheries, forests, and other fauna. Examples include loss of biodiversity of plants or wildlife; loss of trees from urban landscapes, shelterbelts, wooded conservation areas; reduction and degradation of fish and wildlife habitat; lack of feed and drinking water; greater mortality due to increased contact with agricultural producers, as animals seek food from farms and producers are less tolerant of the intrusion; disease; increased vulnerability to predation; migration and concentration; and increased stress to endangered species.
- **Fire**—Impacts associated with forest and range fires that occur during drought events. The relationship between fires and droughts is very complex. Not all fires are caused by droughts and serious fires can result when droughts are not taking place.
- **Other**—Drought impacts that do not easily fit into any of the above categories.

According to NOAA, Rush County has experienced several major periods of drought during the 20th century. The first, from 1933 to 1940, was part of the "Dust Bowl." The dust bowl occurred due to a long period of drought conditions and years of land management practices that left the dry topsoil especially susceptible to wind erosion. This period of drought and wind erosion devastated the agricultural base of the Great Plans, including Rush County.

The planning area was also affected by drought conditions from 1952 to 1957. During this period, rainfall totals were below normal and temperatures were above normal.

Figure 3.3 shows the precipitation levels across the United States during the droughts in the 1930s and 1950s. In 1953, Rush County was part of the driest area of the country (shaded dark orange and dark red). During this drought, President Eisenhower made $40 million available to 13 drought-stricken states, including Kansas.

Figure 3.3 Historical Droughts 1953 and 1937



Source: National Oceanic and Atmospheric Administration, http://www.ncdc.noaa.gov/paleo/drought/images/temporal_spatial.jpg
Note: Blue square indicates the region of southeastern Kansas that includes Rush County

Recent drought periods in Kansas that affected Rush County are summarized below:

- **2006**— According to the National Agricultural Statistics Service's spring planting report, Kansas farmers put in just 3.35 million acres of corn in the spring. This number was down eight percent from the acreage planted the previous year in the state. Producers switched to less input-intensive crops--crops that require less irrigation and fertilizer such as winter wheat, spring wheat, soybeans, sorghum, cotton, and dry edible beans (Drought Impact Reporter).
- **2005—**According to the U.S. Department of Agriculture, drought conditions reduced state-wide corn production by over 18 million bushel units and state-wide corn production value by $34.8 million. Drought conditions also reduced state-wide wheat production by 1,784,000 bushel units and state-wide wheat production value by approximately $6 million (Drought Impact Reporter).
- **2003—**An on-going drought that was in its third year continued across most of the area. The state of Kansas declared drought disaster areas with an estimated cost of $275 million for this growing season alone. A two to three year drought plagued most of the area. Some rainfall deficits were as high as 20 inches over a 28 month long period. Record low river and stream levels were noted across much of the area. Summer crops suffered greatly with yields of beans, corn and milo being much less than normal. Beneficial rains fell in the last three days

of August but at least 50 percent of western Kansas was still in a drought with continued large deficits of rainfall. Counties affected were Barber, Clark, Comanche, Edwards, Ellis, Finney, Ford, Grant, Gray, Hamilton, Haskell, Hodgeman, Kearny, Kiowa, Lane, Meade, Morton, Ness, Pawnee, Pratt, Rush, Scott, Seward, Stafford, Stanton, Stevens, Trego (NCDC).

- **1996**—Water levels in reservoirs and wells became so low that the USDA's Rural Development Program gave $9.1 million to four states, including Kansas, to dig deeper wells and move intake valves into deeper areas of existing reservoirs. NCDC reported that the month of March 1996 was the driest period ever at many locations across western Kansas, with records dating back 120 years. The wheat crop was almost completely wiped out by the drought. The affected counties in the NCDC report included Barber, Clark, Comanche, Edwards, Ellis, Finney, Ford, Grant, Gray, Hamilton, Haskell, Hodgeman, Kearny, Kiowa, Lane, Meade, Morton, Ness, Pawnee, Pratt, Rush, Scott, Seward, Stafford, Stanton, Stevens, and Trego
- **1987-1989**—During this drought, the Kansas Farm Bureau reported $600 million in losses to the States winter wheat crop. It was estimated that 48 percent of the total crop was lost statewide. Cattle sent to slaughter increased by 50% as a result of the feed and water shortages that accompanied this drought. The 1980s drought was the costliest in U.S. history as well as the most expensive natural disaster of any kind to affect the U.S. According to the Rush County News, rains received in the county during the week of May 15-22, 1989 provided a respite for Rush County from this widespread drought. Prior to this week of rain, things were looking grim for the County's cattlemen and farmers. But, this rain provided some improvement (*Rush County News*, May 25, 1989).

From 2005 to 2007, Rush County was included in two USDA disaster declarations that included drought. According to the Kansas Water Office, during the period from 2003 to 2007, Rush County was also included in three drought watch declarations and five drought warning declarations According to the point system utilized by the Kansas Water Office, Rush County received 13 points during this time frame. (1 point for each watch declaration, 2 points for each warning and 3 points for each emergency)

According to the USDA's Risk Management Agency, insured crop losses in Rush County as a result of drought conditions from 2005 to 2007 totaled $2,802,847. Losses to the wheat crop in 2006 alone were over $2 million. Table 3.11 details insured crop losses from 2005-2007.

Table 3.11 Claims Paid in Rush County for Crop Loss as a Result of Drought

Year	Crop	Hazard	Claims Paid ($)
2005	Wheat	Drought	54,504
2005	Oats	Drought	3,837
2005	Corn	Drought	23,784
2005	Grain Sorghum	Drought	188,592
2005	Silage Sorghum	Drought	8,709
2005	Sunflowers	Drought	8,797
2005	Soybeans	Drought	12,803
2006	Wheat	Drought	2,246,042
2006	Oats	Drought	10,906
2006	Corn	Drought	56,481
2006	Grain Sorghum	Drought	149,336
2006	Sunflowers	Drought	5,587
2006	Soybeans	Drought	18,231
2007	Wheat	Drought	6,250
2007	Grain Sorghum	Drought	6,627
2007	Silage Sorghum	Drought	1,818
2007	Soybeans	Drought	543
Total			2,802,847

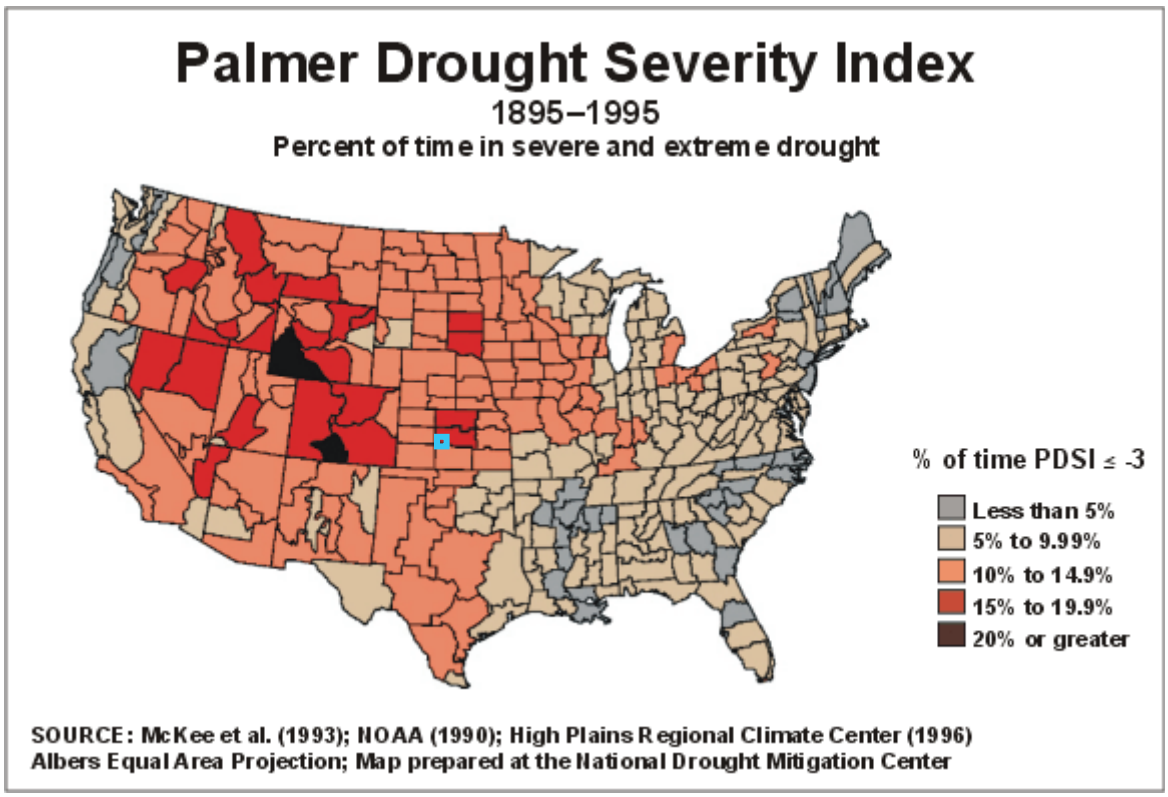
Source: USDA Risk Management Agency, 2009

Probability of Future Occurrences

Lack of precipitation for a given area is the primary contributor to drought conditions. Since precipitation levels cannot be predicted in the long term, it is difficult to determine the probability of future occurrences of drought. Figure 3.4 shows the Palmer Drought Severity Index for the U.S. from 1895-1995. Rush County is in a region of central Kansas that experienced severe and extreme drought 15-19.9 percent of the time during that 100-year period. Considering this historical data as well as more recent periods of drought, the HMPC determined the probability of future occurrence of drought to be “likely”.

Likely: History of events is greater than 20 percent but less than or equal to 33 percent in a given year.

Figure 3.4. United States Percent of Time in Drought, 1895–1995



Note: Blue Square indicates the region of southeastern Kansas that includes Rush County

Magnitude/Severity

Drought impacts are wide-reaching and may be economic, environmental, and/or societal. The most significant impacts associated with drought in Kansas are those related to agriculture. As discussed in the profile on Agricultural Infestation, the agricultural industry provides the economic base for Rush County. A prolonged drought could have severe economic impacts.

Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding. An ongoing drought may also leave an area more prone to wildfires.

Limited: 10-25 percent of property severely damaged; shutdown of facilities for more than a week.

Hazard Summary

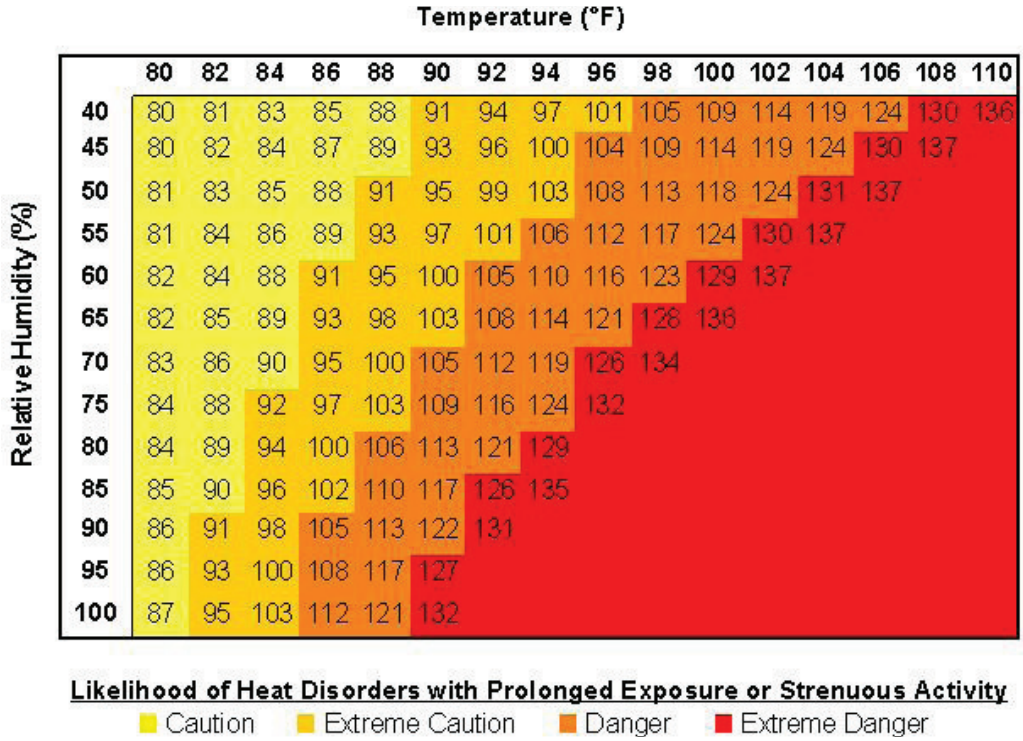
Calculated Priority Risk Index	Planning Significance
2.50	Moderate

3.2.5 Extreme Temperatures

Description

Extreme temperature events, both hot and cold, can have severe impacts on human health and mortality, natural ecosystems, agriculture, and other economic sectors. According to information provided by FEMA, extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks. Ambient air temperature is one component of heat conditions, with relative humidity being the other. The relationship of these factors creates what is known as the apparent temperature. The Heat Index chart shown in Figure 3.5. uses both of these factors to produce a guide for the apparent temperature or relative intensity of heat conditions.

Figure 3.5 Heat Index (HI) Chart



Source: National Weather Service (NWS)

Note: Exposure to direct sun can increase Heat Index values by as much as 15°F. The shaded zone above 105°F corresponds to a HI that may cause increasingly severe heat disorders with continued exposure and/or physical activity.

From 1995-2006, there were 230 fatalities in the U.S. attributed to summer heat. According to the National Weather Service, among natural hazards, no other natural disaster—not lightning, hurricanes, tornadoes, floods, or earthquakes—takes a greater toll. Table 3.12 below shows number of heat related fatalities per year form 1995-2006.

Table 3.12 Extreme Heat Fatalities, U.S. 1995-2006

Year	Heat Related Fatalities
1995	1,021
1996	36
1997	81
1998	173
1999	502
2000	158
2001	166
2002	167
2003	36
2004	6
2005	158
2006	253
Total	**2757**
Annual Avg. (1995-2006)	**230**

Source: National Weather Service, http://www.weather.gov/os/hazstats/images/67-years.pdf

Those at greatest risk for heat-related illness include infants and children up to four years of age, people 65 years of age and older, people who are overweight, and people who are ill or on certain medications. However, even young and healthy individuals are susceptible if they participate in strenuous physical activities during hot weather. In agricultural areas, the exposure of farm workers, as well as livestock, to extreme temperatures is a major concern.

Table 3.13 lists typical symptoms and health impacts of exposure to extreme heat.

Table 3.13.Typical Health Impacts of Extreme Heat

Heat Index (HI)	Disorder
80-90° F (HI)	Fatigue possible with prolonged exposure and/or physical activity
90-105° F (HI)	Sunstroke, heat cramps, and heat exhaustion possible with prolonged exposure and/or physical activity
105-130° F (HI)	Heatstroke/sunstroke highly likely with continued exposure

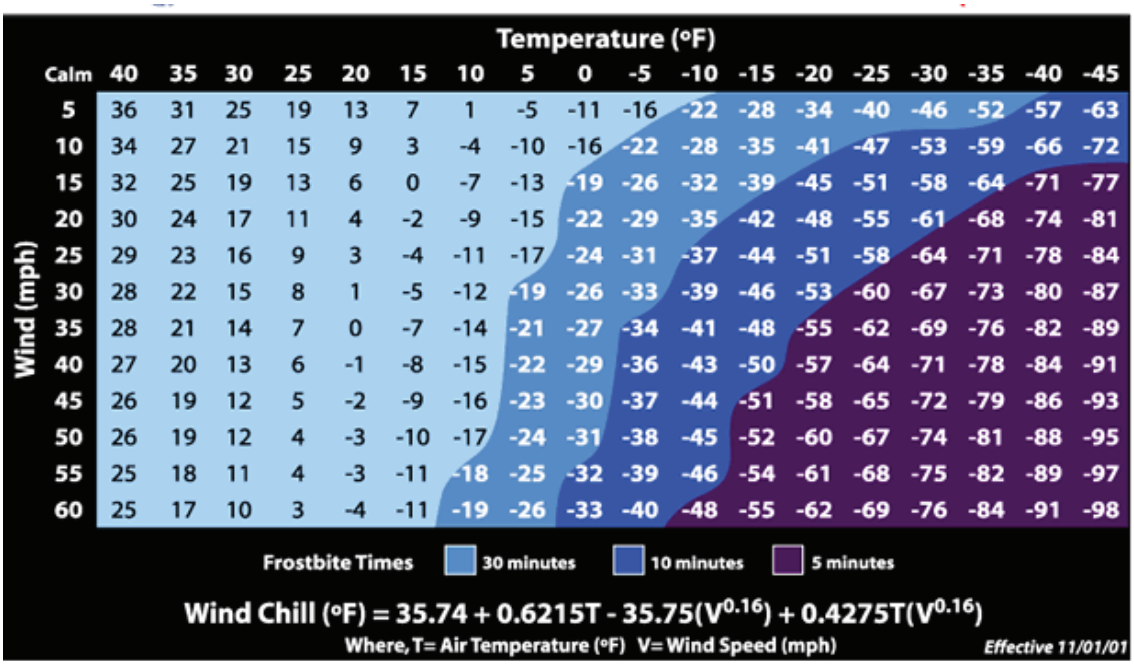
Source: National Weather Service Heat Index Program, www.weather.gov/os/heat/index.shtml

The National Weather Service has a system in place to initiate alert procedures (advisories or warnings) when the Heat Index is expected to have a significant impact on public safety. The expected severity of the heat determines whether advisories or warnings are issued. A common guideline for issuing excessive heat alerts is when the maximum daytime Heat Index is expected to equal or exceed 105 degrees Fahrenheit (°F) and the night time minimum Heat Index is 80°F or above for two or more consecutive days.

For humans, extreme cold can cause hypothermia (an extreme lowering of the body's temperature) and permanent loss of limbs due to frostbite. Infants and the elderly are particularly at risk, but anyone can be affected. According to the National Center for Health Statistics, approximately 600 adults die from hypothermia each year, with the isolated elderly being most at

risk. Also at risk are those without shelter or living in a home that is poorly insulated or without heat. Other potential health and safety threats include toxic fumes from emergency heaters, and household fires caused by fireplaces or emergency heaters. Figure 3.6 below shows the relationship of wind speed to apparent temperature and typical time periods for the onset of frostbite.

Figure 3.6. Wind Chill Chart



Source: NOAA, National Weather Service, http://www.weather.gov/om/windchill/

Other effects of extreme cold are discussed as they relate to Winter Storm in Section 3.2.14.

Warning Time: 1—24+ hours

Duration: 4—more than one week

Geographic Location

The entire planning area is subject to extreme temperatures and all participating jurisdictions are affected.

Previous Occurrences

During the period from 1950-2005, the NCDC database lists one incident of extreme cold that could be considered life-threatening as well as two incidents that report unseasonable cold temperatures but were not life-threatening.

- **December 11, 2000**—Arctic air swept across the area and combined with strong north winds producing wind chill reading as low as 45 degrees below zero.
- **September 24, 2000**—Less than one week after temperatures of around 100 degrees, an unseasonable and record setting cold airmass moved across the region. On the 24th, many stations recorded high temperatures in the 40s which set a record for minimum highs. Following on the morning of the 25 and 26th, record low minimums were record across many areas. Some records had been established for 125 years! Some lows include 21 at Kinsley; 26 at Syracuse; 27 and Ashland; 28 and Garden City, Jetmore and Montezuma; 29 at Cedar Bluff, Healy and Wilmore; 30 at Hays, Ness City, Scott City and the Medicine Lodge airport; and 31 at Elkhart, Greensburg, Dodge City, Richfield, Sublette, Ulysses and Hays.
- **June 6, 1998**—Late season freeze damaged 114,200 acres of corn, milo, and wheat

During 2005-2007, Rush County received USDA emergency designations each year for excessive heat.

During the three year period from 2005-2007, crop insurance claims paid as a result of losses related to extreme temperatures totaled $1,454,084. The losses as a result of freeze are also included in the Winter Storm profile in Section 32.14. Table 3.14 summarizes the claims paid by year and type of event.

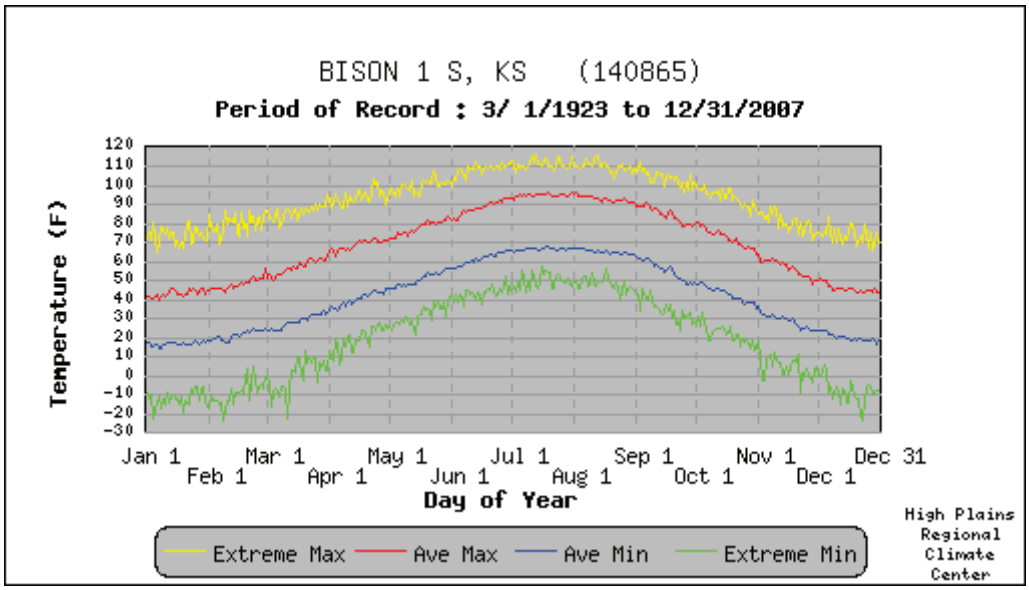
Table 3.14 Claims Paid in Rush County for Crop Loss as a Result of Extreme Temperature Events (2005-2007)

Year	Crop	Infestation Type	Claims Paid ($)
2005	Corn	Heat	8,213
2005	Grain Sorghum	Heat	5,985
2005	Sunflowers	Heat	2,594
2005	Soybeans	Heat	2,619
2006	Wheat	Heat	1,151
2006	Corn	Heat	2,841
2006	Grain Sorghum	Heat	3,998
2006	Soybeans	Heat	5,752
2007	Soybeans	Heat	2,383
		Heat Total	35,537
2005	Corn	Hot Wind	12,455
2005	Grain Sorghum	Hot Wind	1,465
2006	Corn	Hot Wind	7,444
2006	Grain Sorghum	Hot Wind	3,490
		Hot Wind Total	24,854
2005	Wheat	Freeze	41,242
2006	Wheat	Freeze	896,689
2006	Grain Sorghum	Freeze	22,787
2006	Soybeans	Freeze	2,305
2007	Wheat	Freeze	330,580
		Freeze Total	1,293,603
2006	Wheat	Frost	26,158
2007	Wheat	Frost	73,931
		Frost Total	100,090
Total			**1,454,084**

USDA Risk Management, 2009

Figure 3.7graphs the record temperatures by month from 1948 to 2007.

Figure 3.7 Daily Temperature Averages and Extremes, Bison, Kansas



- Extreme Max. is the maximum of all daily maximum temperatures recorded for the day of the year.
- Ave. Max. is the average of all daily maximum temperatures recorded for the day of the year.
- Ave. Min. is the average of all daily minimum temperatures recorded for the day of the year.
- Extreme Min. is the minimum of all daily minimum temperatures recorded for the day of the year.

Source: High Plains Regional Climate Center,
http://www.hprcc.unl.edu/data/historical/index.php?state=ks&action=select_state&submit=Select+State

As shown in Table 3.15 below, during the period from 1923-2008, the National Weather Service Station at Bison, Kansas recorded an annual average of 73.6 days with the maximum temperature over 90 degrees Fahrenheit and an average of 6.4 days with the minimum temperature below zero degrees Fahrenheit.

Table 3.15 Period of Record (1923-2008)-Temperature Maximum and Minimum Bison, KS

Month	# Days >= 90° F	# Days <= 32° F	# Days <= 32° F	# Days <= 0° F
	Daily High Temperature		Daily Low Temperature	
January	0.0	7.8	29.9	2.8
February	0.0	5	25.4	1.7
March	0.0	1.6	20.3	.4
April	0.8	.1	7	0
May	3.5	0	.6	0
June	13.8	0	0	0
July	22.6	0	0	0
August	20.7	0	0	0
September	10.2	0		0
October	2.0	.1	.2	0
November	0.0	1.3	5	.2
December	0.0	5.1	20.2	1.3
Annual	73.6	20.9	28.9	6.4

Source: High Plains Regional Climate Center Table updated on July 15, 2008

Probability of Future Occurrences

Although periods of extreme heat generally occur on an annual basis, events that create a serious public health risk or threaten infrastructure capacity occur less often. The planning committee determined that damaging events occur "occasionally".

Occasional: Event is probable within the next five years.

Magnitude/Severity

Due to the potential for fatalities and the possibility for the loss of electric power due to increased strain on power generation and distribution for air conditioning, periods of extreme heat can severely affect the planning area. In addition, accompanying drought may compound the problem exacerbating agricultural and economic losses. The impacts of extreme cold in the planning area have been primarily associated with agricultural losses. However, extreme cold can also cause injury such as frostbite or in extreme situations, death.

Although the most common impact of extreme temperatures is losses to crops, the primary concerns expressed by the planning committee for this hazard are the human health and safety issues. The county has a high percentage of elderly population that either does not have air conditioning or chooses not to use it due to the expense. This same at-risk population is more susceptible to extreme cold as the elderly are more likely to have problems regulating body temperature. The magnitude level assigned to this hazard was determined to be "negligible" as reported previous events did not result in human injury or death.

Negligible: less than 10 percent of property severely damaged

Hazard Summary

Calculated Priority Risk Index	Planning Significance
1.75	Low

3.2.6 Flood

Description

There are several different types of potential flood events in Rush County including riverine, flash flooding, and urban stormwater. Riverine flooding is defined as an event when a watercourse exceeds its "bank-full" capacity and is the most common type of flood event. Riverine flooding generally occurs as a result of prolonged rainfall, or rainfall that is combined with soils already saturated from previous rain events. The area adjacent to a river channel is its floodplain. In its common usage, "floodplain" most often refers to that area that is inundated by the 100-year flood, the flood that has a 1 percent chance in any given year of being equaled or exceeded. The 1 percent annual flood is the national standard to which communities regulate their floodplains through the National Flood Insurance Program.

Factors that directly affect the amount of flood runoff include precipitation, intensity and distribution, the amount of soil moisture, seasonal variation in vegetation, and water-resistance of the surface areas due to urbanization. The term "flash flood" describes localized floods of great volume and short duration. In contrast to riverine flooding, this type of flood usually results from a heavy rainfall on a relatively small drainage area. Precipitation of this sort usually occurs in the spring and summer. Urban flood events result as land loses its ability to absorb rainfall as it is converted from fields or woodlands to roads, buildings, and parking lots. Urbanization increases runoff two to six times over what would occur on undeveloped terrain.

The onset of flooding varies depending on the cause and type. Flash flooding and dam/levee failure inundation typically occur with little or no warning, whereas flooding caused by long periods of excessive rainfall tends to have longer duration but more gradual onset.

Warning Time: 4 —less than 6 hours

Duration: 2—less than one day

Geographic Location

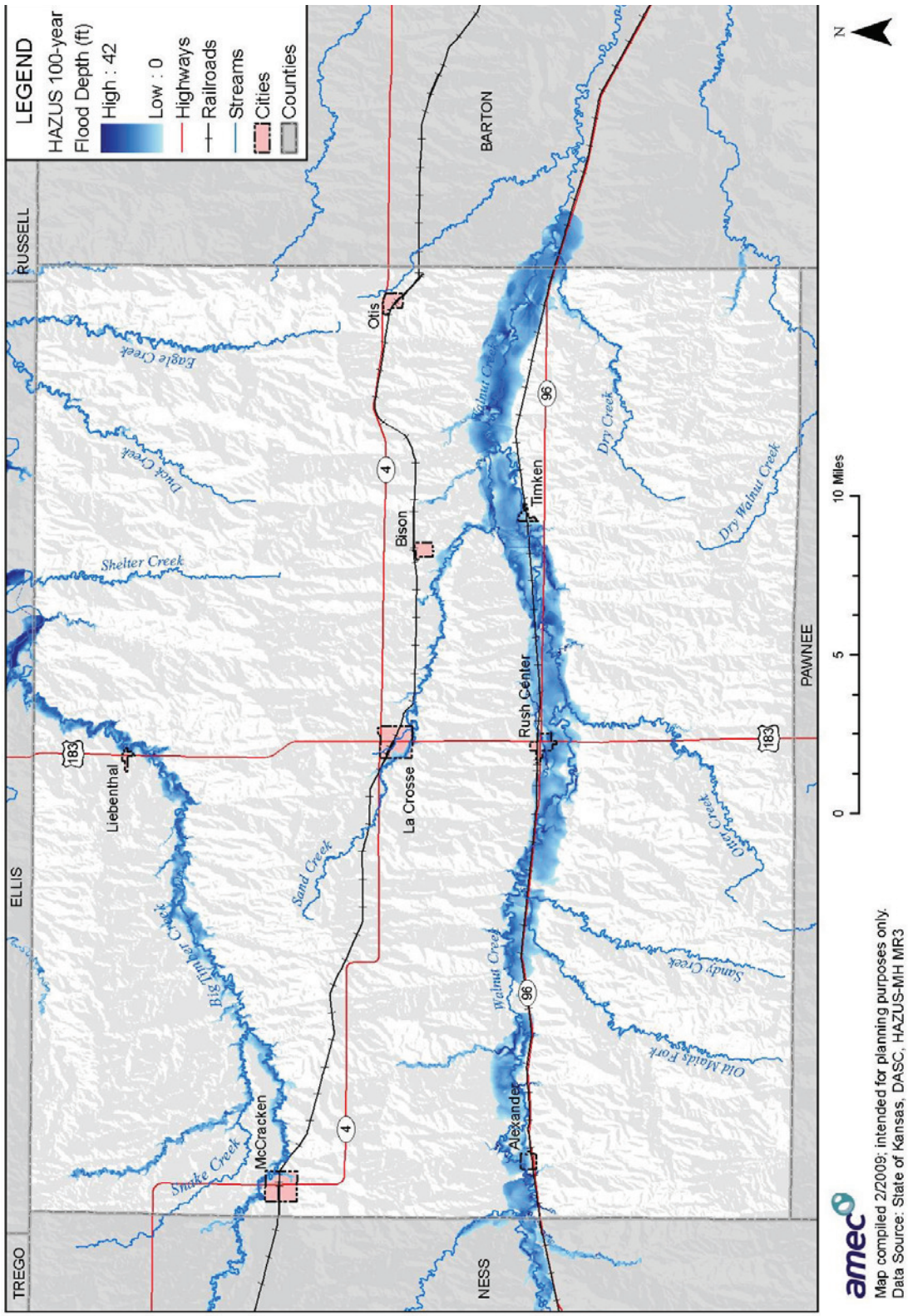
The best available data for flooding in Rush County during the vulnerability analysis phase of this planning effort was HAZUS-MH MR3, FEMA's software program for estimating potential losses from disasters. HAZUS was used to generate a one percent annual flood, or 100-year flood, event for major rivers and creeks in the County. The software produces a flood polygon and flood depth grid that represent the 100-year flood. While not as accurate as official flood maps these floodplain boundaries are for use in GIS-based loss estimation.

This section provides geographic location of the known flood hazard areas as identified by FEMA flood insurance rate maps and/or HAZUS for Rush County and all incorporated cities in the County. However, as previously indicated, Alexander, Liebenthal, Otis, and Timken did not participate in the planning process. Figure 3.8 is a map of Rush County's 100-year floodplain as generated by HAZUS-MH MR3. Figures 3.9 through 3.20 on the following pages provide flood risk maps for the incorporated Cities. The available Flood Hazard Boundary Maps (FHBM) or Flood Insurance Rate Maps (FIRM) and the HAZUS-generated 100-year floodplain maps are provided for Alexander, Lacrosse, McCracken, Rush Center, and Timken. For Bison, Liebenthal, and Otis, just the HAZUS map is displayed as these areas do not have available Flood Insurance Rate Maps.

Rush County

There is no available Flood Insurance Rate Map for Rush County. Therefore, the geographic area of flood risk is displayed utilizing the HAZUS 100-year flood inundated areas. The northern one-third of Rush County is in the Smoky Hill River drainage basin. Big Timber Creek is the largest tributary to the Smoky Hill River in Rush County. The Smoky Hill River begins in northeastern Ness County, entering Rush County in the vicinity of McCracken and Ellis County northeast of Liebenthal. Other Smoky Hill tributaries in Rush County include Shelter Creek, Duck Creek, and Eagle Creek. The southern two-thirds of the County is in the Arkansas River drainage basin. The major stream in this part of the county is Walnut Creek which begins in western Lane County about 55 miles west of where it enters Rush County near Alexander. Walnut Creek flows eastward across Rush County and enters Barton County east of Shaffer. Major tributaries to Walnut Creek from the south include Old Maid Fork, Sandy Creek, and Otter Creek. Alexander Dry Creek and Sand Creek are the major tributaries to Walnut Creek from the north. Dry Walnut and Dry Creeks trend east-northeast n the southeast quarter of Rush County and enter Walnut Creek in Barton County. Along the south side of Rush County are headwater areas for some tributaries of Pawnee River (Kansas Geological Survey Bulletin 207 by Jesse M. McNellis, 1973).

Figure 3.8 Rush County HAZUS 100-Year Flood Hazard



Alexander

Walnut Creek flows through the north east corner of city limits. The floodplain covers roughly the northern two-thirds of city limits.

Figure 3.9 Flood Hazard Boundary Map-Alexander, Kansas

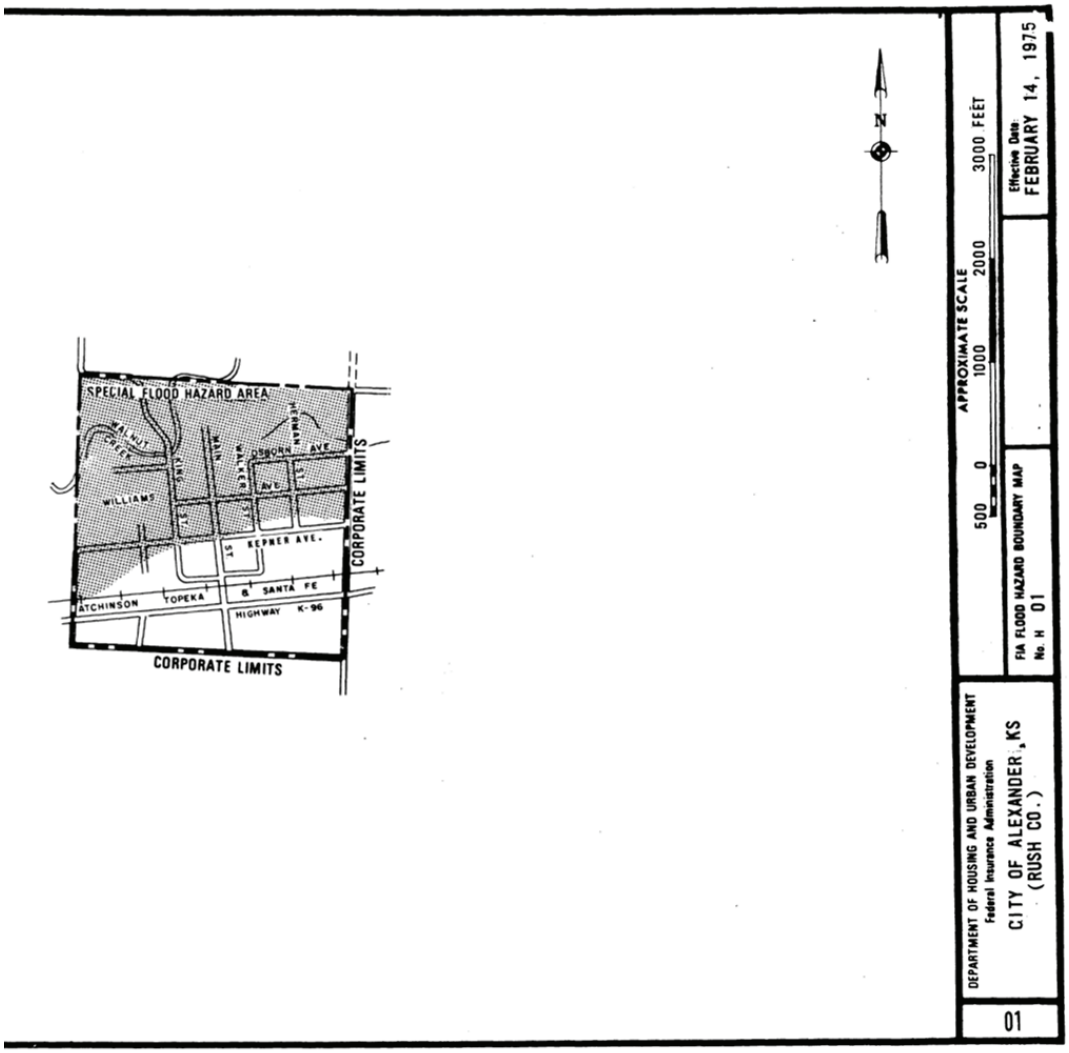
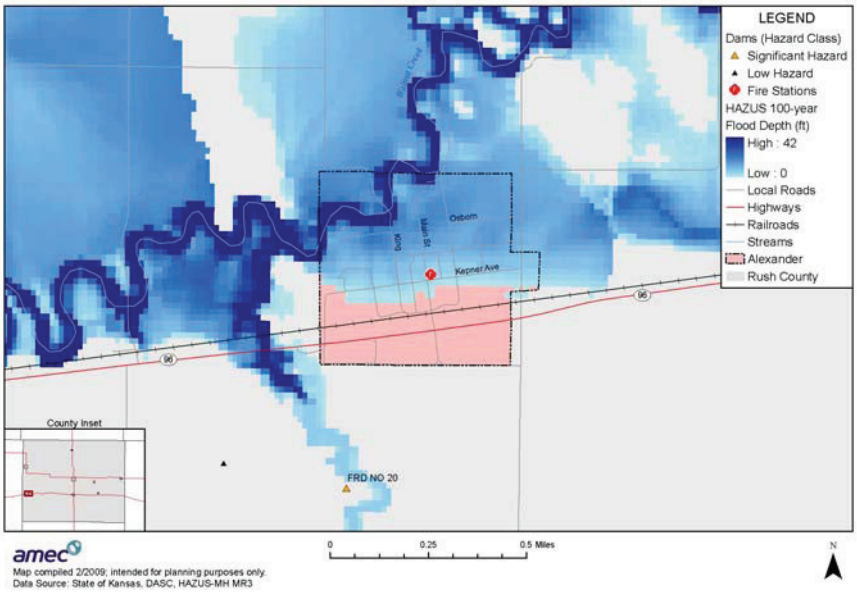


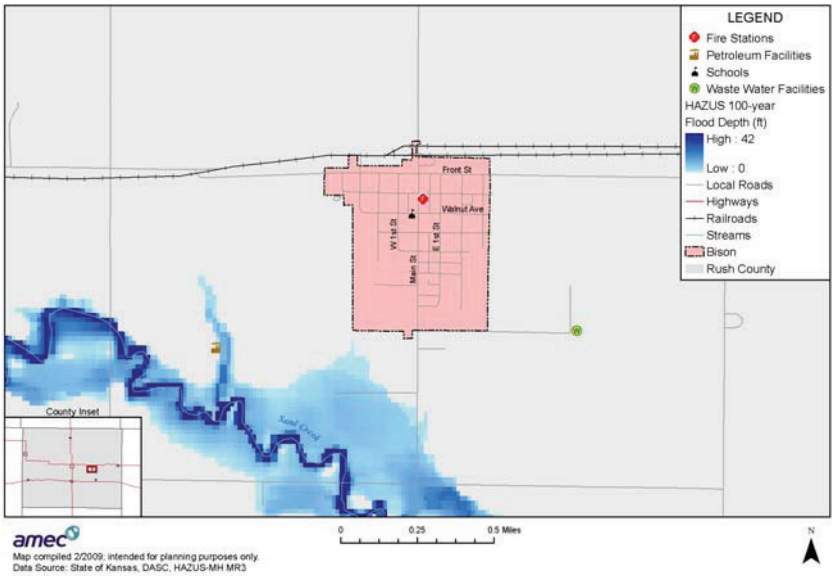
Figure 3.10 Alexander HAZUS 100-year Flood Hazard



Bison

Sand Creek, a tributary to Walnut Creek flows to the south of the City of Bison. However, according to this assessment, the City of Bison incorporated area is not vulnerable to the 100-year flood hazard. A FEMA FIRM has not been completed for Bison. Although riverine flooding is not a problem in Bison, stormwater flooding can be an issue in this jurisdiction. The City of Bison is situated on very flat terrain. Stormwater takes a long time to drain. The original culverts are too small and some have silted shut. In addition, ditches and gutters have filled with silt forcing water into the streets during heavy rains.

Figure 3.11 Bison HAZUS 100-year Flood Hazard



La Crosse

Sand Creek, a large tributary of Walnut Creek runs along the southeast corner of La Crosse. In addition, an unnamed tributary of Sand Creek and Mule Creek another tributary of Sand Creek also flow through city limits with narrow floodplains. When comparing the HAZUS model results with the current FEMA FIRM, it was observed that HAZUS does not represent flooding for Mule Creek or Sand Creek Tributary in the City of La Crosse. The reason these streams were not calculated within the model is due to the fact that these streams do not have 10 square mile drainage areas, which is a parameter within the HAZUS procedure.

Figure 3.12 Flood Insurance Rate Map (converted FHBM)-Lacrosse, Kansas

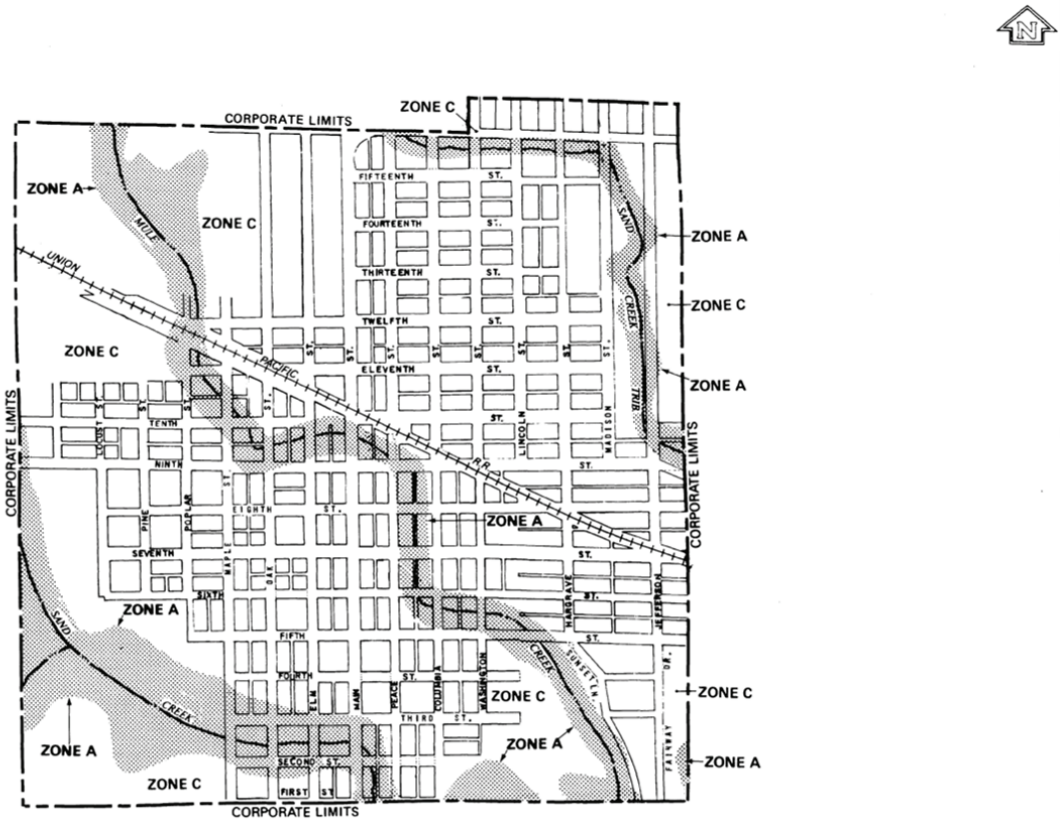
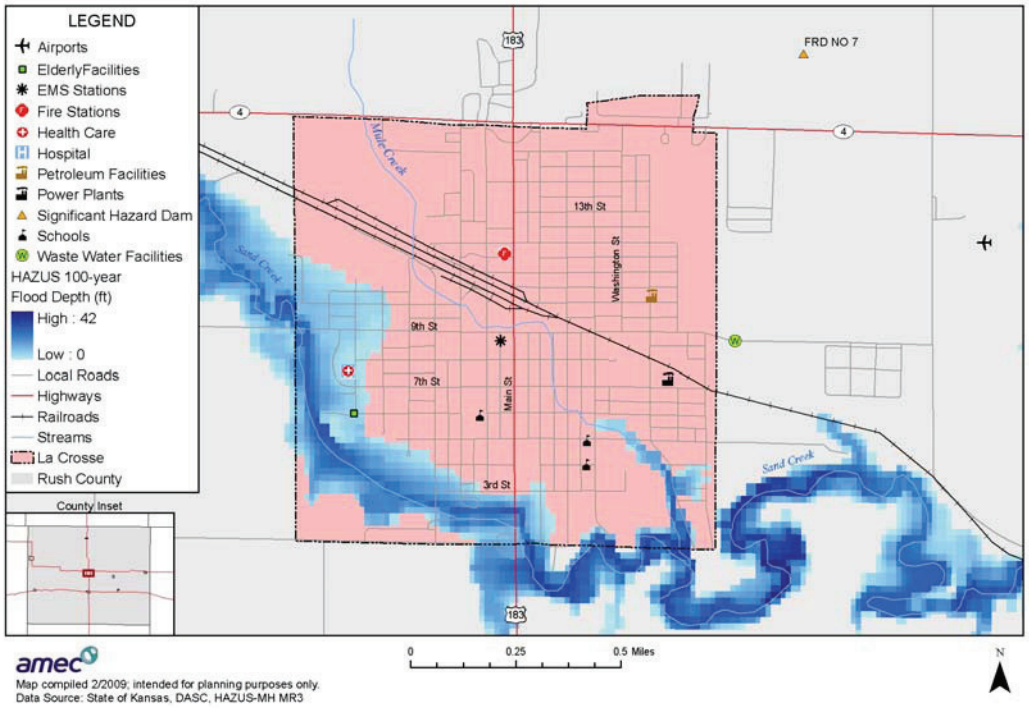


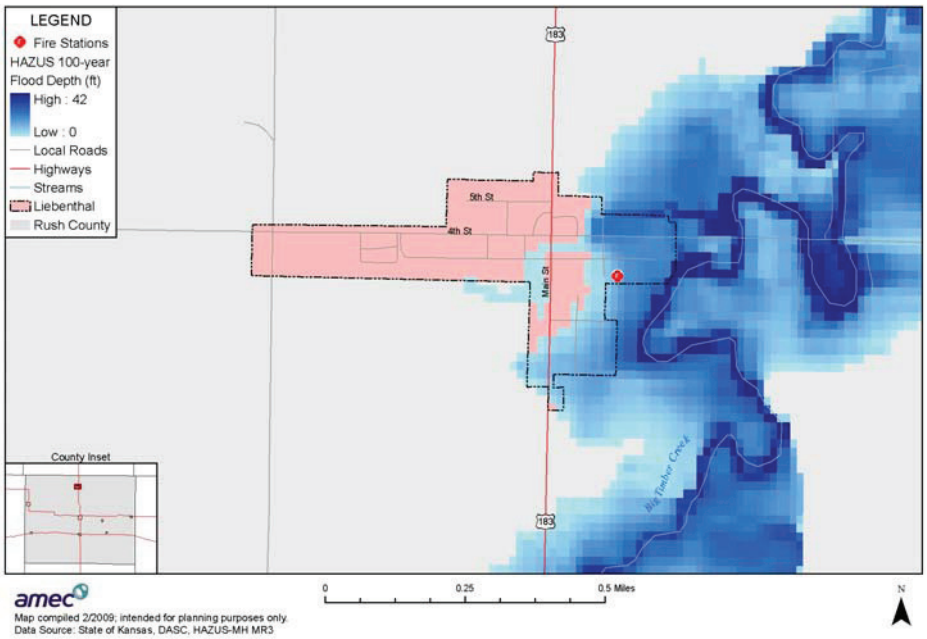
Figure 3.13 La Crosse HAZUS 100-year Floodplain



Liebenthal

A FEMA FIRM has not been completed for Liebenthal. As depicted in the HAZUS generated 100-year floodplain, Big Timber Creek flows just to the east of City Limits and its floodplain extends into city limits.

Figure 3.14 Liebenthal HAZUS 100-year floodplain



McCracken

Big Timber Creek flows along the northeast corner of City limits. Portions of the northeast corner and eastern side of city limits are in the floodplain.

Figure 3.15 Flood Hazard Boundary Map-McCracken, Kansas

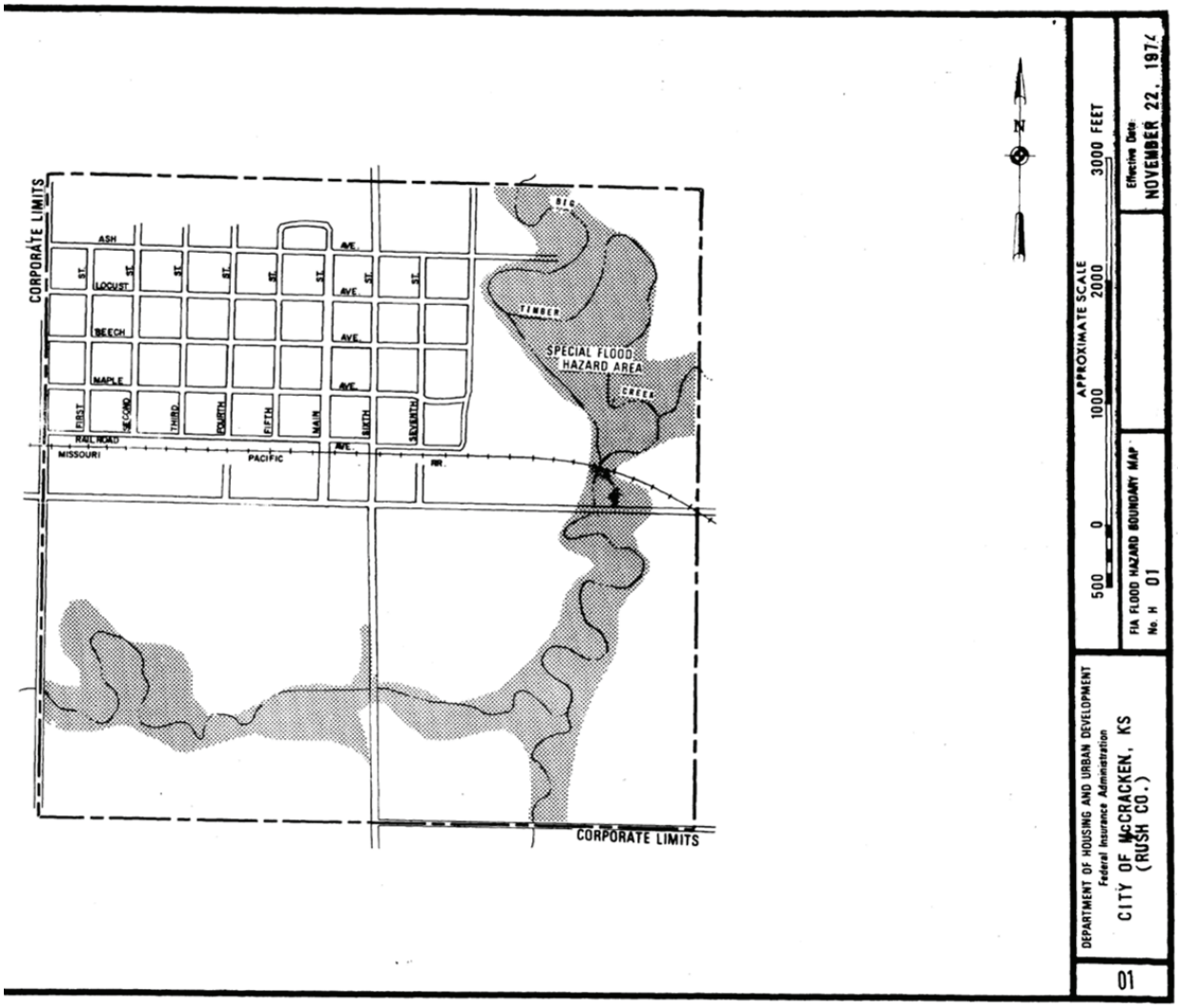
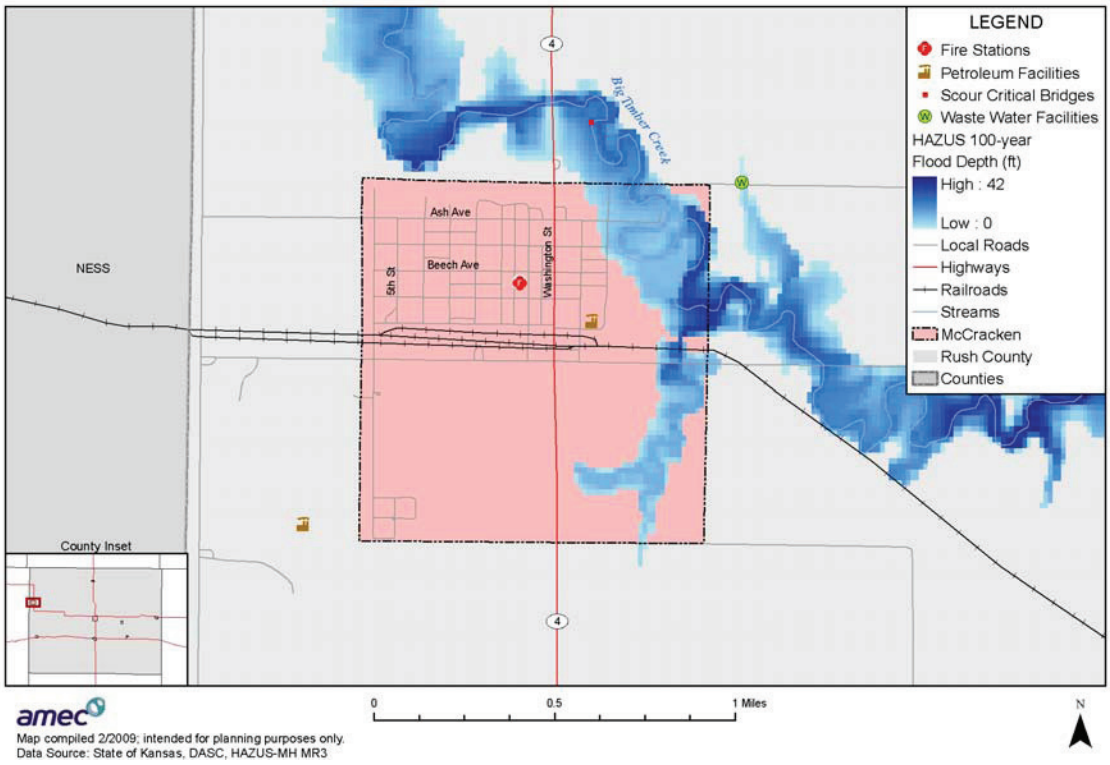


Figure 3.16 McCracken HAZUS 100-year Flood Hazard



Otis

According to this risk assessment, the City of Otis incorporated area is not vulnerable to the 1 percent annual chance riverine flood. The HAZUS software did not indicate any flood risk for the City of Otis. There is no FEMA Flood Insurance Rate Map for the City of Otis.

Rush Center

Walnut Creek flows South of Rush Center and a tributary to Walnut Creek runs through City limits, The combination of the floodplains created by these two rivers results in approximately two-thirds of city limits within the floodplain.

Figure 3.17 Flood Insurance Rate Map (converted FHBM)-Rush Center, Kansas

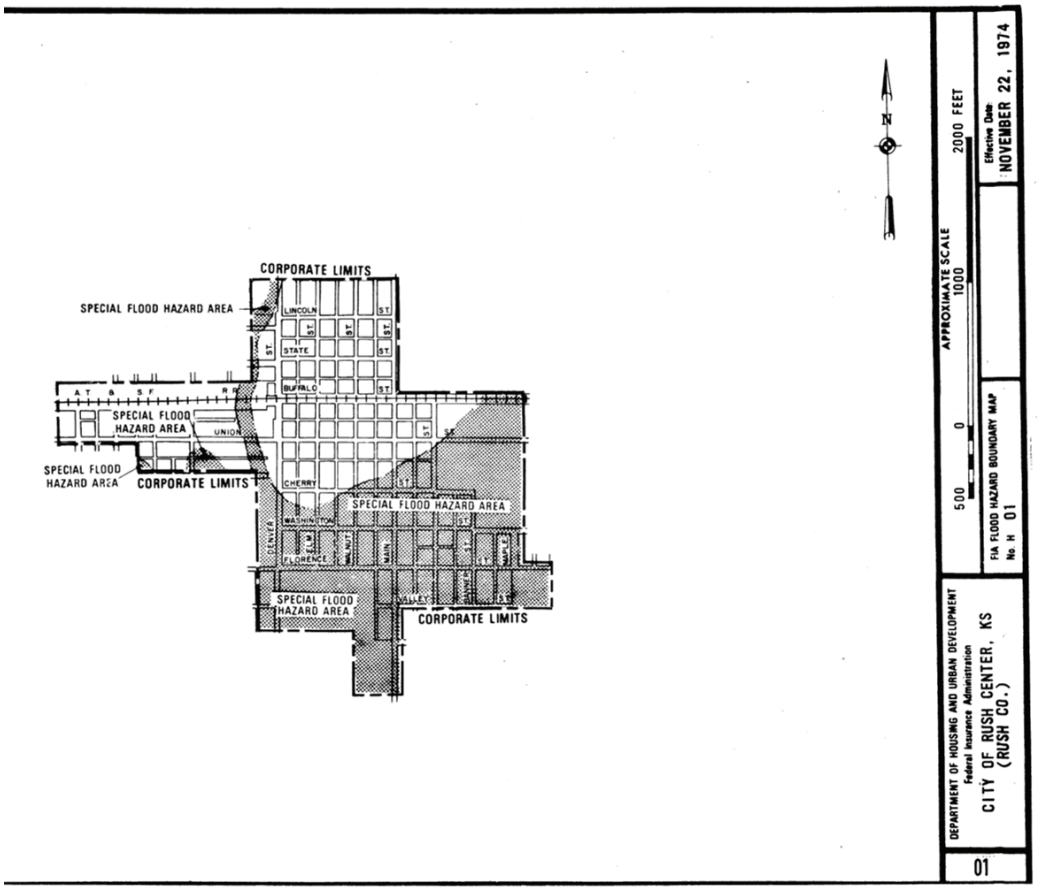
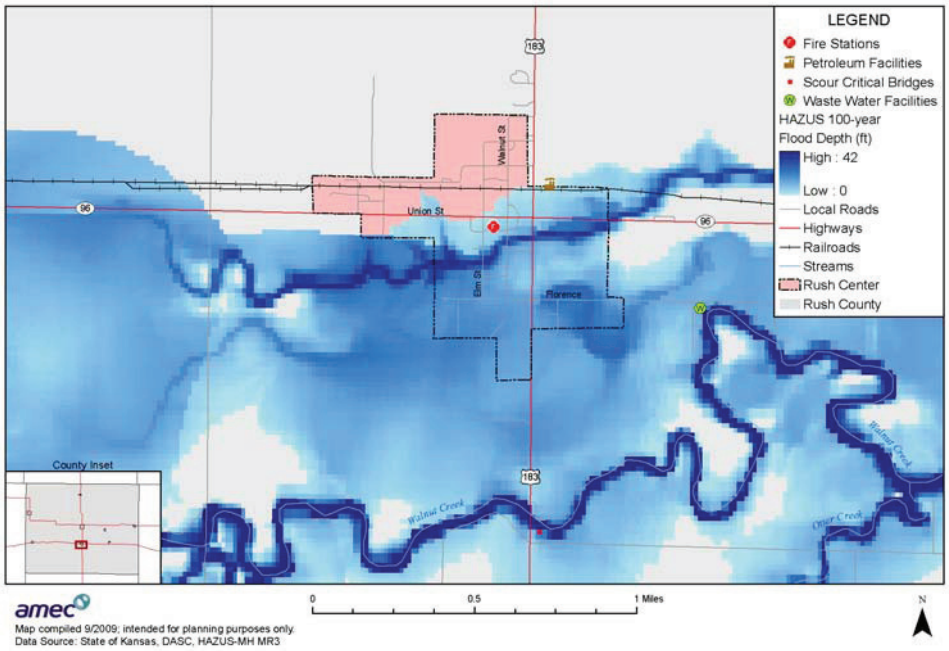


Figure 3.18 Rush Center HAZUS 100-year Flood Hazard



Timken

Walnut Creek flows to the north of Timken. The wide floodplain of this major river covers all of city limits with the exception of a small portion of southern city limits.

Figure 3.19 Flood Insurance Rate Map (converted FHBM)-Timken, Kansas

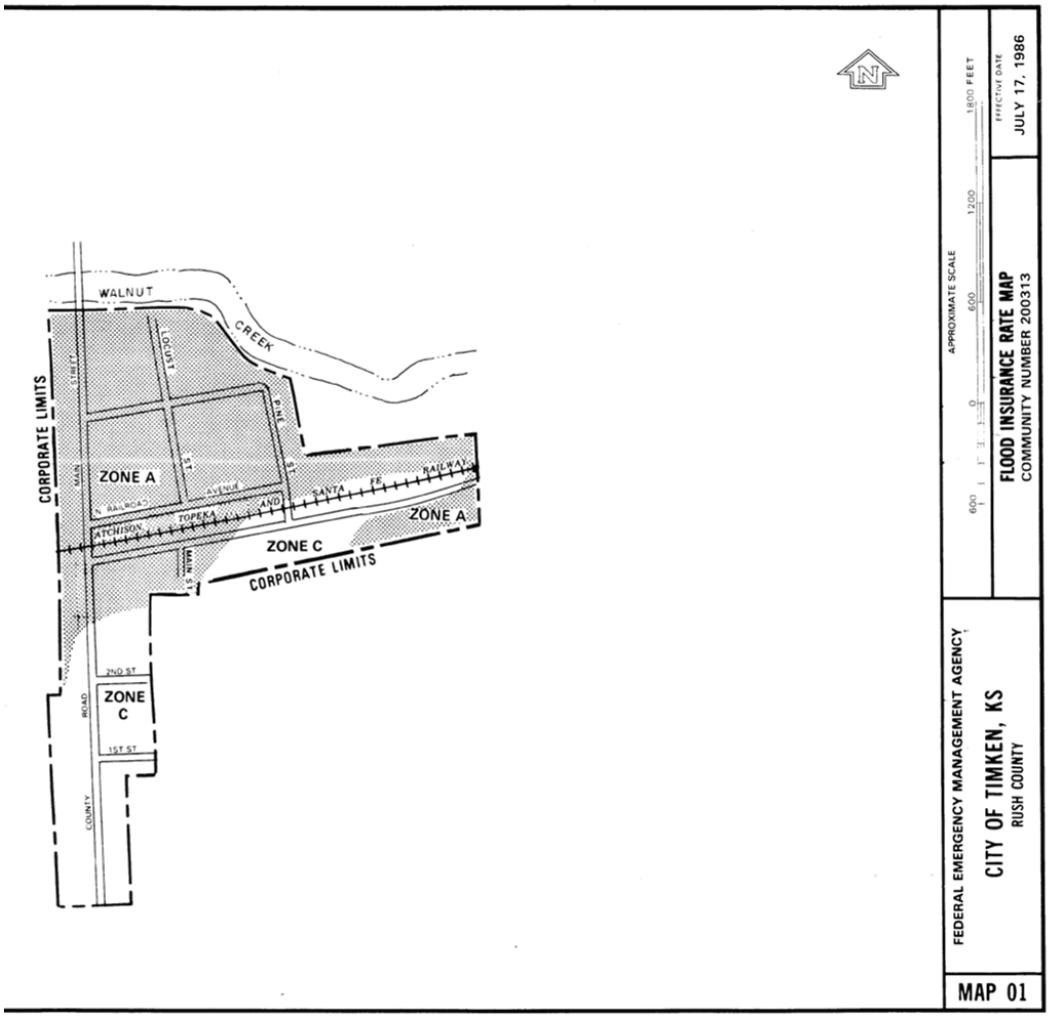
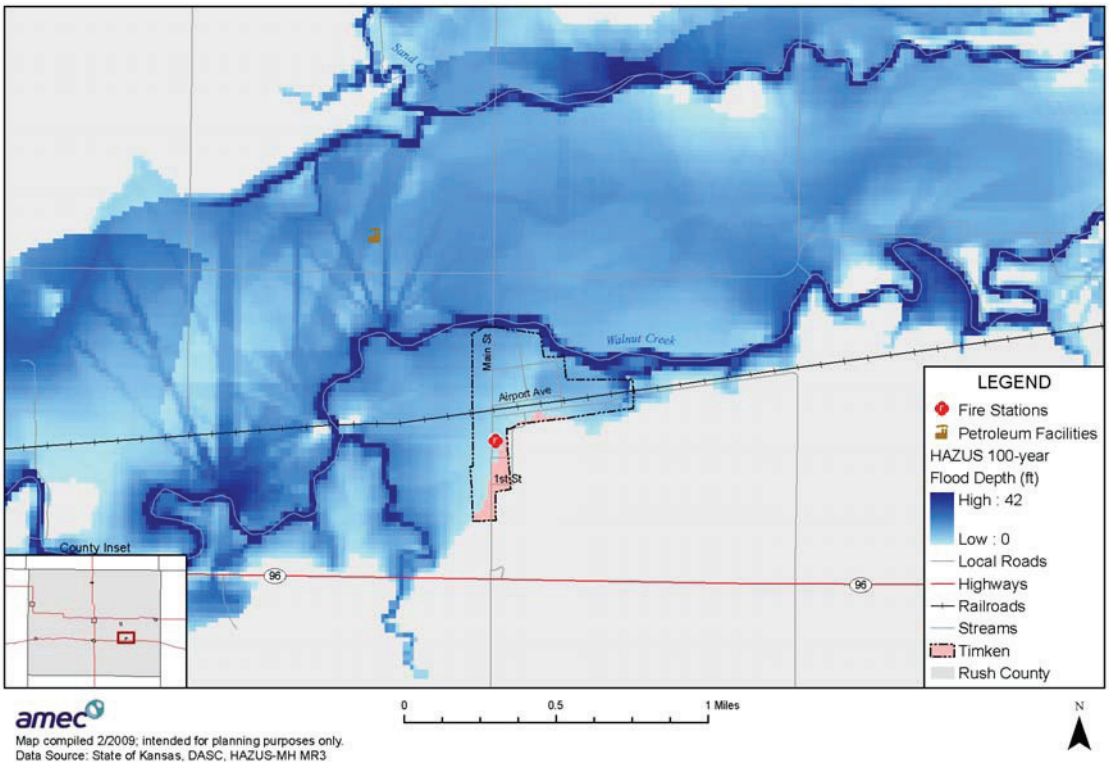


Figure 3.20 Timken HAZUS 100-year Flood Hazard



National Flood Insurance Program and Repetitive Flood Loss Properties

Three communities in the planning area are currently participating in the National Flood Insurance Program. Lacrosse, Rush Center, and Timken are all participating communities. Table 3.16 provides additional details on NFIP participation as well as flood insurance policies and claims. A detailed Flood Insurance Study has not been completed for any of the participating communities.

Table 3.16. Community Participation in the National Flood Insurance Program in Rush County

Jurisdiction	Status/Date	Effective FIRM Date	Policies in Force	Insurance in Force ($)	Number of Claims	Claims Totals ($)
Rush County	Not participating Never Mapped	N/A	N/A	N/A	N/A	N/A
Alexander	Not Participating/Sanctioned Withdrew 7/5/89	2/14/1975	N/A	N/A	N/A	N/A
Bison	Not participating Never Mapped	N/A	N/A	N/A	N/A	N/A
Lacrosse	Participating Regular Phase 7/16/1990	7/16/1990	6	365,700	0	0
Liebenthal	Not Participating Never Mapped	N/A	N/A	N/A	N/A	N/A
McCracken	Not Participating/Sanctioned 11/22/75 In process of re-joining	11/22/1974	N/A	N/A	N/A	N/A
Otis	Not Participating Never Mapped	N/A	N/A	N/A	N/A	N/A
Rush Center	Participating Regular Phase 5/1/1988	5/1/1988	7	266,900	0	0
Timken	Participating Regular Phase 7/17/1986	7/17/1986	1	31,400	1	8,434

Source: National Flood Insurance Program, Community Information System

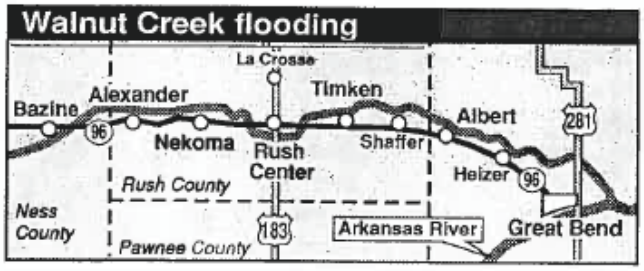
There are no repetitive loss properties in Rush County.

Previous Occurrences

There are 13 flood events listed in the NCDC database for Rush County between 1996 and 2008. This database provides information on flooding events back to 1993. In addition, Rush County has been included in four Presidential disaster declarations that included flooding between 1973 and 2008. Additional Local accounts are also provided below for a total of 19 flood or flash flood events in a 35 year period from 1973-2008. Historical accounts of flooding events are recorded below. Sources are the NCDC database, the *Rush County News*, the Rush County Emergency Board Minutes and other descriptions provided by members of the HMPC.

- **May 2, 1973, FEMA-378-DR.** Sever Storms and Flooding. Additional damage information not available (FEMA)

- **March 1993**, Rush County Rivers were out of their banks as the snow accumulation from the previous winter began to melt. The March 11, 1993 edition of the *Rush County News* reported Timber Creek, one-half mile south of Liebenthal out of its banks and covering some smaller bridges by five or six feet. In LaCrosse, water rushed across the road on west Ninth Street. The water was over 12 inches deep and washed out part of the road.
- **July 22, 1993, FEMA-1000-DR**. Flooding, Severe Storms. From Alexander to Timken, residents worked filling sandbags to try to keep floodwaters out of their homes. Most of the homes in Alexander had some water in the basements and at least three were flooded. In Timken, The Post Office, Mid State Co-op, Timken Seed Company and six residential blocks were flooded. In the northern part of the county, the town of Liebenthal was threatened with flooding when Big Timber Creek spilled over its banks. In Rush Center, US 183 was flooded from Walnut Creek for about one quarter mile (*Rush County News*).



WALNUT CREEK parallels K-96 for 28 miles across southern Rush County. The creek spilled out of its banks from Bazine in Ness County to Heizer in Barton County, measuring ¼ to ½ mile wide in some areas.

Figure 3.21 Flooding in Timken, July 1993

Source: *Rush County News*, July 29, 1993

- **May 31, 1996**. Flash Flooding reported in Alexander (NCDC).
- **August 23, 1996**. Flash flooding reported in Alexander (NCDC).
- **November 16, 1996**. Flooding reported in the National Weather Service forecast zone that includes Rush County (NCDC).

- **June 25, 1997**. Flash flooding reported in Rush Center (NCDC).
- **June 29, 1997**. Flash flooding reported in Hargrave (NCDC). During this event, the wastewater treatment facility in McCracken was damaged. As a result, the City received an Urgent Need grant through the Kansas Department of Health and Environment to make improvements to the system..
- **July 17, 1999**. Flash flooding reported in La Crosse (NCDC).
- **July 20, 2000**. Flash flooding reported in Liebenthal (NCDC).
- **June 5, 2001**. Flash flooding reported in Rush Center (NCDC).
- **September 13, 2001**. Flash flooding reported in McCracken (NCDC).
- **September 17, 2001**. Flash flooding reported in Liebenthal (NCDC).
- **September 10, 2003**. Flash flooding reported in McCracken (NCDC).
- **August 3, 2004, FEMA-1535-DR** (6/12-7/25/2004) Severe Storms, Flooding, and Tornadoes. Additional damage information not available (FEMA).
- **July 8, 2006**. Flooding reported in Alexander (NCDC).
- **August 17, 2006**. Flooding reported in McCracken (NCDC).
- **July 9, 2008,FEMA-1776-DR**, Severe Storms, Flooding, and Tornadoes (May 22-June 16, 2008) This declaration included two separate severe weather events that impacted Rush County with hail and flooding.
  - **May 23, 2008 through May 26, 2008**. Between 5-7 inches of rain fell across the county causing localized flooding of the Big Timber and Walnut Creeks. The flooded areas washed county roads, eroded fields, and broke over terraces (Rush County Emergency Board Minutes, May 29, 2008).
  - **June 11, 2008**. A storm hit the Bison/Otis area of Rush County. It was reported that high winds and heal with four inches of rain fell in the area in a short period of time. The affected area consisted on an area between 1 mile west, 2 miles south and 2 miles north of Bison to 5 miles north, 2 miles south and 1 mile east of Otis. Localized flooding occurred in the low lying areas. The flooded areas washed county roads, eroded fields and broke over terraces. Most losses as a result of this disaster were to crops from hail that accompanied the sever storms. Many county roads were closed as a result of floodwaters making them impassible (Rush County Emergency Board Minutes, June 17, 2008).

According to the USDA's Risk Management Agency, insured crop losses in Rush County as a result of flood conditions and excessive moisture from 2005 to 2007 totaled $212,472. Crop insurance claims as a result of flooding are detailed in Table 3.17 below.

Table 3.17 Claims Paid in Rush County for Crop Loss as a Result of Flood and Excessive Moisture (2005-2007)

Year	Crop	Hazard	Claims Paid
2005	Grain Sorghum	Excess Moisture/Precip/Rain	5,276
2006	Grain Sorghum	Excess Moisture/Precip/Rain	25,273
2006	Sunflowers	Excess Moisture/Precip/Rain	1,951
2007	Wheat	Excess Moisture/Precip/Rain	167,644
2007	Grain Sorghum	Excess Moisture/Precip/Rain	6,535
2007	Wheat	Flood	5,793
Total			212,472

Source: USDA Risk Management Agency, 2009

Probability of Future Occurrences

Based on data from FEMA, the NCDC database and local accounts, from 1973 to 2008, there were 19 records of flood or flash flood events over a 35 year period. The average number of flood and flash flood events calculates to .54 per year. When considering the most damaging flooding events, there were at least six that impacted Rush County in this 35-year period. This calculates to a 17 percent chance in any given year. Therefore, the probability of future occurrences for damaging flooding is "occasional".

Occasional: Event is probable within the next five years.

Magnitude/Severity

The floodplain extends into populated areas of Rush County indicating that property damage will occur during larger events. The most frequent damages are to roads and bridges during flash flood events.

Limited: 10-25 percent of property severely damaged; and injuries/illnesses do not result in permanent disability

Hazard Summary

Calculated Priority Risk Index	Planning Significance
2.30	Moderate

3.2.7 Hailstorm

Description

In the United States, hail causes more than $1 billion in damage to property and crops each year. Hailstorms in Kansas cause damage to property, crops, and the environment, and harm livestock. Because of the large agricultural industry in Kansas, crop damage and livestock losses due to hail are of great concern to the state. Even relatively small hail can cause serious damage to crops and

trees. Vehicles, roofs of buildings and homes, and landscaping are the other things most commonly damaged by hail. Hail has been known to cause injury and the occasional fatality to humans, often associated with traffic accidents.

Hail is associated with thunderstorms that can also bring powerful winds and tornadoes. A hailstorm forms when updrafts carry raindrops into extremely cold areas of the atmosphere where they condense and freeze. Hail falls when it becomes heavy enough to overcome the strength of the updraft and is pulled by gravity towards the earth.

Based on information provided by the Tornado and Storm Research Organization, Table 3.18 describes typical damage impacts of the various sizes of hail.

Table 3.18. TORRO Hailstorm Intensity Scale

Intensity Category	Diameter (mm)	Diameter (inches)	Size Description	Typical Damage Impacts
Hard Hail	5-9	0.2-0.4	Pea	No damage
Potentially Damaging	10-15	0.4-0.6	Mothball	Slight general damage to plants, crops
Significant	16-20	0.6-0.8	Marble, grape	Significant damage to fruit, crops, vegetation
Severe	21-30	0.8-1.2	Walnut	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
Severe	31-40	1.2-1.6	Pigeon's egg > squash ball	Widespread glass damage, vehicle bodywork damage
Destructive	41-50	1.6-2.0	Golf ball > Pullet's egg	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
Destructive	51-60	2.0-2.4	Hen's egg	Bodywork of grounded aircraft dented, brick walls pitted
Destructive	61-75	2.4-3.0	Tennis ball > cricket ball	Severe roof damage, risk of serious injuries
Destructive	76-90	3.0-3.5	Large orange > Soft ball	Severe damage to aircraft bodywork
Super Hailstorms	91-100	3.6-3.9	Grapefruit	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
Super Hailstorms	>100	4.0+	Melon	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Source: Tornado and Storm Research Organization (TORRO), Department of Geography, Oxford Brookes University
Notes: In addition to hail diameter, factors including number and density of hailstones, hail fall speed and surface wind speeds affect severity.

Warning Time: 4—less than 6 hours

Duration: Level 1—less than 6 hours

Geographic Location

The entire planning area, including all participating jurisdictions, is at risk to hailstorms.

Previous Occurrences

The NCDC reports 286 hail events in Rush County between April 1958 and December 2008. When limiting the list to those events considered severe or higher in magnitude according to the TORRO Hail Intensity scale (.8 in. diameter or larger), there were 203 events in the same 51.3 year period causing a reported $3,792,000 in property damages and $7,500,000 in reported crop damages. Table 3.19 below shows the number of hail events by the size of the hail.

Table 3.19. Rush County Hail Events Summarized by Hail Size from April 1958 to December 2008

Hail Size	Number of Events	Property Damages	Crop Damages
0.88 in.	32	-	-
1.00 in.	81	-	-
1.25 in.	10	$50,000-	-
1.50 in.	6	-	-
1.75 in.	58	$1,002,000	$9,500,000
2.00 in.	3	-	-
2.50 in.	6	-	-
2.75 in.	5	-	-
3.00 in.	2	$740,000	-
Total	**203**	**1,792,000**	**9,500,000**

Source National Climatic Data Center Storm Events Database, April 2009

Rush County has received 4 Presidential declarations including a description for severe storms as follows: FEMA-DR-1776 (July 9, 2008), FEMA-DR-1535 (8/3/2004), FEMA-DR- 1000 (7/22/1003), and FEMA-378-DR (5/2/1973) The FEMA-DR-1776 declaration of July 9, 2008 includes specific information regarding damages in Rush County as a result of Hail (see description below). In addition, during the reporting period from 2005-2007, Rush County received USDA declarations for hail twice; once in 2005 and once in 2007.

Details of some of the more damaging events are provided below:

- **March 29, 1998.** Damages occurred to vehicles throughout the town of Otis as a result of 1.25 inch hail. Damages estimated to be $50,000.
- **May 24, 1998.** A Hail swath 7 miles wide produced 1.75 inch hail and caused total devastation to some of the native grasses and destroyed most of the wheat crop. Reported property damages were $2,000,000 and reported crop damage was $7,000,000.
- **May 16, 1999.** Widespread severe weather continued from eastern Colorado, spreading across Rush county during the midnight hour. Loss to wildlife and some livestock across the county was heavy. There was a report of several dead cattle and many injured cows and horses. One-hundred thousand acres of wheat were mowed down, 3,500 acres of corn

damaged and 4,000 acres of alfalfa destroyed (first cutting) for total reported crop damages of $2,000,000. In addition a reported $480,000 in damage was done to farm equipment across the county.

- **July 3, 2005.** 1.75 inch hail broke out 20 windows at the Rush County courthouse. Two patrol cars had their windshields broken out. Windows were also broken out of the St. Michaels Catholic Church as well as numerous homes and businesses. Total reported property damages were estimated at $500,000. In addition, an estimated 50 percent crop damage occurred to $95,000 acres for an estimated $740,000 in crop damages.
- **FEMA-DR-1776 (Period of Incident May 22-June 16, 2008)** This declaration included incidents of hail, high winds, and excessive rain that impacted Rush County. This declaration is separately discussed in the flood and windstorm sections of this plan
  - May 23-26, 2008. The only significant hail damage was noted in a small area ranging east/west from 2 miles either side of LaCrosse to 3 miles north of LaCrosse. Hail size ranged from pea to tennis ball sized. Damage to the wheat in this area ranged from mostly 10-30% loss to a limited few fields of 70% loss. Most acreage in the hailed area was either wheat or grass. There was one small field of alfalfa with 50% loss on this one cutting. All other crops had limited or no damage
  - June 11, 2008. A storm hit the Bison/Otis area of Rush County. High winds and pea to tennis ball size hail with four inches of rain fell in the area in a short period of time. The affected area consisted of an area between 1 mile west, 2 miles south and 2 miles north of Bison to 5 miles north, 2 miles south and 1 mile east of Otis. Corn and soybeans were planted at the time of the storm. Corn was several feet tall and incurred only leaf damage. The soybeans planted had only limited loss as well. Milo planting was in full swing and land prepared for planting caused increased erosion in some areas. Approximately 9,000 acres of wheat sustained some loss (10-30 percent). Some fields in the direct path of the most severe hail incurred 100% crop loss.

According to the USDA Risk Management Agency, insurance payments for damages to crops as a result of hail from 2005-2007 totaled $1,554,883.

Table 3.20 Claims Paid in Rush County for Crop Loss as a Result of Hail

Year	Crop	Hazard	Insurance Paid ($)
2005	Wheat	Hail	30,425
2005	Corn	Hail	51,735
2005	Grain Sorghum	Hail	7,932
2005	Soybeans	Hail	18,846
2006	Wheat	Hail	38,781
2006	Oats	Hail	3,862
2006	Corn	Hail	7,963
2006	Soybeans	Hail	5,016
2007	Wheat	Hail	1,389,355
2007	Soybeans	Hail	970
Total			1,554,883

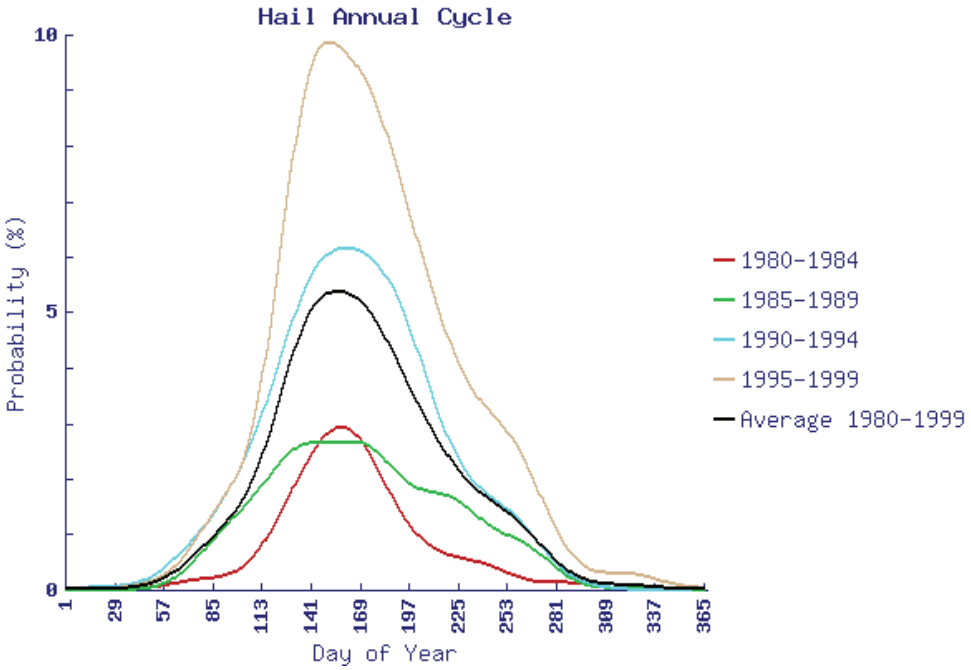
Source: USDA Risk Management, 2009

Probability of Future Occurrences

Based on this data, there have been 203 hail events over the past 51.3 years considered severe or destructive on the TORRO hailstorm scale. This severe or destructive historic frequency of hailstorms equates to roughly 4 events in any given year or a 3 month recurrence interval.

Regarding probability based on time of year, Figure 3.22 shows the daily probability of a hailstorm occurrence for Rush County. Probability is highest in the spring months and overall probability is highest during the reporting period from 1995-1999.

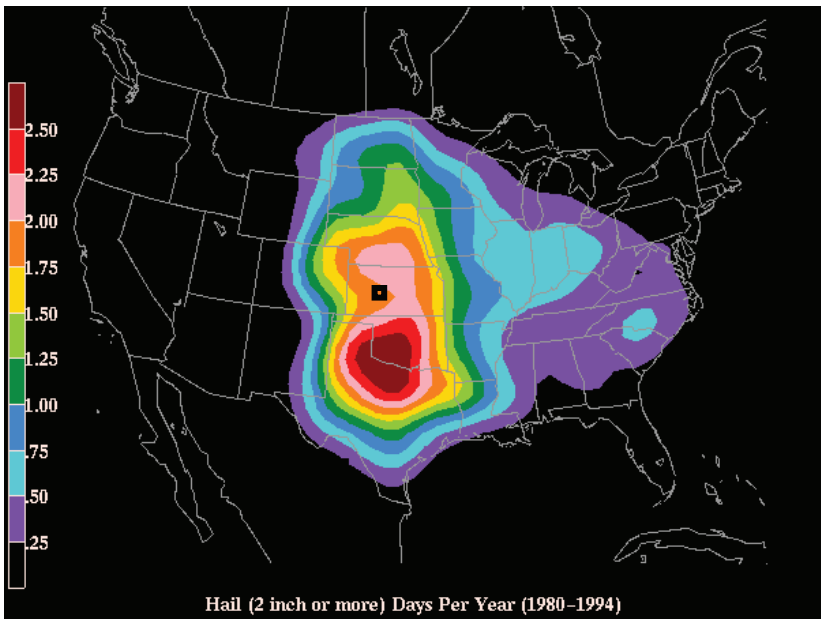
Figure 3.22 Daily Hailstorm Probability, 2" Diameter or Larger, Rush County 1980-1999



Source: National Severe Storms Laboratory, http://www.nssl.noaa.gov/hazard/hazardmap.html

Figure 3.23 is based on hailstorm data from 1980-1994. It shows the probability of hailstorm occurrence (2" diameter or larger) based on number of days per year within a 12.5 mile radius of a given point on the map.

Figure 3.23. Annual Hailstorm Probability (2'' diameter or larger), United States 1980-1994



Source: NSSL, http://www.nssl.noaa.gov/users/brooks/public_html/bighail.gif
Note: Black rectangle indicates approximate location of Rush County

Based on the reported 203 events in the NCDC database of hail considered severe or higher impact on the TORRO scale, the probability for damaging hail in Rush County exceeds 100% in any given year. Therefore, the probability is "highly likely".

Highly Likely: History of events is greater than 33 percent likely per year.

Magnitude/Severity

The most devastating losses to hail in Rush County is generally to crops. As reported in previous events, if a hail event occurs during periods in the growing season when crops are most vulnerable, damages can be devastating. Damages also occur to roofs, vehicles, windows and other personal property and are largely covered by private insurance.

Critical: 25-50 percent of property severely damaged.

Hazard Summary

Calculated Priority Risk Index	Planning Significance
3.40	High

3.2.8 Lightning

Description

Severe thunderstorms strike Kansas on a regular basis with high winds, heavy rains, and the occasional subsequent flooding, often accompanied by lightning. Lightning is an electrical discharge between positive and negative regions of a thunderstorm. It is sudden, extremely destructive and potentially deadly. The National Weather Service reports that lightning caused 48 fatalities and 246 injuries nationwide in 2006 and causes 73 fatalities and 300 injuries in an average year.

The National Lightning Safety Institute reports that lightning causes more than 26,000 fires in the United States each year. The institute estimates that the total cost for direct and indirect impacts of lightning including property damage, increased operating costs, production delays, and lost revenue to be in excess of $6 billion per year.

Due to its nature as a powerful electrical phenomenon, lightning causes extensive damage to electronic systems that it contacts. A particular concern in Kansas is the protection of facilities and communications systems that are critical for maintaining emergency response systems, protecting public health, and maintaining the state's economy.

Average duration of each lightning stroke is 30 microseconds and duration of lightning storm events is usually less than six hours.

Warning Time: 4—less than six hours

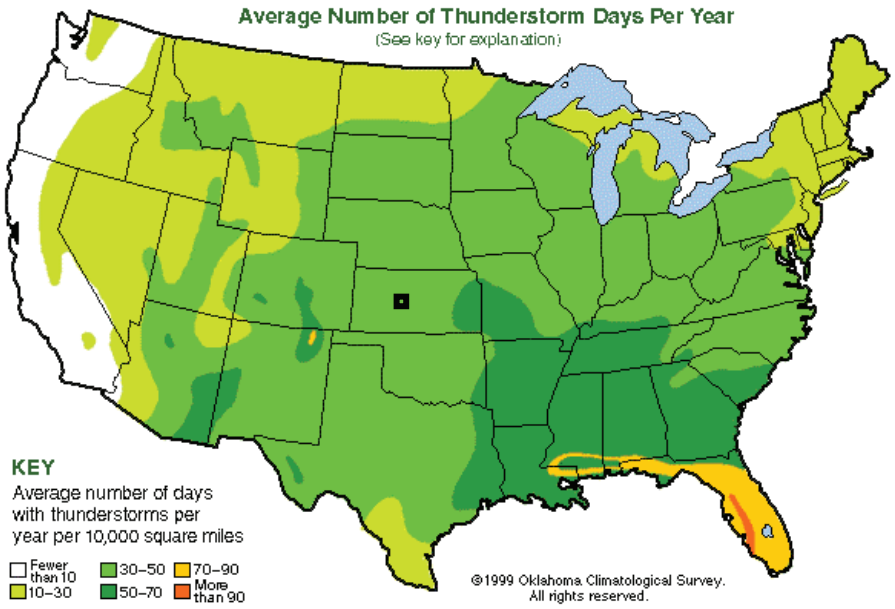
Duration: 1—less than six hours

Geographic Location

The entire planning area, including all participating jurisdictions, is at risk to lightning.

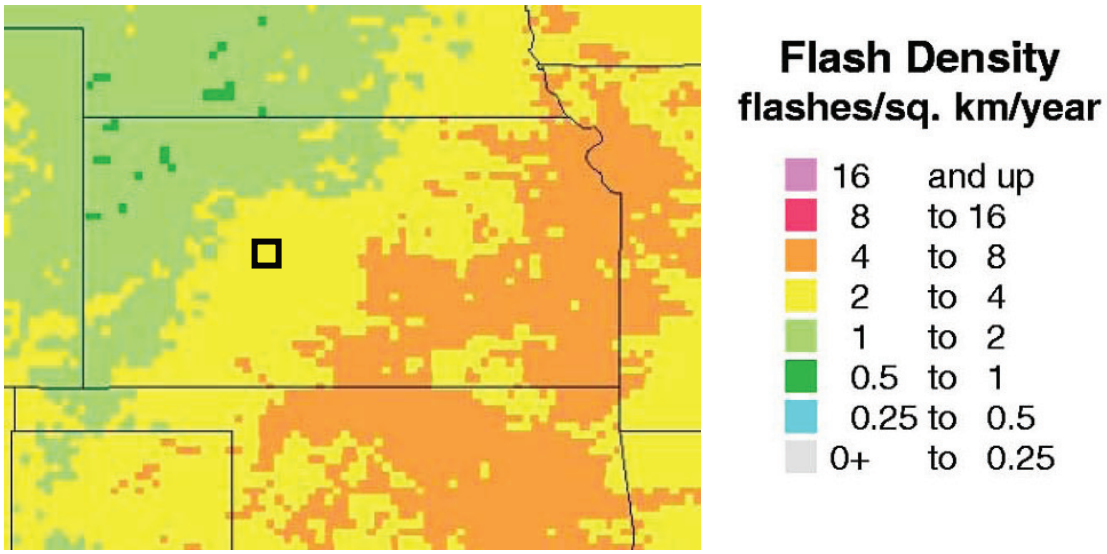
Figures 3.24 and 3.25 show Rush County located in an area with an average of 30-50 days with thunderstorms per year per 10,000 square miles and two to four lightning strikes per square kilometer per year.

Figure 3.24. Distribution and Frequency of Thunderstorms



Source: Oklahoma Climatological Survey
Note: Black square indicates approximate location of Rush County

Figure 3.25. Annual Frequency of Lightning in Kansas, 1996-2000



Source: National Weather Service, www.lightningsafety.noaa.gov/lightning_map.htm
Note: Black square indicates approximate location of Rush County

Previous Occurrences

The NCDC database has two records of damaging lightning event in Rush County from 1950 to December 2008. On July 6, 1988, lightning caused a fire that destroyed 200 bales of hay in Otis. Damages were estimated to be $500,000. On September 29, 1988, numerous grass fires were

started by lightning in the Otis area. Additional damaging lightning strikes most likely go unreported as private property owners repair damages.

Probability of Future Occurrences

National Weather Service data indicates that Rush County is in a region that receives two to four lightning strikes per square kilometer per year. However, most of these lightning strikes do not result in damages. Considering that most lightning strikes do not pose significant risk to life or property, the HMPC determined the probability of damaging events to be "occasional" in any given year.

Occasional: Event is probable within the next five years.

Magnitude/Severity

Although the frequency of lightning events is high, the magnitude is generally within local response capabilities. Generally damages are limited to single buildings and in most cases, personal hazard insurance covers any losses.

Negligible: Injuries and/or illnesses are treatable with first aid; Minor quality of life lost; Shutdown of critical facilities and services for 24 hours or less; Less than 10 percent of property is severely damaged

Hazard Summary

Calculated Priority Risk Index	Planning Significance
1.90	Low

3.2.9 Soil Erosion and Dust

Description

Soil erosion and dust are both ongoing problems for Kansas. Both can cause significant loss of valuable agricultural soils, damage crops, harm environmental resources, and have adverse economic impacts. Soil erosion in Kansas is largely associated with periods of drought, when winds are able to move tremendous quantities of exposed dry soil (wind erosion), and flooding (streambank erosion). Improper agricultural and grazing practices can also contribute to soil erosion.

Federal reservoirs are a vital resource for public water suppliers in Kansas, providing regional sources of stored untreated water to surrounding communities and industries. The silting of these reservoirs is impacting water supply and quality as well as flood storage. Because of differing climatic conditions, land uses, and physical attributes in the various watersheds, sedimentation rates vary among the reservoirs. In 2001, the Kansas Water Office completed a report that projected the affect of sedimentation on state-owned storage in federal reservoirs. By the year

2040, sedimentation was projected to reduce the total amount of state-owned storage from 1.2 million acre-feet to roughly 857,000 acre-feet, a rate of loss of 6,260 acre-feet per year.

Erosion increases the amount of dust carried by wind. Dust can also threaten agriculture and have economic impacts by reducing seedling survival and growth, increasing the susceptibility of plants to certain stressors, and damaging property and equipment (e.g., clogging machinery parts). It is also a threat to health and safety. It acts as an abrasive and air pollutant and carries about 20 human infectious disease organisms (including anthrax and tuberculosis). There is evidence that there is an association between dust and asthma. Some studies indicate that as much as 20 percent of the incidence of asthma is related to dust. Blowing dust can be severe enough to necessitate highway closures because of low visibility, which can cause vehicle accidents.

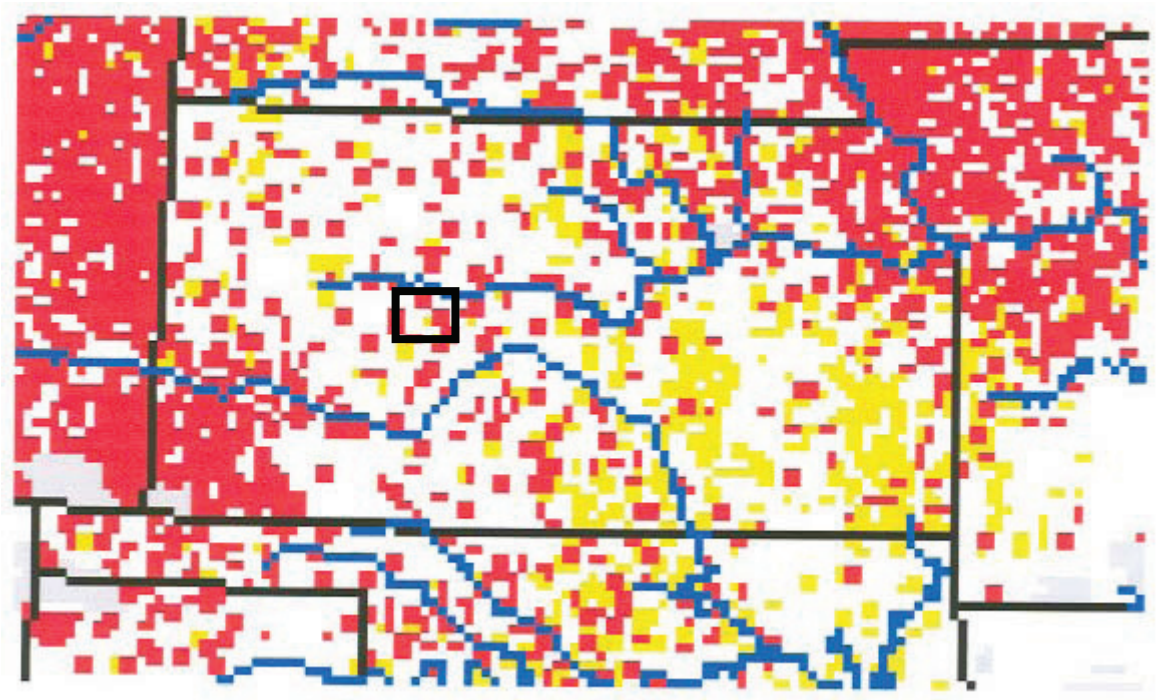
Warning Time: 1—more than 24 hours

Duration: 4—more than one week

Geographic Location

Figure 3.26 shows areas of excessive erosion of farmland in Kansas based on a 1997 analysis. Each red dot represents 5,000 acres of highly erodible land, and each yellow dot represents 5,000 acres of non-highly erodible land with excessive erosion above the tolerable soil erosion rate. Rush County, approximated by the black square on the map, does have some sections of land that are considered highly erodible and non-highly erodible.

Figure 3.26. Locations of Excessive Erosion of Farmland, 1997



Source: Kansas Hazard Mitigation Plan, 2007

Previous Occurrences

According to the 2003 Natural Resources Inventory (NRI) by the Natural Resources Conservation Service, Kansas looses 55,211,000 tons of cropland (2.1 tons per acre) to water erosion and 35,449,000 tons (1.3 tons per acre) to wind erosion each year (National Resources Inventory 2003 Annual NRI State Report, February 2007).

The NCDC database includes on recorded dust storm event specific to Rush County:

On May 29, 2004 severe thunderstorms in northwest Kansas and northeast Colorado created a significant outflow boundary with winds well in excess of 70 mph across a large stretch of northwest Kansas. In addition, a cold front was barreling south in that area. The result was the creation of a huge dust cloud similar to the ones of the dust bowl days in the 30s. Visibility in Wakeeney, Ellis, Ransom and Alexander dropped to near zero for several hours as the dust storm rolled south. It did dissipate some as it moved on into the remainder of southwest Kansas.

Rush County has also lost soil due to erosion during other previous “dust storm” events.

Kansas is well-known for its role in the 1930s Dust Bowl, in which the Central Plains states suffered drought and resulting wind erosion for about a decade. It is estimated that 21.5 million acres were lost during this time.

In the 1970s, Rush County was part of the general Great Plains regions that lost approximately 891,000 acres to wind erosion.

The spring of 1990 was another period when the Great Plains lost soil to wind erosion that severely damaged agricultural land.

Previous occurrences of notable soil erosion in the planning area have occurred during flood events. These impacts are discussed in the flood hazard profile.

Probability of Future Occurrences

While soil erosion and dust occur annually as part of natural processes, the adverse effects of erosion are only fully realized as a cumulative function. Therefore, the probability of notable effects from soil erosion and dust events is considered occasional; meaning the cumulative effect of annual events reaches a notable level on the average of every five years.

Occasional: Event is probable within the next five years

Magnitude/Severity

The magnitude of soil erosion and dust is generally realized over time. Due to the importance of agricultural production in Rush County, soil erosion can cause significant damage to the

economy of the planning area. Especially when coupled with periods of drought, valuable topsoil can be lost, substantially decreasing agricultural yield.

Limited: 10-25 percent of property severely damaged

Hazard Summary

Calculated Priority Risk Index	Planning Significance
2.05	Moderate

3.2.10 Tornado

Description

The National Weather Service defines a tornado as a "violently rotating column of air extending from a thunderstorm to the ground." Tornadoes are the most violent of all atmospheric storms and are capable of tremendous destruction. Wind speeds can exceed 250 mph, and damage paths can be more than one mile wide and 50 miles long. In an average year, more than 900 tornadoes are reported in the United States, resulting in approximately 80 deaths and more than 1500 injuries. High winds not associated with tornadoes are profiled separately in this document in Section 3.2.13 Windstorm.

Although tornadoes have been documented on every continent, they occur most frequently in the United States east of the Rocky Mountains. Kansas is situated in an area that is generally known as "Tornado Alley." Climatological conditions are such that warm and cold air masses meet in the center of the country to create conditions of great instability and fast moving air at high pressure that can ultimately result in formation of tornado funnels.

In Kansas, most tornadoes and tornado-related deaths and injuries occur during the months of April, May, and June. However, tornadoes have struck in every month. Similarly, while most tornadoes occur between 3:00 and 9:00 p.m., a tornado can strike at any time.

Prior to February 1, 2007, tornado intensity was measured by the Fujita (F) scale. This scale was revised and is now the Enhanced Fujita scale. Both scales are sets of wind estimates (not measurements) based on damage. The new scale provides more damage indicators (28) and associated degrees of damage, allowing for more detailed analysis, better correlation between damage and wind speed. It is also more precise because it takes into account the materials affected and the construction of structures damaged by a tornado.

Table 3.21 shows the wind speeds associated with the original Fujita scale ratings and the damage that could result at different levels of intensity.

Table 3.21. Original Fujita Scale

Fujita (F) Scale	Fujita Scale Wind Estimate (mph)	Typical Damage
F0	< 73	Light damage. Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
F1	73-112	Moderate damage. Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2	113-157	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
F3	158-206	Severe damage. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
F4	207-260	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.
F5	261-318	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yards); trees debarked; incredible phenomena will occur.

Source: National Oceanic and Atmospheric Administration Storm Prediction Center, www.spc.noaa.gov/faq/tornado/f-scale.html

Table 3.22 below shows wind speeds associated with the Enhanced Fujita Scale ratings. The Enhanced Fujita Scale's damage indicators and degrees of damage can be found online at www.spc.noaa.gov/efscale/ef-scale.html.

Table 3.22. Enhanced Fujita Scale

Enhanced Fujita (EF) Scale	Enhanced Fujita Scale Wind Estimate (mph)
EF0	65-85
EF1	86-110
EF2	111-135
EF3	136-165
EF4	166-200
EF5	Over 200

Source: National Oceanic and Atmospheric Administration Storm Prediction Center, www.spc.noaa.gov/faq/tornado/ef-scale.html

Warning Time: 4—typical warning time is less than six hours

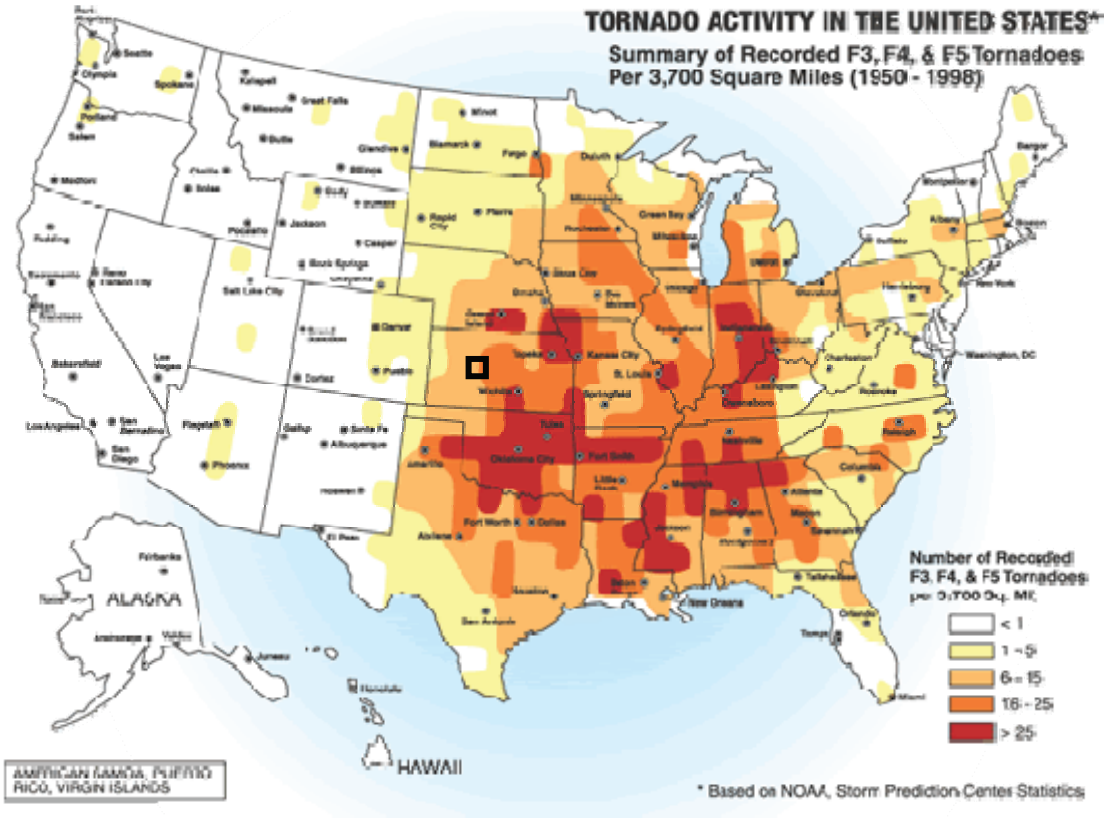
Duration: 1—typical duration is less than six hours

Geographic Location

While tornadoes can occur in all areas of the State of Kansas, historically, some areas of the state have been more susceptible to this type of damaging storm. Figure 3.27 illustrates the number of F3, F4, and F5 tornadoes recorded in the United States per 3,700 square miles between 1950 and 1998. Most of Rush County is in the section shaded light orange indicating 6-15 tornadoes of this

magnitude during this 48-year period. The eastern boundary of the planning area is adjacent to the section shaded dark orange, indicating 16-25 events.

Figure 3.27. Tornado Activity in the United States



Previous Occurrences

According to the NCDC database, there were 29 separate tornado events in Rush County between January of 1950 and December of 2008 (listings on the same date more than one hour apart or at different locations were considered multiple events). Combined damages of these events were zero fatalities, 8 injuries, and over $591,000 in reported property damages. Of these previous events, 16 were rated F0, five were rated F1, four were rated F2, one was rated F3 and 3 were not rated. Table 3.23 summarizes these events.

Rush County has been included in two presidential disaster declarations that involved tornadoes since 1955. Although tornado touchdowns were spotted during these events, they did not cause any reported damages in Rush County. See below under DR-1776 and DR-1535. The County was included in these disaster designations for other related damages that result from hail, strong winds and flooding. These impacts are discussed separately under those hazards.

Table 3.23. Recorded Tornadoes in Rush County, 1950-2007.

Location	Date	Magnitude	Fatalities	Injuries	Property Damage ($)
Rush	5/4/1950	F1	0	0	25000
Rush	6/21/1951	F2	0	0	0
Rush	8/23/1951	F	0	0	0
Rush	9/23/1951	F	0	0	0
Rush	7/13/1958	F	0	0	3000
Rush	7/15/1961	F0	0	0	0
Rush	9/1/1963	F0	0	0	0
Rush	4/19/1964	F0	0	0	0
Rush	6/10/1964	F2	0	0	25000
Rush	6/18/1968	F3	0	8	250000
Rush	9/3/1970	F1	0	0	25000
Rush	4/30/1973	F2	0	0	3000
Rush	8/17/1974	F1	0	0	25000
Rush	5/19/1978	F0	0	0	0
Rush	5/24/1990	F0	0	0	25000
17 Bazine	5/31/1996	F1	0	0	10000
21 Hargrave	4/21/2001	F0	0	0	0
19 Rush Center	4/21/2001	F2	0	0	200000
22 Nekoma	6/13/2001	F0	0	0	0
23 La Crosse	6/14/2004	F0	0	0	0
24 Rush Center	6/14/2004	F0	0	0	0
25 Otis	4/10/2005	F1	0	0	0
26 Otis	7/3/2005	F0	0	0	0
27 Hargrave	5/31/2007	F0	0	0	0
28 Nekoma	5/25/2008	F0	0	0	0
29 La Crosse	5/25/2008	F0	0	0	0
30 Otis	5/25/2008	F0	0	0	0
31 Bison	5/25/2008	F0	0	0	0
32 Timken	5/25/2008	F0	0	0	0
Total					**591,000**

Source: National Climatic Data Center

Descriptions of the more damaging events are provided below:

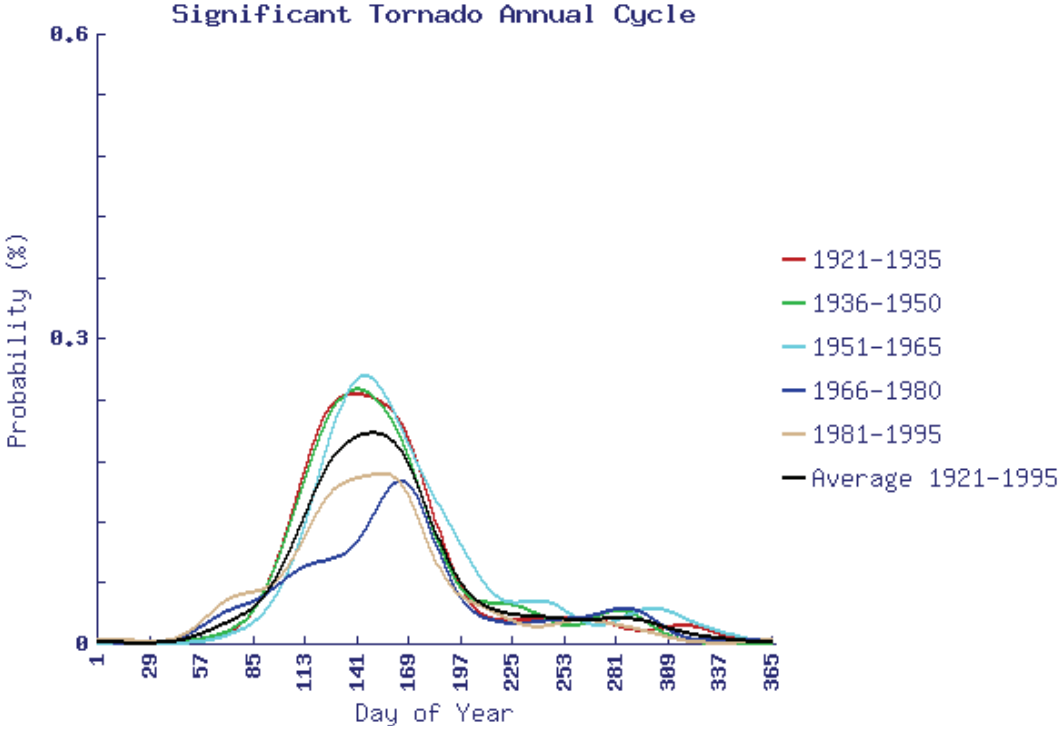
- **June 18, 1968**. An F3 rated tornado touched down in Rush County causing 8 injuries and $250,000 in damages. This tornado was estimated to be one mile wide and 220 yards wide.
- **September 3, 1970**. An F1 rated tornado touched down in Rush County causing an estimated $25,000 in damages. This tornado was estimated to be 10 miles long and 300 yards wide. According to the *Rush County News*, the tornado was reported on the ground west of La Cross. Damages occurred to two farms seven miles west of la Crosse (*Rush County News*, September 3, 1970).

- **August 17, 1974**. An F1 rated tornado touched down in Rush County causing and estimated $25,000 in damages. This tornado was an estimated 14 miles long and 50 yards wide.
- **May 24, 1990**. An F0 tornado 18 miles long and 10 yards wide touched down in Rush County causing an estimated $25,000 in damages. According to the *Rush County News*, this storm tore the doors off of a machine shed south of Timken (*Rush County News*, May 31, 1990).
- **May 31, 1996**. An F1 tornado touched down six miles east south east of Bazine. Most of the time on the ground, the 3 mile long and 100 yard wide tornado was across open farm land. One stone house was destroyed along with threes and fences. A few outbuildings had some damage for total estimated damages of $10,000.
- **April 21, 2001**. An F2 rated tornado touched down 8 miles southeast of Rush Center heavily damaging grain bins, roofs, a shed and a vehicle at two farms. Total estimated damages were $200,000.
- **June 14, 2004, FEMA-1535-DR** (6/12-7/25/2004 Incident Period) An F0 landspout 1 mile long and 50 yards wide was witnessed by a pilot 2 miles north east of La Crosse. This tornado was also spotted 3 miles south, southeast of Rush Center but did not cause any reported damages.
- **April 10, 2005**. An F1 rated tornado touched down 12 miles north northeast of Otis. There was some roof damage to a farm and a trailer along with tree damage. Damage estimates were not reported.
- **May 25, 2008, FEMA-DR-1776** (5/22-6/16/2008 Incident Period) A tornado made brief contacts two miles south east of Lacrosse, two miles north of Otis, one mile south west of Bison, and one mile west north west of Timken. No damages were reported.

Probability of Future Occurrences

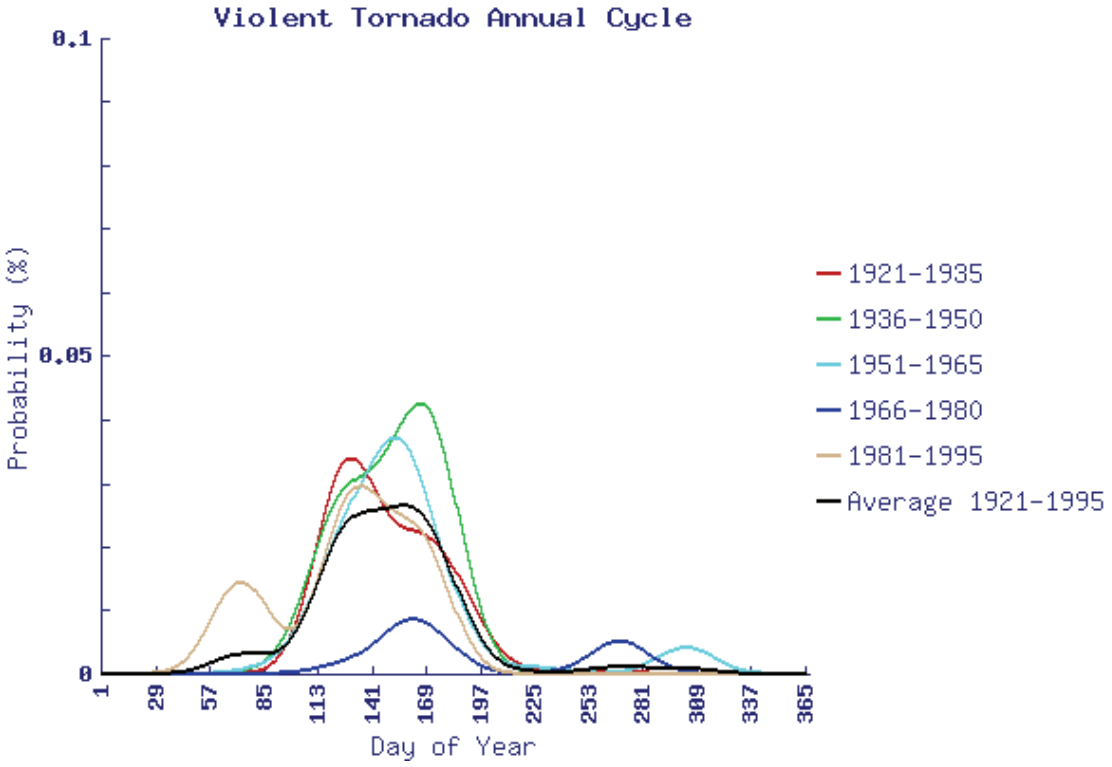
The National Severe Storms Laboratory calculated probability of violent tornadoes based on time of year for the period 1921-1995. Figure 3.28 below shows the probability of a F2 or larger tornado occurring on any given day at a location within a 25 mile radius of the center of Rush County. For example, a y-axis value of 2.0 would indicate a two percent chance of receiving the chosen type of severe weather on the date indicated by the x-axis value. The 1951-1965 period was the peak in probability based on data from previous occurrences, with the most recent reporting period (1981-1995) showing a lower probability of occurrence than the overall average. Figure 3.29 shows the probability of an F4 or larger tornado occurring on any given day at a location within a 25 mile radius of the center of Rush County. For both significant (F2 or larger) and violent (F4 and larger) tornadoes there is a pronounced peak in probability during the spring months.

Figure 3.28. Daily Significant Tornado Probability, F2 or Larger, Rush County 1921-1995



Source: National Severe Storms Laboratory, http://www.nssl.noaa.gov/hazard/hazardmap.html

Figure 3.29. Daily Violent Tornado Probability, F4 or Larger, Rush County 1921-1995



Source: National Severe Storms Laboratory, http://www.nssl.noaa.gov/hazard/hazardmap.html

Based on NCDC records of 29 tornadoes in a 58-year period, there is a 50 percent probability of a tornado in Rush County in any given year. Removing the F0 rated events from this calculation, there were 13 tornadoes in the same period resulting in a probability 22 percent probability in any given year.

Likely: History of events is greater than 20 percent but less than or equal to 33 percent likely per year. Event is probable within the next three years.

Magnitude/Severity

If a strong tornado did impact the populated portions of Rush County, the impacts could be devastating.

Limited: 10-25 percent of property severely damaged; shutdown of facilities for more than one week; injuries and/or illnesses do not result in permanent disability.

Hazard Summary

Calculated Priority Risk Index	Planning Significance
2.65	Moderate

3.2.11 Utility / Infrastructure Failure

Description

Critical infrastructure involves several different types of facilities and systems: transportation, power systems, natural gas and oil pipelines, water and sewer systems, storage networks, and telecommunications facilities. State and locally designated critical facilities, such as hospitals, government centers, etc., are also considered critical infrastructure. Failure of utilities or other components of the infrastructure in the planning area could seriously impact public health, the functioning of communities, and the economy. Disruption of any of these services could result as a secondary impact from drought (water systems), flood, tornado, windstorm, winter storm, lightning, and extreme heat. Solar storms can also potentially affect power and communication systems, and equipment failure or sabotage are other potential causes.

Warning Time: 4—Less than six hours

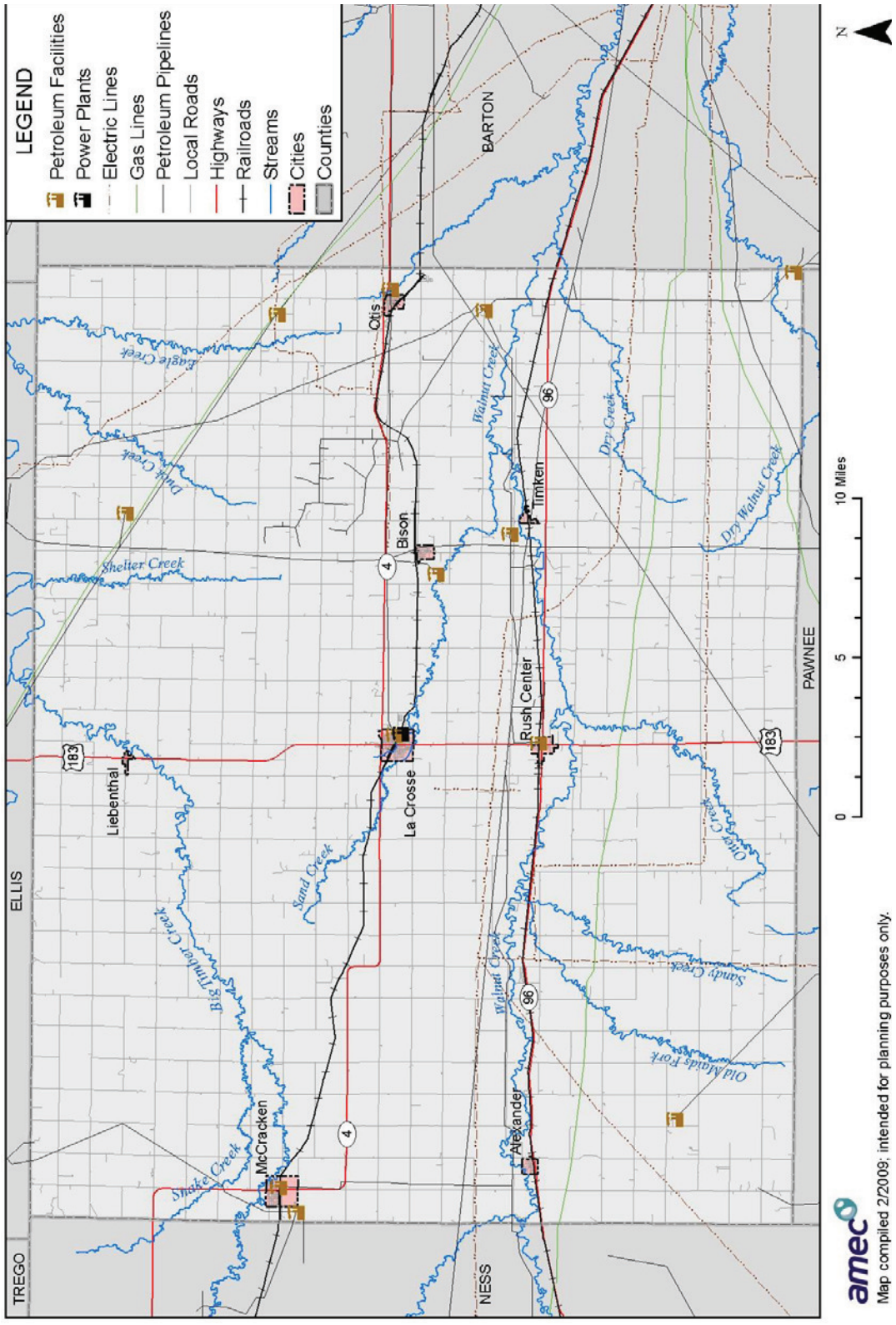
Duration: 3 —Less than one week

Geographic Location

Power Providers/Infrastructure

Utility lines and critical infrastructure are located throughout Rush County, concentrated in the county's population centers and on lines connecting them. Figure 3.30 below shows the locations of petroleum facilities, petroleum pipelines, electric transmission lines, and gas transmission pipelines in Rush County.

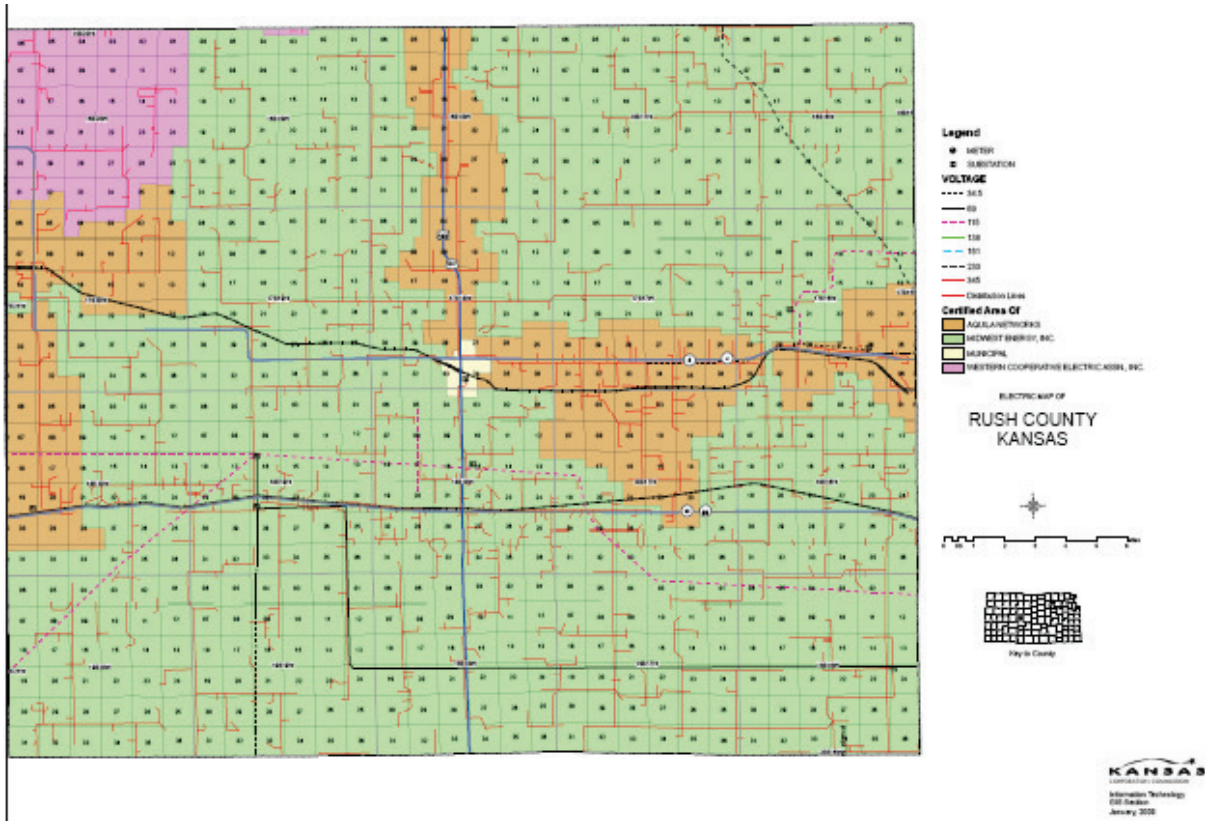
Figure 3.30 Rush County Utility Infrastructure



Electric Providers

Electricity providers in Rush County include: Aquila Networks, Midwest Energy, Inc. Western Cooperative Electric Association, Inc., Lane Scott Electric Cooperative (not shown on map), and a municipal electric supply in La Crosse. The locations of these suppliers are provided in the map in Figure 3.31.

Figure 3.31 Electric Map of Rush County, Kansas



Source: Kansas Corporation Commission, http://www.kcc.state.ks.us/maps/county/rh_el.pdf

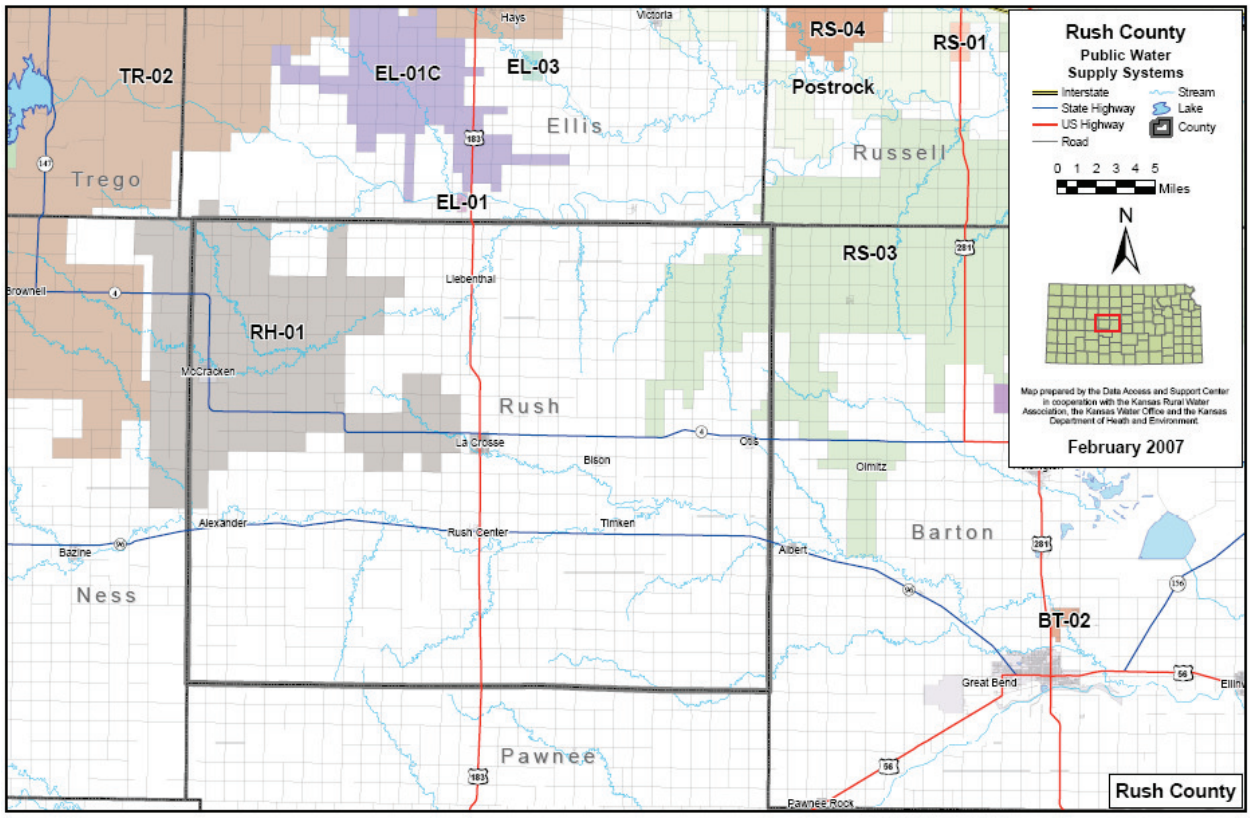
Wind Energy

In late 2008, West Wind Energy, LLC, purchased a building in Otis. The first of 2 wind turbines were installed at this location in Spring of 2009.

Water Supply

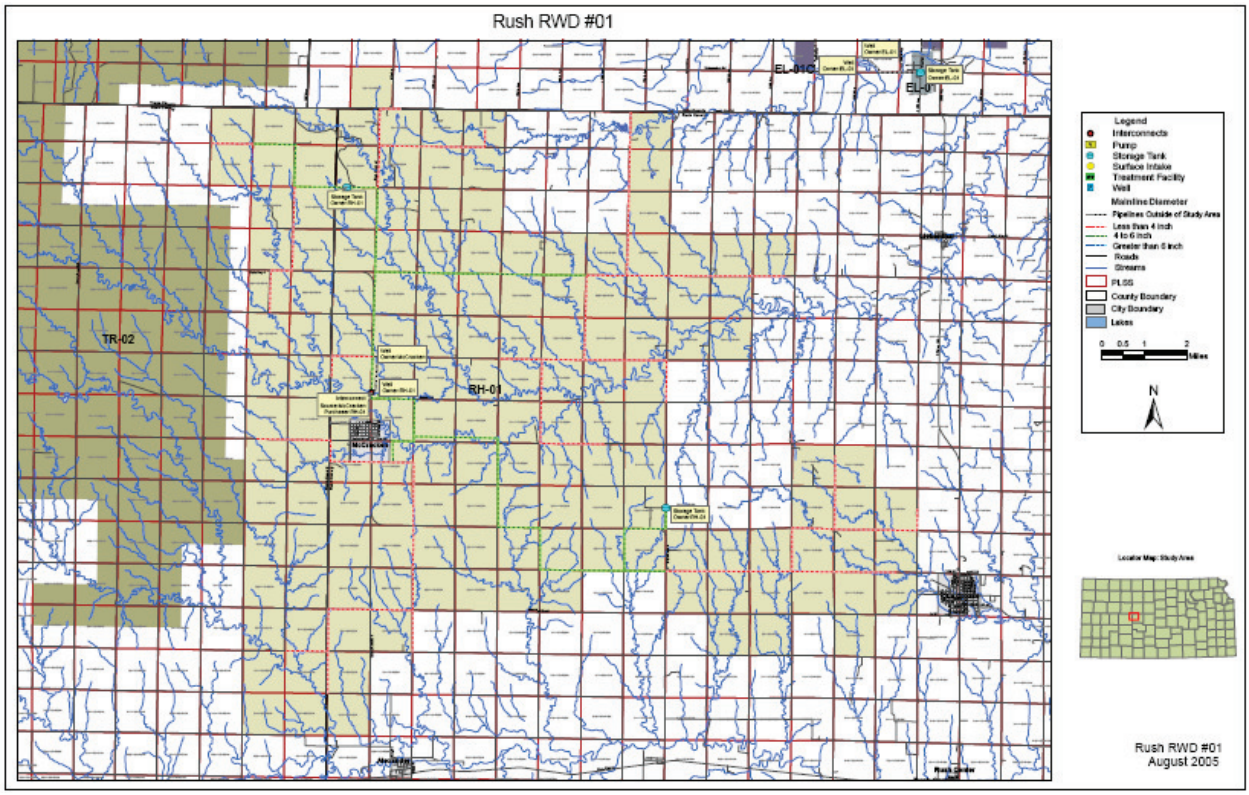
The water suppliers in Rush County are Rush County Rural Water District #1 and Russell County Rural Water District 3. The supply areas are depicted in the map in Figure 3.32. Figures 3.33 and 3.34 that follow provide additional details for these two main water supplies.

Figure 3.32 Rush County Public Water Supply Systems



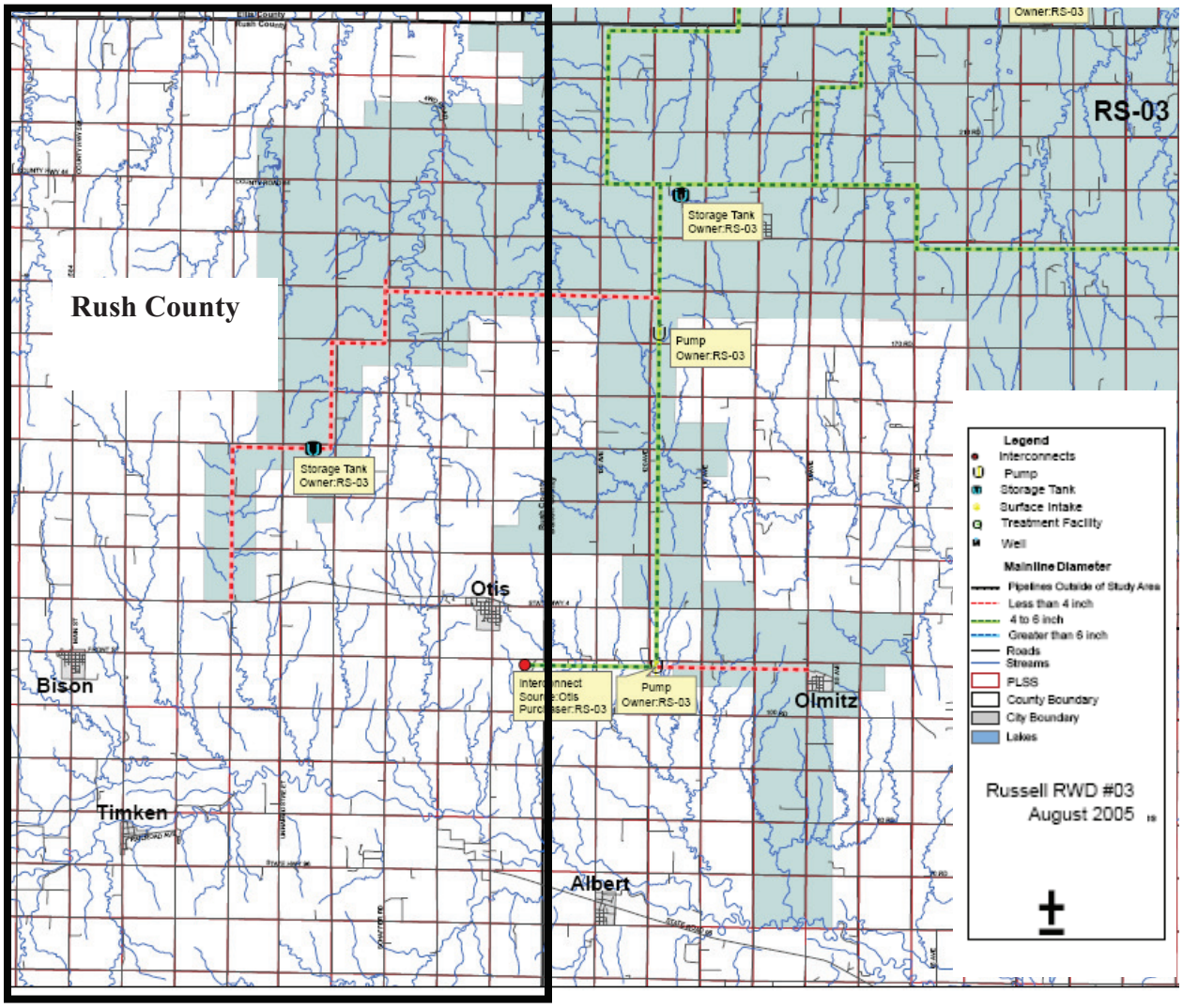
Data Access and Support Center; http://www.krwa.net/mapovers/countymaps/Rush_Co.pdf;

Figure 3.33 Rush County Rural Water District #1



http://www.krwa.net/mapovers/RH01.pdf;

Figure 3.34 Russell County Rural Water District #3 in Rush County

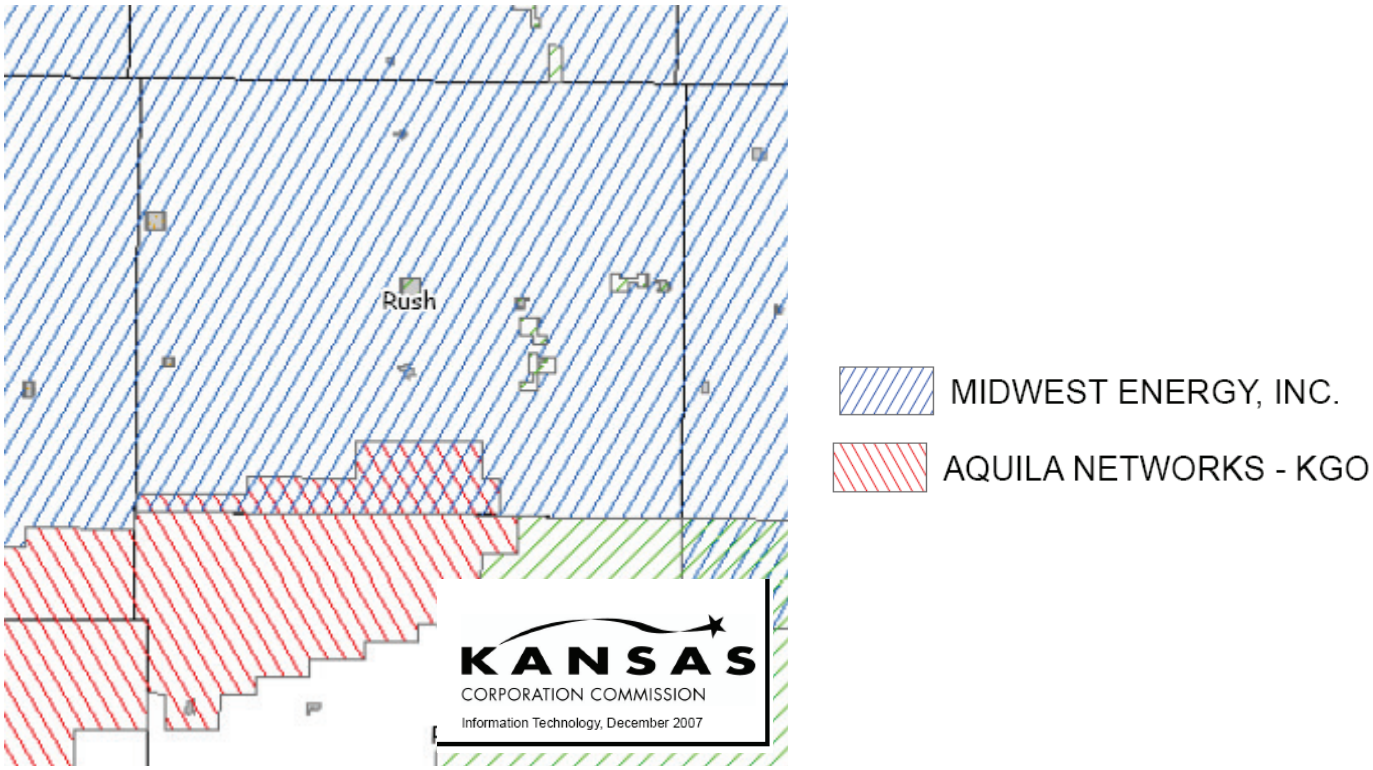


http://www.krwa.net/mapovers/RS03.pdf

Natural Gas Public Utilities

The natural gas public utilities in Rush County are Midwest Energy, Inc and Aquila Networks-KGO. The service areas are provided in the map in Figure 3.35.

Figure 3.35 Certified Areas of Natural Gas Public Utilities in Kansas



Kansas Corporation Commission, http://www.kcc.state.ks.us/maps/ks_gas_certified_areas.pdf, April 2009

Waste disposal, storage, and treatment

Waste water treatment facilities are located in McCracken, Bison, Rush Center and La Crosse. McCracken is a non-discharge facility and Bison has an Emhoff. All facilities are city owned and operated.

Communications

Telecommunications

The following telecommunications providers service Rush County.

Table 3.24 Telecommunications Providers in Rush County

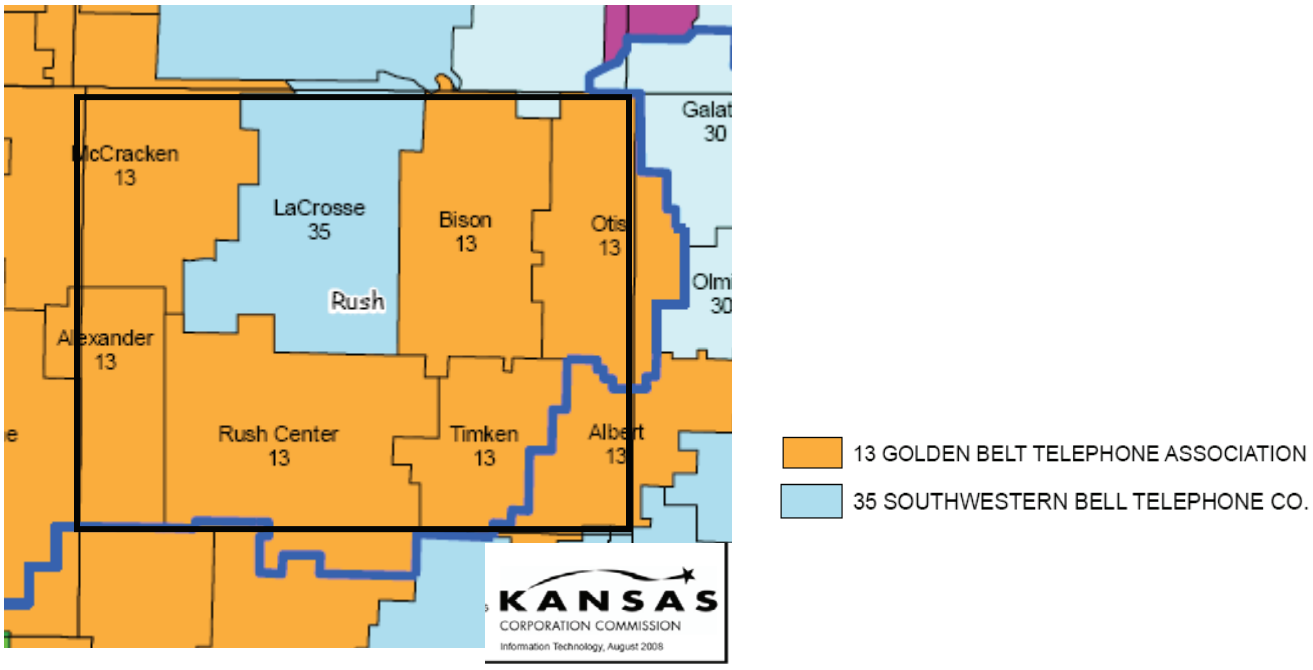
City	Provider
ALEXANDER	GOLDEN BELT TELEPHONE ASSOCIATION.
ALEXANDER	SAGE TELECOM, INC.
BISON	GOLDEN BELT TELEPHONE ASSOCIATION.
LA CROSSE	AT&T COMMUNICATIONS OF THE SOUTHWEST, INC.
LA CROSSE	BIRCH TELECOM OF KANSAS, INC.

City	Provider
LA CROSSE	IONEX COMMUNICATIONS, INC.
LA CROSSE	NEX-TECH, INC.
LA CROSSE	NAVIGATOR TELECOMMUNICATIONS, LLC
LA CROSSE	SAGE TELECOM, INC.
LA CROSSE	SOUTHWESTERN BELL TELEPHONE CO.
LA CROSSE	COMTEL TELCOM ASSETS LP D/B/A EXCEL TELECOMM., VARTEC TELECOM, VARTEC SOLUTIONS, CLEAR CHO
LIEBENTHAL	BIRCH TELECOM OF KANSAS, INC.
MCCRACKEN	GOLDEN BELT TELEPHONE ASSOCIATION.
OTIS	GOLDEN BELT TELEPHONE ASSOCIATION.
RUSH CENTER	GOLDEN BELT TELEPHONE ASSOCIATION.
RUSH CENTER	METROPOLITAN TELECOMMUNICATIONS OF KANSAS, INC. D/B/A METTEL
TIMKEN	GOLDEN BELT TELEPHONE ASSOCIATION.

Kansas Corporation Commission, http://www.kcc.state.ks.us/telecom/service.cgi, April 2009

The map in Figure 3.36 provides the locations of certified areas of telephone exchanges in Kansas. Rush County is outlined in the dark black box.

Figure 3.36 Certified Areas of Telephone Exchanges in Rush County Kansas



source: Kansas Corporation Commission, http://www.kcc.state.ks.us/maps/ks_telephone_certified_areas.pdf, April 2009

Cable Television Providers

The only cable television provider is Golden Belt Cable Television. They do operate the Emergency Alert System and have 1050 customer connections.

Internet Service Providers

Several internet service providers are avail able in the area. These providers are listed by service area in Table 3.25.

Table 3.25 Rush County Internet Service Providers

Location	Provider	Max. Modem
Alexander	GOLDEN BELT TELEPHONE	1.5 MB
Bison	GOLDEN BELT TELEPHONE	1.5 MB
La Crosse	AMBERWAVE INTERNET	33.6
La Crosse	AMBERWAVE INTERNET	28.8
La Crosse	CARROLLS WEB	56K
La Crosse	CARROLLS WEB	56K
La Crosse	EARTHLINK NETWORK	V.90/56K
La Crosse	GOLDEN BELT TELEPHONE	1.5 MB CATV Modem/786K Wireless
La Crosse	GRAPEVINE/INTERNET DIRECT COM--D/B/A HYPERVINE	56FLEX/ V.90
La Crosse	HOMETOWN COMMUNICATIONS	V.92
La Crosse	INTERNET KANSAS	56K
La Crosse	KANSAS NET INTERNET SERVICES	56K
La Crosse	QUANTUM AMERICA	56K V 92
La Crosse	WEBLINK2000.NET	56K
La Crosse	WWWEBSERVICE.NET, INC.	56K
Liebenthal	GOLDEN BELT TELEPHONE	1.5 MB
McCracken	GOLDEN BELT TELEPHONE	1.5 MB
McCracken	GOLDEN BELT TELEPHONE	1.5 MB
Otis	GOLDEN BELT TELEPHONE	1.5 MB
Rush Center	GOLDEN BELT TELEPHONE	1.5 MB
Timken	GOLDEN BELT TELEPHONE	1.5 MB

Kansas Corporation Commission, http://www.kcc.state.ks.us/telecom/isp.htm, April 2009

Previous Occurrences

Power and communications systems and infrastructure are damaged annually as a result of windstorm, winter storm and lightning. Water Systems and wastewater systems are impacted by flood events occasionally.

Extreme Heat

No previous power outages were reported. However, there is the potential for outages to occur when the power supply systems are taxed during extreme heat events.

Flooding

The power line that supplies the hospital, rest home and assisted living center in La Crosse runs through a floodplain and has previously been inaccessible during flood events.

Another power line in La Crosse that supplies the sewer plant also runs through a pasture that is prone to flooding and becomes inaccessible.

Lightning

Lightning routinely damages electronic equipment across the planning area. Are there any specifics on lightning events causing widespread power outages?

Tornado

There were 29 separate tornado events in Rush County between January 1950 and December of 2008. Although specific accounts do not provide details of utility failure, power outages routinely occur as a result of tornadoes.

Windstorm

Fifty-two separate thunderstorm/wind events reported by NCDC in Rush County between 1993 and 2008. Many of the reports included mention of power outages and downed electric lines.

Winter Storm

According to accounts from NCDC, FEMA declarations, and the HMPC, there were at least 30 significant recorded winter storm events in Rush County from 1993 to 2008. Power outages with longer durations generally occur during winter storm since repair crews are hampered by the ice and snow.

Probability of Future Occurrences

Infrastructure failure can occur as a secondary impact as a result of extreme heat, flooding, lightning, tornado, windstorm, and winter Storm. In addition, solar storm activity can also cause power outages. The next 11-year cycle of solar storms will most likely start in March 2008 and peak in late 2011 or mid-2012.

In addition, this hazard can occur as a result of unintentional equipment failure or intentional equipment failure. Due to the numerous potential causes of infrastructure failure, the HMPC determined the probability of this hazard to be “highly likely”.

Highly Likely: Event is probable within the calendar year. Event is “highly likely” to occur.

Magnitude/Severity

When utility/infrastructure failure does occur, utility providers generally respond quickly to restore service. However, depending on the cause of the utility disruption, events of prolonged outage do occur. Rush County is particularly vulnerable to winter storm events (discussed in the Section 3.x). This is a common cause of utility failure and can lead to prolonged outages.

Critical—25-50 percent of property (utility/infrastructure) severely damaged; shutdown of facilities for at least two weeks.

Hazard Summary

Calculated Priority Risk Index	Planning Significance
3.60	High

3.2.12 Wildfire

Description

Wildfires in Kansas typically originate in pasture or prairie areas following the ignition of dry grasses (by natural or human sources). About 75 percent of Kansas wildfires start during spring due to dry weather conditions. Since protecting people and structures takes priority, a wildfire's cost to natural resources, crops, and pastured livestock can be ecologically and economically devastating. In addition to the health and safety impacts to those directly affected by fires, the state is also concerned about the health affects of smoke emissions to surrounding areas.

Wildfires in Kansas are frequently associated with lightning and drought conditions, as dry conditions make vegetation more flammable. As new development encroaches into the wildland-urban interface (areas where development occurs within or immediately adjacent to wildlands, near fire-prone trees, brush, and/or other vegetation), more and more structures and people are at risk. On occasion, ranchers and farmers intentionally ignite vegetation to restore soil nutrients or alter the existing vegetation growth. These fires have the potential to erupt into wildfires.

Warning Time: 4—less than six hours

Duration: 2—less than one day

Geographic Location

The entire planning area is subject to incidents of wild fire. There is an increased risk in agricultural areas where Conservation Reserve Program (CRP) land is burned and in rural areas where individuals burn trash or debris. During high wind conditions, these small fires can get out of control and spread to dry vegetation such as native grasses, shrubs, and invasive Eastern Cedars trees. An area-specific wildfire vulnerability assessment was not available from the Kansas Forest Service at the time this plan was developed. If an assessment is available at the time of the plan update, it will be incorporated.

Previous Occurrences

According to the Kansas State University Wildland Fire Loss Report for 2006, Rush County had 43 rural fires that burned 309 acres. There were two civilian fatalities and 1 civilian injury reported in association with these rural fires and an estimated $78,500 in property damage. According to the Kansas Incident Fire Reporting System from 2003-2006, Rush County lost 1,058 acres to wild fires. During the four-year period there were four fatalities and two injuries. Estimated property damages totaled $311,275. Table 3.26 below details wildfire occurrences in Rush County from 2003-2006.

Table 3.26. Wildfires, Rush County, 2003-2006

Year	# Fires	Injuries	Fatalities	Estimated Losses ($)	Acres Burned
2003	37	1	0	64,375	41
2004	32	0	0	106,150	338
2005	34	0	2	62,250	370
2006	43	1	2	78,500	309
Totals	**146**	**2**	**4**	**311,275**	**1,058**

Source: Kansas Incident Fire Reporting System

Probability of Future Occurrences

Wildfires occur in Rush County on an annual basis. The average number of wildfires per year for the 4-year period from 2003-2006 was 36.5. The planning committee anticipates that this rate of occurrence is likely to continue. Future occurrences of this hazard are likely to increase if development in wildland-urban interface areas increases.

Highly Likely: Event is probable within the next year.

Magnitude/Severity

Wildfires occur on an annual basis. With the history of two injuries and four fatalities during the 2003-2006 reporting period, the potential magnitude/severity is considered to be "critical"

Critical—Injuries and/or illnesses result in permanent disability.

Hazard Summary

Calculated Priority Risk Index	Planning Significance
3.50	High

3.2.13 Windstorm

Description

Relatively frequent strong winds are a weather characteristic of Kansas. Figure 3.15 shows the wind zones of the United States based on maximum wind speeds; Kansas is located within wind

zones III and IV, the highest inland categories. All of Rush County is in zone IV. High winds, often accompanying severe thunderstorms, can cause significant property and crop damage, threaten public safety, and have adverse economic impacts from business closures and power loss.

Straight-line winds are generally any thunderstorm wind that is not associated with rotation (i.e., is not a tornado). It is these winds, which can exceed 100 mph, which represent the most common type of severe weather and are responsible for most wind damage related to thunderstorms. Since thunderstorms do not have narrow tracks like tornadoes, the associated wind damage can be extensive and affect entire (and multiple) counties. Objects like trees, barns, outbuildings, high-profile vehicles, and power lines/poles can be toppled or destroyed, and roofs, windows, and homes can be damaged as wind speeds increase. In 2005, hail and wind damage made up 45 percent of homeowners insurance losses. One type of straight-line wind is the downburst, which can cause damage equivalent to a strong tornado and can be extremely dangerous to aviation.

Thunderstorms over Kansas typically occur between late April and early September, but, given the right conditions, they can develop as early as March. They are usually produced by supercell thunderstorms or a line of thunderstorms that typically develop on hot and humid days.

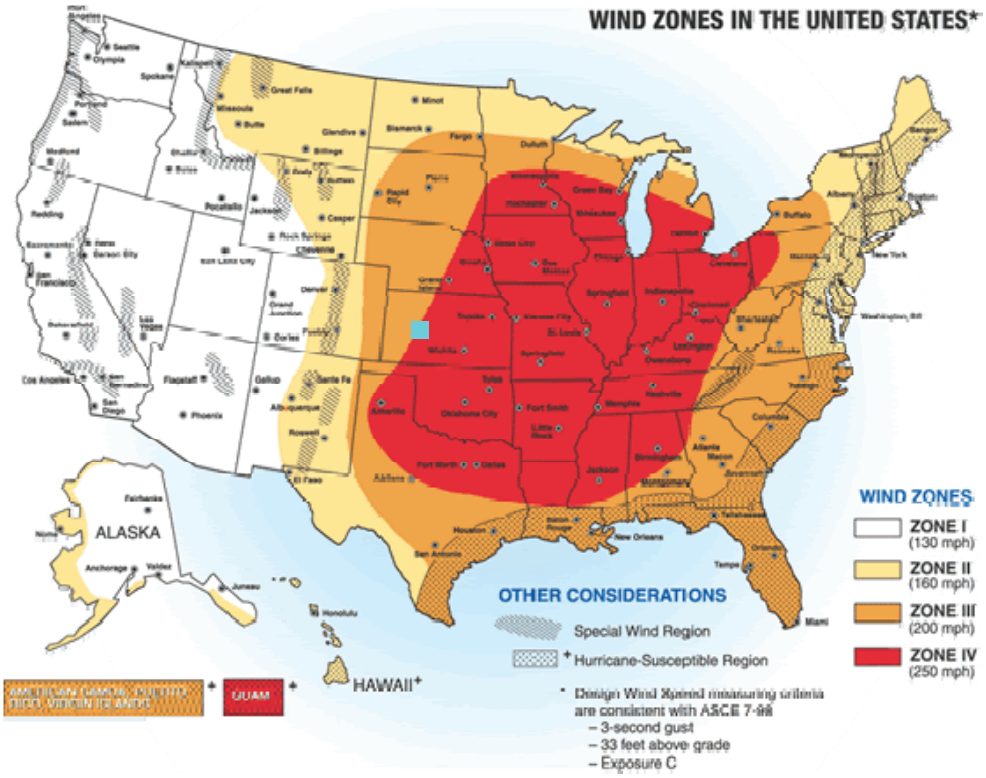
Warning Time: 2—less than one day

Duration: 2—less than one day

Geographic Location

All of Rush County is susceptible to high wind events, and all of the participating jurisdictions are vulnerable to this hazard. Figure 3.37 below shows Rush County (blue square approximates location on map) is in Wind Zones III and IV. These zones of the United States can experience winds 200 to 250 mph.

Figure 3.37. Wind Zones in the United States



Source: FEMA; http://www.fema.gov/plan/prevent/saferoom/tsfs02_wind_zones.shtm
Note: Blue square indicates approximate location of Rush County

Previous Occurrences

Rush County has not been included in any presidential disaster declaration that specifically included high winds. However, generally, the events that included severe storms likely included high winds as well. For reference, the four declarations that Rush County received including severe storms are summarized below in Table 3.27. These events are also discussed separately in the hail, flood, and tornado profiles.

Table 3.27 Severe Storm Declarations in Rush County

Declaration Number	Declaration Date (incident period)	Disaster Description
1776	7/9/2008 (5/22-6/16)	Severe Storms, Flooding, and Tornadoes
1535	8/3/2004 (6/12-7/25/2004)	Severe Storms, Flooding, and Tornadoes
1000	7/22/1993	Flooding, Severe Storms
378	5/2/1973	Severe Storms, Flooding

Source: FEMA

From 2005 to 2007, there were four USDA disaster declarations that included high winds. These events are summarized in Table 3.28.

Table 3.28 USDA Disaster Declarations in Rush County including High Wind Hazard

Year	Number
2005	S2128
2005	S2196
2006	S2413
2007	S2593

Source: USDA

According to the NCDC database, there were 52 separate thunderstorm/wind events reported in Rush County between 1993 and 2008 (Events that occurred on the same day within 1 hour were considered one event). There were only five entries between 1967, the first record, and September, 1993 indicating that consistent records were not kept during this time. Therefore, the period from September 1993 to December 2008 (15.25 years) was chosen to provide a more accurate account of previous occurrences. During this time period there was one reported death and 5 reported injuries as a result of windstorm events. Reported damages for the 15.2 year period were reported to be $ 1,156,000 in property damages and 165,000 in crop damages.

Summaries of some of the more damaging events are provided below:

- **August 5, 1995.** Thunderstorm wind blew the doors off a 100 foot metal storage building two miles north of Liebenthal causing an estimated $2,000 in damages.
- **October 5, 1995.** A northwest wind of 60 to 70 mph prevailed for an extended period as deep low pressure moved across the area. Numerous trees and roofs were damaged. A few large structures lost walls or roofs. Crop damage was to uncut milo. Some wheat had to be replanted due to erosion. A trash cart was blown out of a pickup and hit three people that were injured, but none seriously. Property damages were reported to be $200,000 and crop damages were reported to be $150,000.
- **March 23, 1996.** One house burned down and six others were damages when a power line snapped as a result of high wind. Damage estimates were not reported for this event.
- **June 21, 1996.** In Alexander, a 30/40 foot she was destroyed, large trees and branches were blown down, a camper trailer was overturned and approximately 100 power poles were blown down. Reported property damage was $550,000. In La Crosse, the same storm took 2/3 of the roof off a business building, took down power lines, overturned a truck and destroyed a lab trailer. Reported damages were estimated toe be $30,000. In Otis, this storm snapped a power pole. Estimated damages reported to be $500.
-
- **April 14, 1999.** There were at least two injuries from the wind blowing vehicles off the road due to this high wind event that affected 27 Kansas counties, including Rush County.

Numerous overturned tractor trailers littered the area. Large trees were uprooted in many communities and missing shingles reports were quite common.

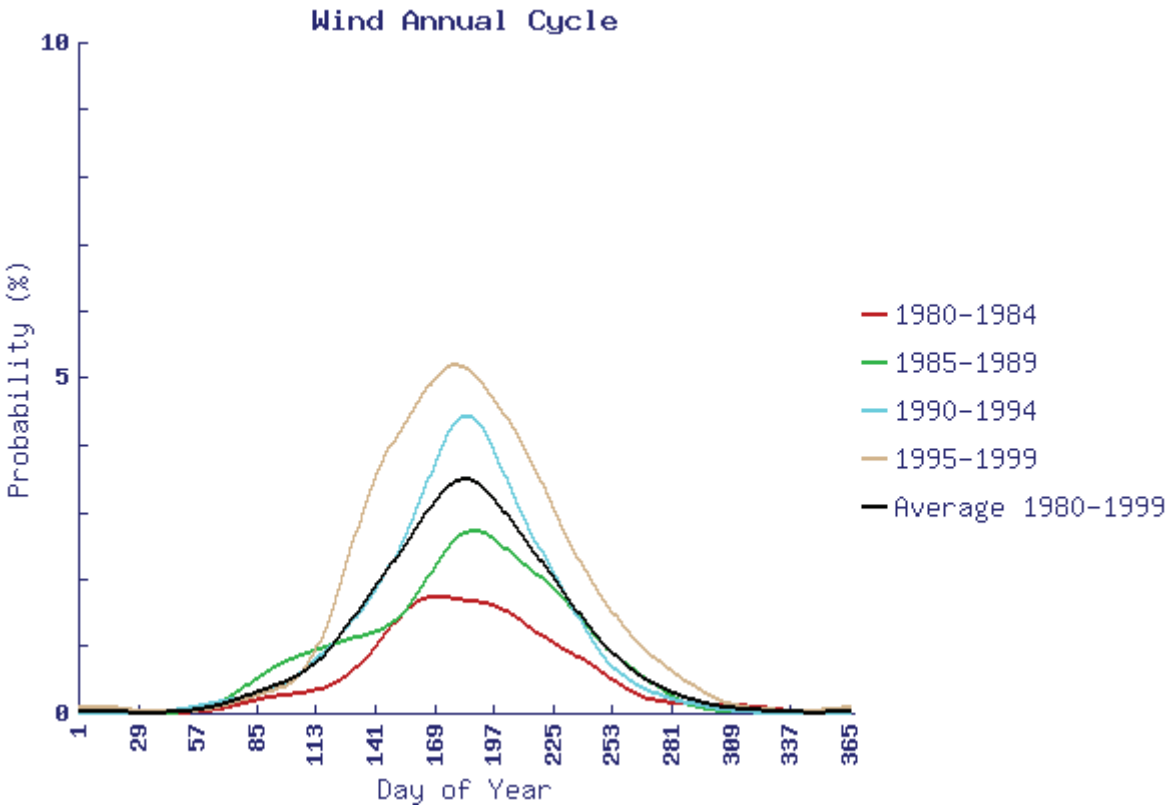
- **June 23, 2000.** A camper was overturned and the tops blown out of two large trees four miles north of McCracken. Damages estimated at $2,000.
- **July 16, 2000.** A power pole was blown down four miles south of Alexander. Damages estimated to be $500.
- **May 16, 2004.** Twelve power poles were blown down just east of Highway 183 one mile east south east of Rush Center. Damages estimated at $6,000.
- **July 7, 2004.** Six power poles were blown down in Otis.
- **August 2, 2006.** Twenty-six power poles were blown down along Highway 183 closing the highway between Rush Center and La Crosse. Damages estimated at $30,000.
- **November 6, 2008.** A 20 foot diameter tree (largest in La Crosse) was heavily damaged by strong winds. Crop losses as a result of the event were reported to be $10,000.

Most of the events in the NCDC database included reports of downed power poles, trees and tree limbs. Although many of these events did not report damages to property or crops, debris removal and other associated costs are common as a result of the numerous high wind events.

Probability of Future Occurrences

The National Severe Storms Laboratory calculated probability of windstorms based on time of year for the period 1980-1999. Figure 3.38 below shows the probability of a windstorm 50 knots or greater occurring on any given day at a location within a 25 mile radius of the center of Rush County. For example, a y-axis value of 2.0 would indicate a two percent chance of receiving the chosen type of severe weather on the date indicated by the x-axis value. The most recent reporting period (1995-1999) had the highest probability based on data from previous occurrences, while overall probability was highest during the spring months across all reporting periods.

Figure 3.38. Daily Windstorm Probability, 50 Knots or Higher, Rush County 1980-1999



Source: National Severe Storms Laboratory, http://www.nssl.noaa.gov/hazard/hazardmap.html

According to NCDC, there were 52 wind events in Rush County between September 1993 and December 2008 (15.25 years). Based on this information, the probability that at least one significant wind event will occur in Rush County in any given year is 100 percent with an annual average of 3.4 events per year.

Highly Likely—History of events is greater than 33 percent likely per year.

Magnitude/Severity

Estimated damages in the NCDC database for the 15.2 year period were reported to be $1,156,000 in property damages and 165,000 in crop damages. Many damages and costs as a result of such events are often not reported. So, these estimates can be considered to be very conservative. Common types of damages were structural damages caused by falling limbs and debris, roof damages, overturned vehicles and light structures, and downed power poles resulting in some loss of electric service. In addition, clearance of the debris left behind can be costly and is generally not reported in damage estimates in NCDC.

Limited—10 to 25 percent of property is severely damaged; injuries and/or illnesses do not result in permanent disability.

Hazard Summary

Calculated Priority Risk Index	Planning Significance
2.90	Moderate

3.2.14 Winter Storm

Description

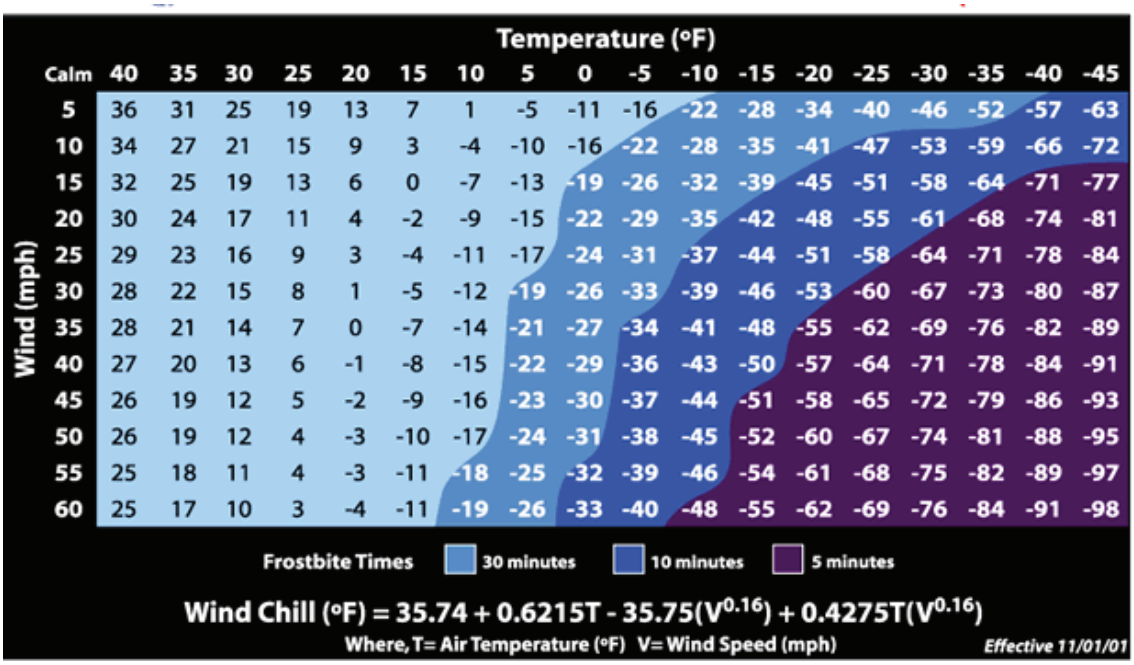
Winter storms in Kansas typically involve snow, extreme cold, and/or freezing rain (ice storms). These conditions pose a serious threat to public safety, disrupt commerce and transportation, and can damage utilities and communications infrastructure. Winter storms can also disrupt emergency and medical services, hamper the flow of supplies, and isolate homes and farms. Heavy snow can collapse roofs and down trees onto power lines. Extreme cold conditions can stress or kill unprotected livestock and freeze water sources. Direct and indirect economic impacts of winter storms include cost of snow removal, damage repair, increased heating bills, business and crop losses, power failures and frozen or burst water lines. Occurrence of extreme cold temperature often associated with winter storm is discussed separately in Section 3.2.5.

The National Weather Service describes different types of winter storm conditions as follows:

- **Blizzard**—Winds of 35 mph or more with snow and blowing snow reducing visibility to less than 1/4 mile for at least three hours.
- **Blowing Snow**—Wind-driven snow that reduces visibility. Blowing snow may be falling snow and/or snow on the ground picked up by the wind.
- **Snow Squalls**—Brief, intense snow showers accompanied by strong, gusty winds. Accumulation may be significant.
- **Snow Showers**—Snow falling at varying intensities for brief periods of time. Some accumulation is possible.
- **Freezing Rain**—Measurable rain that falls onto a surface whose temperature is below freezing. This causes the rain to freeze on surfaces, such as trees, cars, and roads, forming a coating or glaze of ice. Most freezing-rain events are short lived and occur near sunrise between the months of December and March.
- **Sleet**—Rain drops that freeze into ice pellets before reaching the ground. Sleet usually bounces when hitting a surface and does not stick to objects.

Wind can greatly amplify the impact of cold ambient air temperatures and thus the severity of winter storms. Provided by the National Weather Service, Figure 3.39 below shows the relationship of wind speed to apparent temperature and typical time periods for the onset of frostbite.

Figure 3.39. Wind Chill Chart



Source: NOAA, National Weather Service, http://www.weather.gov/om/windchill/

Duration of the most severe impacts of winter storms is generally less than one week, though dangerous cold, snow, and ice conditions can remain present for longer periods in certain cases. Weather forecasts commonly predict the most severe winter storms at least 24 hours in advance, leaving adequate time to warn the public.

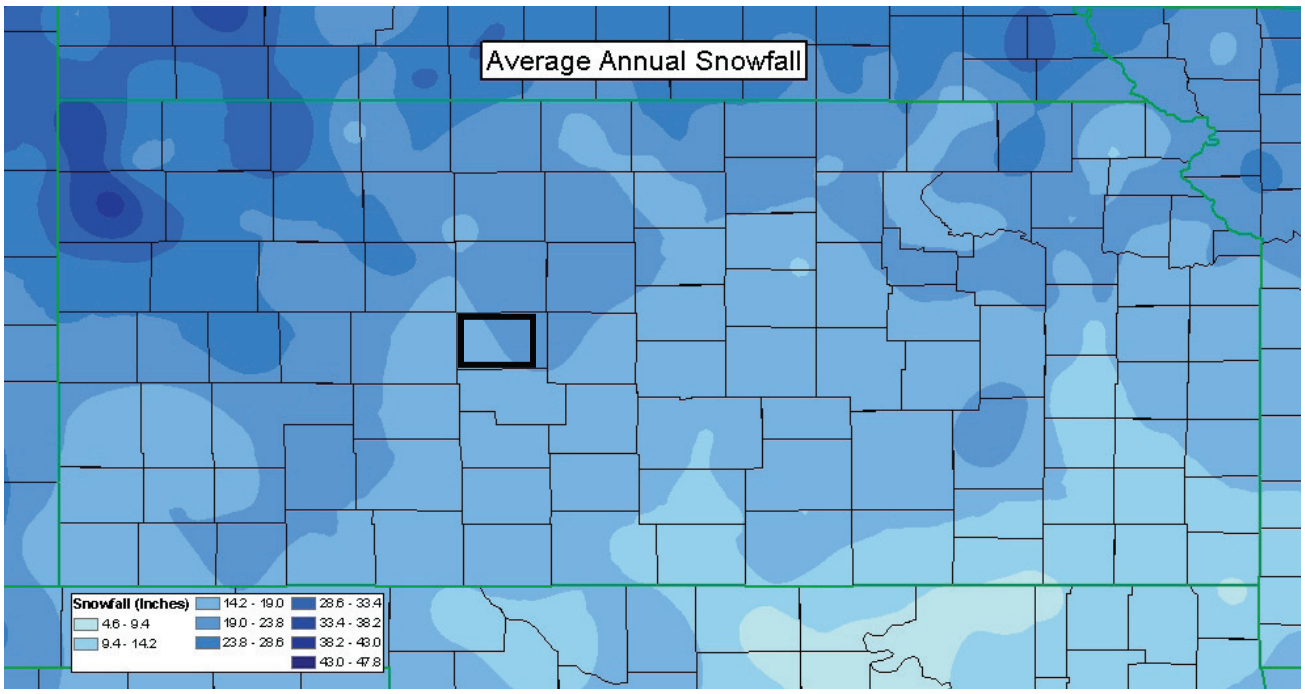
Warning Time: 2—12-24 hours

Duration: 3—less than one week

Geographic Location

The entire State of Kansas is vulnerable to heavy snow and freezing rain. Northwestern Kansas receives the greatest average annual snowfall. The central region of Kansas including the Rush County receives 14.2 to 23.8 inches of snow per year e as shown in Figure 3.40 below.

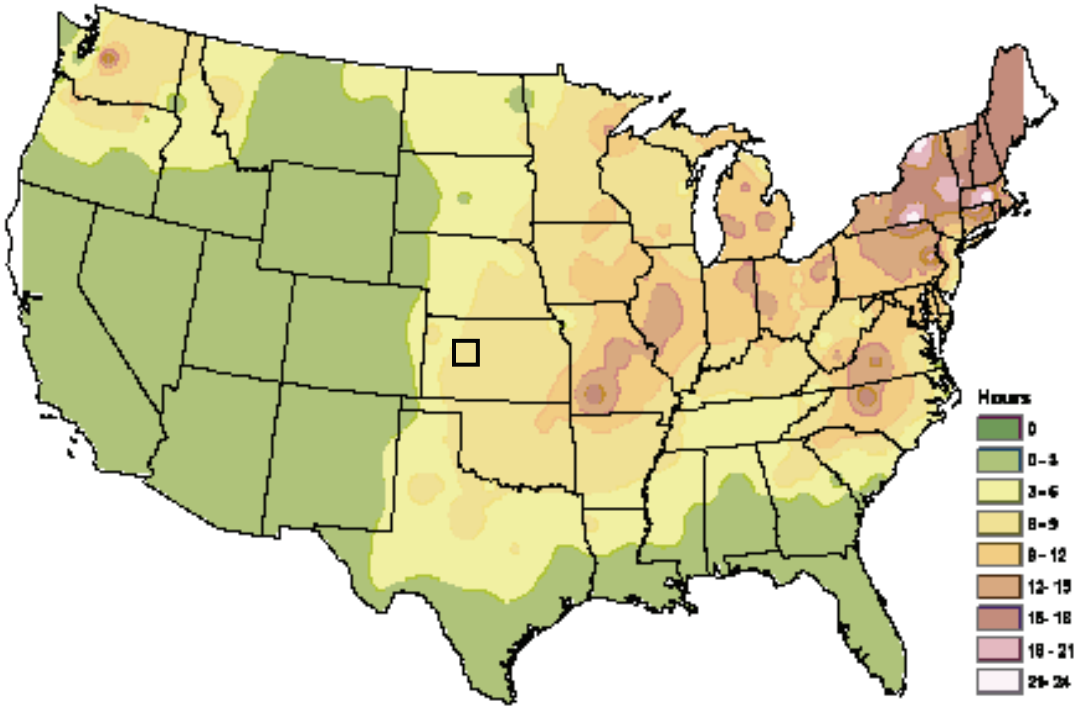
Figure 3.40. Average Annual Snowfall in Kansas



Source: Kansas State University, Research and Extension, Weather Data Library, www.oznet.ksu.edu/wdl/Maps/Climatic/AnnualFreezeMap.asp
Note: Black square indicates Rush County

Figure 3.41 shows that Rush County falls in a zone that receives 8-9 hours of freezing rain per year.

Figure 3.41. Average Number of Hours per Year with Freezing Rain in the United States



Source: American Meteorological Society. "Freezing Rain Events in the United States." http://ams.confex.com/ams/pdfpapers/71872.pdf.
Note: Black square indicates approximate location of Rush County

Previous Occurrences

Of the seven Major Presidential Disaster Declarations that have occurred in Rush County since 1955, three have been related to winter storms. In addition, the entire State of Kansas received an Emergency Declaration for Winter Storm in December 2007. Details of these events are provided in Table 3.29.

Table 3.29 Winter Storm Disaster Declaration History in Rush County, 1955-Present

Declaration Number	Declaration Date	Disaster Description
1741	2/1/2008 12/6-19/2007)	Severe Winter Storms
1675	1/7/2007 (12/28-30/2006)	Severe Winter Storm
1626	1/26/2006 (11/27-28/2005)	Severe Winter Storm
3282	12/12/2007	Severe Winter Storms Emergency Declaration

Source: FEMA; Amounts for Rush County provided by KDEM from NEMIS reports dated 6/1/2008

From 2005, Rush County received five USDA declarations for Winter Storms. One USDA declaration was made in conjunction with the DR-1626 Presidential Declaration and two were associated with the DR-1675 Presidential Declaration. The USDA declarations during this period are summarized in Table 3.30

Table 3.30 Winter Storm USDA Disaster Declarations in Rush County 2005-2007

Year	Number
2005	M1626
2005	S2128
2006	M1675
2007	M1675
2007	S2525

- **February 1, 2008-FEMA-1741-DR (period of incident December 6-19, 2007,** Severe Winter Storm: On December 14, 2007 over a foot of snow had fallen across parts of Ellis, Rush, Pawnee and northwestern Edwards, southeastern Hodgeman and a small portion of northeastern Ford counties. This event caused significant damages to trees power lines and poles resulting in power outages and school and business closure across the planning area. Estimated federal/state disaster relief funding in unincorporated Rush County for this disaster was $7,851.
- **January 7, 2007-FEMA-1675-DR (period of incident 12/28-30/2006)**, Severe Winter Storm: This storm was one of Kansas' worst disasters on record. It began on December 28, 2006, and increased in intensity overnight on December 29 into December 30. Snow depths. Ranged from 4 inches in Saline County to 30 inches n Wallace County. Several counties set snowfall records. Numerous highways were closed for days in western Kansas and there were major power outages due to icing. According to FEMA Region VII, as reported in the Kansas Agricultural Impact Assessment prepared by the Kansas Department of Agriculture, As of March 29, 2007, statewide damages to electrical transmission and distribution systems and communications facilities exceeded $52 million. More than 70 miles of transmission/ distribution line–miles were damaged or destroyed. Approximately 16,750 poles were downed by the storm. Power companies reported approximately 69,000 meters without power at the peak of the storm. There were three storm-related fatalities. The storm also severely impacted ranchers, making it temporarily impossible for some to feed and water livestock. The Kansas National Guard used Black Hawk helicopters to feed stranded cattle.

  Damages specific to Rush County reported by the planning committee were damages to power poles and power lines as well as road damages to approximately 34 miles of road. The road damages were exacerbated by the heavy electrical utility vehicles on the roads to repair power lines. Schools were out for Christmas vacation during this event. So, school closings were not an issue. However, an unknown number of businesses were closed due to power outages and treacherous road conditions. The estimated federal/state disaster relief funding for the unincorporated county was $123,141.

- **January 26, 2006, FEMA-1626-DR (period of incident 11/27-28/2005)**, Severe Winter Storm: Much of the state was affected by this storm. Winds of 40 to 60 miles per hour combined with two to seven inches of snow resulting in a blizzard which raged across parts of Kansas. The wind whipped the snow into drifts 10-15 high in some places. Interstate 70 was closed west of Russell, and numerous other highways were impassable during the storm. There were several reports of auto accidents, including a 25-car pileup, and sporadic power outages. At least three auto-related deaths were attributed to the storm.
- **December 12, 2007-**FEMA-3282-EM, Sever Winter Storm: Emergency declaration for all 105 counties in Kansas for debris removal and emergency protective measures.

In addition to the events that resulted in Presidential Declarations, The following events occurred in Rush County between October 1992 and February 2008. Events from 1994 to February 2008 are reported form NCDC records:

- **October 31, 1992 to April 30, 1993.** At total of 67 inches of snow fell during this 6-month period. Extensive damages occurred to roads across the county to soft bottomless roads. Forty-two miles of county road were recommended for reconstruction at an estimated cost of $400,000. School closures were common during this period and farmers were unable to cut standing milo. The county applied for an Urgent Need grant from the Kansas Department of Commerce but was denied (County Road and Bridge Dept., 2009).
- **December 16, 1994.** A significant ice storm struck a 26-county forecast zone including Rush County. Surfaces were coated with ½ to 1" of ice and significant tree damage was reported causing some damage to power lines and associated spotty power outages.
- **March 1, 1995.** Heavy snow measuring five to 10 inches blanketed much of the area. Driving conditions were treacherous and numerous accidents were reported, none with serious injuries.
- **September 21, 1995.** The earliest snow on record for the 22-county affected area including Rush County caused an unspecified amount of damages to crops.
- **December 17, 1995.** An intense winter storm moved out of the southern Rockies spreading heavy snow across much of Southwest Kansas. The heaviest snow fell south of a line from Elkhart to Pratt. Largest snow amounts included eight to nine inches in the Hugoton, Moscow and Greensburg areas. Lesser amounts from four to six inches fell elsewhere. The snow was accompanied by a strong north wind producing snow drifts of from two to six feet. Towards the end of the event, a tractor-semi trailer jackknifed into the path of a car, killing one and injuring three others.
- **December 21, 1997.** Widespread freezing rain occurred east of al line from Scott City to Liberal. Roads were ice-covered causing numerous accidents. There was no structural damage reported.
- **March 16, 1998.** Ice storm occurred with anywhere from 1/2 inch of ice accumulation on roadways to several inches of ice accumulations on objects such as radio towers. Every radio station in the area had damage due to the ice accumulation. KRPH's 800 foot radio tower

completely fell down with a reported 6 inches of ice accumulation. 1450 power poles came down across the area. Power was out for 4 to 6 days in some places. A USDA weather related disaster was declared.

- **March 12, 1999.** Winter Storm affected the entire central western area producing heavy snow and local blizzard conditions. There were winter weather driving accidents (fender benders) but no injuries. Snowfall amounts ranged from 7 to 18 inches with 12 to 14 inches common. There was an unofficial amount of 24 inches in Edwards County. Alexander had 12 inches.
- **January 3, 2000.** Snow fell across the entire central western area with all locations receiving at least three inches. In a narrow band about 25 miles wide much heavier snow fell. Southeast Rush County received six or more inches of snow.
- **January 27, 2000.** Heavy snow fell across the entire central western area with accumulations measuring six to 11 inches in some areas.
- **January 27, 2001.** More than four inches of snow fell across the central western area.
- **February 8, 2001.** Heavy snow fell across the central western area measuring six to eight inches. An area from Jetmore to La Crosse reported 10 to 12 inches.
- **January 30, 2002.** Heavy snow fell over a good portion of the area with four to eight inches of snow common. Eight to twelve inch snow amounts were reported over southeast Stevens, Seward and southwest Meade counties, as well as from Hodgeman into Ness, Trego, Rush and Ellis counties. There were indirect fatalities and injuries from the storm. Two women died in a head-on collision that occurred west of Dodge City in very low visibilities in blowing snow. Six people were injured due to roll-over accidents.
- **February 23, 2003.** A strong winter storm moved from eastern Colorado to southern Kansas bringing blizzard conditions and a swath of heavy snow two to five inches in most places. Many roads and highways were closed, numerous churches cancelled services and many schools closed the following Monday. Many dozen vehicle accidents were reported due to snow packed roads and poor visibilities.
- **February 28, 2003.** potent winter storm moving out of New Mexico first spread freezing drizzle across the area east of Dodge City and then turned to snow, becoming heaving in many areas. Six to nine inches of snow was common in a 25 mile wide band stretching from McCracken in Rush county, southwest through Ness City, to Garden City and into western Grant county. Elsewhere, amounts ranged from 3 to 5 inches. Many schools were closed and numerous accidents were reported due to the typical winter driving conditions that usually accompany common winter storms. Many events planned for the following day (Saturday) were cancelled.
- **January 25, 2004.** From two to four inches of snow fell across most of the area. 20 to 30 mile per hour winds dropped visibilities to under one quarter of a mile at times.
- **November 29, 2004.** A strong winter storm marched east along the Kansas-Oklahoma border during the late afternoon and evening hours of Monday, November 29th, leaving a swath of heavy snow across parts of southwest and south central Kansas. The snow tapered off during the early overnight hours of November 30th. The heaviest band of snow, 5 to 15 miles wide and with 5 to 6 inch depths, stretched from the east side of Dodge City northeast to near Bison, then curved southeast to near Hudson. A band of snow with 3 to 4 inch

amounts fell, basically surrounding this heavier swatch, southeast of a line from 10 miles east of Liberal, to Cimarron, to near Kalvesta, to Rush Center, to just east of Victoria, and also northeast of line from 15 miles east of Liberal, to Kinsley, to near St. John. An inch or greater of snow fell southeast of a line from 10 miles east of Hugoton, to near Scott City, to 5 miles north of Hays.

- **January 4, 2005.** A major winter storm swept across southwestern and south central Kansas with a vengeance from early Tuesday, January 4th and through late Wednesday, January 5th. This storm left a thick layer of ice, followed by periods of sleet, and then a blanket of snow. Hardest hit were Barber, Comanche, Pawnee, Hodgeman, Rush, Finney, Haskell and Grant counties. Up to 2 inches of sleet accumulated in the La Crosse area. Widespread tree limb damage, extended power outages, and numerous school closings were reported, as well as numerous accidents. The power outages were so widespread, mainly from fallen limbs and downed power lines, that Aquilla Power Company set up an 800 number to report outages. Westar Energy reported over 51,000 customers across the state were without power at one point.
- **February 8, 2005.** A winter storm moved in from the northwest early Tuesday, February 8th, covering the eastern half of DDC's CWA with snow, freezing drizzle and sleet. Parts of western Kansas received a layer of ice from freezing drizzle. In most locations, the precipitation began as freezing fog in the morning, giving way by late morning to freezing drizzle and/or light sleet. Then, as temperatures cooled through the day, all precipitation turned over to snow. In general, greater than 2 inches of snow fell east of a line from Wakeeney to Kinsley to Ashland. The greatest snow amounts reported were 4.5 inches just north of Liebenthal and 3.5 inches three miles north-northwest of Bison, both in Rush county. Icy roads were blamed for an early morning three-car pile up in Seward County near the Cimarron Bridge around 5:48 AM CST, 15 miles east of Liberal on U.S. highway 54. There were also two non-injury accidents reported in Finney County at 5 AM CST and 8:25 AM CST, stating ice contributed to the accidents.
- **November 27, 2005.** Most locations reported around 2 inches, with 3 inches of new snow reported at both Wakeeney and 6 miles north-northwest of Larned in Pawnee County. Strong north to northwest winds at 30 to 50 mph accompanied the snowfall, causing numerous travel problems due to deep drifting and icing up of roads. In addition, snow and blowing snow caused very poor visibility conditions.
- **December 16, 2005.** Snowfall amounts of 4 inches or greater fell in southern Ellis county, northeastern Ford, northern Pratt, and across most of Rush, Pawnee, Hodgeman, Edwards, and Stafford counties.
- **February 12, 2007.** Six inches of snow fell in Alexander. Snow began to fall across a slice of southwest Kansas Sunday evening, February 11th, and continued to fall along an elevated baroclinic zone until almost midnight Monday night, February 12th. Before it ended, a 20 to 40 mile wide swath of 2 to 5.3 inches of snow had fallen from near Johnson to La Crosse. The highest amount of snowfall reported was 5.3 inches just east of La Crosse. Other higher amounts reported included 5 inches of snow at 1 mile east of Alexander, just east-northeast of Garden City and also at the east edge of Jetmore. Additionally, 4.0 inches was reported 16 miles northwest of Garden City.

- **November 23, 2007.** A swath 15 to 30 miles wide of 3-inch plus snowfall fell from Hays south through eastern Rush County and continued in the Larned, Kinsley and St. John areas.
- **December 22, 2007.** An area of 3 to 5 inches of snow fell east of a line from Ashland in Clark county to Greensburg in Kiowa county to just northeast of Jetmore in Hodgeman county to east of LaCrosse in Rush county.
- **January 16, 2008.** Three inch snows were reported from both La Crosse in Rush County and in Johnson City in Stanton County.
- **February 5, 2008.** A potent winter storm moved into western Kansas during the early morning of Tuesday, February 5th and then marched eastward through central Kansas during the day Tuesday. As the upper low tracked west to east through Kansas, a surface low pressure system moved slowly east along the Kansas-Oklahoma border. This combination resulted in moderate to heavy snow in parts of western and central Kansas. Before the snow ended, from 6 to 8 inches fell in a 30 to 40 mile-wide swath from Hays to Kalvesta (in Finney County). Seven inches of snow fell at a location 10 miles south of Alamota. An area of 4 to 6 inches of snow fell south of this heavier band, and was basically north of a line from Johnson to Jetmore to east of La Crosse in Rush County.
- **February 23, 2008.** The Hays and La Crosse areas reported 4 to 5 inches of snow.
- **March 2009.** This event resulted in 4-6 inches of snow in Rush County with 40-60 mile per hour winds that caused drifting snow and decreased visibility. The county offices were shut down for a half day (HMPC accounts).

According to the USDA Risk Management Agency, insurance payments for insured crop losses in Rush County as a result of cold winter and freeze conditions from 2005 to 2007 totaled $246,732. Losses associated with freeze conditions are also discussed in Section 3.2.5. Table 3.31 summarizes the crops damaged by year and hazard type.

Table 3.31 Claims Paid in Rush County for Crop Loss as a Result of Freeze Conditions, 2005-2007

Year	Crop	Hazard	Claims Paid
2005	Wheat	Cold Winter	1,912
Cold Winter Total			**1,912**
2005	Wheat	Freeze	41,242
2006	Wheat	Freeze	896,689
2006	Grain Sorghum	Freeze	22,787
2006	Soybeans	Freeze	2,305
2007	Wheat	Freeze	330,580
Freeze Total			**1,293,603**
2006	Wheat	Frost	26,158
2007	Wheat	Frost	73,931
Frost Total			**100,090**
Total			**1,395,605**

Source: USDA's Risk Management Agency, 2009

Probability of Future Occurrences

With the combined historical information from FEMA declarations, planning committee accounts, and the NCDC database, during a 15-year period from December 1993 to December 2008 there were at least 30 significant recorded winter storm events in Rush County resulting in an average of 2 significant winter storms per year. Based on historic frequency, the probability of future occurrence rating for winter storms is 100% in any given year, or "highly likely".

Highly Likely—History of events is greater than 33 percent likely per year

Magnitude/Severity

Damages associated with winter storms in Rush County are usually related to downed power lines and power infrastructure. These damages and the associated losses as a result of disruptions in normal daily operations can be costly.

Additionally, as seen in the winter storm event resulting in FEMA-DR-1675, agriculture in Rush county is vulnerable to the impacts of winter storm including the impacts to the cattle and milk industry as well as farm crops.

One significant winter weather event can have multiple impacts including property damage and damages to power lines and infrastructure from falling trees and limbs, prolonged power outages, road damage, road hazards, and road closures, school, government and business closures as well as loss of agricultural production. Considering the multiple potential impacts the planning committee determined the potential magnitude/severity of this frequent hazard to be "critical".

Critical—25-50 percent of property severely damaged; injuries and or illnesses result in permanent disability.

Hazard Summary

Calculated Priority Risk Index	Planning Significance
3.30	High

3.2.15 Hazard Profiles Summary

Table 3.32 summarizes the results of the hazard profiles and how each hazard varies by jurisdiction. Of moderate and high ranked hazards, dam and levee failure and flood hazard vary uniquely across the planning area. Wildfire also has the potential to vary. However, since a wildfire assessment is not currently available from the Kansas Forest Service to describe the areas at greatest risk, and since the HMPC rated this hazard with a high planning significance, all areas were assigned a high planning significance. .This assessment was used by the HMPC to prioritize those hazards of greatest significance to each jurisdiction, enabling the jurisdictions to focus resources where they are most needed and develop the mitigation strategy accordingly.

Those hazards that occur infrequently, or have little or no impact were determined to be of low significance.

Table 3.32. Planning Significance of Identified Hazard by Jurisdiction

Hazard	Rush County	Alexander	Bison	La Crosse	Liebenthal	McCracken	Otis	Rush Center	Timken
Agricultural Infestation	M	M	M	M	M	M	M	M	M
Dam and Levee Failure	L	L	-	L	-	-	-	L	L
Drought	M	M	M	M	M	M	M	M	M
Extreme Temperatures	L	L	L	L	L	L	L	L	L
Flood	M	M	L	M	L	M	L	M	M
Hailstorm	H	H	H	H	H	H	H	H	H
Lightning	L	L	L	L	L	L	L	L	L
Soil Erosion and Dust	M	M	M	M	M	M	M	M	M
Tornado	M	M	M	M	M	M	M	M	M
Utility/Infrastructure Failure	H	H	H	H	H	H	H	H	H
Wildfire	H	H	H	H	H	H	H	H	H
Windstorm	M	M	M	M	M	M	M	M	M
Winter Storm	H	H	H	H	H	H	H	H	H

Source: HMPC, Note: H = High, M = Moderate, L = Low

3.3 Vulnerability Assessment

Requirement §201.6(c)(2)(ii) :[The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

Requirement §201.6(c)(2)(ii)(A) :The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas.

Requirement §201.6(c)(2)(ii)(B) :[The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate.

Requirement §201.6(c)(2)(ii)(C): [The plan should describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

Requirement §201.6(c)(2)(ii): (As of October 1, 2008) [The risk assessment] must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged floods.

3.3.1 Methodology

The vulnerability assessment further defines and quantifies populations, buildings, critical facilities, and other community assets at risk to natural hazards. The vulnerability assessment for this plan followed the methodology described in the FEMA publication *Understanding Your Risks—Identifying Hazards and Estimating Losses* (2002).

The vulnerability assessment was conducted based on the best available data and the significance of the hazard. Data to support the vulnerability assessment was collected from the following sources:

- Statewide GIS datasets compiled by state and federal agencies
- FEMA's HAZUS-MH loss estimation software
- Written descriptions of assets and risks provided by participating jurisdictions
- Existing plans and reports
- Personal interviews with HMPC members and other stakeholders
- Other sources as cited

The Vulnerability Assessment is divided into four parts:

- **Section 3.3.2 Community Assets** first describes the assets at risk in Rush County, including the total exposure of people and property; critical facilities and infrastructure; natural, cultural, and historic resources; and economic assets.
- **Section 3.3.3 Vulnerability by Hazard** describes the vulnerability to each hazard identified in section 3.1 and profiled in section 3.2. This vulnerability analysis includes a vulnerability overview for each hazard. For hazards of high and moderate significance, the vulnerability analysis includes evaluation of vulnerable buildings, infrastructure, and critical facilities; estimated losses and a description of the methodology used to estimate losses; discussion of future development in relation to hazard-prone areas.
- **Section 3.3.4 Future Land Use and Development** discusses development trends, including population growth, housing demand, and future projects.
- **Section 3.3.5 Summary of Key Issues** summarizes the key issues and conclusions identified in the risk assessment process.

3.3.2 Community Assets

This section assesses the population, structures, critical facilities and infrastructure, and other important assets in Rush County that may be at risk to natural hazards.

Total Exposure of Population and Structures

Table 3.33 shows the total population, number of structures, and estimated value of improvements to parcels by jurisdiction. Land values have been purposely excluded because land remains following disasters, and subsequent market devaluations are frequently short term and difficult to quantify. Additionally, state and federal disaster assistance programs generally do not address loss of land or its associated value (other than loss of crops through USDA). The highest concentration of people and property is in the City of La Crosse. Unincorporated portions of the county also have significant exposure of population and buildings overall, but these assets are not concentrated in one geographic area.

Table 3.33. Maximum Population and Building Exposure by Jurisdiction

City	Population	Building Count	Building Exposure ($)	Building Content ($)	Total Exposure ($)
Alexander	75	67	4,870,000	3,421,000	8,291,000
Bison	235	229	13,784,000	9,967,000	23,751,000
La Crosse	1,376	1,069	86,990,000	65,560,000	152,550,000
Liebenthal	111	68	4,608,000	2,876,000	7,484,000
McCracken	211	188	13,189,000	8,397,000	21,586,000
Otis	325	281	15,252,000	9,777,000	25,029,000
Rush Center	176	123	10,429,000	8,137,000	18,566,000
Timken	83	55	3,645,000	1,933,000	5,578,000
Unincorporated	959	1,082	52,583,000	36,223,000	88,806,000
Total	3,551	3,162	205,350,000	146,291,000	351,641,000

Sources: Kansas Division of the Budget (population); HAZUS-MH (MR 3) (structures)

Critical Facilities and Infrastructure

A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. Table 3.34 is an inventory of critical facilities and infrastructure (based on available data from the State of Kansas) in Rush County. Figure 3.42 displays the locations of these facilities for the entire planning area.

Table 3.34. Inventory of Critical Facilities and Infrastructure by Jurisdiction

Facility	Unincorporated	Alexander	Bison	La Crosse	Liebenthal	McCracken	Otis	Rush Center	Timken	Totals
Airport	1									1
Bridges	146	1		1						148
Communication	1									1
Dams	36									36
Elderly Facility	-			1						1
EMS Station	-			1			1			2
Fire Station	-	1	1	1	1	1	1	1	1	8
Health Care	-			2						2
Hospital	-			1						1
Natural Gas	2									2
Petroleum	12			1		1				14
Power Plant	-			1						1
School	-		1	3			2			6
Waste Water	4									4
Totals	202	2	2	12	1	2	4	1	1	227

Sources: HAZUS-MH (MR 3)

Figures 3.42 through 3.52 on the following pages show the location of critical facilities, pipelines and infrastructure, and bridges in Rush County. Figure 3.42 provides locations of the critical facilities in the entire planning area. Figures 3.43-3.52 provide more detailed locations of the critical facilities in each incorporated city. Figure 3.51 provides the locations of utility pipelines and infrastructure. Lastly, Figure 3.52 provides the locations of bridges in Rush County.

Figure 3.42 Rush County Critical Facilities

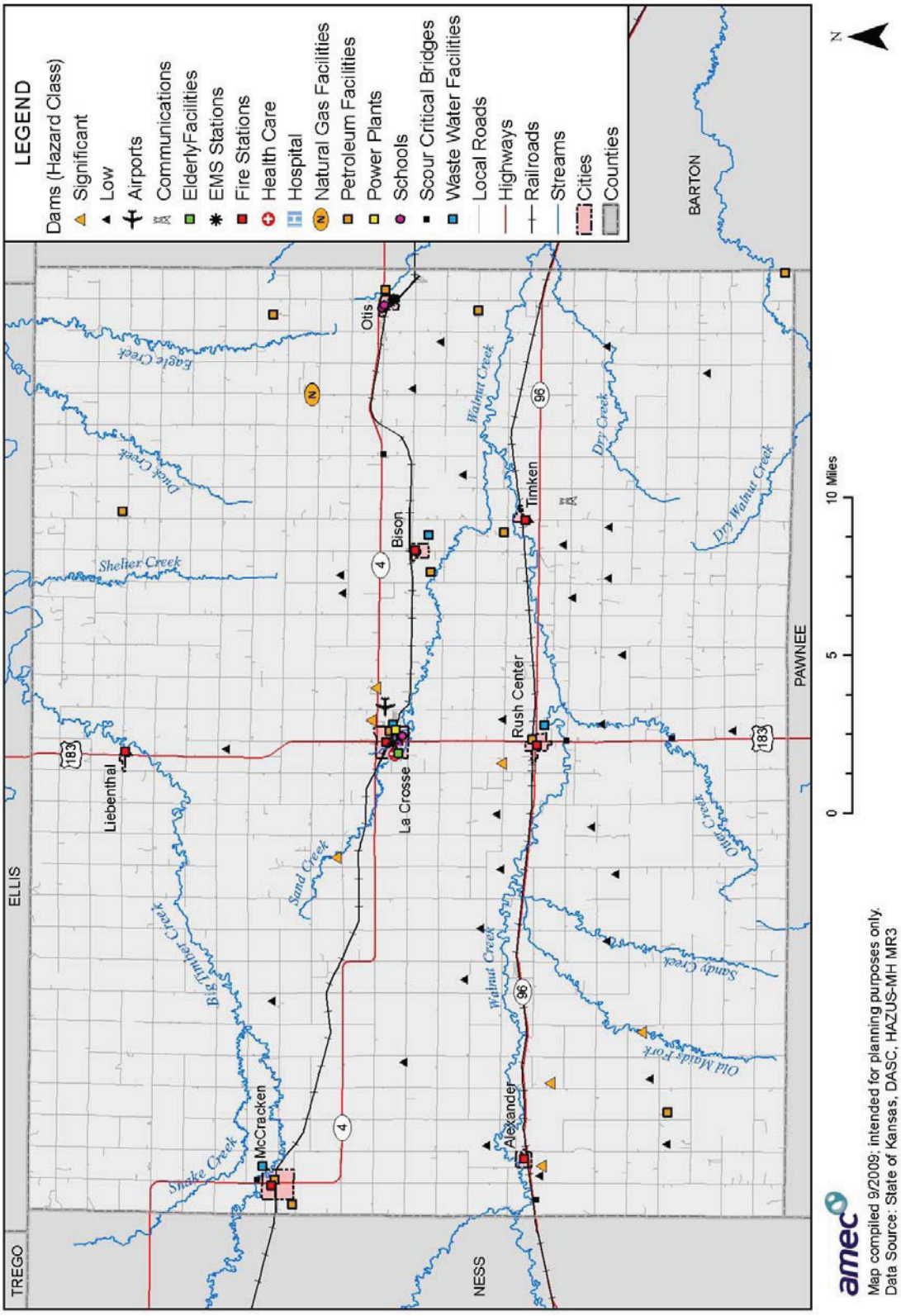


Figure 3.43 Alexander Critical Facilities

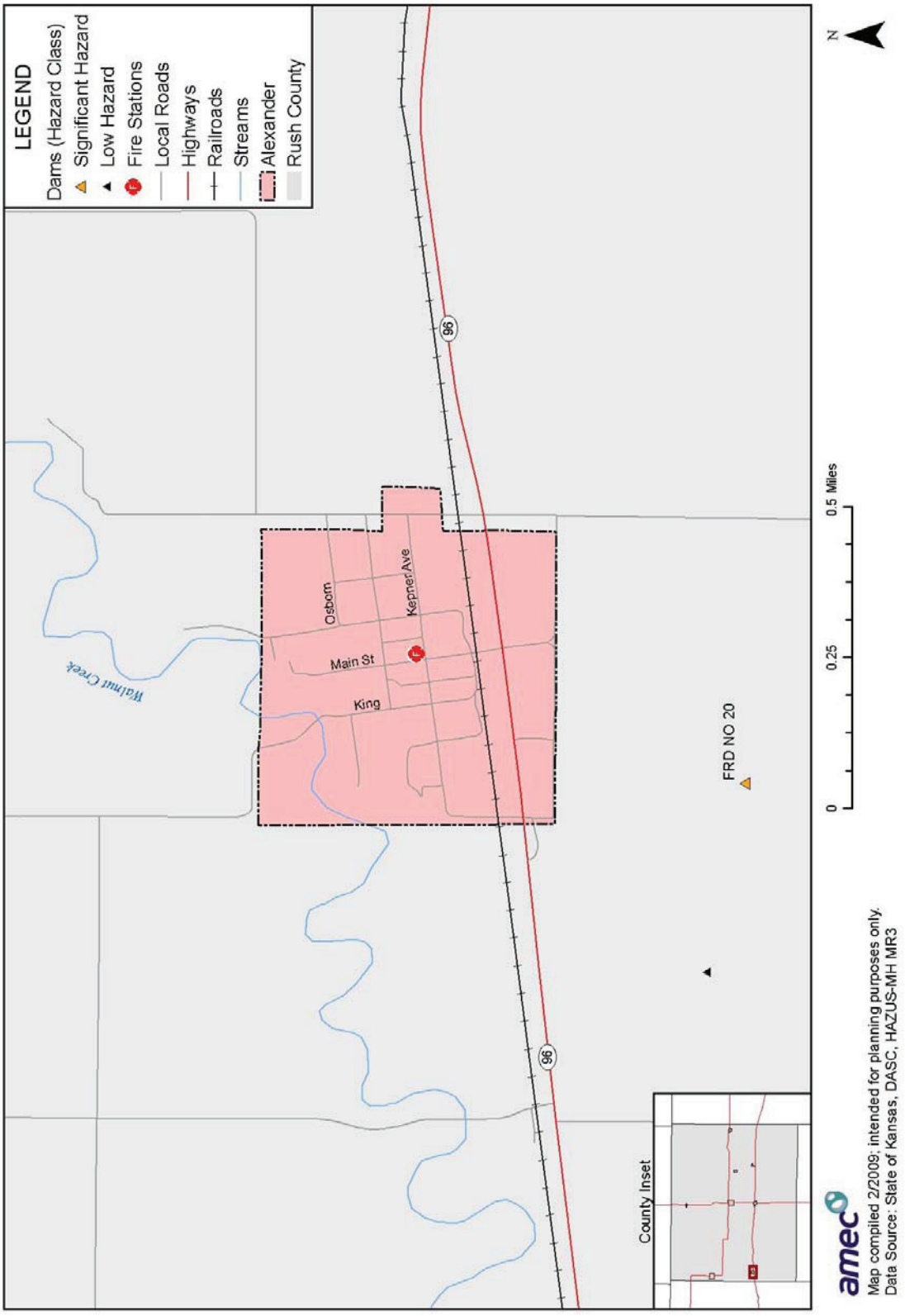


Figure 3.44 Bison Critical Facilities

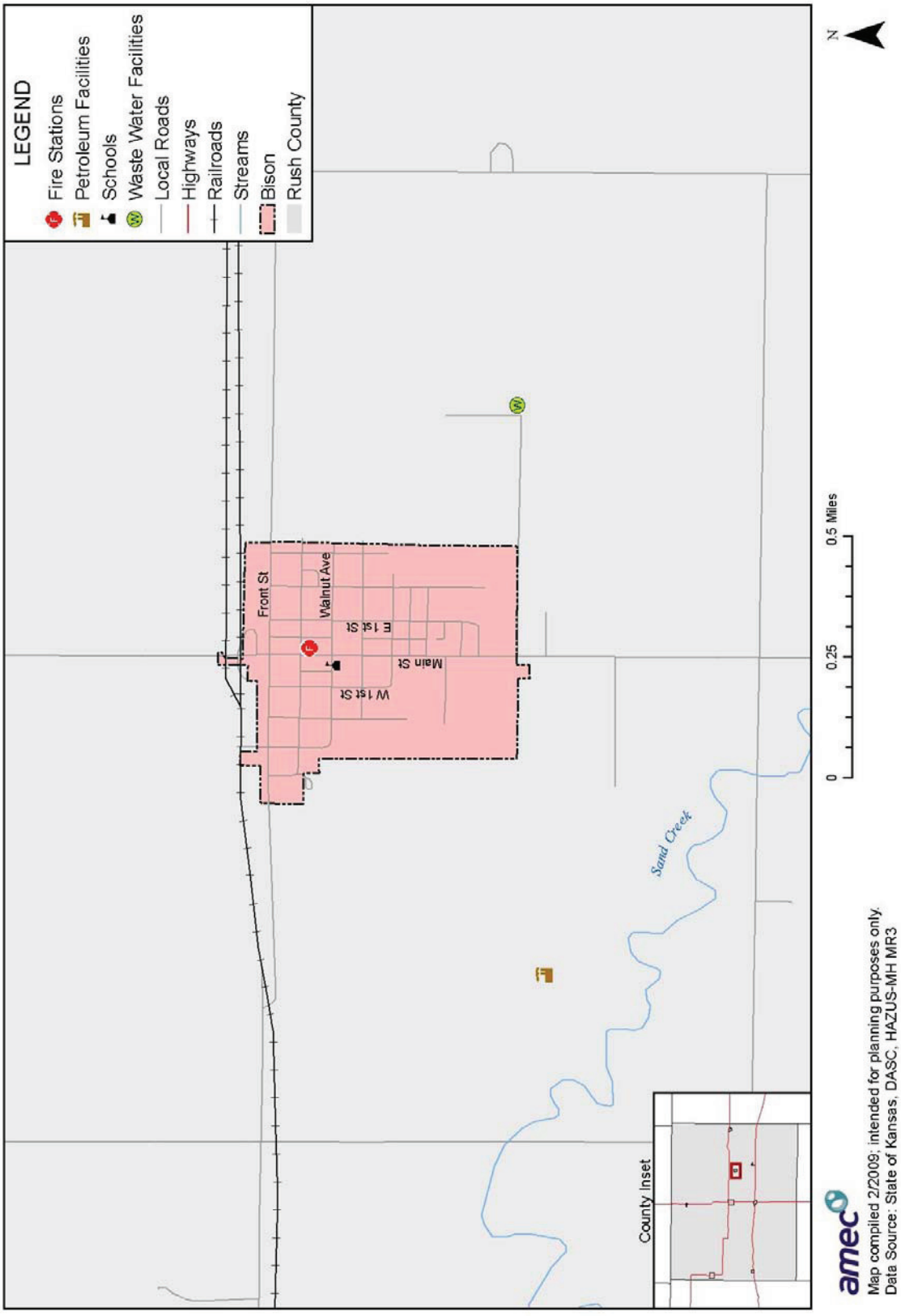


Figure 3.45 La Crosse Critical Facilities

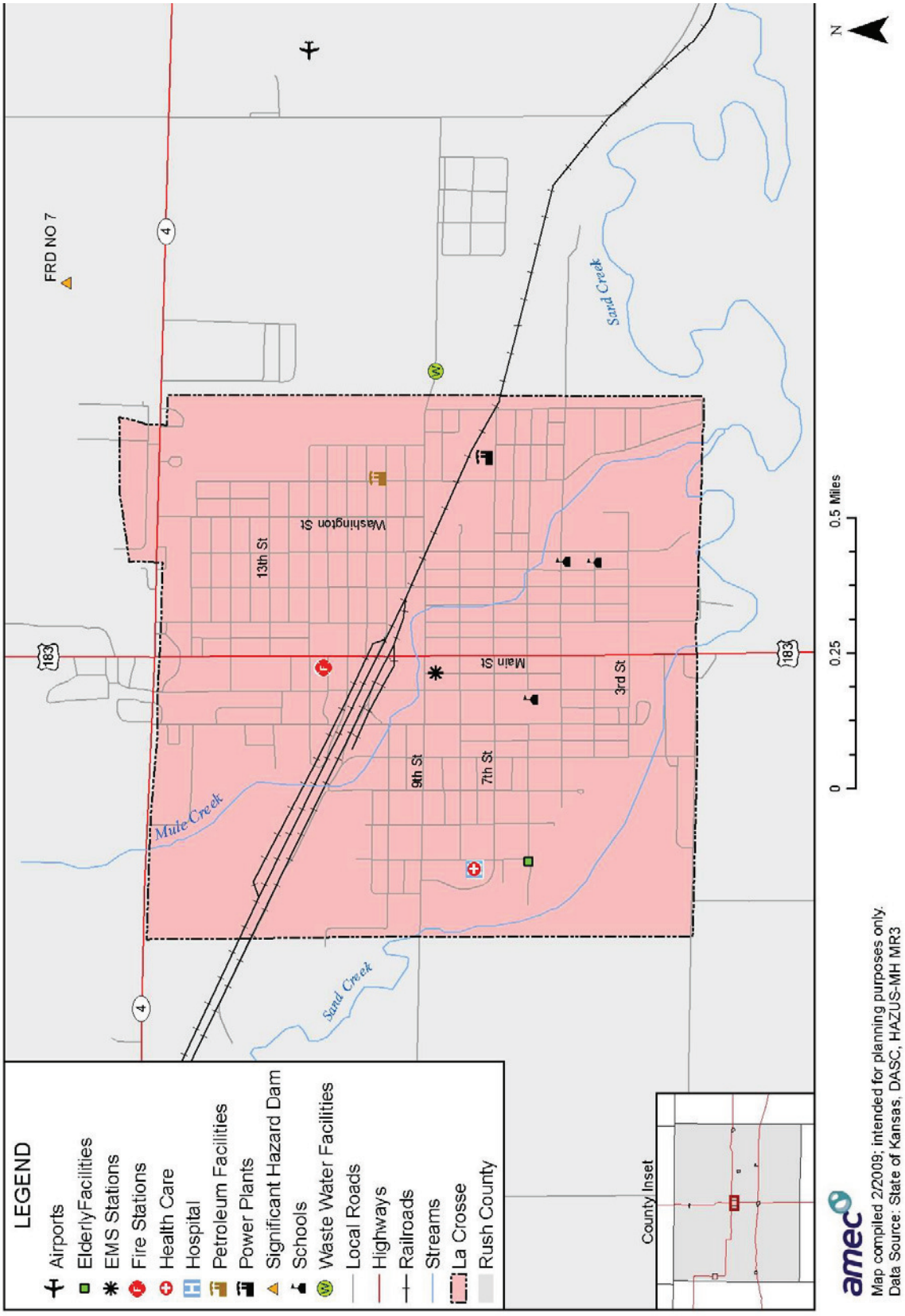


Figure 3.46 Liebenthal Critical Facilities

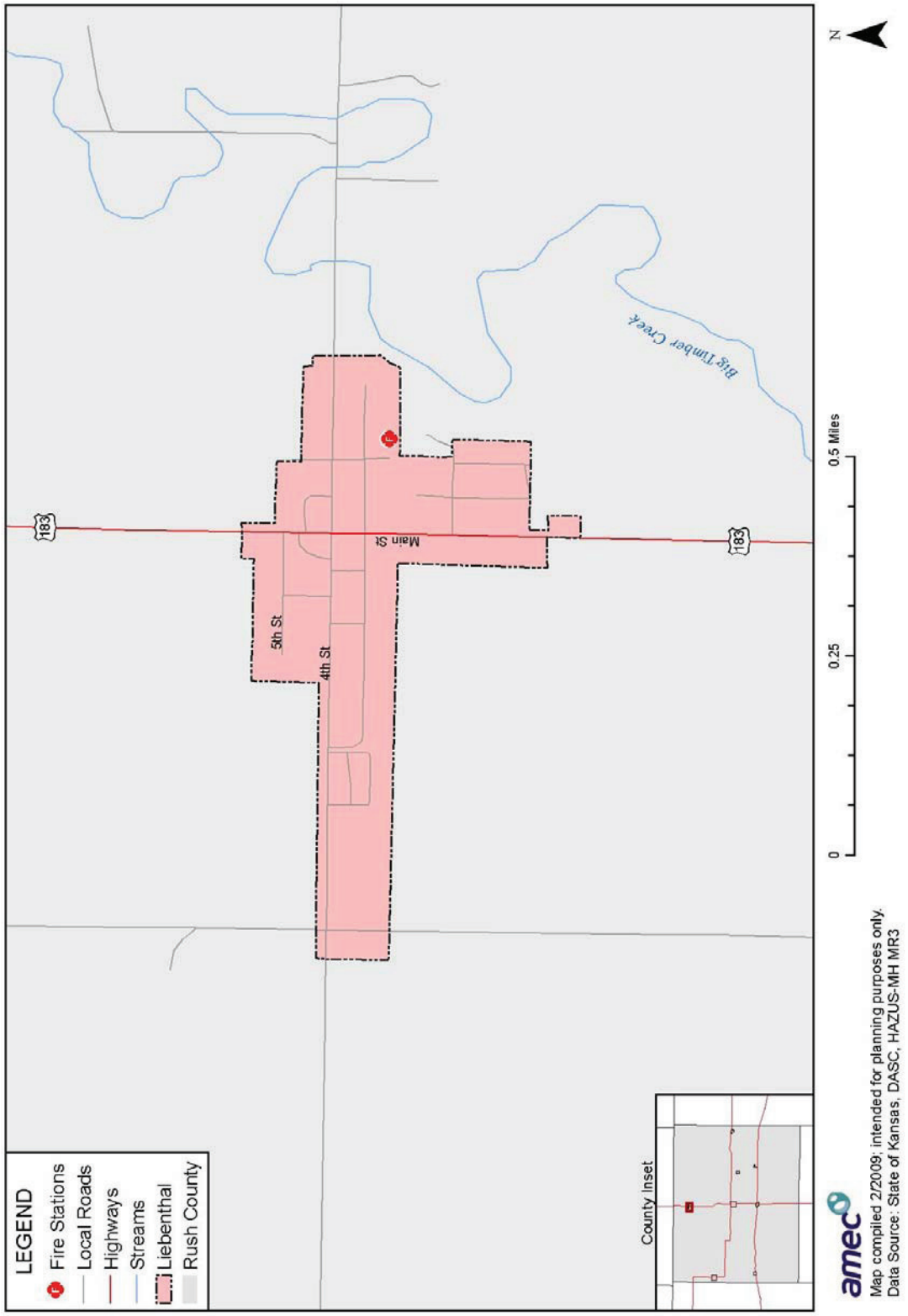


Figure 3.47 McCracken Critical Facilities

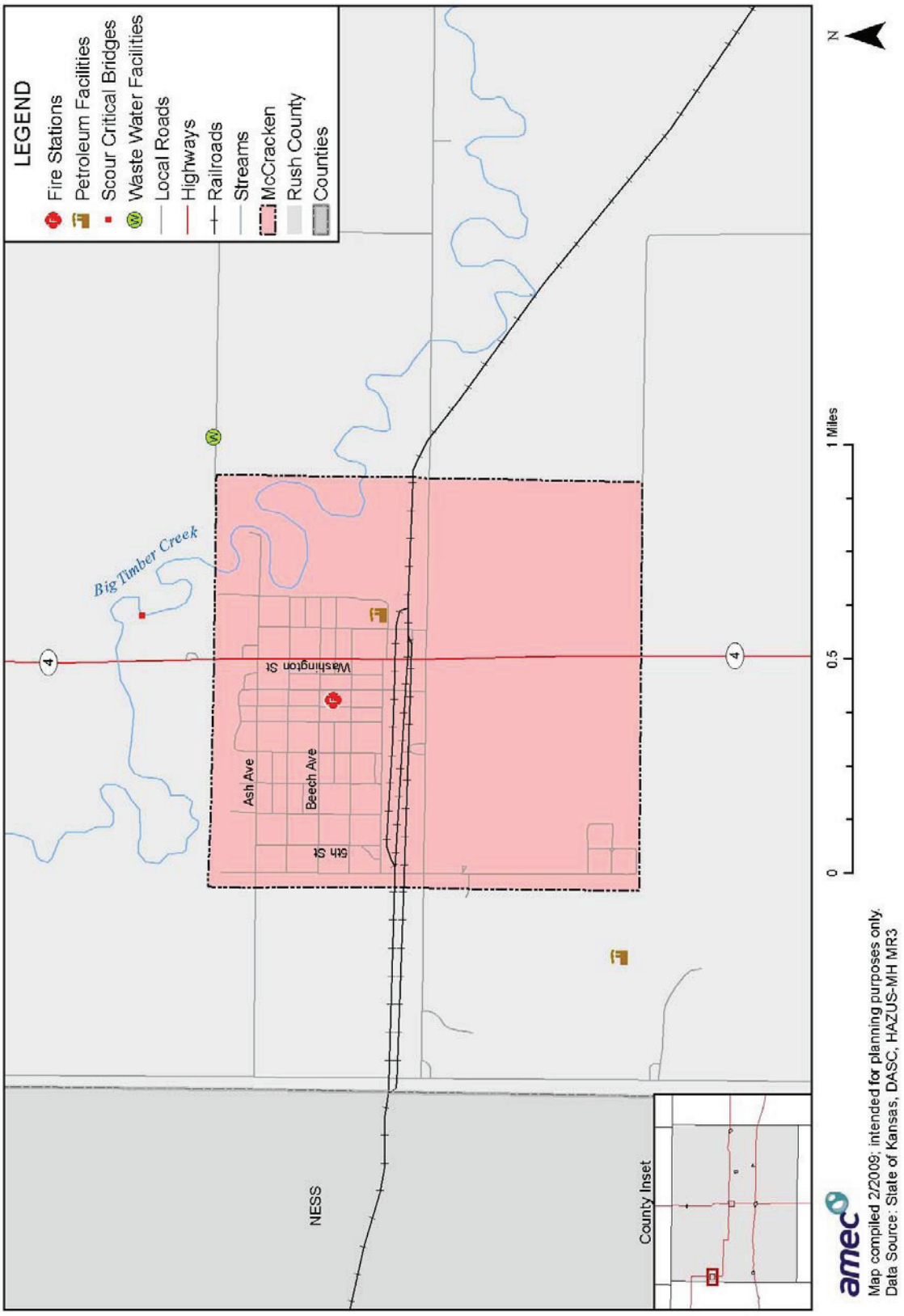


Figure 3.48 Otis Critical Facilities

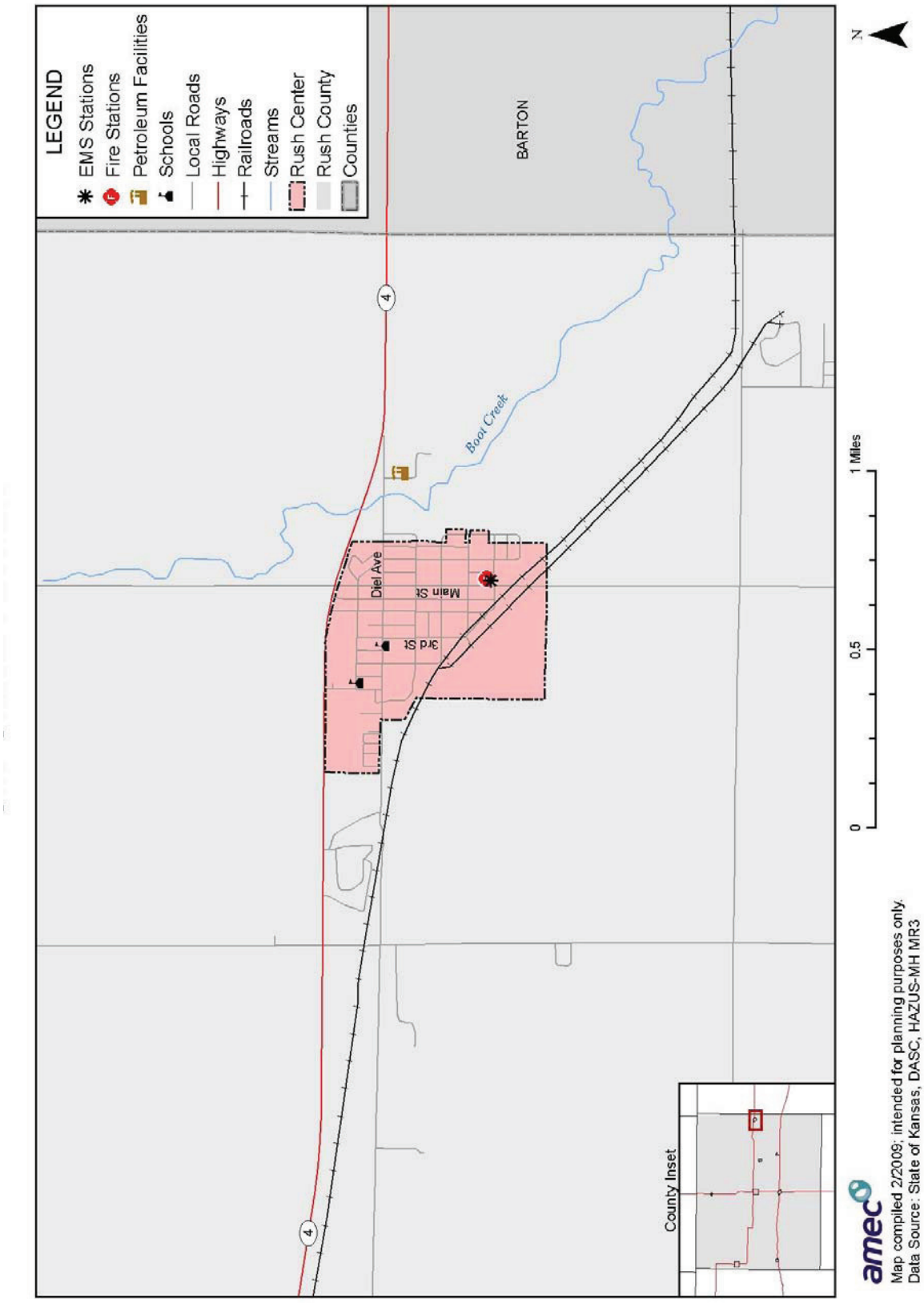


Figure 3.49 Rush Center Critical Facilities

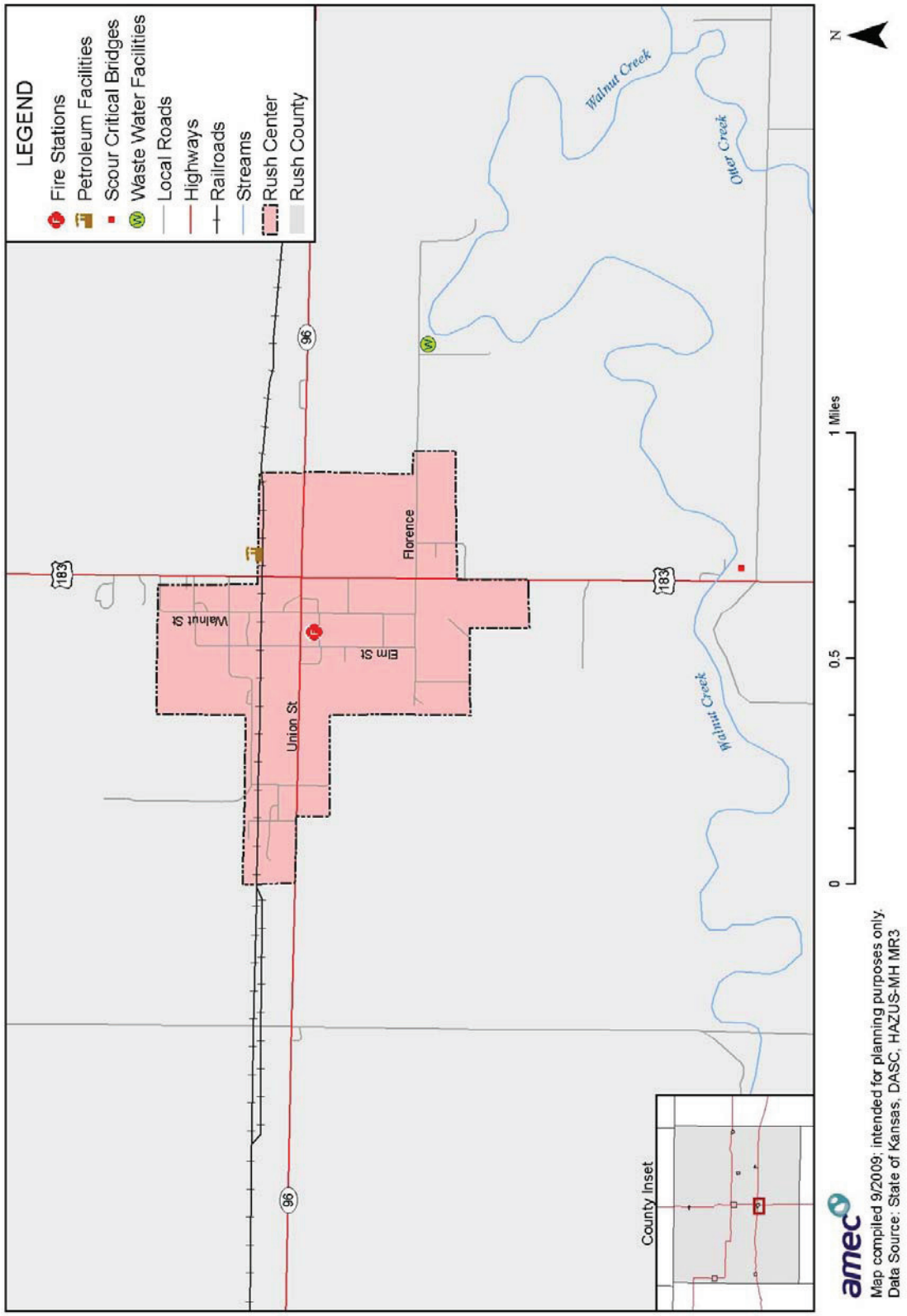


Figure 3.50 Timken Critical Facilities

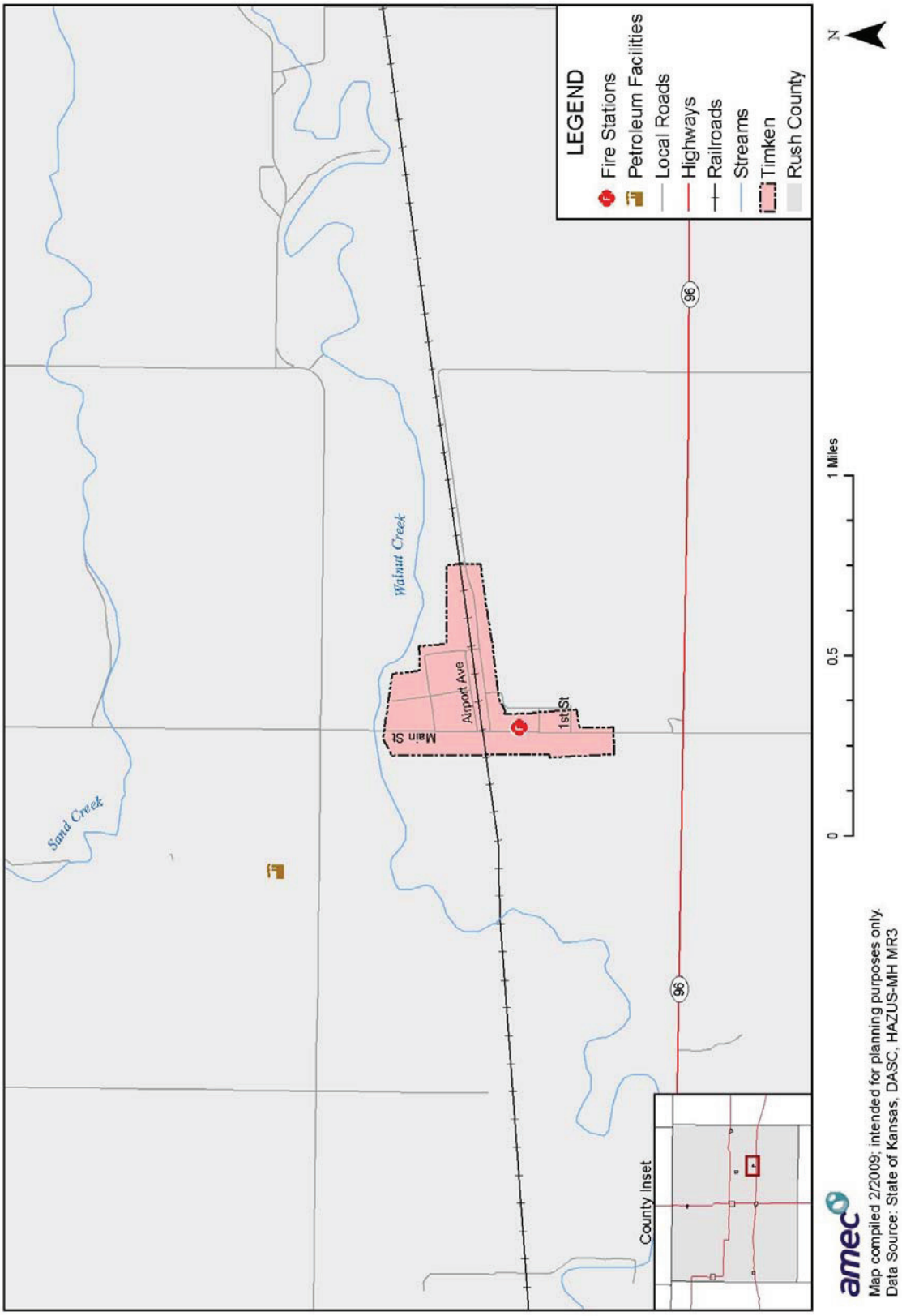


Figure 3.51. Rush County Pipelines and Power Infrastructure

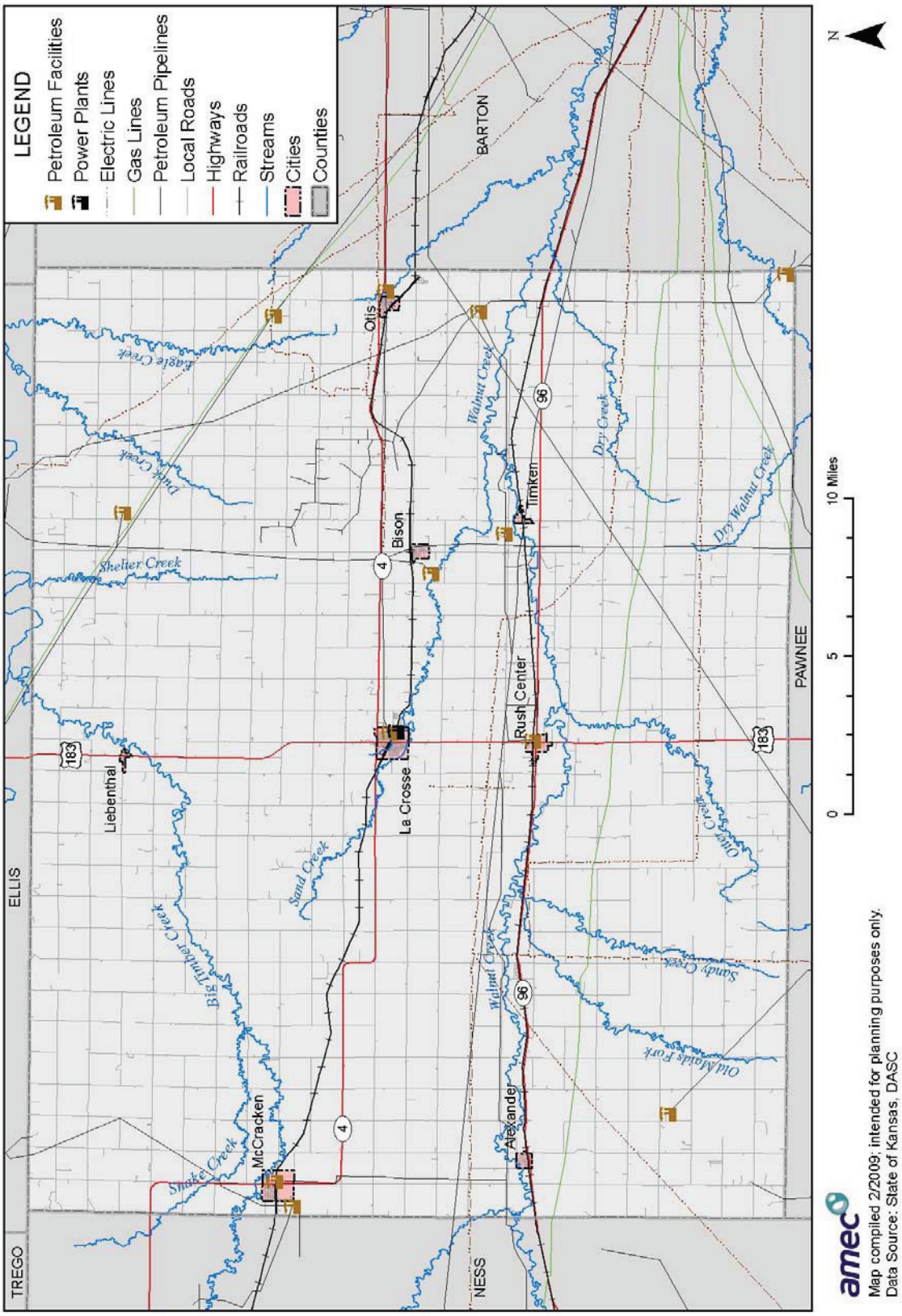
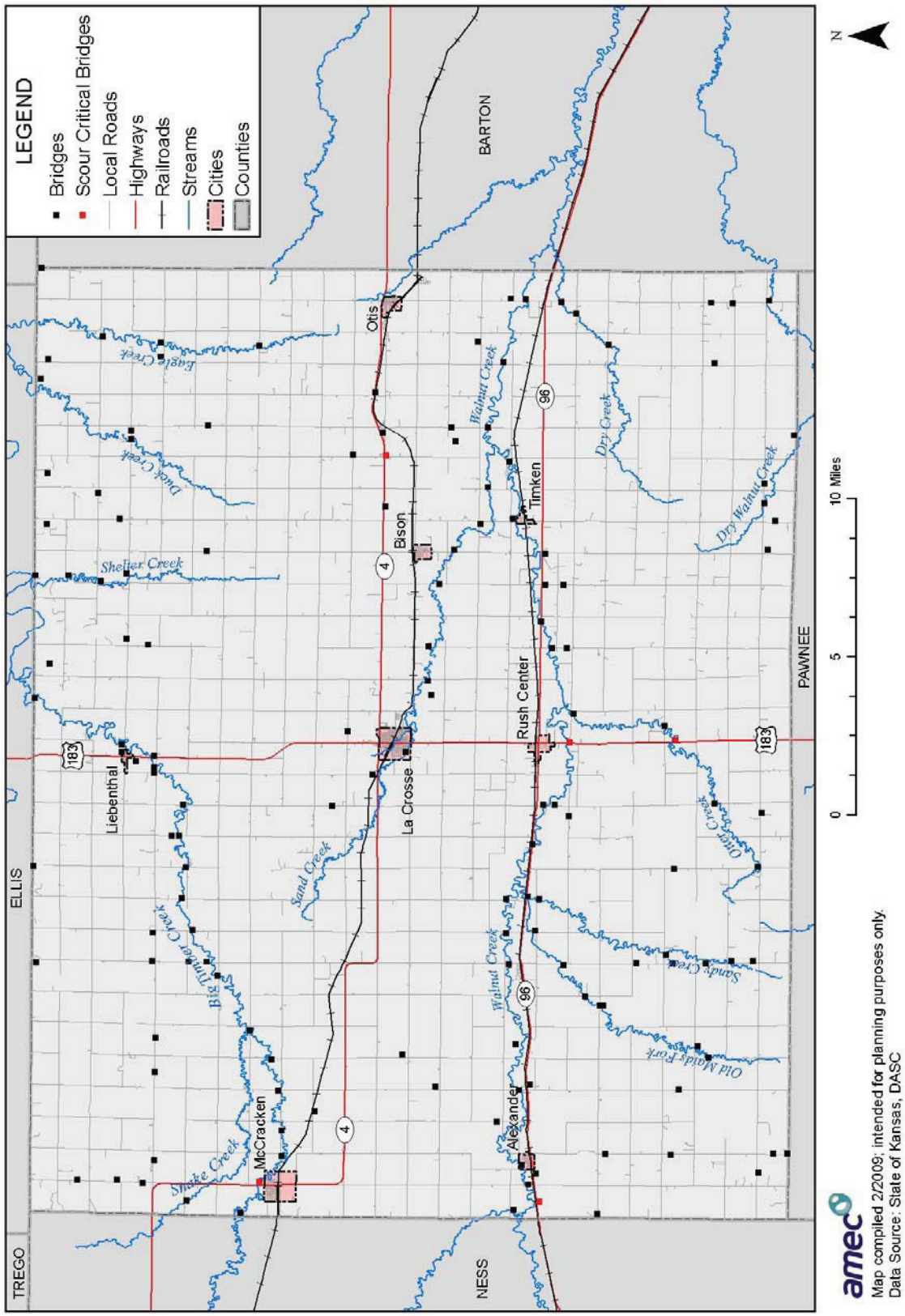


Figure 3.52. Rush County Bridges



Other Assets

Assessing the vulnerability of Rush County to disaster also involves inventorying the natural, historic, cultural, and economic assets of the area. This is important for the following reasons:

- The county may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- If these resources are impacted by a disaster, knowing about them ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts is higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.
- Natural resources can have beneficial functions that reduce the impacts of natural hazards, such as wetlands and riparian habitat, which help absorb and attenuate floodwaters.
- Losses to economic assets (e.g., major employers or primary economic sectors) could have severe impacts on a community and its ability to recover from disaster.

In Rush County, specific assets include the following:

- Natural Resources:
  - One endangered species: the Whooping Crane is an endangered species
  - One candidate species: the Lesser Prairie Chicken is a candidate species (United States Department of the Interior, Fish and Wildlife Service, Ecological Services, Kansas Field Office, December, 2008).
- Cultural Resources:
  - Lone Star School Community Museum, Bison
  - Barnard Library, La Crosse
  - Kansas Barbed Wire Museum, La Crosse
  - Post Rock Museum, La Crosse
  - Rush County Historical Museum, La Crosse
  - Nekoma bank Museum, La Crosse
  - St. Joseph's Kirche, Liebenthal
  - St. Mary's McCracken Heritage Association, McCracken
  - McCracken Historical Museum, McCracken
- Economic Assets (major employers)
  - Mid States Coop, Agricultural Services
  - KBK Industries, Oil Field Equipment
  - Golden Belt Telephone, Communications
  - Bison State Bank, Banking
  - City of Bison
  - Flame Engineering, Propane Products
  - La Crosse Furniture Factory, Furniture
  - BOC Gas, Helium/Compressed Gas

- La Crosse Livestock, Domestic Livestock Sales
- Westwind Energy, Commercial Wind Generation

- Historic resources: There are four Rush County properties on the National Register of Historic Places. These properties are identified in Table 3.35.

Table 3.35. Rush County Properties on the National Register of Historic Places

Property Name	Address	Location	National/State Register/Date Listed
Lone Star School, District 64	Rural Route 1 ¼ miles West of Bison Ave. M	Bison Vicinity	1/22/2009
Rush County Courthouse	715 Elm Street	La Crosse	4/13/1972
Rush County Line Bridge	11 miles north of Otis	Otis Vicinity	10/22/1986
Walnut Creek Tributary Bridge	.5 miles north and 2.5 miles west of Nekoma	Nekoma Vicinity	7/02/1985

Source: Kansas State Historical Society, www.kshs.org/resource/national_register/index.php

Community Assets by Jurisdiction

Table 3.36 provides community assets by jurisdiction. These are specific assets identified by the planning committee as those structures and facilities that should receive priority consideration in efforts to minimize risk. Although much of the risk assessment includes data for incorporated cities that did not officially participate in the planning process, the following table includes data only for those jurisdictions that officially participated in the preparation of this plan as this data was provided directly by the planning committee members to supplement and call attention to specific assets.

Table 3.36. Specific Community Assets in Rush County

Name of Asset	Replacement Value ($)	Occupancy/ Capacity #
Rush County Unincorporated Areas		
Rush County Hospital	$8,174,000	44
County Courthouse	$2,632,932	40
County Sheriff Dept.	$394,899	9
County Road and Bridge Dept.	$409,629 (equip) $2,500,000	40
County Noxious Weed Dept.	$189,259 (equip) $500,000	4
Public Transportation Equipment	$75,000	2
County Health Dept.	$50,000	3
County Landfill	$2,107 (equip) $225,000	2
County Clinic	$259,064 (equip) $1,000,000	6
Storage Buildings and Contents	407,316	N/A
Extension Office	386,839	Not provided
County Highways (1,215 miles)	$5,732,500	N/A
County Bridges	$8,884,383	N/A
Bison		
Bison City Hall/Library/Community Center	$100,000	Not provided
Fire Department and Equipment	$75,.000	Not provided
Water Wells	$150,000	N/A
Water Tower	$150,000	N/A
Sewage Treatment Plant	$250,000	Not provided
Bison Lone Star School (historic property)	$150,000	N/A
Bison-Timken blacktop road (6 miles)	$36,000	N/A
La Crosse		
Water Tank and Tower	$352,075	N/A
Swimming & Wading Pools	$668,970	Not provided
Office & Fire Station	$505,675	Not provided
East Pump House	$73,400	N/A
West Pump House	$34,600	N/A
Water Softening Plant	$528,150	Not provided
Water Tank	$42,887	N/A
Garage & Warehouse	$49,100	Not provided
City Auditorium	$1,416,355	Not provided
Shelter Houses	$3,569	Not provided
Storage Shed	$26, 119	N/A
Restrooms	$4,672	Not provided
Sewage Treatment Plant	$828,400	Not provided

Name of Asset	Replacement Value ($)	Occupancy/ Capacity #
Tennis Court	$9,355	N/A
Siren	$29,201	N/A
Substations (6)	$960,814	N/A
City Museum	$36,257	Not Provided
McCracken		
City Hall/Community Building	$100,000	Not Provided
McCracken Fire Station	$50,000	Not Provided
City Water Wells (3)	$150,000	N/A
Water Tower	$150,000	N/A
Sewage Treatment (Lagoons)	$400,000	N/A
Water Co. Building	$40,000	Not Provided
City Maintenance Shed	$40,000	Not Provided
Rush Center		
Fire Station and Equipment	$150,000	10
Water Wells (3)	$150,000	N/A
Sewage Treatment Plant (lagoon)	$50,000	N/A
Senior Center (old school house)	$75,000	Not Provided
USD 395,-La Crosse		
La Crosse Elementary	2,127,368	400+/-
La Crosse Elementary	349,718	65
La Crosse Middle	1,071,845	100
La Crosse High	5,278,368	380+/-
District Office	197,259	50

Source: Data Collection Guides provided by HMPC, 2009

3.3.3 Vulnerability by Hazard

In order to focus on the most critical hazards, those assigned a level of high or moderate planning significance were given more extensive attention in the remainder of this analysis (e.g., quantitative analysis or loss estimation where available), while those with a low planning significance were addressed in more general or qualitative ways.

Agricultural Infestation Vulnerability

Overview

Planning Significance: Moderate. Of the 459,520 total acres (square miles) in Rush County, 416,000 acres (90 percent) are classified as farmland. From 2002-2006, the average value of crop harvests in Rush county was nearly $25.5 million and the annual average value of cattle and milk production during this period $6.5 million for a total of $32 million per year (Kansas Department of Agriculture, 2007). A widespread infestation of agricultural products could seriously impact the economic base of the planning area.

Potential Losses to Existing Development

Buildings, infrastructure, and critical facilities are not vulnerable to this hazard. Its impacts are primarily economic and environmental, rather than structural affects. In a worst-case scenario,

rough estimates of potential direct losses fall in a range of 1-50 percent of annual crop receipts for the County and/or a 1-75 percent of livestock receipts. Based on a worst case scenario where 50 percent of crop production is lost, damages could reach nearly $13 million. If a major event affected the cattle and milk production at a 75 percent loss, damages could reach nearly $5 million. Annual infestations that normally occur do not normally reach this scale. In the three year period from 2005-2007, USDA crop insurance claims paid as a result of agricultural infestation totaled $172,747. This translates to an annual average of $5,758. This amount certainly does not represent all damages that could occur as a result of agricultural infestation and much of the loss is not reported or claimed for insurance.

Future Development

Any future structural development would not impact Rush County's vulnerability to this hazard since the impacted assets are agricultural products. However, an increase in the amount of agricultural production in Rush County would also increase the potential economic losses that could occur if a widespread, uncontrolled infestation were to occur.

Dam and Levee Failure Vulnerability

Overview

Planning Significance: Low. Dam or levee failure is typically an additional or secondary impact of another disaster such as flooding or earthquake. The impacts to the County and its municipalities from a dam failure would be similar in some cases to those associated with flood events (see the flood hazard vulnerability analysis and discussion). The biggest difference is that a catastrophic dam failure has the potential to result in greater destruction due to the potential speed of onset and greater depth, extent, and velocity of flooding. Another difference is that dam failures could flood areas outside of mapped flood hazards.

According to the Kansas Department of Agriculture, Water Structures Program, Rush County has 36 total state regulated dams. There are no federal reservoirs in Rush County. Of the state-regulated dams in the county, none are high hazard dams and seven are significant hazard dams. The remaining 29 are low hazard dams. Table 3.31 provides additional information on the significant hazard dams that could impact the planning area in the event of overtopping or failure.

There are no accredited or provisionally accredited levees in the planning area.

Potential Losses to Existing Development

Dam inundation maps and Emergency Action plans were available for five of the seven significant hazard dams that could impact the planning area in the event of breach or failure. Information is not available at this time to determine the numbers and locations of buildings, infrastructure and/or critical facilities that would be impacted as a specific result of dam failure of the dams without an Emergency Action Plan and inundation map. If this information becomes available during future updates of the plan, it will be incorporated. Since information is not

available to develop a quantitative loss estimate as a result of dam failure for all dams, a qualitative impact analysis was completed.

The qualitative vulnerability analysis was conducted to determine relative downstream impacts for those areas that might be impacted by breach or failure of the high and significant dam in the county. This information is provided for planning purposes only and is not intended to make specific inundation determinations that would be provided in an Emergency Action Plan.

To classify the Relative Downstream Impacts the designations were based on the following factors: Dam Hazard Class, Proximity to populations, Terrain, Volume of Dam and comparisons to the effective FIRMs and HAZUS flood model. There are seven significant hazard dams in the county. However none have a designation above Limited due to their volume and hazard class. FRD no 8 is on Sand Creek above La Crosse, it has a Limited impact since it could affect this town but it has a small volume of 1,151 acre ft. FRD no 20 is just outside of the city limits of Alexander on a tributary to Walnut Creek, since its proximity is very close it has a designation of Limited. It has a volume of 2,018 acre ft. FRD no 24 could affect the town of Rush Center and has designation of Limited. It is on a tributary to Walnut Creek and has a volume of 697 acre ft. The other 4 significant hazard dams within Rush County have a negligible designation since they all have low volumes and would not impact any communities due to their distance. These dams are: FRD no 6,7,17 and 19. Table 3.37 summarizes the relative downstream impacts for the high and significant hazard dams that could impact the planning area in the event of overtopping or failure. Those dams in bold type also have an available emergency action plan and dam inundation map and are discussed separately below with a more quantitative vulnerability analysis.

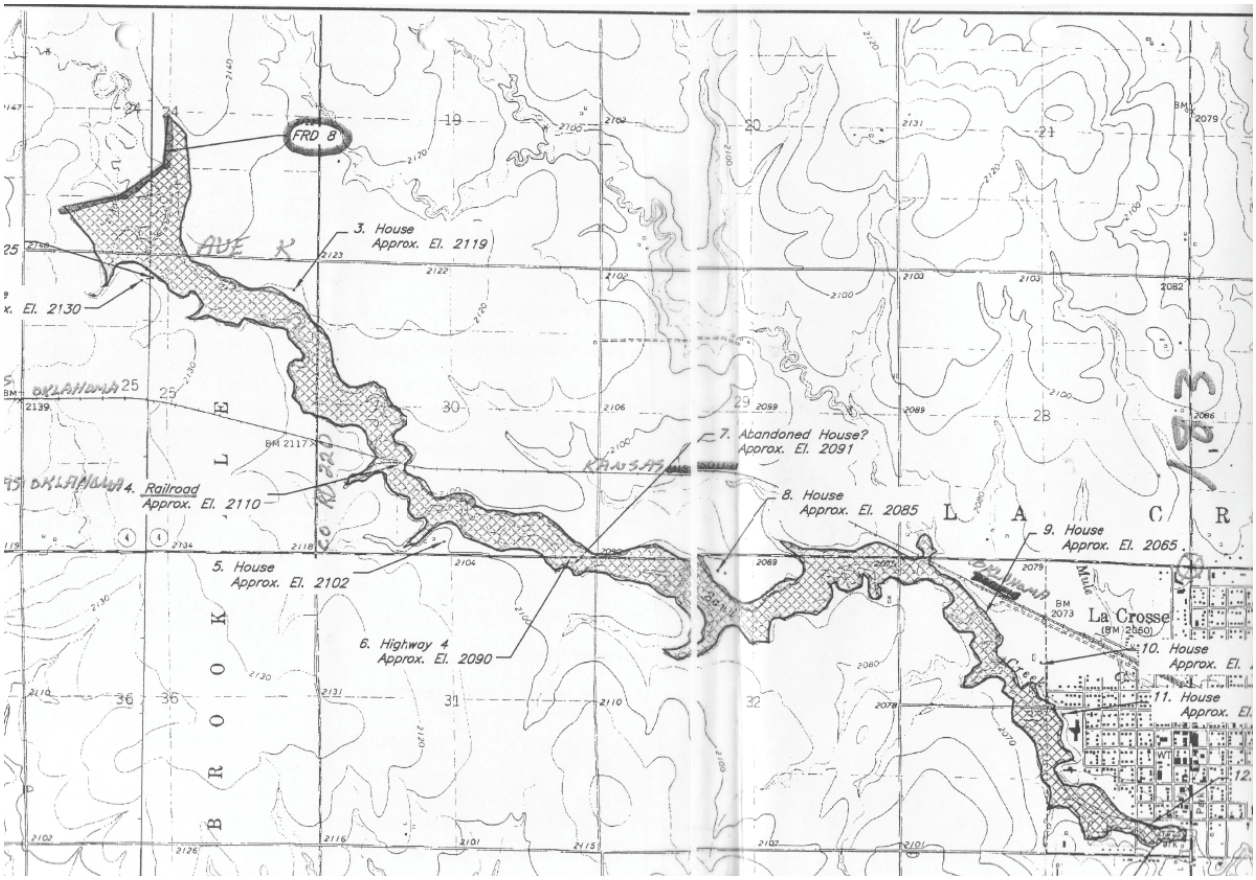
Table 3.37 Relative Downstream Impacts from Dam Breach

Dam Name	Location	Max Storage (acre ft)	Dam Hazard	Downstream Communities	Relative Downstream Impacts
FRD No 8	**Rush County**	**1,151**	**Significant**	**La Crosse**	**Limited**
FRD No 20	**Rush County**	**2,018**	**Significant**	**Alexander, Rush Center, Timken**	**Limited**
FRD No 24	**Rush County**	**697**	**Significant**	**Rush Center, Timken**	**Limited**
FRD No 6	**Rush County**	**2,326**	**Significant**	**-**	**Negligible**
FRD No 7	Rush County	1,989	Significant	-	Negligible
FRD No 17	**Rush County**	**2,990**	**Significant**	**Rush Center, Timken**	**Negligible**
FRD No 19	**Rush County**	**1,439**	**Significant**	**Rush Center, Timken**	**Negligible**

FRD #8

According to the Emergency Action plan dated December 15, 2008 for this significant hazard dam, breach could cause overtopping of Highway 4, K&O Railroad, Rush County Roads and through the Grass Park drainage in La Crosse. Figure 3.53 provides a section of the breach analysis map prepared by the Natural Resources Conservation Service.

Figure 3.53 FRD #8



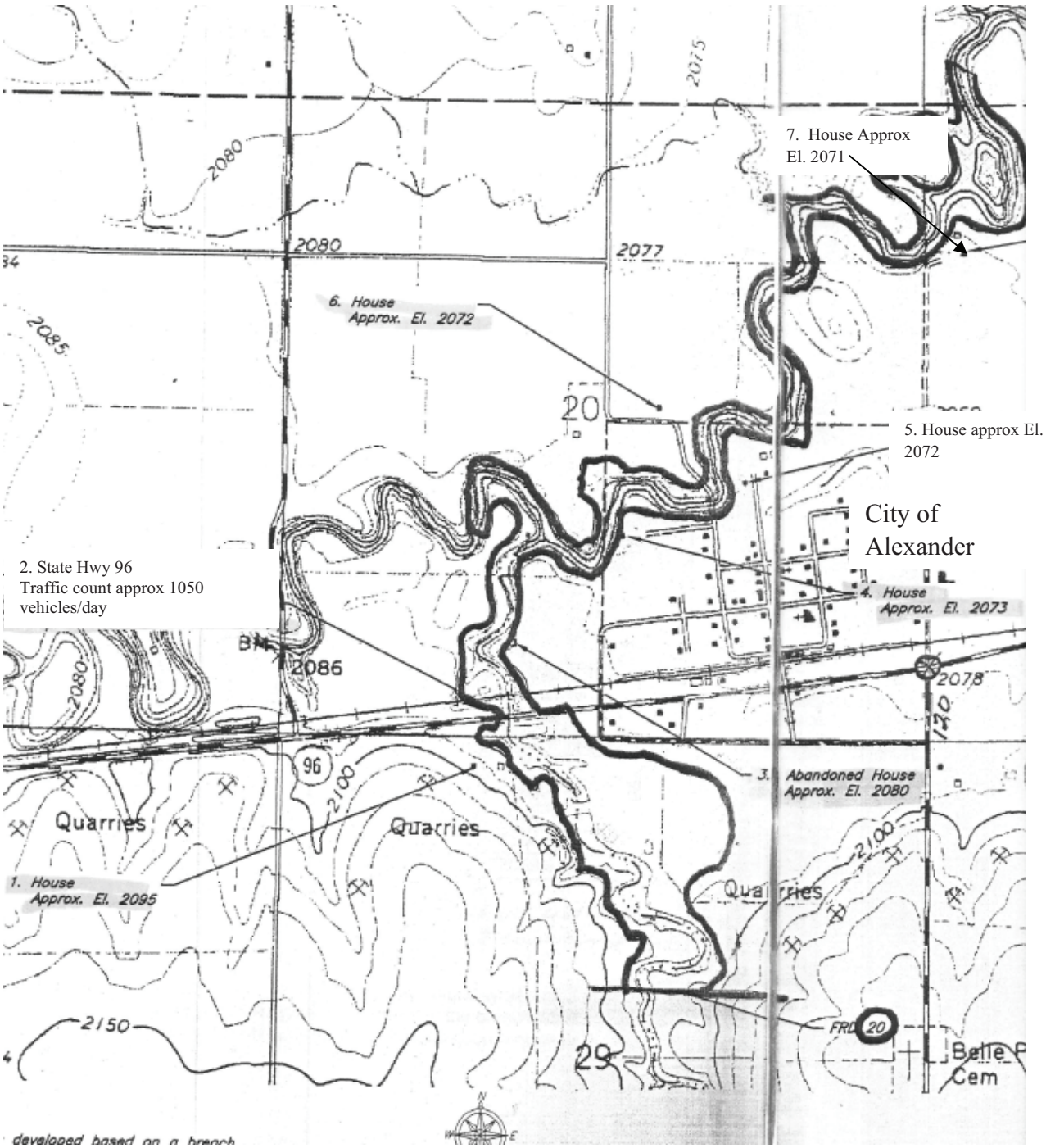
FRD #20

According to the Emergency Action plan dated December 16, 2008 for this significant hazard dam, breach could cause overtopping of Highway 96 K&O Railroad and Rush County roads. There are also six houses (five inhabited and one abandoned) in proximity to the inundation zone. Residents may need to be evacuated. However, the elevations of the homes are all higher than the breach wave elevation. Table 3.38 provides additional details regarding potential impacts out of the Emergency Action Plan and Figure 3.54 provides a section of the breach analysis map prepared by the Natural Resources Conservation Service.

Table 3.38 Assets Vulnerable to Inundation FRD #20

Item	Distance Downstream	Elevation of Item (all are approximate)	Maximum Elevation of Breach Wave.
1. House	.5 miles	2095	2077.9
2. State Highway 96	.5 miles	2080	2077.7
3. Abandoned House	.6 miles	2080	2073.8
4. House	1.0 miles	2073	2065.4
5. House	1.2 miles	2072	2064.3
6. House	1.2 miles	2072	2064.3
7. House	1.7 miles	2071	2056.9

Figure 3.54 FRD #20



FRD #24

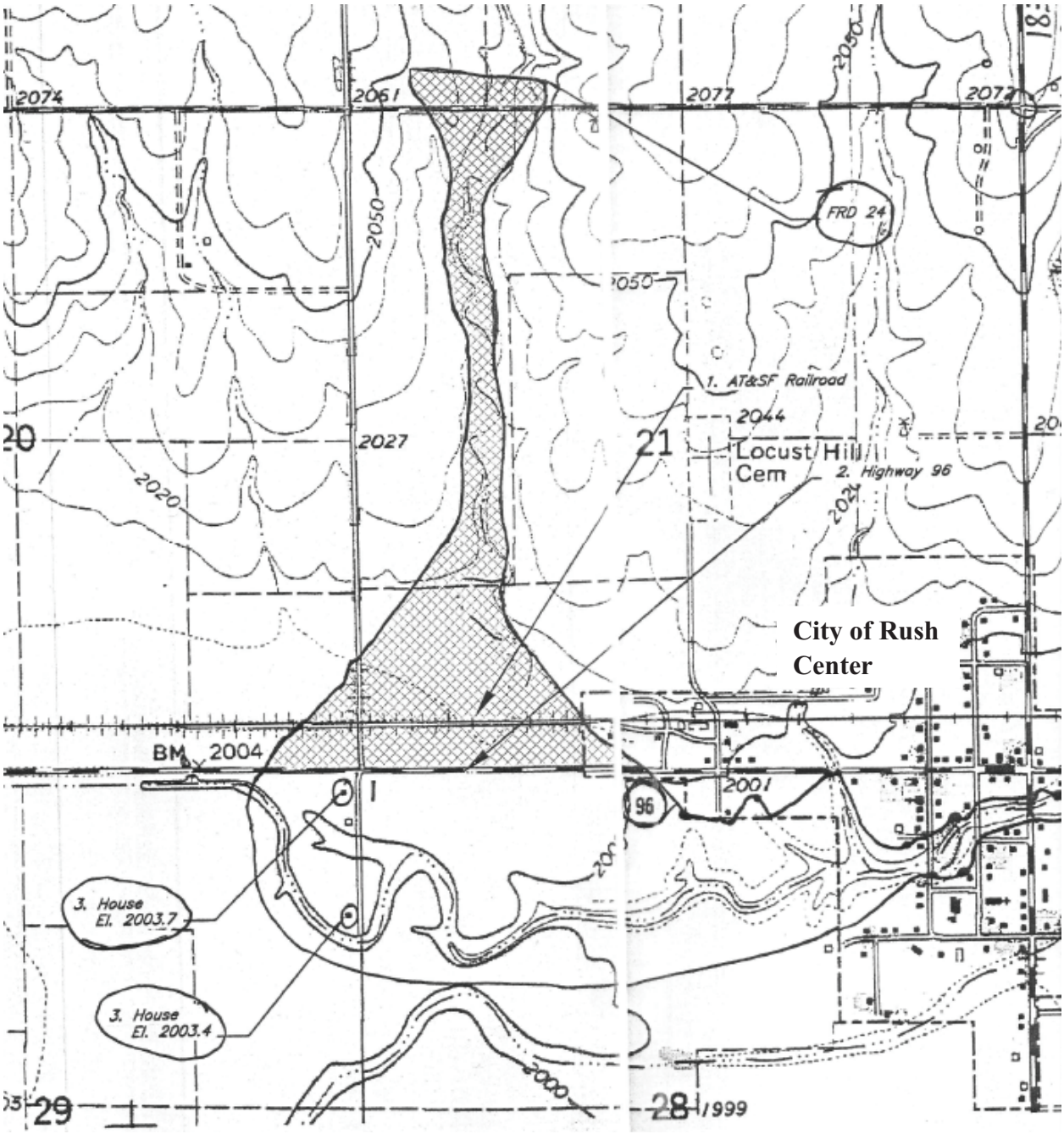
According to the Emergency Action Plan dated December 16, 2008 for this significant hazard dam, breach could cause inundation of two houses, overtopping of Highway 96, K&O Railroad, Rush County Roads and City Streets in Rush Center. Table 3.39 provides additional details

regarding potential impacts and Figure 3.55 provides a section of the breach analysis map prepared by the natural Resources Conservations Service. The current breach map does not show the breach affect south of Highway 96 and on the City of Rush Center. Therefore, the Watershed District has requested this additional information.

Table 3.39 Assets Vulnerable to Inundation FRD #24

Item	Distance Downstream	Elevation of Item	Maximum Elevation of Breach Wave.
1. Railroad-Atchison-Topeka Santa Fe	5280 feet	2005.7	Approx. 2007.7
2. US Highway 96	5600 feet	2005.1	Approx 2007.7
3. House	5700 feet	2003.7	Not Provided
4. House	6600 feet	2003.4	Not Provided

Figure 3.55 FRD #24



FRD #6

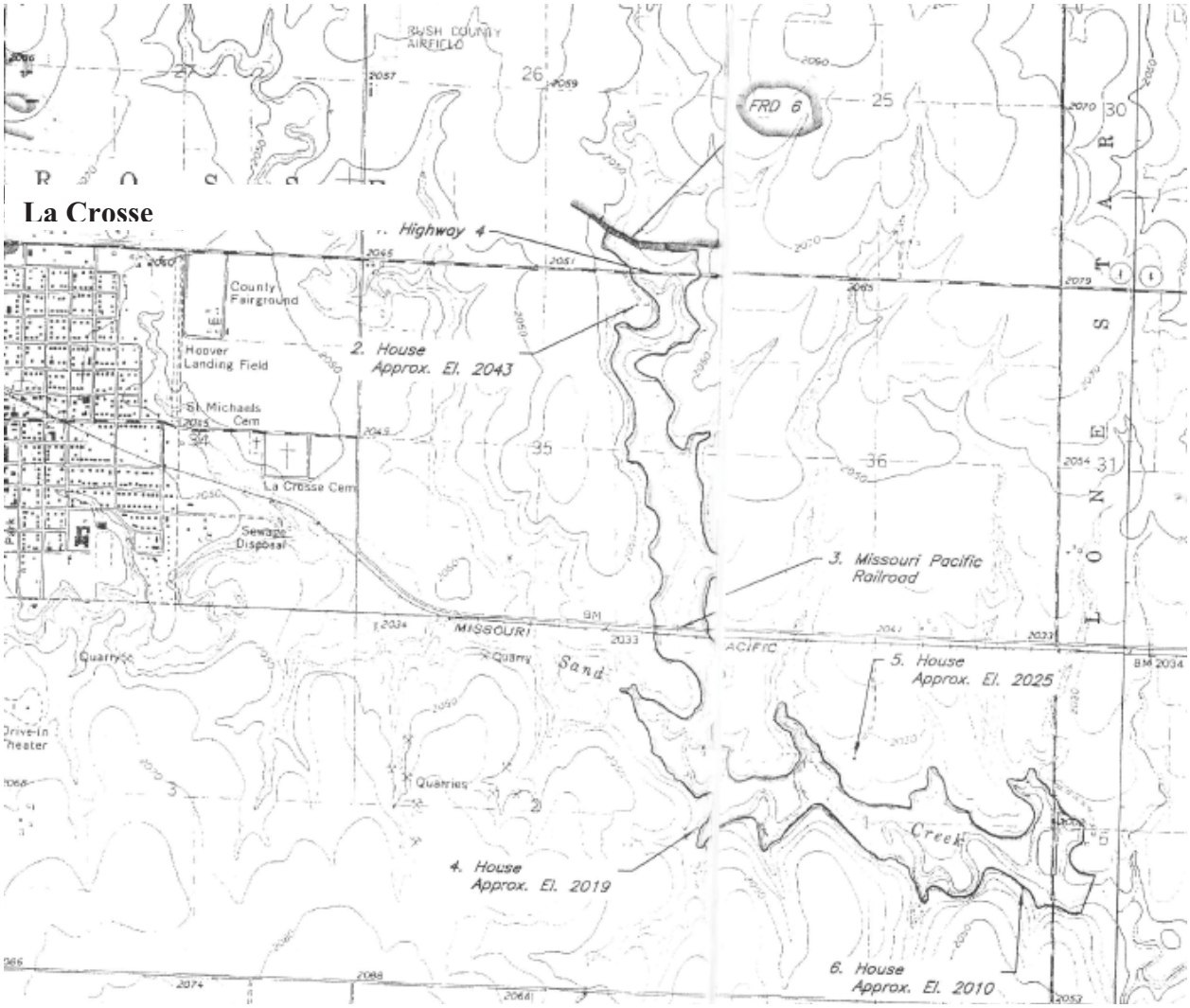
According to the Emergency Action Plan dated December 15, 2008 for this significant hazard dam, breach could cause overtopping of Highway 4, K&O Railroad, and various Rush County roads. There are also four houses in proximity to the inundation zone. Residents may need to be evacuated. However, the elevations of the homes are all higher than the breach wave. Table 3.40 provides additional details regarding potential impacts and Figure 3.56 provides the section of the breach analysis map prepared by the Natural Resources Conservation Service.

Table 3.40 Assets Vulnerable to Inundation FRD #6

Item	Distance Downstream	Elevation of Item (all are approximate)	Maximum Elevation of Breach Wave.
1. Highway 4	600 feet	2046	2040.3
2. House	1,100 feet	2043	2037.5
3. Missouri Pacific Railroad	6,700 feet	2025	2030.4
4. House	9,500 feet	2019	2017.8
5. House	11,300 feet	2025	2014.1
6. House	14,100 feet	2010	2007.8

Emergency Action Plan, December 2008

Figure 3.56 FRD #6 Breach Analysis Section



Source: Natural Resources Conservation Service, January 17, 2006

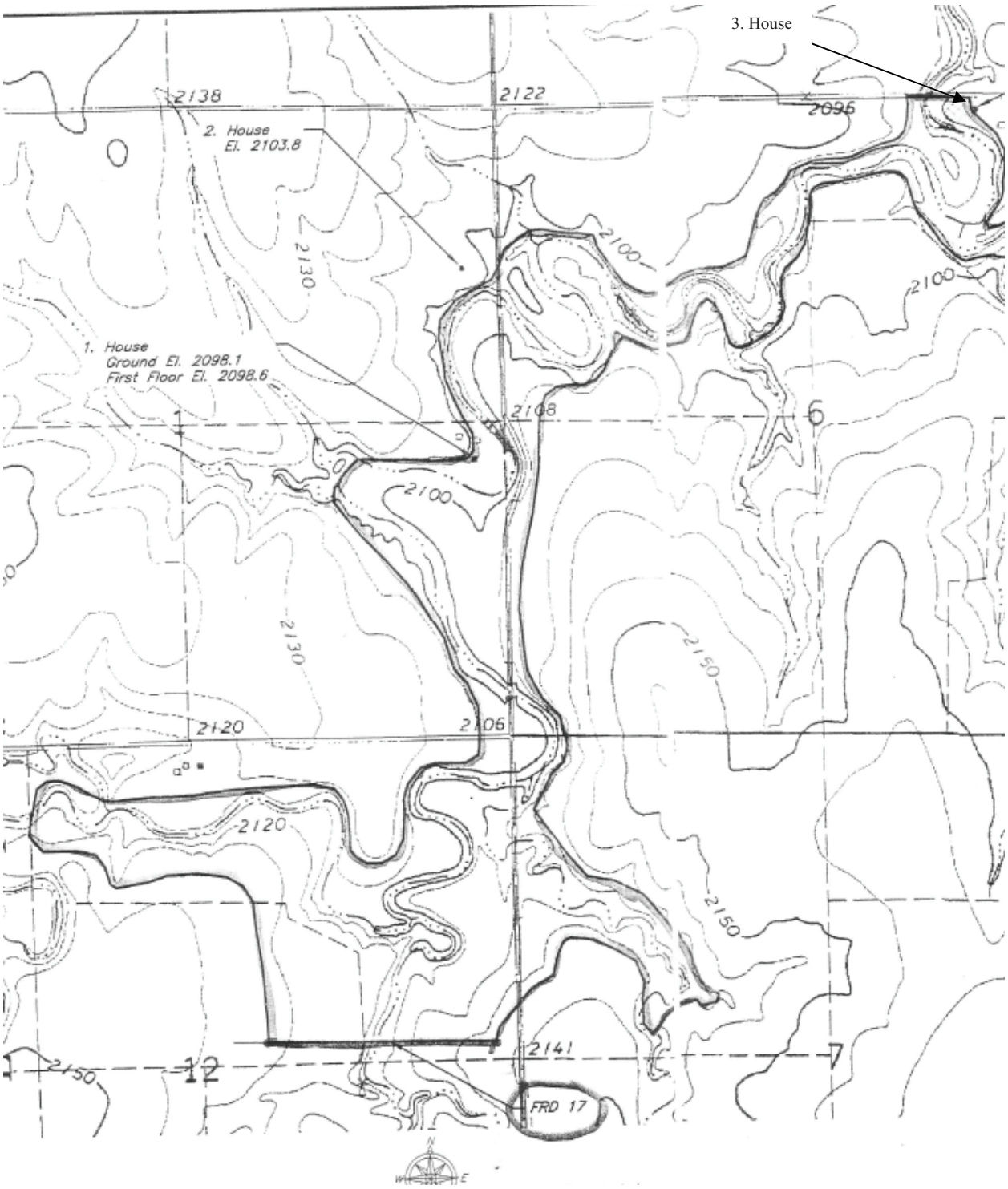
FRD #17

According to the Emergency Action Plan dated December 16, 2008 for this significant hazard dam, breach could cause inundation of one residence and various Rush County Roads. There are two other homes within close proximity to the inundation zone. Residents may need to be evacuated in the even of failure. However, the elevations of the structures are above the maximum elevation of the breach wave. Table 3.41 provides additional details regarding potential impacts and Figure 3.57 provides the section of the breach analysis map prepared by the Natural Resources Conservation Service.

Table 3.41 Assets Vulnerable to Inundation FRD #17

Item	Distance Downstream	Elevation of Item	Maximum Elevation of Breach Wave.
House	7,500 feet	2098.6	3000.6
House	9,500 feet	2103.8	Approx. 2101.8
House	17,000 feet	Approx. 2083	Approx. 2082

Figure 3.57 FRD #17 Breach Analysis Section



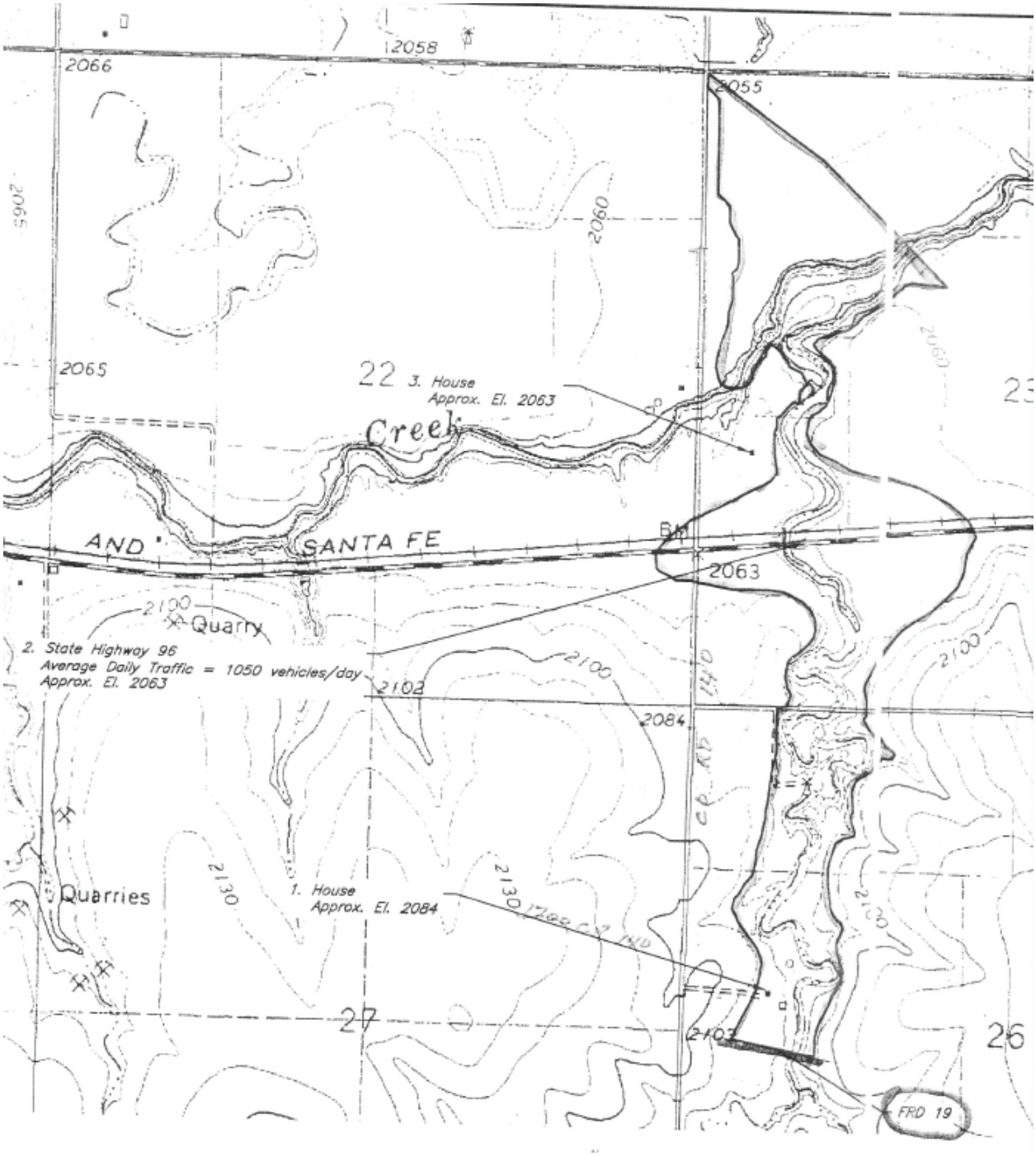
FRD #19

According to the Emergency Action Plan dated December 16, 2008 for this significant hazard dam, breach could cause inundation of one residence, overtopping of Highway 96, K&O Railroad and various Rush County Roads. There is one other home within close proximity to the inundation zone. Residents may need to be evacuated in the event of failure. However, the elevations of the structure is above the maximum elevation of the breach wave. Table 3.42 provides additional details regarding potential impacts and Figure 3.58 provides the section of the breach analysis map prepared by the Natural Resources Conservation Service.

Table 3.42 Assets Vulnerable to Inundation FRD #20

Item	Distance Downstream	Elevation of Item (all are approximate)	Maximum Elevation of Breach Wave.
1. House	440	2084	2086.1
2. State Highway 96	4200	2063	2067.7
3 House	5000	2063	2055.6

Figure 3.58 FRD #19 Breach Analysis Section



To estimate dollar losses as a result of dam failure hazard for the dams with an emergency action plan, the following values were used. According to the U.S. Census bureau, the average home value in Rush County is $32,200. According to the available data, there are 4 homes at risk to inundation as a result of dam failure for a total estimated vulnerability of $128,800 considering 100% damage to the structures. For the railroad, highway and roads, the following damage estimates were utilized: $1 million for each occurrence of State Highway inundation, $.5

million for each occurrence of railroad inundation. $5 million for each occurrence of County Road inundation, and .25 million for each occurrence of City Road inundation. In addition, $5,000 per possible residential evacuation was estimated. Please note that quantified estimated losses are only available for the 6 out of the 7 significant hazard dams that had an available emergency action plan and inundation map. Table 3.43 summarizes the loss estimates.

Table 3.43 Dam Inundation Loss Estimates

Dam	Highway	Railroad	County Roads	City Roads	Houses Inundation	Houses Evacuation	Total
FRD #8	1	1	1	-	-	-	2,000,000
FRD #20	1	1	1	-	-	6	2,030,000
FRD #24	1	1	1	1	2		2,314,400
FRD #6	1	1	1	-	-	4	2,020,000
FRD #17			1	-	1	2	542,200
FRD #29	1	1	1	-	1	1	2,037,200
Total Counts	4	4	5	1	4	13	
Estimated Losses	$4,000,000	$2,000,000	$2,500,000	$250,000	128,800	$65,000	$10,943,800

Levees

There are no accredited or provisionally accredited levees in Rush County.

Future Development

Future development located downstream from dams in floodplains or inundation zones would increase Rush County's vulnerability to this hazard. However, the County and incorporated cities have all adopted a countywide dam breach inundation zoning ordinance. So, future construction will be subject to this ordinance.

Drought Vulnerability

Overview

Planning Significance: Moderate. Negative impacts of drought are primarily economic and environmental. With 90 percent of the land area of Rush County used for agricultural purposes, the planning area has significant exposure to this hazard. In addition to potential economic impacts, water supplies for local communities can also be threatened and soil erosion, dust, and wildfire hazard can all be exacerbated by drought conditions.

Potential Losses to Existing Development

Water treatment and distribution facilities could be affected during periods of prolonged drought and customers may be requested to limit water consumption. According to the Kansas Water Office, the Alexander water supply is listed as drought vulnerable.

To determine the potential losses that could be associated with loss of water during a drought affecting the water supply of Alexander, loss of use estimates for utilities were obtained from the Kansas Division of Emergency Management based on FEMA's publication *What is a Benefit?:*

Guidance on Benefit-Cost Analysis of Hazard Mitigation Projects, May 2001. The loss of use estimate for loss of drinking water supply is $43 per day per person. If potable water is also lost, the total is $146 per day per person. For a City the size of Alexander (75 people) this would result in $10,950 in damages from one day without water.

Another impact of drought would be to agricultural production in the county. Areas associated with agricultural use are vulnerable to drought conditions which could result in a decrease in crop production or a decrease in available grazing area for livestock. According to the three-year period for which data is available from USDA's Risk Management Agency, (see previous occurrences section under drought profile in section 3.2.4) the average amount of annual claims paid for crop damage as a result of drought in Rush County was $934,282. The HMPC realizes that USDA claims only represent a small portion of the actual damages.

Aside from agricultural impacts, other losses related to drought include increased costs of fire suppression and damage to roads and structural foundations due to the shrink dynamic of expansive soils during excessively dry conditions.

Future Development

As population grows, demand for water increases for household, commercial, industrial, recreational, and agricultural uses. Population has declined in Rush County over previous few decades and currently new development is limited in scale. Future development is unlikely to exacerbate drought conditions in the short term.

Extreme Temperatures Vulnerability

Overview

Planning Significance: Low. The primary concern with this hazard is the potential health impacts, though economic impacts in the agricultural sector are also an issue. Those at greatest risk for heat-related illness include infants and children up to four years of age, people 65 years of age and older, people who are overweight, and people who are ill or on certain medications.. Individuals below the federal poverty level also may also be at increased risk to the impacts of extreme temperatures in cases where air conditioning and/or heating is not affordable. Those over 65 are also considered to be at greater risk to extreme cold due to issues with poor circulation and the inability to regulate body temperature is some elderly people.

Based on information from the 2000 U.S. Census, Table 3.44 compares the percentage of persons over age 65, below age 5, and the percentage of persons below the federal poverty level in the participating jurisdictions to state and national averages. Rush County and all incorporated cities exceed the state and national averages for percent of persons over age 65. Only Bison and Timken exceed the state and national averages for percent of persons under age 5. The unincorporated areas of the county and other cities are below the state and national average for this population category. The percent of population in Alexander that is below the poverty level is more than three times the state average. Timken, Liebenthal, and McCracken also have a slightly higher percentage below the poverty level than the state and national averages. The

percent of population below the poverty level in unincorporated areas and other cities are all below the state and national averages.

Table 3.44 Population over age 65 and Below the Poverty Level

Community	Total Population	% Age 65 and Over	% Age 5 and Under	% Individuals Below Poverty Level*
United States	281,421,906	12.4	6.8	12.4
Kansas	2,688,418	13.3	7.0	9.9
Alexander	75	29.3	5.3	31.9
Bison	235	20.0	8.1	5.3
La Crosse	1,376	27.3	5.2	9.7
Liebenthal	111	18.0	4.5	11.1
McCracken	211	28.4	4.3	13.7
Otis	325	21.2	5.5	6.5
Rush Center	176	26.7	3.4	5.6
Timken	83	22.9	8.4	10.4
Unincorporated	959	25.3	4.8	9.7

Source: U.S. Census Bureau: population and % age 65 and older based on Census 2000; percent below poverty level based on 1999 data

Potential Losses to Existing Development

Extreme temperatures normally do not impact structures and it is difficult to identify specific hazard areas. Heavy trucking can increase wear and tear on roadways during periods of extreme heat though the cost of these impacts is difficult to quantify. Stress on livestock and reductions in crop yields are also typical impacts of extended periods of high temperatures.

The power generation and transmission facilities and infrastructure are vulnerable to failure during periods of extreme heat due to an increased use of electricity to power air conditioning. If power failure occurs, occupants of nursing homes may be at increased risk if there is no alternate power source. There are two long-term care facilities in Rush County, both are in Lacrosse. Rush County Nursing Home is a 56 bed facility and there is also a 20-bed long term care unit at Rush County Memorial Hospital. If these facilities lost power, the special needs population would be at increased risk as would other elderly persons in private residences. There is no data available to estimate potential dollar losses as a result of power failure during extreme temperature events.

Future Development

In general, a growing population increases the number of people vulnerable to extreme temperature events. New development increases the strain on the power grid during extreme heat periods. Currently, population and development trends in Rush County are declining and unlikely to increase vulnerability to this hazard in the short term.

Flood Vulnerability

Overview

Planning Significance: Moderate. According to the vulnerability analysis and the loss estimates provided below, the City of La Crosse has the greatest flood risk and majority of the damage with an estimated $10,792,000 followed by the City of Rush Center with damage of $3,426,000. According to the map in Figure 3.59 the majority of flood impacts in the unincorporated County are located on Walnut Creek which goes through the Cities of Alexander, Rush Center and Timken.

Potential Losses to Existing Development

This section provides information on the population, buildings, infrastructure, and critical facilities that are vulnerable to flood hazard.

The best available flood data for Rush County was generated by HAZUS-MH MR3, FEMA's software program for estimating potential losses from disasters. The 100-year floodplain was generated for major rivers and creeks in the county (those with a 10 square mile minimum drainage area). A USGS 30 meter resolution digital elevation model (DEM) was used as the terrain base in the model. HAZUS-MH produces a flood polygon and flood-depth grid that represents the base flood. While not as accurate as official flood maps, such as digital flood insurance rate maps, these floodplain boundaries are suitable for use in GIS-based loss estimation. Potential losses to the county were analyzed with HAZUS-MH, based on Census Block-based buildings and population inventory and the flood hazard data. The following discussion, maps and tables presents the results of the loss estimation in more detail.

Description of potential losses to existing development will include analyses of estimated economic losses as well as estimated population displaced.

Economic Losses

HAZUS-MH provides reports on the number of buildings impacted, estimates of the building repair costs, and the associated loss of building contents and business inventory. Building damage can cause additional losses to a community as a whole by restricting the building's ability to function properly. Income loss data accounts for business interruption and rental income losses as well as the resources associated with damage repair and job and housing losses. These losses are calculated by HAZUS-MH using a methodology based on the building damage estimates. Building damage is estimated by Census Block based on the average depth of flooding within a given Census Block. Flood damage is directly related to the depth of flooding. HAZUS-MH uses depth-damage functions to model the losses. For example, a two-foot flood generally results in about 20 percent damage to the structure (which translates to 20 percent of the structure's replacement value). To estimate the monetary loss for each city, the flooded Census Blocks were extracted, and the damage costs were totaled using GIS. This was done for each city and unincorporated area to illustrate how the risk varies across the planning area.

Table 3.45 summarizes the estimated economic losses as a result of a 1 percent annual chance flood in the planning area.

Table 3.45 Economic Losses Associated with Building Damage

Jurisdiction	Cost Building Damage ($)	Cost Contents Damage ($)	Inventory Loss ($)	Relocation Loss ($)	Capital Related Loss ($)	Rental Income Loss ($)	Wage Loss ($)	Total Loss ($)	Percent of Total Loss
Alexander	898,000	1,452,000	86,000	3,000	7,000	-	50,000	2,496,000	11%
Bison	-	-	-	-	-	-	-	-	-
La Crosse	3,181,000	7,322,000	40,000	16,000	20,000	7,000	206,000	10,792,000	46%
Liebenthal	485,000	253,000	-	2,000	-	-	1,000	741,000	3%
McCracken	452,000	909,000	131,000	-	7,000	-	35,000	1,534,000	7%
Otis	-	-	-	-	-	-	-	-	-
Rush Center	1,728,000	1,567,000	113,000	5,000	3,000	-	10,000	3,426,000	15%
Timken	506,000	312,000	8,000	2,000	-	-	1,000	829,000	4%
Unincorp.	1,858,000	1,449,000	12,000	-	2,000	-	160,000	3,481,000	15%
Total	9,108,000	13,264,000	390,000	28,000	39,000	7,000	463,000	23,299,000	100%

According to HAZUS-MH, the City of La Crosse has the greatest flood risk and majority of the damage with $10,792,000 followed by the City of Rush Center with damage of $3,426,000. According to this analysis, the City of La Crosse will be hit the hardest by a 100-year flood event. The flood encroaches from the northwest of the city.

When comparing the HAZUS model results with the current FEMA FIRMs, it was observed that HAZUS does not represent flooding for Mule Creek in the City of La Crosse. The reason these streams were not calculated within the model is due to the fact that these streams do not have 10 square mile drainage areas, which is a parameter within the HAZUS procedure. If the model did account for Mule Creek there could be even more damage as it goes straight through the middle of town. The HAZUS model does match up closely to the FIRMs for the cities of McCracken, Rush Center and Timken. The other communities and the unincorporated county can not be compared since there are not any effective flood maps for them.

Each of the building loss categories (building damage, contents damage, inventory loss, relocation loss, capital related loss, rental income loss, wages loss and total loss) are the highest for the City of La Crosse and Rush Center. La Crosse has a total loss of $10,792,000 and Rush Center has a total loss of $3,426,000. La Crosse's loss estimate is likely to be low, as the FIRM shows more flooding than the HAZUS model. The towns of Alexander, Rush Center and Timken are more than 50% flooded according to the HAZUS model. The amount of flooding in these towns is not reflected in the Building Loss table due to the values of properties within these towns.

Table 3.46 provides the building damage loss ratio based on the dollar value of building exposure for each city and the unincorporated areas of the county. According to this analysis, Alexander would suffer the highest loss ratio followed by Rush Center, Timken, and Liebenthal.

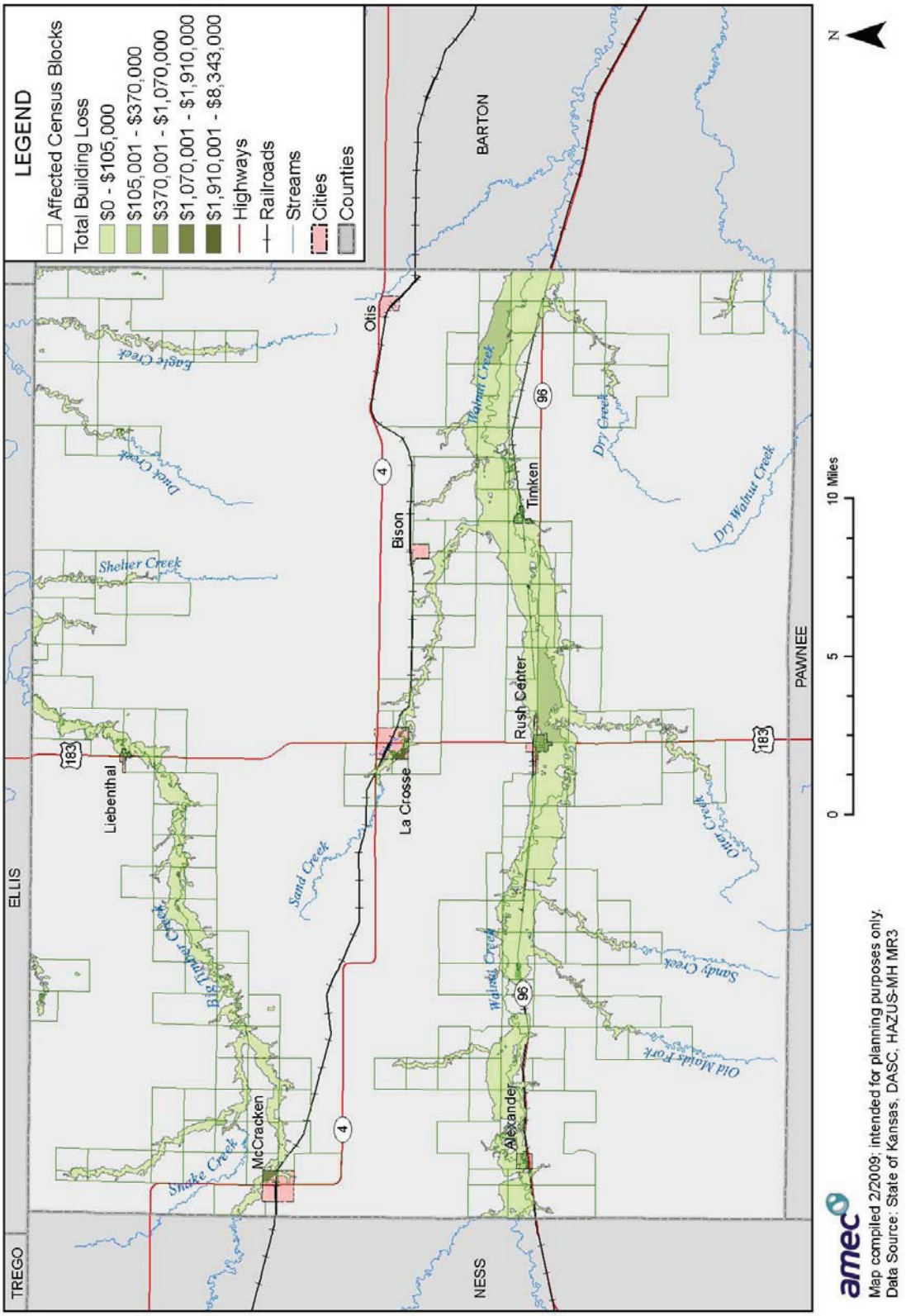
The building damage loss ratio is an indication of the community's ability to recover after an event. Building Damage Loss Ratio percent is calculated by taking the Building Structural Damage divided by Building Structural Value and then multiplying by 100. Loss ratios exceeding 10% are considered significant by FEMA. The cities with the highest building damage loss ratio are Alexander, Liebenthal, Rush Center and Timken. Alexander has the highest loss ratio of 18.4% with a potential building damage loss of $898,000. Rush Center has the second highest loss ratio of 16.6% with a potential building damage loss of $1,728,000. Timken is next with a loss ratio of 13.9% and a potential building damage loss of $506,000. Last is Liebenthal with a loss ratio of 10.5% and a potential building damage loss of $485,000.

Figure 3.46 Building Damage Loss Ratio

Jurisdiction	Building Exposure ($)	Building Damage ($)	Loss Ratio (%)
Alexander	4,870,000	898,000	18.4
Bison	13,784,000	-	-
La Crosse	86,990,000	3,181,000	3.7
Liebenthal	4,608,000	485,000	10.5
McCracken	13,189,000	452,000	3.4
Otis	15,252,000	-	-
Rush Center	10,429,000	1,728,000	16.6
Timken	3,645,000	506,000	13.9
Unincorporated	52,583,000	1,858,000	3.5
Total	205,350,000	9,108,000	4.4

The map in Figure 3.59 provides a visual representation of the building loss data summarized above. This shows the majority of flood impacts in the planning area located along Sand Creek in Lacrosse, and along Walnut Creek which goes through the Cities of Alexander, Rush Center and Timken.

Figure 3.59. Estimated Financial Losses from 100-Year Flood in Rush County



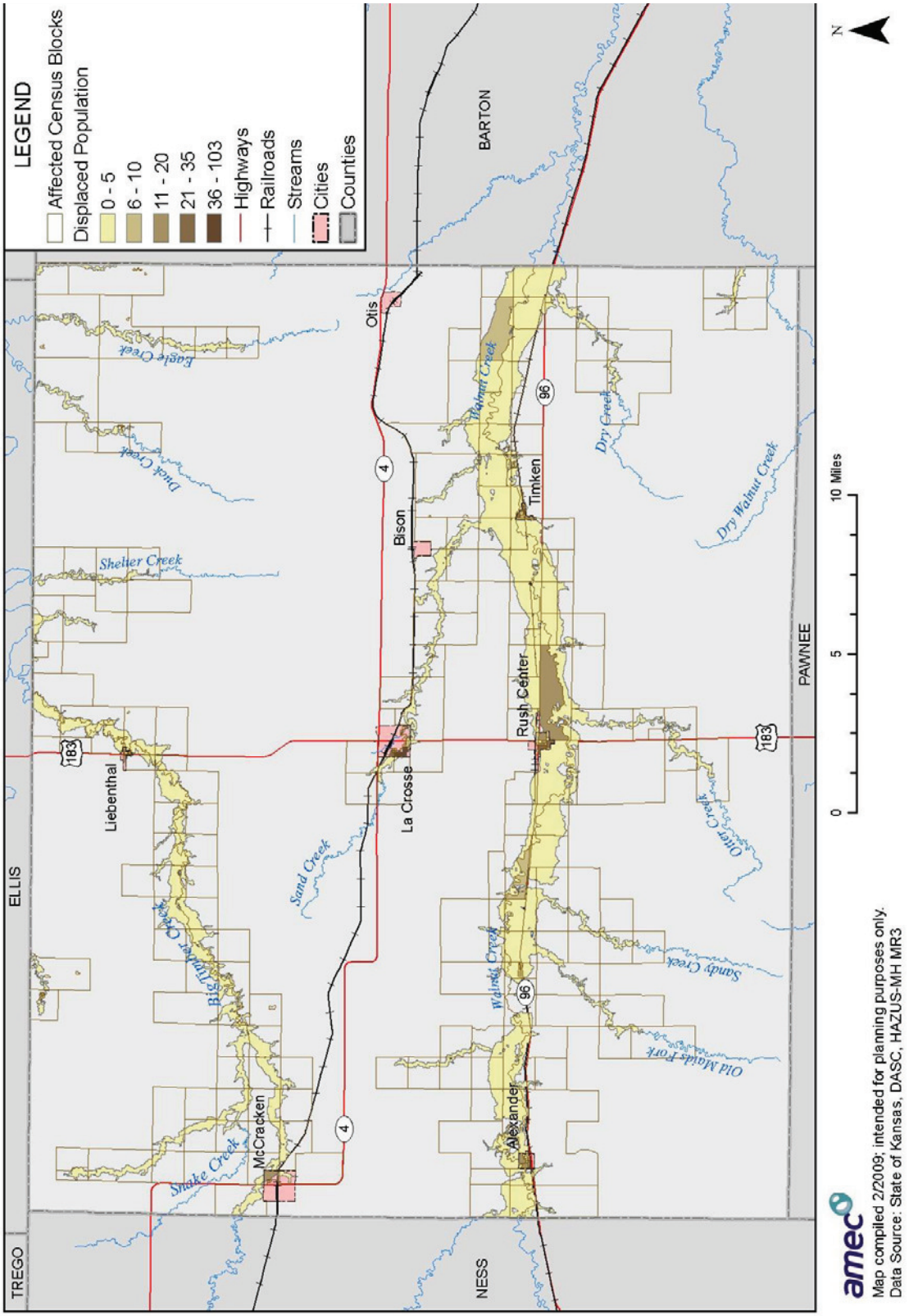
Displaced Population

Table 3.47 provides the estimates for displaced population and population needing shelter as a result of the 1 percent annual chance flood. The area with the highest amount of affected population is La Crosse followed by Rush Center and the unincorporated portions of the county. The map in Figure 3.60 shows this same information with the darker shaded areas being the areas with the higher numbers of displaced population.

Table 3.47 Displaced Population

Jurisdiction	Displaced Population	Population Needing Shelter
Alexander	68	12
Bison	-	-
La Crosse	208	143
Liebenthal	53	22
McCracken	13	2
Otis	-	-
Rush Center	132	78
Timken	59	33
Unincorporated	129	3
Total	662	293

Figure 3.60. Estimated Population Displaced by 100-Year Flood in Rush County



Default HAZUS-MH data was used to develop the loss estimates. Thus, the potential losses derived from HAZUS-MH, the best available data, may contain some inaccuracies. The building valuations used in HAZUS-MH MR3 are updated to R.S. Means 2006 and commercial data is updated to Dun & Bradstreet 2006. There could be errors and inadequacies associated with the hydrologic and hydraulic modeling of the HAZUS-MH model. The damaged building counts generated by HAZUS-MH are susceptible to rounding errors and are likely the weakest output of the model due to the use of census blocks for analysis.

Agricultural Impacts

In addition, USDA crop insurance claims as a result of flood and excessive moisture damage has averaged $70,809 per year from 2003-2005 and total $212,472 for the period.

Critical Facilities, Bridges, Pipelines, and Power Infrastructure at Risk

The best available data for critical facilities came from two sources: the State of Kansas, and the National Bridge Inventory from within HAZUS-MH. Critical facilities in the floodplain were determined using GIS, by selecting all critical facilities that fell within the floodplain. Table 3.48 provides the critical facilities from these sources that occur in the HAZUS-generated 100-year floodplain along with the estimated flood depth.

Table 3.48 Critical Facilities in the 100-year Floodplain

Flooded Critical Facility	Name	Near City	Flood Depth (ft)
Elderly Facility	Rush County Nursing Home	La Crosse	1.7
Fire Station	Rush County Rural Fire District 1	Alexander	1.5
Fire Station	Rush County Fire District 6	Liebenthal	4.2
Fire Station	Rush County Fire District 3	Rush Center	1.3
Fire Station	Rush County Fire District 2	Timken	1.3
Petroleum Facility	Facility ID 11598	Timken	7.1
Scour Critical Bridge	KS017865	McCracken	10.2
Scour Critical Bridge	KS023218	Rush Center	1
Scour Critical Bridge	KS023219	Rush Center	8.5
Waste Water Treatment	Rush Center City of STP	Rush Center	17.9

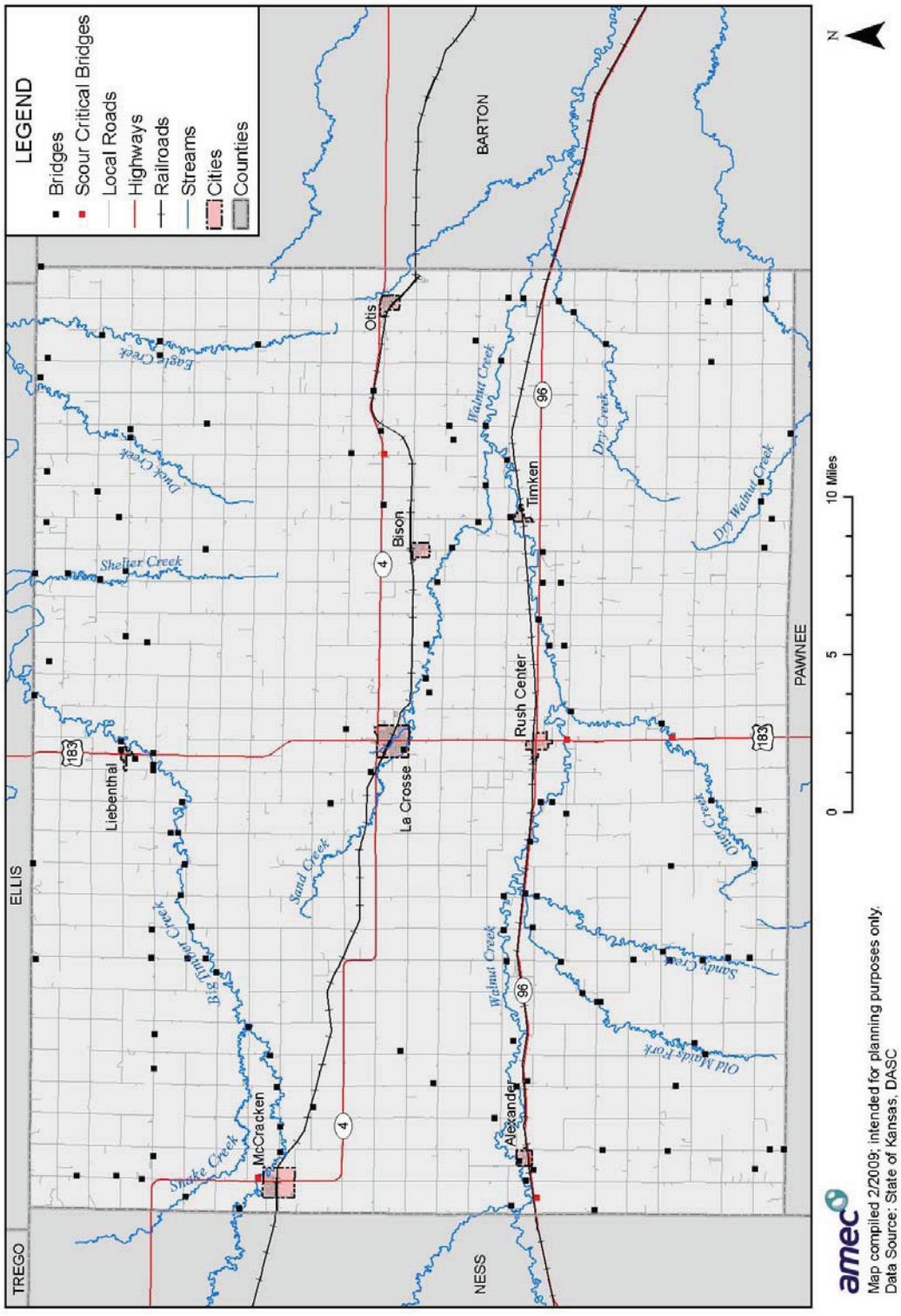
Rush County Scour Critical Bridges

Included with HAZUS-MH is a database of bridges called the National Bridge Inventory developed by the Federal Highway Administration. One of the database items is a "scour index", which is used to quantify the vulnerability of a bridge to scour during a flood. Bridges with scour index between 1 and 3 are considered "scour critical", or a bridge with a foundation element determined to be unstable for the observed or evaluated scour condition.

There are 5 scour critical bridges in Rush County. They are all located on the main highways that travel through Rush. One scour critical bridge is located just north of the city limits of McCracken at the intersection of Big Timber Creek and Hwy 4. Another one is located between

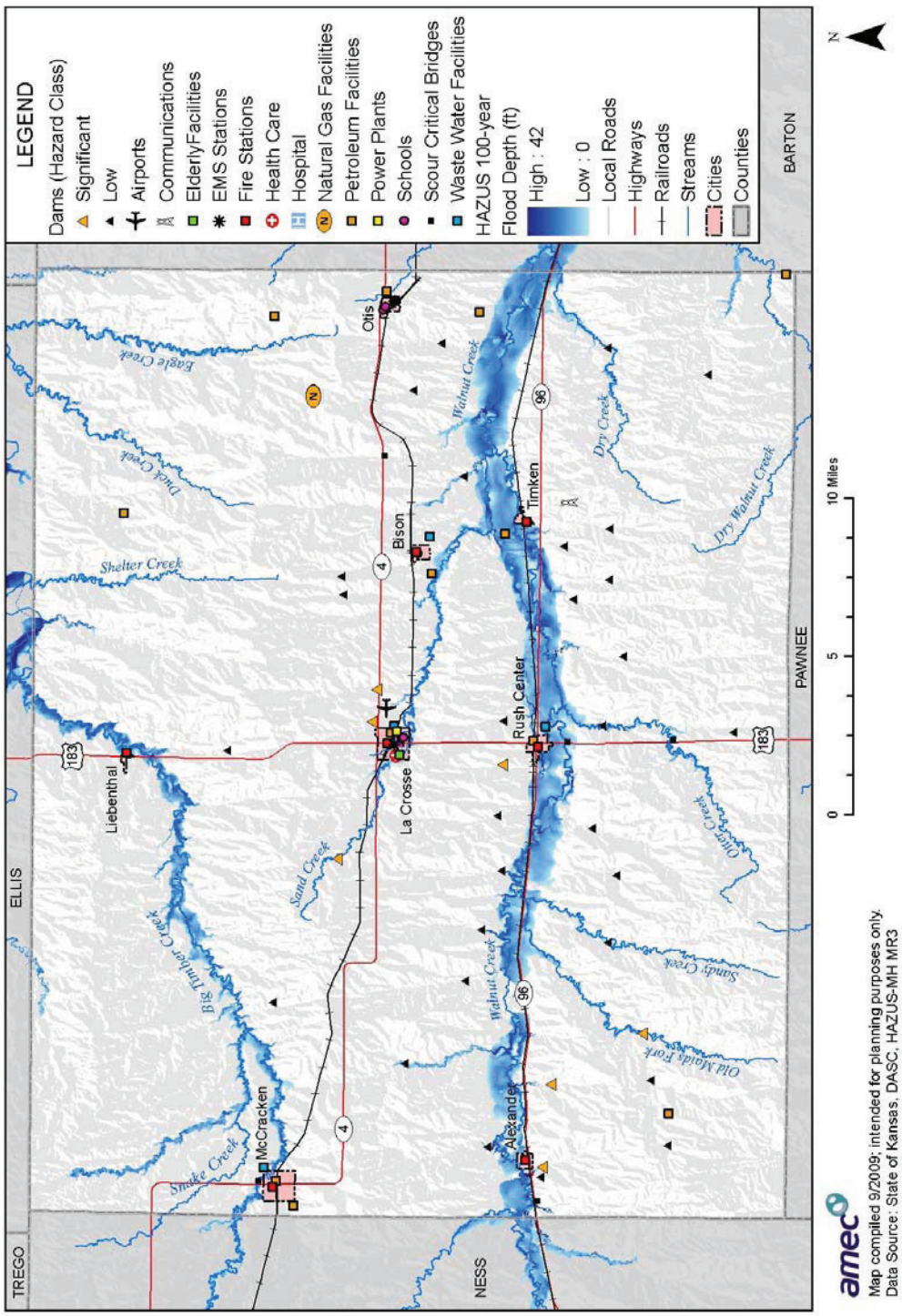
La Crosse and Otis on Hwy 4. One is west of Alexander on Hwy 96. Two are south of Rush Center on Hwy 183 at the intersections of Walnut Creek and Otter Creek. The location of these bridges is shown in Figure 3.61.

Figure 3.61 Bridges in Rush County



The location of critical facilities in relation to the HAZUS generated floodplain are shown for the entire county in Figure 3.62. Figures 3.63- 3.69 detail critical facility location for each city in Rush County.

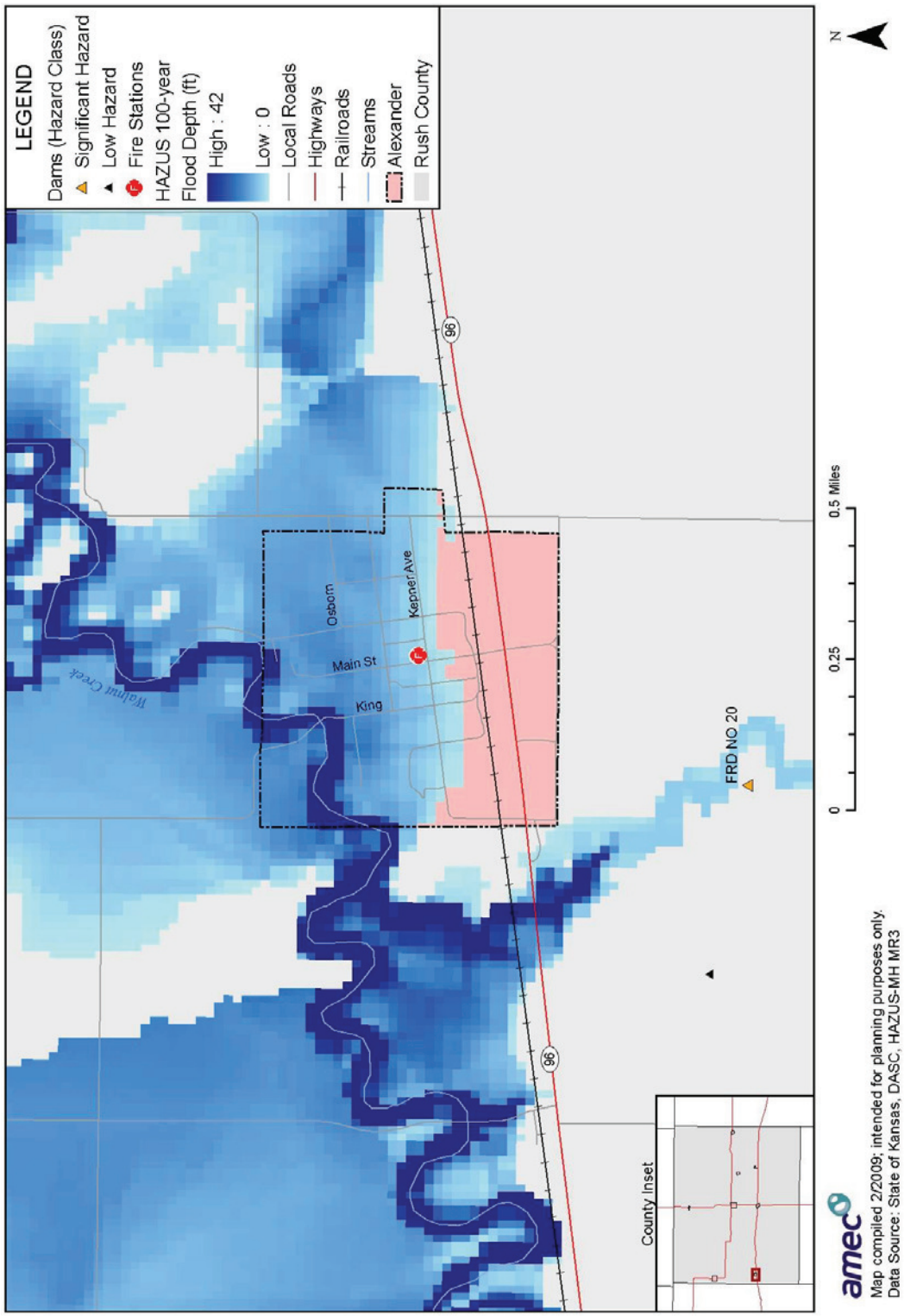
Figure 3.62. Critical Facilities in the 100-Year Floodplain, Rush County



Alexander

Rush County Rural Fire District #1 is located in the floodplain.

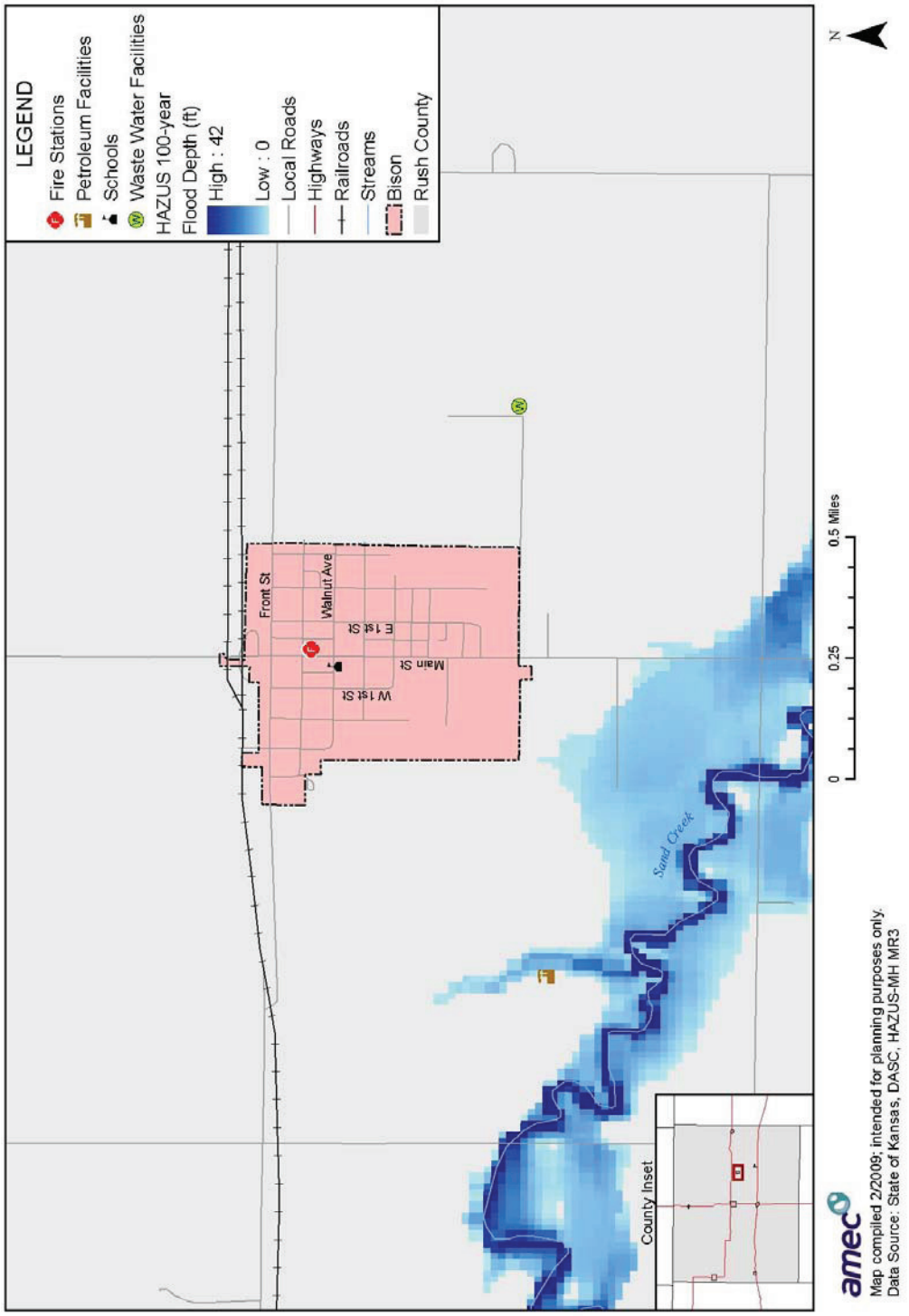
Figure 3.63. Critical Facilities-100-Year Floodplain, Alexander



Bison

According to this assessment, the City of Bison incorporated area is not vulnerable to the 1 percent annual chance riverine flood.

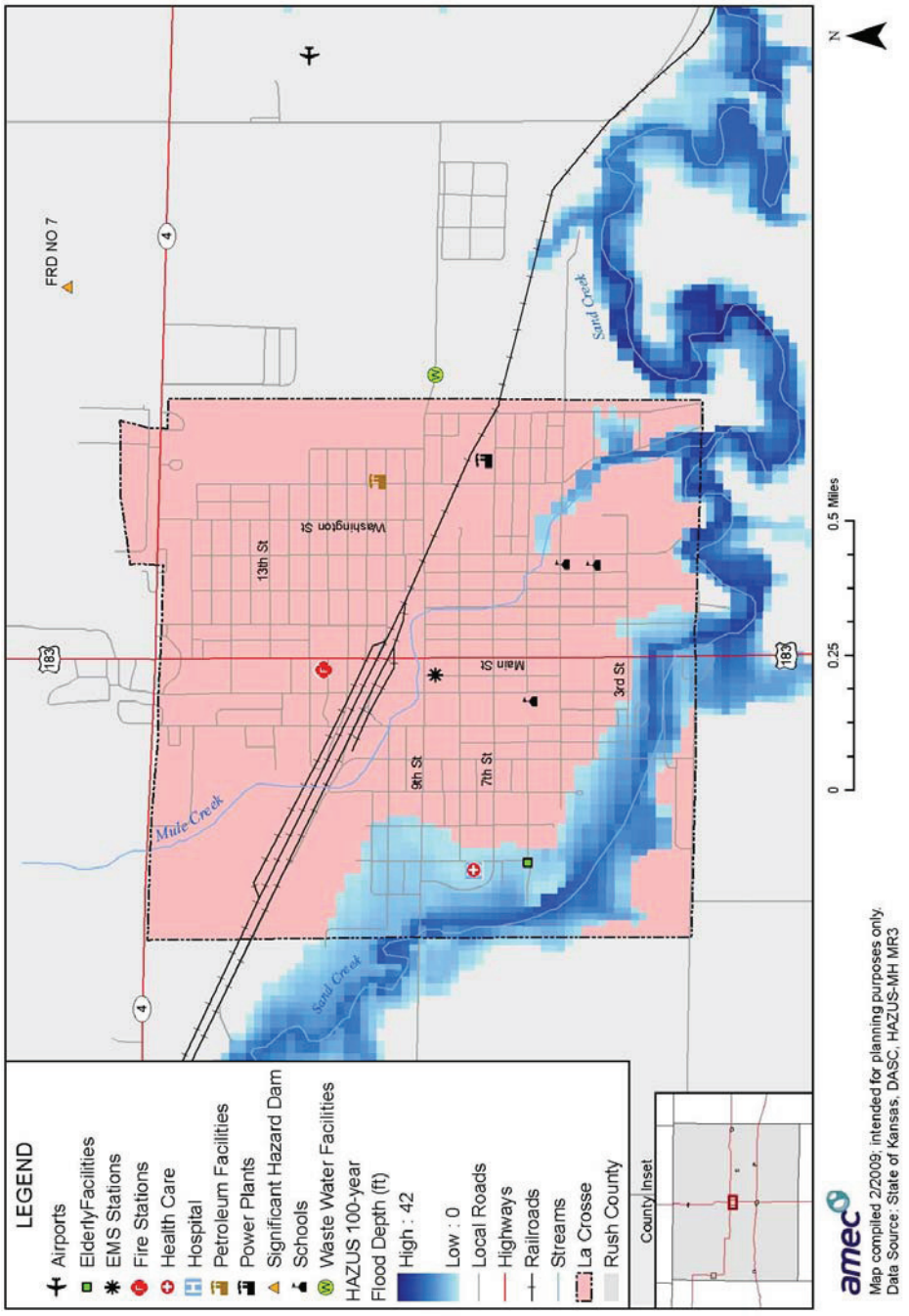
Figure 3.64. Critical Facilities-100-Year Floodplain, Bison



La Crosse

In La Crosse, the Rush County Nursing Home is located in the floodplain. Additional problems occur during flooding because the power line that supplies the hospital, rest home and assisted living center runs through a flood zone area and a small pasture that cannot be accessed in adverse weather. In addition, the power line that supplies the sewer plant runs through a pasture that is vulnerable to flooding.

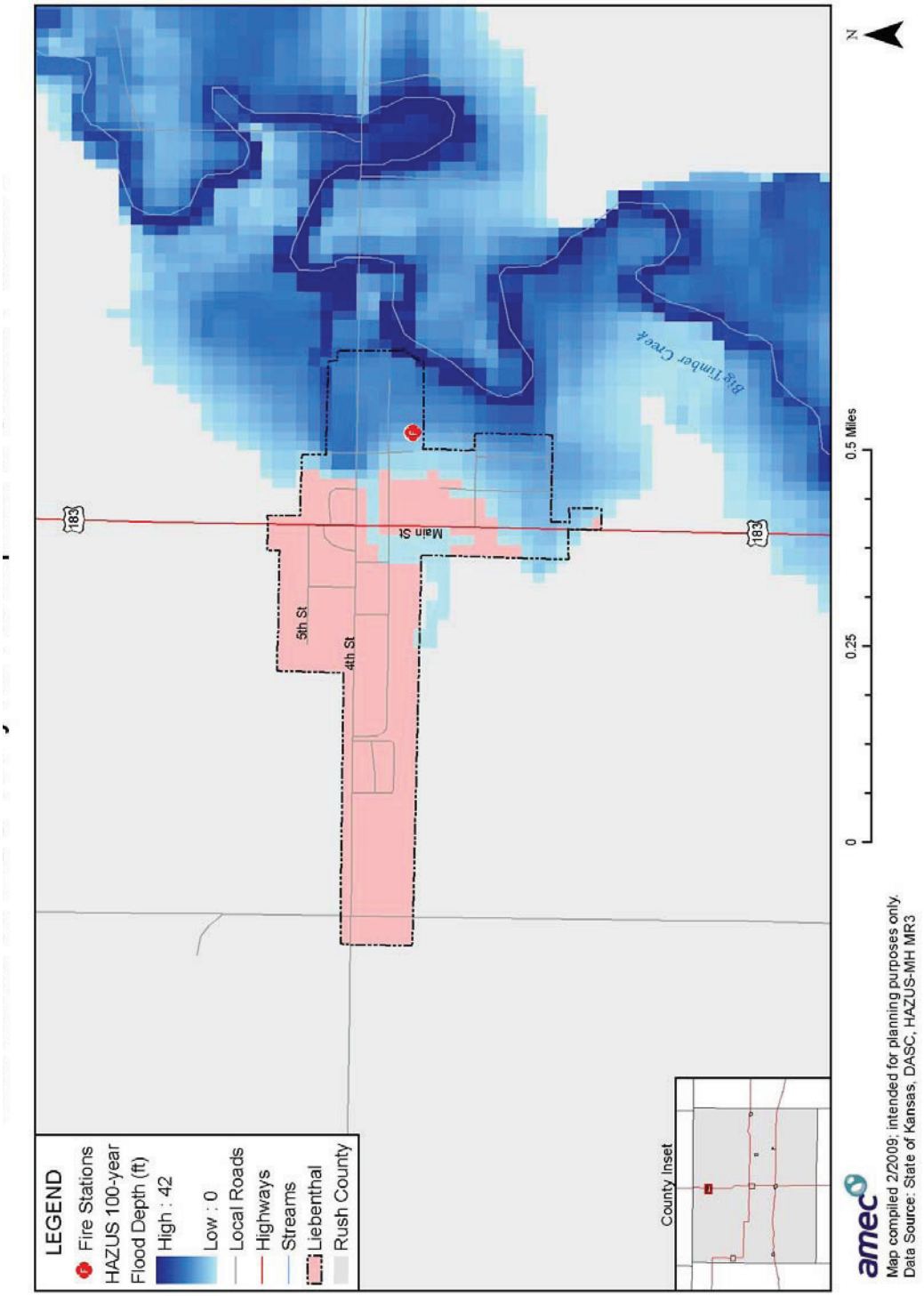
Figure 3.65. Critical Facilities-100-Year Floodplain, La Crosse



Liebenthal

Rush County Rural Fire District # 6 is located in the floodplain.

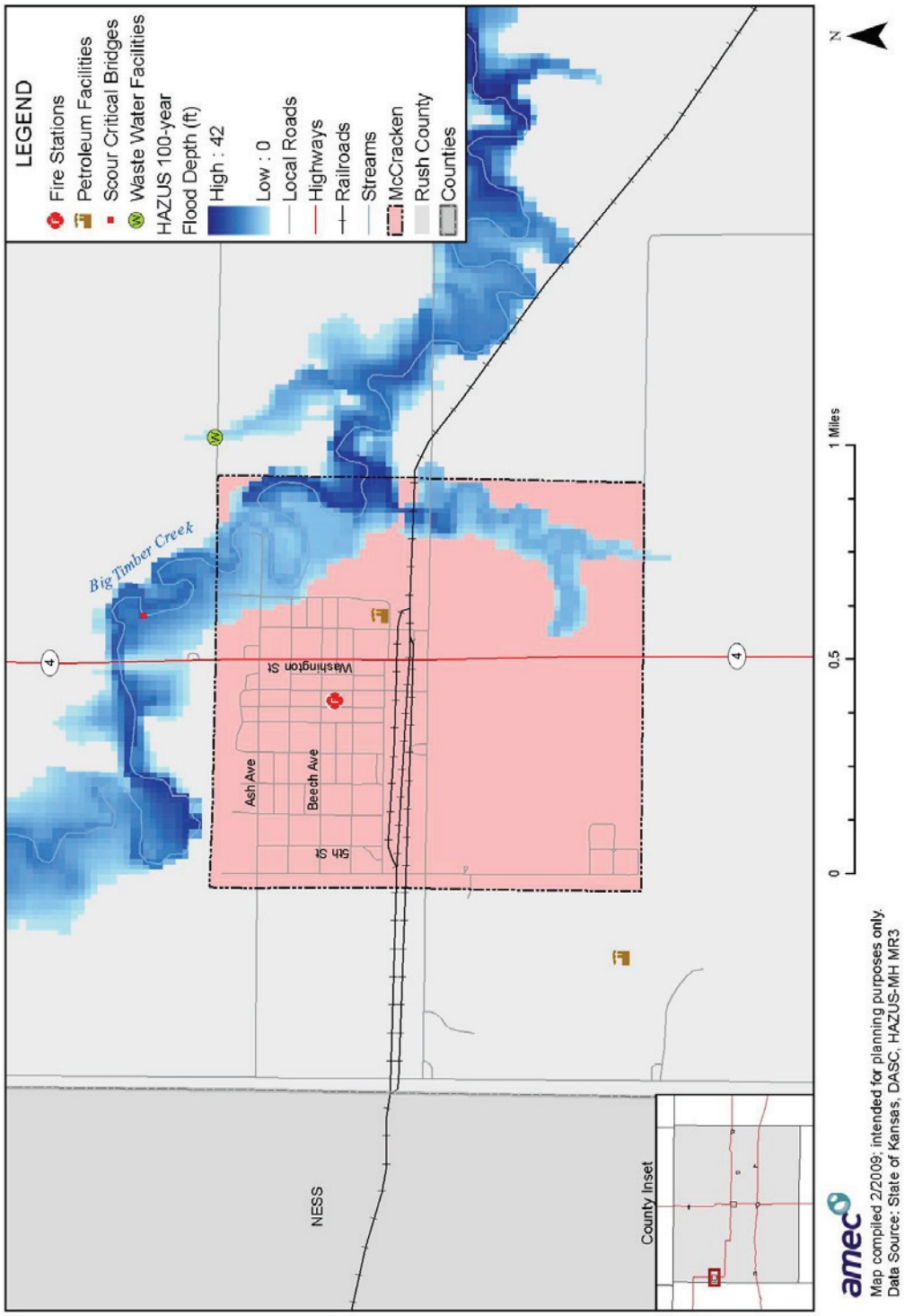
Figure 3.66 Critical Facilities-100-Year Floodplain, Liebenthal



McCracken

There is one scour critical bridge in McCracken located in the floodplain

Figure 3.67. Critical Facilities-100-Year Floodplain, McCracken



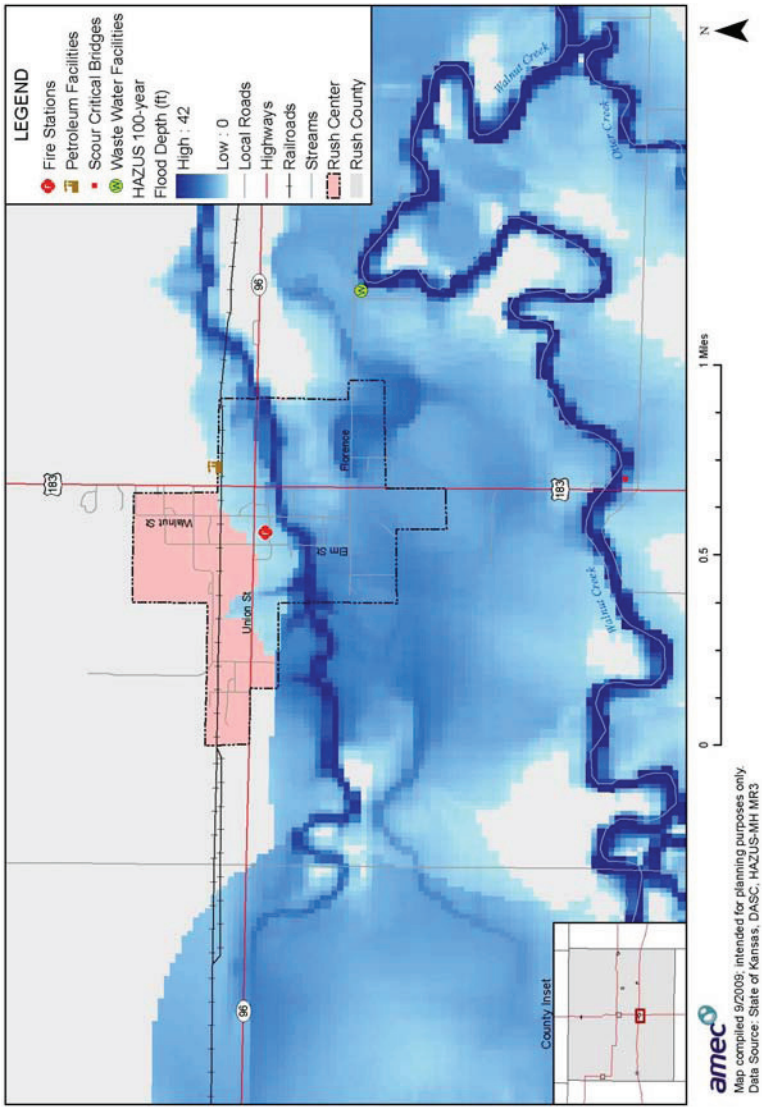
Otis

According to this assessment, the City of Otis incorporated area is not vulnerable to the 1 percent annual chance riverine flood. The HAZUS software did not indicate any flood risk for the City of Otis.

Rush Center

Rush County Fire District #3 is located in the floodplain. There area also two scour critical bridges within the floodplain in Rush Center. The wastewater treatment plan in Rush Center is located in the floodplain.

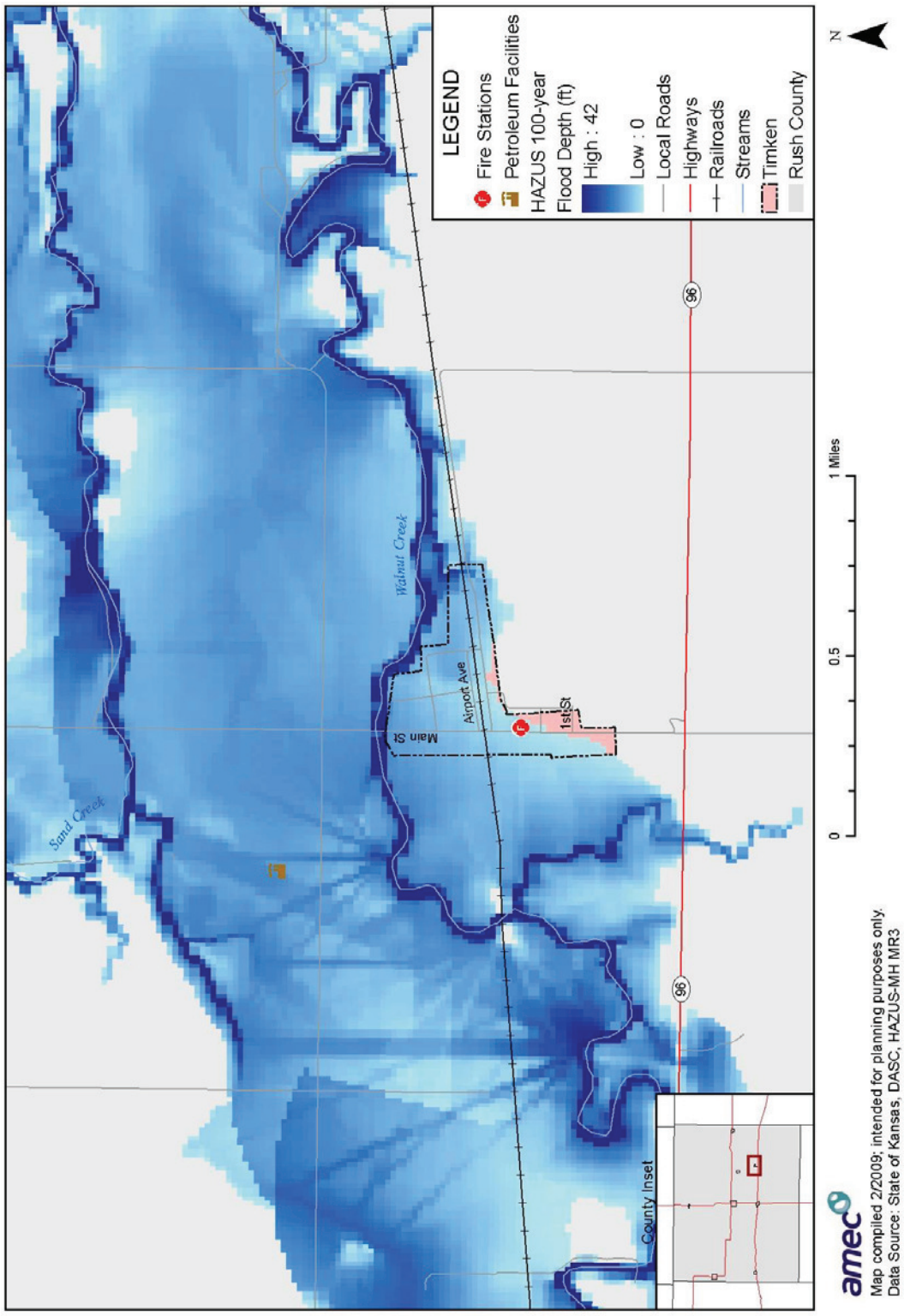
Figure 3.68. Critical Facilities-100-Year Floodplain, Rush Center



Timken

Rush County Fire District #2 and a petroleum facility are located in the floodplain in Timken.

Figure 3.69. Critical Facilities-100-Year Floodplain, Timken



National Flood Insurance Program and Repetitive Flood Loss Properties

Three communities in the planning area are currently participating in the National Flood Insurance Program. Lacrosse, Rush Center, and Timken are all participating communities. Table 3.49 provides additional details on NFIP participation as well as flood insurance policies and claims. A detailed Flood Insurance Study has not been completed for any of the participating communities.

Table 3.49. Community Participation in the National Flood Insurance Program in Rush County

Jurisdiction	Status/Date	Effective FIRM Date	Policies in Force	Insurance in Force ($)	Number of Claims	Claims Totals ($)
Rush County	Not participating Never Mapped	N/A	N/A	N/A	N/A	N/A
Alexander	Not Participating/Sanctioned Withdrew 7/5/89	2/14/1975	N/A	N/A	N/A	N/A
Bison	Not participating Never Mapped	N/A	N/A	N/A	N/A	N/A
Lacrosse	Participating Regular Phase 7/16/1990	7/16/1990	6	365,700	0	0
Liebenthal	Not Participating Never Mapped	N/A	N/A	N/A	N/A	N/A
McCracken	Not Participating/Sanctioned 11/22/75 In process of re-joining	11/22/1974	N/A	N/A	N/A	N/A
Otis	Not Participating Never Mapped	N/A	N/A	N/A	N/A	N/A
Rush Center	Participating Regular Phase 5/1/1988	5/1/1988	7	266,900	0	0
Timken	Participating Regular Phase 7/17/1986	7/17/1986	1	31,400	1	8,434

Source: National Flood Insurance Program, Community Information System

There are no repetitive loss properties in Rush County.

Future Development

Overall, there is relatively little population change and new development in Rush County. Future development within the floodplain of the County should be limited by enforcement of floodplain ordinances in the three communities that participate in the National Flood Insurance Program (La Crosse, Rush Center, and Timken) and for McCracken who is in the process of re-joining the NFIP. For the communities that do not participate in the National Flood Insurance Program, codes, standards, or other mechanisms should be considered to minimize construction in flood hazard areas. Plans for future development should avoid areas with a known flood risk and be constructed to avoid net increase in stormwater run-off.

Hailstorm Vulnerability

Overview

Planning Significance: High. In general, assets in the planning area that are vulnerable to hail damage include crops, livestock, vehicles, people, and built structures. Of these, crop damage is the most common. Moderate to large size hail can devastate crops that are at vulnerable stages in the growth/harvest cycle. Injuries to humans and livestock can occur if shelter is not available during a severe hail event.

Potential Losses to Existing Development

Vehicular damage is a common impact, ranging from minor cosmetic impacts to moderate body damage. For structures; roof damage, damages to siding and windows occurs frequently with hail damage and is usually covered under private insurance.

According to the loss estimates included in the Kansas State Mitigation Plan, potential losses to existing development are estimated to be at least $312,184. This estimate is based on data from 1993 to 2006 in the NCDC database and is reflected in 2006 dollars. This estimate is considered to be quite low as most structural and property damages are handled by private insurance and are not always reported in the NCDC database.

According to the USDA Risk Management Agency, insurance payments for damages to crops as a result of hail in Rush County totaled $1,554,833 for the 3-year period from 2005-2007. This translates to an annual average of $518,278. Rough estimates of the total vulnerability of agricultural production to hailstorms fall in a range of 1 to 5 percent of annual crop receipts for the County. In 2007, the value of crops harvested in Rush County was $47,212,000 (Kansas Agricultural Statistics, 2007-2008). Based on a worst case scenario where 5 percent of crop production is lost in a given year due to hailstorm, the damages could be $2,360,600.

Future Development

Current structural development trends for Rush County are unlikely to substantively increase or decrease vulnerability to hailstorms for the built environment. Increases in agricultural production in the planning area will also increase the vulnerability of crops to this hazard.

Lightning Vulnerability

Overview

Planning Significance: Low. The NCDC reports no injuries or fatalities resulting from lightning strikes from 1993-2008, but it is nonetheless a significant public safety hazard. National Weather Service data indicates that Rush County is in a region that receives two to four lightning strikes per square kilometer per year. However, most of these lightning strikes do not result in damages.

Previous events have caused fires damaging crops. Structure fires area also a possibility as well as damage to electronic equipment located inside buildings. Communications equipment and

warning transmitters and receivers could be knocked out by lightning strikes. In general, person hazard insurance covers property losses as a result of lightning damage.

Potential Losses to Existing Development

Existing development in exposed locations and high elevation relative to its surroundings are the most vulnerable structures. Estimates of damage and potential losses at these facilities are not currently available.

Future Development

Current development trends for Rush County are unlikely to substantively increase or decrease vulnerability to lightning.

Soil Erosion/Dust Vulnerability

Vulnerability Overview

Planning Significance: Moderate. Assets most vulnerable to soil erosion are agricultural land, bridges, roads, and water storage facilities that can fill with sediment. The vulnerability of bridges and roads to erosion is discussed under the flood hazard since the main cause of damaging erosion to these structures is flood waters rushing past and washing out the soil.

Potential Losses to Existing Development

Rush County will continue to lose valuable topsoil to wind and water erosion. According to the 2003 Natural Resources Inventory by the Natural Resources Conservation Service, Kansas looses 2.1 tons of cropland per acre to water erosion and 1.3 tons per acre to wind erosion. In Rush County in 2007, 186,500 acres were harvested. This translates to 391,650 tons of soil on harvested acreage lost to water erosion and 242,450 tons of soil on harvested acreage lost to wind erosion. Per acre yield of crops is less over time as nutrient-rich topsoil is lost. Data is not available to quantify the economic impacts as a result of soil erosion.

Future Development

As additional acreage is planted in crops, the percentage of potential losses in yield could increase as well due to impacts of soil erosion.

Tornado Vulnerability

Overview

Planning Significance: Moderate. Rush County is located in a region of the U.S. with very high frequency of dangerous and destructive tornadoes. A tornado in June of 1968 resulted in eight injuries. From 1950-2008, over $591,000 in property damages were reported as a result of tornadoes.

Potential Losses to Existing Development

To assess vulnerability to this damaging hazard, the HMPC considered the recent tornado in Greensburg, Kansas approximately 70 miles south of La Crosse along Highway 183. Although the EF5 magnitude event is not a common occurrence, this event was used for comparative analysis due to the lack of specific damages information for events of a lesser magnitude as well as the desire to consider a worst-case scenario for this hazard. There are many variables that come in to consideration when attempting to estimate vulnerability to tornadoes such as wind speed, time on the ground, affected population density, affected building density, width of ground swath, and time of day. Therefore, the HMPC chose to consider a worst-case scenario for planning purposes. This is consistent with the methodology applied by FEMA in design and construction of tornado saferoom structures, which are designed to withstand an EF5, or worst-case scenario event.

On May 4, 2007, Greensburg was hit by an EF5 tornado that was 1.7 miles wide and traveled for nearly 22 miles with winds estimated at 205 mph. The path of this tornado ran directly through Greensburg. Ninety-five percent of Greensburg's structures were destroyed and the remaining five percent were severely damaged. Greensburg at the time, had a population of approximately 1,500 across a 1.5 square mile area. By comparison, each of the incorporated cities of Rush County is smaller in area and in population.

If a tornado event as violent as the one that hit Greensburg directly impacted one of Rush County's cities, it is conceivable that a similar level of destruction could occur. Table 3.50 estimates potential losses for an EF5 event by calculating a 95 percent loss of structure value in the damaged area of each city. Since the cities of Rush County are all smaller than the City of Greensburg, damage to 100 percent of each city's area was assumed. This analysis indicates that a scenario similar to that of Greensburg in any one of the participating jurisdictions could result in damages totaling in the millions for even the smallest communities. This damage estimate does not include losses to building contents or infrastructure.

Table 3.50. Potential Property Loss from EF5 Tornado by Jurisdiction

Community	City Area	Number of Structures	Total Structure Value ($)	% City Area Damaged by EF5	95% Loss of Structure Value in Damaged Area ($)
Alexander	.25	67	4,870,000	100	4,626,500.00
Bison	.26	229	13,784,000	100	13,094,800.00
La Crosse	1.02	1,069	86,990,000	100	82,640,500.00
Liebenthal	.12	68	4,608,000	100	4,377,600.00
McCracken	.96	188	13,189,000	100	12,529,550.00
Otis	.30	281	15,252,000	100	14,489,400.00
Rush Center	.39	123	10,429,000	100	9,907,550.00
Timken	.15	55	3,645,000	100	3,462,750.00
Total					**145,128,650.00**

Source: U.S. Census Bureau, 2000 census; loss estimates AMEC Earth & Environmental

Future Development

Due to the general lack of population growth in the region, development trends are not anticipated to increase vulnerability to tornadoes. Future development that does occur in Rush County should consider tornado hazards at the planning, engineering and architectural design stages.

Utility/Infrastructure Failure Vulnerability

Vulnerability Overview

Planning Significance: High. Utilities and infrastructure are vulnerable to damage from many natural hazards. Public health and safety and potential impacts on the economy are primary concerns with this hazard.

Power and telephone lines are the most vulnerable infrastructure asset; but water supply, wastewater facilities and communications towers are also vulnerable. Typically the events that cause the most damages are flood, lightning, winter storm, tornado, and wind storm. The electrical grid is vulnerable in periods of extreme heat when air conditioning use peaks. Underground utilities can also be damaged by expansive soils, erosion and intentional or unintentional human actions.

Potential Losses to Existing Development

By definition, this hazard includes all infrastructure and critical facilities that could be impacted by one or more hazard events. Electrical blackouts and power surges can damage high tech equipment but generally do not cause structural damage. Descriptions of utility/infrastructure assets that could be impacted are in Section 3.3.11 under the profile for this hazard.

Potential losses would include cost of repair or replacement of damaged facilities, lost economic opportunities for businesses. Secondary effects of infrastructure failure could include burst water pipes in homes without electricity during winter storms and damage to equipment due to power surges in the electrical grid during blackouts. Public safety hazards include risk of electrocution from downed power lines and hazard events that affect the normal functioning of wastewater facilities.

Specific amounts of estimated losses are not available due to the complexity and multiple variables associated with this hazard. Loss of use estimates were made available from the Kansas Division of Emergency Management based on FEMA's publication *What is a Benefit?: Guidance on Benefit-Cost Analysis of Hazard Mitigation Projects, May 2001*. These figures are used to provide estimated costs associated with the loss of utilities. Table 3.51 provides these estimates in relation to the populations served in Rush County. The loss of use for each utility is provided in the heading as the loss of use cost per person per day of loss. The estimated loss of use provided for each jurisdiction in Rush County represents the loss of service of the indicated utility for one day. These figures do not take into account physical damages to utility equipment and infrastructure. This loss estimation methodology does not take in to account the portion of

population that does not utilize public utilities such as rural areas that use well water and home-site septic systems.

Table 3.51 Estimated Costs for Single Day Loss of Use of Electric, Water and Wastewater Utilities

City Name	Population	Electric ($188)	Drinking Water ($43)	Potable Water ($103)	Wastewater Treatment (partial loss) ($8.50)	Wastewater Treatment (complete loss) ($33.50)	Totals
Alexander	75	14,100	3,225	7,725	637.50	2,512.50	28,200
Bison	235	44,180	10,105	24,205	1,997.50	7,872.50	88,360
La Crosse	1,376	258,688	59,168	141,728	11,696.00	46,096.00	517,376
Liebenthal	111	20,868	4,773	11,433	943.50	3,718.50	41,736
McCracken	211	39,668	9,073	21,733	1,793.50	7,068.50	79,336
Otis	325	61,100	13,975	33,475	2,762.50	10,887.50	122,200
Rush Center	176	33,088	7,568	18,128	1,496.00	5,896.00	66,176
Timken	83	15,604	3,569	8,549	705.50	2,780.50	31,208
unincorporated	959	180,292	41,237	98,777	8,151.50	32,126.50	360,584
Totals	3551	667,588	152,693	365,753	30,183.50	118,958.50	1,335,176

Future Development

Future development can increase vulnerability to this hazard by placing additional strains on existing infrastructure and by increasing the size and thus the exposure of infrastructure networks, but currently there is little population change in Rush County. In addition, utility and infrastructure development and expansion should be minimized or mitigated in known hazard areas to ensure the vulnerability to this hazard is not increased as a secondary impact to other hazard events.

Wildfire Vulnerability

Overview

Planning Significance: Moderate. According to the HMPC, the areas that are most vulnerable to wildfire are agricultural areas where CRP land is burned, rural areas where trash and debris are burned, and the wildland-urban interface areas. According to the Kansas Incident Fire Reporting System, from 2003-2006, Rush County lost an average of 264.5 acres per year (a total of 1,058 over a four year period) to wildland fires.

Potential Losses to Existing Development

Homes built in rural areas are more vulnerable since they are in closer proximity to CRP land that is burned and homeowners are more likely to burn trash and debris in rural locations. The

vulnerability of structures in rural areas is exacerbated due to the lack of hydrants in these areas for firefighting and the distance required for firefighting vehicles and personnel to travel to respond. Potential losses to crops and rangeland are additional concerns.

Utilizing the data available from the Kansas Fire Incident Reporting System for the 4-year period from 2003-3006, estimated damages totaled $311,275. If wildfires continue at a similar rate, the annual losses to this hazard are estimated to be $77,818.75.

Future Development

Future development in the wildland-urban interface would increase vulnerability to this hazard.

Windstorm Vulnerability

Overview

Planning Significance: High. Windstorm is primarily a public safety and economic concern, and Rush County is located in a region with very high frequency of occurrence. Windstorm can cause damage to structures and power lines which in turn can create hazardous conditions for people. Debris flying from high wind events can shatter windows in structures and vehicles and can harm people that are not adequately sheltered.

Potential Losses to Existing Development

Campers, mobile homes, barns, and sheds and their occupants are particularly vulnerable as windstorm events in Rush County can be sufficient in magnitude to overturn these lighter structures. Overhead power lines and infrastructure are also vulnerable.

According to reports from the NCDC, there were 52 separate thunderstorm/wind events reported in Rush County between 1993 and 2008 (events that occurred on the same day within one hour were considered one event). During this time period, there was one reported death and five reported injuries. Reported damages for the 15.2 year period were $1,156,000 in property damages and $165,000 in crop damages for total reported financial losses of $1,321,000. This computes to an average annual economic loss of $86,908. This loss estimate is considered to be quite low as many losses are not reported to NCDC and are handled by private insurance.

Future Development

Future development projects should consider windstorm hazards at the planning, engineering and architectural design stage with the goal of reducing vulnerability.

Winter Storm Vulnerability

Vulnerability Overview

Planning Significance: High. The entire planning area is vulnerable to the effects of winter storm. Winter storms tend to make driving more treacherous and can impact the response of emergency vehicles. The probability of utility and infrastructure failure increases during winter

storms due to freezing rain accumulation on utility poles and power lines. Elderly populations are considered particularly vulnerable to the impacts of winter storms.

Vulnerable Buildings, Infrastructure, and Critical Facilities

Buildings with overhanging tree limbs are more vulnerable to damage during winter storms. Businesses experience loss of income as a result of closure during power outages. In general heavy winter storms increase wear and tear on roadways though the cost of such damages is difficult to determine. Businesses can experience loss of income as a result of closure during winter storms.

In the three Presidential Disaster Declarations for winter storm events (DRs 1626, 1675, and 1741), the average amount of FEMA Public Assistance funds paid to Rush County totaled $38,080. It is anticipated that in similar events, this level of damages would occur. It should be noted that this amount does not take in to consideration damages incurred by private electric providers, private businesses or other expenses non-reimbursable by FEMA or other damages that may have been covered by private insurance.

Additionally, crop insurance claims for winter storm, and freeze conditions for the three-year period from 2005-2007 totaled $1,395,605. This results in an average loss of $465,202 to crops as a result of freeze and frost affecting agriculture.

Future Development

Future development could potentially increase vulnerability to this hazard by increasing demand on the utilities and increasing the exposure of infrastructure networks.

3.3.4 Future Land Use and Development

For the most part, Rush County is not experiencing population growth. Table 3.52 provides information on changes in population and housing units in the planning area. All jurisdictions within the planning area are experiencing a decline in population. The City of Alexander population decreased the most with a 22 percent decrease from 1990 to 2007. Although the population is declining in the planning area, number of housing units increased slightly in La Crosse, McCracken, and Rush Center. The cities of Alexander, Bison, Liebenthal, Otis, Timken, and the unincorporated county saw a decrease in housing units for the period 1990-2000. Despite the overall lack of population growth, some development and construction continues, and the communities should monitor new development to ensure that it does not take place in hazard-prone areas, specifically in the floodplains, dam inundation areas and the wildland-urban interface.

Table 3.52. Change in Population and Housing Units

Location	1990 Population	2000 Population	2007 Population	Percent Change 1990-2007	1990 Housing Units	2000 Housing Units	Percent Change 1990-2000
Alexander	85	75	66	-22%	47	42	-11%
Bison	252	235	207	-18%	122	120	-2%
La Crosse	1,427	1,376	1,234	-14%	711	720	1%
Liebenthal	112	111	101	-10%	58	56	-3%
McCracken	231	211	191	-17%	137	139	1%
Otis	385	325	300	-22%	183	170	-7%
Rush Center	177	176	163	-8%	97	99	2%
Timken	87	83	76	-13%	52	51	-2%
Rush County	3,842	3,551	3,211	-16%	1,999	1,928	-4%

Source: Source: U.S. Census Bureau; http://budget.ks.gov/files/FY2010/KS_Certified_Population_July2008.xls

Planned Development/Expansion Activities

Linde World Wide (formerly BOC Gases) of Otis, the second largest helium extraction plant in the world, is in process of an expansion.

In late 2008, I.A.C.X. Energy, LLC, established a nitrate scrubber plant north of the helium plant in Otis.

Most of the growth the planning area is experiencing currently is related to energy companies. A major power line distribution line is planned in the next three years and will cross the county. The exact location for this planned distribution line is unknown.

In late 2008, West Wind Energy, LLC, purchased the former Ochs, Inc. building in Otis. The company remanufactures wind turbines and currently employs 6 full-time people, with plans to expand the work force to 15-20 by summer 2009. The first of two wind turbines were installed in the spring of 2009. Demand is reportedly strong.

A major power distribution line is planned to traverse Rush County originating from a wind farm in southwest Kansas. This line has the capacity to serve additional wind farms.

The LaCrosse Livestock Market handles about 50,000 head per year. The owner has plans for an expansion to the holding pens in the near future.

Several new homes have been constructed in the past few years. Most recently, two large homes were constructed east of La Crosse in a new development area.

In 2008, the City of Bison received a block grant to be used for the demolition or rehabilitation of un-livable homes in the community.

The City of La Crosse continues to enforce an ordinance requiring the rehabilitation or demolition of unoccupied structures. Most other cities within the county have enforced similar ordinances.

In November 2008, Rush County citizens voted a $4 million bond issue to expand and update the hospital. Construction is slated to begin in summer 2009 with completion scheduled in about one year.

3.4 Summary of Key Issues

Table 3.53 shows the results of the Hazard Ranking in order of High to Low Planning Significance based on the methodology described in section 3.1.

Table 3.53 Rush County Hazard Ranking-High to Low Planning Significance

Hazard	Warning Time	Duration	Magnitude/ Severity	Probability of Future Events	Calculated Priority Risk Index	Planning Significance
Utility Infrastructure	4	3	3	4	3.6	High
Wildfire	4	2	3	4	3.5	High
Hail Storm	4	1	3	4	3.4	High
Winter Storm	2	3	3	4	3.3	High
Wind Storm	2	2	2	4	2.9	Moderate
Tornado	4	1	2	3	2.65	Moderate
Drought	1	4	2	3	2.5	Moderate
Flood	4	2	2	2	2.3	Moderate
Agricultural Infestation	1	4	2	2	2.05	Moderate
Soil Erosion / Dust	1	4	2	2	2.05	Moderate
Lighting	4	1	1	2	1.90	Low
Dam & Levee Failure	2	4	2	1	1.75	Low
Extreme Temperatures	1	4	1	2	1.75	Low

The following section summarizes key issues and questions for the planning committee brought out by the risk assessment.

Utility/Infrastructure Failure

- Can be a secondary impact of many other hazards including hailstorm, winter storm, windstorm, tornado, flood, lightning, dam and levee failure, and extreme temperature.

Wildfire

- From 2003-2006, Rush County lost 1,058 acres to wildfires.

Hailstorm

- 203 events in a 51.3 year period caused $3,792,000 in property damages and $7,500,000 in crop damages.

Winter Storm

- Three out of the seven major presidential disaster declarations since 1955 in Rush County have been related to Winter Storm.

- Damages to power lines and poles occurs with winter storms
- Damages to roads widespread in Rush County, exacerbated by heavy electrical utility vehicles repairing power lines
- DR-1675was one of Kansas' worst disasters on record.
- Winter storm can impact ranchers making it impossible to feed and water livestock
- Causes closure of businesses and schools

Windstorm

- Rush County is in Wind Zones III and IV with winds as high as 200-250 mph
- 52 separate thunderstorm/wind events in Rush County between 1993 and 2008 caused $1,156,000 in property damages and $165,000 in crop damages.
- Causes power outages from downed power lines
- Mobile homes, campers and light buildings at increased risk of damages.

Tornado

- 29 tornado events in Rush County between January 1950 and December 2008
- 8 injuries and over $591,000 in reported property damages
- Do Rush County schools have tornado saferooms?
- Do residents have adequate shelter areas available to them?
- Are indoor and outdoor warning systems adequate?

Drought

- City of Alexander is a drought vulnerable public water supply
- USDA crop insurance payments as a result of drought totaled $2,902,847 from 2005-2007.

Flood

- La Crosse, Rush Center, and Timken participate in the National Flood Insurance Program—the unincorporated county and other cities do not participate in the program—flood insurance is not available to residents in those areas.
- 100-year flood scenario shows damages in all areas of the county except Bison and Otis
- The area with the highest amount of affected population is La Crosse followed by Rush Center and the unincorporated portions of the county.
- Critical facilities in the 100-year floodplain
- The power line that supplies the hospital, rest home and assisted living center runs through a flood zone area and a small pasture that cannot be accessed in adverse weather
- The power line that supplies the sewer plant in La Crosse runs through a pasture that is vulnerable to flooding.

Agricultural Infestation

- Agriculture is important to the economy of Rush County

Lightning

- Can cause power outages, damage electronic equipment
- Previous events have started structure fires

Dam and Levee Failure

- Thirty-six state- regulated dams in Rush County

- Seven significant hazard dams in the county
- One high hazard and one significant hazard dam in Ness County could impact Rush County
- Dam Breach Analysis and Emergency Action Plans are only available for 5 of the significant hazard dams
- Emergency Action Plans for 5 significant hazard dams show following vulnerabilities: highways (4 locations), railroads (4 locations), county roads (numerous), City Roads in Rush Center, house inundations (4), house evacuations (13)

Extreme Temperatures

- Persons over 65 are especially vulnerable. Rush County and all incorporated cities exceed the state and national averages for percent of persons over age 65.
- Persons below poverty level may not be able to afford air conditioning/adequate heat. Alexander's percent population that is below the poverty level is more than three times the state average. Timken, Liebenthal, and McCracken also have a slightly higher percentage below the poverty level than the state and national averages.
- Both extreme heat and extreme/unseasonable cold can adversely impact crops

4 MITIGATION STRATEGY

44 CFR Requirement 201.6(c)(3): The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.

This section presents the mitigation strategy developed by the Hazard Mitigation Planning Committee (HMPC) based on the risk assessment. The mitigation strategy was developed through a collaborative group process and consists of general goal statements to guide the jurisdictions in efforts to lessen disaster impacts as well as specific mitigation actions that can be put in place to directly reduce vulnerability to hazards and losses. The following definitions are based upon those found in FEMA publication 386-3, *Developing a Mitigation Plan* (2002):

- **Goals** are general guidelines that explain what you want to achieve. Goals are defined before considering how to accomplish them so that they are not dependent on the means of achievement. They are usually long-term, broad, policy-type statements.
- **Mitigation Actions** are specific actions that help achieve goals and objectives.

4.1 Goals

44 CFR Requirement 201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

The HMPC developed goals to provide direction for reducing hazard-related losses in Rush County. These were based upon the results of the risk assessment and a review of mitigation goals from other state and local plans, specifically, the Kansas Hazard Mitigation Plan, 2007 and the Rush County Basic Operations Plan. This review was to ensure that this plan's mitigation strategy was integrated or aligned with existing plans and policies.

Through a brainstorming process at their second meeting, the HMPC came to a consensus on three main goals. The Goals of the mitigation strategy are listed below, in no particular order:

- Goal 1: Improve the level of responder, government, business, and citizen awareness and preparedness for disaster in Rush County.
- Goal 2: Adopt new or modify existing policies / regulations that will reduce the potential damaging effects of natural hazards in Rush County.
- Goal 3: Reduce or eliminate the impact of disasters to residents and property in Rush County through mitigation actions.

4.2 Identification and Analysis of Mitigation Actions

44 CFR Requirement §201.6(c)(3)(ii): The mitigation strategy shall include a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

During the second meeting of the HMPC, the draft risk assessment was provided to the HMPC committee members for review. After reviewing the draft risk assessment, the committee discussed in detail, the key issues that were identified for specific hazards (provided in meeting #2 meeting minutes) In addition, AMEC provided the HMPC with information on the Kansas division of Emergency Management HMGP funding priorities and the types of mitigation actions generally recognized by FEMA. A handout was provided with the following types of mitigation actions, which originated from the National Flood Insurance Program's Community Rating System, as well as definitions and examples for each type of action:

- **Prevention:** Administrative or regulatory actions or processes that influence the way land and buildings are developed and built
- **Property protection:** Actions that involve the modification of existing buildings or structures to protect them from a hazard or remove them from the hazard area
- **Structural:** Actions that involve the construction of structures to reduce the impact of hazard
- **Natural resource protection:** Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems
- **Emergency services**: Actions that protect people and property during and immediately after a disaster or hazard event
- **Public education and awareness:** Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them.

Committee members engaged in discussion regarding the types of mitigation actions or projects that could be implemented in the planning area. Appendix C contains a comprehensive list of the types of actions discussed. Consideration was given to the identified key issues and the anticipated success of each project type. HMPC committee members discussed issues such as how many shelter projects the county could reasonable support and where best to place shelters if funds were limited. Projects such as emergency preparedness drills were discussed, but it was decided, these types of actions would be given a low priority for this mitigation planning effort as these types of actions occur on a routine basis as requirements of other plans, such as the local emergency operations plan. Additionally, complex projects which would necessitate extensive personnel resources were discussed. This type of group discussion allowed the committee as a whole to understand the broad priorities and discussion of the types of projects most beneficial to all jurisdictions within Rush County.

4.3 Implementation of Mitigation Actions

44 CFR Requirement §201.6(c)(3)(ii): The mitigation strategy shall include an action strategy describing how the actions identified in paragraph (c)(2)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefits review of the proposed projects and their associated costs.

Projects were discussed within the context of the STAPLEE criteria and the likelihood of success/failure for each action. STAPLEE is a tool used to assess the costs and benefits, and overall feasibility of mitigation actions. STAPLEE stands for the following:

- **Social**: Will the action be acceptable to the community? Could it have an unfair effect on a particular segment of the population?
- **Technical**: Is the action technically feasible? Are there secondary impacts? Does it offer a long-term solution?
- **Administrative**: Are there adequate staffing, funding, and maintenance capabilities to implement the project?
- **Political**: Will there be adequate political and public support for the project?
- **Legal**: Does your jurisdiction have the legal authority to implement the action?
- **Economic**: Is the action cost-beneficial? Is there funding available? Will the action contribute to the local economy?
- **Environmental**: Will there be negative environmental consequences from the action? Does it comply with environmental regulations? Is it consistent with community environmental goals?

Throughout the discussion of the types of projects that the committee would include in the mitigation plan, emphasis was placed on the importance of a benefit-cost analysis in determining project priority. The Disaster Mitigation Act regulations state that benefit-cost review is the primary method by which mitigation projects should be prioritized. Recognizing the federal regulatory requirement to prioritize by benefit-cost, and the need for any publicly funded project to be cost-effective, the HMPC decided to pursue implementation according to when and where damage occurs, available funding, political will, jurisdictional priority, and priorities identified in the Kansas Hazard Mitigation Plan. Due to many variables that must be examined during project development, the benefit/cost review at the planning stage, will primarily consist of a qualitative analysis. For each action, the jurisdictions will list, in narrative form, the types of benefits that could be realized with implementation of the action. Where possible, the cost will be estimated as closely as possible with further refinement to occur as project development occurs. Cost-effectiveness will be considered in additional detail when seeking FEMA mitigation grant funding for eligible projects identified in this plan. At that time, additional information will be researched to provide for a quantitative benefit-cost analysis.

After the group brainstorming session, individual jurisdictions were instructed to coordinate meetings with his or her jurisdictional planning team (where available) to discuss mitigation actions and to complete the mitigation action worksheets and STAPLEE Worksheets for each

action that they wanted to include in the plan. Committee members were instructed to return completed action worksheets to AMEC.

Initially, the planning committee considered prioritizing the actions chosen for inclusion in the plan as a group. However, after the planning committee members, in coordination with their jurisdictional planning teams, determined the actions to include in the plan, it was decided that each individual jurisdiction should separately prioritize the actions they chose to include in the plan. This decision was made to avoid "competition" among jurisdictions in prioritizing actions. The priority level assigned by each jurisdiction to the actions they submitted to the plan is indicated by a high, medium, or low priority level.

Tables 4.1 through 4.6 summarize the mitigation actions that the participating jurisdictions selected to submit to the plan. The mitigation action implementation worksheets follow the action table for each jurisdiction. Table 4.1 includes actions submitted by Rush County. Following in Tables 4.2 through 4.5 separate tables provide the actions developed by each incorporated city. The actions submitted by the school district are provided in Table 4.6. The rural electric cooperative, Midwest Energy also contributed to the mitigation strategy. Their actions are summarized in Table 4.7. Each table also provides the priority level, the STAPLEE score, plan goals addressed, and the hazards addressed.

4.3.1 Actions Developed by Rush County

Table 4.1. Mitigation Action Matrix-Unincorporated County/County Health Department/Multi-jurisdictional Actions

Action ID	Action	Priority	STAPLEE Score	Goals	Hazards Addressed
County-1	Culvert Upgrades	M	22	3	flooding
County-2	County Road O Flood Mitigation	H	21	3	flooding
County-3	Additional Tornado Shelter Entrance	H	17	3	tornadoes, windstorm
County-4	Public Education Disaster Guide	M	16	1	All Hazards

Rush County-1	Culvert Upgrades
Issue/Background:	Several drainage culverts across the county need to be upgraded to help reduce flooding of the roads.
Plan for Implementation and Administration:	1. Remove silted material from ditches and drainage ways into culverts crossing county roads. Areas that need attention include, but are not limited to: Avenue M and County Road 360. 2. Increase sizes of culverts to carry additional flow where deemed appropriate. 3. Raise road elevation where necessary.
Alternatives to Project	Close roads during flooding events (current situation)
Lead Agency:	Rush County Highway Department
Partners:	Rush County Emergency Management, FEMA, KDEM
Potential Funding Source:	HMGP
Total Cost:	To Be Determined
Benefits (Losses Avoided):	Some of the damages to roads during flooding events will be avoided
Completion Date:	To Be Determined

Rush County-2	County Road O Flood Mitigation
Issue/Background:	At County Road O, ½ mile west of County Road 360, the creek crosses the road. The ingress and egress of the crossing at this location are at a higher elevation level than the portion of the road crossing the creek. Consequently, each significant rain or storm event floods the road. Flooding at this location typically ranges from 1-10 feet at times. This requires constant visual checking and barricades when necessary. County Road O is a significant east/west road in the County.
Plan for Implementation and Administration:	1. Replace current culverts with larger ones, perhaps additional culverts as well. 2. Using fill material, raise the portion of County Road O to the same elevation as the current ingress/egress elevation.
Alternatives to the Project:	Construct a bridge meeting KDOT specifications across this low area. Continue to monitor and close road during flooding
Lead Agency:	Rush County Highway Department
Partners:	Rush County Emergency Management, KDEM, FEMA
Potential Funding Source:	HMGP
Total Cost:	To Be Determined
Benefits (Losses Avoided):	Flooding to this portion of the road could be eliminated; Continuous monitoring and closure of the road during flooding could be avoided. Constant repairs to the road at this location could be avoided. Inconvenience to area residents during road closure could be avoided. Possibility of injury or death from automobiles being swept off roadway could be avoided.
Completion Date:	To Be Determined

Rush County-3	Additional Tornado Shelter Entrance
Issue/Background:	When the health department is not open, residents in the exercise room and physical therapy area are unable to access the basement tornado shelter in case of a storm.
Plan for Implementation and Administration:	1. Review FEMA requirements 2. Investigate retrofitting area to provide an alternate access to the basement area
Alternatives to the Project:	Educate staff and personnel on other safe areas in the building that would be an alternate to the basement.
Lead Agency:	Rush County Health Department
Partners:	Rush County Emergency Management, KDEM, FEMA
Potential Funding Source:	HMGP
Total Cost:	$10,000
Benefits (Losses Avoided):	Life Safety
Completion Date:	To Be Determined

Rush County-4	Public Education Disaster Guide
Issue/Background:	Citizens of Rush County need additional information/resources regarding steps to take in the event of an emergency or disaster event. Ellis County Emergency Management has prepared a resource guide for this purpose. This guide could be modified to meet the needs of Rush County Residents.
Plan for Implementation and Administration:	Modify Ellis County emergency/disaster resource guide to meet the needs of Rush County. This resource guide would list contact names and numbers of persons living in neighborhoods. In the event of a disaster, families would check on their neighbors to see that everyone is okay and then organize flood, shelter, water, and emergency care until help arrives.
Alternatives to the Project:	Continue with education information through the local newspaper and county website.
Lead Agency:	Rush County Emergency Management
Partners:	Other County departments, City governments, KDEM
Potential Funding Source:	Grants, local funds, private sponsors
Total Cost:	$2,000
Benefits (Losses Avoided):	Residents would be better prepared in the event of an emergency or disaster event.
Completion Date:	In process

4.3.2 Actions Developed by the City of Bison

Table 4.2. Mitigation Action Matrix-Bison

Action ID	Action	Priority	STAPLEE Score	Goals	Hazards Addressed
Bison-1	Stormwater Drainage Improvements	H	25	3	flooding
Bison-2	Utility Line Clearance	M	24	3	Lightning, tornado, utility/infrastructure failure, windstorm, winter storm

Bison-1	Stormwater Drainage Improvements
Issue/Background:	The City of Bison is situated on very flat terrain. Stormwater takes a long time to grain. The original culverts are too small and have silted shut. In addition, ditches and gutters have filled with silt forcing water into the streets. One concrete low water crossing ahs sunk. The drainage ditches which receive the water also need improvement.
Plan for Implementation and Administration:	1. Remove all old 4-inch gas pipe culverts in town and replace with minimum 18-inch culverts. The total number of culverts that need replacement is unknown at this time and must be determined. 2. Clan and re-open silted ditches adjacent to streets 3. Replace/repair concrete curbs and gutters 4. Remove, raise and replace concrete low water crossing 5. Improve flow lines of drainage ditches carrying water away from town.
Alternatives to the Project:	Doing nothing will result in surface flooding and pooling of water to continue.
Lead Agency:	City of Bison
Partners:	Rush County Emergency Management
Potential Funding Source:	HMGP
Total Cost:	To Be Determined
Benefits (Losses Avoided):	Damages to city streets could be avoided
Completion Date:	To Be Determined

Bison-2	Utility Line Clearance
Issue/Background:	There are large elm trees next to the city streets. Branches extend in to power lines and overhang streets. Wind and ice break branches (and potentially lightning), damage power lines and clog streets with debris.
Plan for Implementation and Administration:	1. Remove dead or dying trees from right-of way 2. Remove tree branches over existing power lines 3. Eliminate tree limbs overhanging city streets
Alternatives to the Project:	If nothing is done, power outages will continue. Clearance of lines could be done incrementally. However power outages and debris removal will continue until problem is completely addressed.
Lead Agency:	City of Bison
Partners:	Utility providers
Potential Funding Source:	To Be Determined
Total Cost:	To Be Determined
Benefits (Losses Avoided):	Last debris removal cost $7,000 and power was out for 2 days. These costs could be avoided by this project.
Completion Date:	To Be Determined

4.3.3 Actions Developed by the City of La Crosse

Table 4.3. Mitigation Action Matrix-La Crosse

Action ID	Action	Priority	STAPLEE Score	Goals	Hazards Addressed
La Crosse-1	Nursing Home Feeder Upgrade	H	22	3	flooding, utility/infrastructure failure, windstorm, lightning, winter storm
La Crosse-2	Utility Line Clearance	H	23	3	Tornado, windstorm, winter storm, utility/infrastructure failure
La Crosse-3	Sewer Plant Power Line Relocation	M	21	3	Utility/Infrastructure Failure
La Crosse-4	Enforcement of Floodplain Requirements	L	16	2,3	Flood

La Crosse-1	Nursing Home Feeder Upgrade
Issue/Background:	Currently the power line that services the Rush County Nursing Home runs through a pasture that has a creek in it. In severe or wet weather, repair crews cannot access the area.
Plan for Implementation and Administration:	1. lay out new route to relocate the line 2. determine needed materials 3. price materials 4. obtain bids from qualified contractors 5. implement project
Alternatives to the Project:	Doing nothing results in continued risk of power outages to nursing home
Lead Agency:	City of La Crosse
Partners:	None Specified
Potential Funding Source:	HMGP
Total Cost:	$60,000
Benefits (Losses Avoided):	Eliminating or shortening length of power outages to Rush County Nursing Home
Completion Date:	To Be Determined

La Crosse-2	Utility Line Clearance
Issue/Background:	Branches falling on utility lines during wind, winter storm, and potentially lightning events cause power outages.
Plan for Implementation and Administration:	1. Determine locations that need to be trimmed. 2. Develop a plan to start with the areas that receive the worst damages. 3. Obtain bids from qualified contractors 4. Hire contractor 5. Implement project utilizing plan in step 2
Alternatives to the Project:	Trim trees with the city's 2-main crew when time allows.
Lead Agency:	City of La Crosse
Partners:	None Specified
Potential Funding Source:	To Be Determined
Total Cost:	$20,000
Benefits (Losses Avoided):	Reduce or eliminate power outages from severe weather
Completion Date:	To Be Determined

La Crosse-3	Sewer Plant Power Line Relocation
Issue/Background:	The power line that serves the sewer plant is in the middle of a bunch of trees. This area is inaccessible.
Plan for Implementation and Administration:	1. Develop plan to relocate the power line underground along the road right-of-way 2. Price and order materials 3. obtain bids from a qualified contractor to do trenching work 4. Implement project utilizing contractor to dig trench and city crews to do the remaining work
Alternatives to the Project:	Doing nothing will result in the sewer plant remaining vulnerable to power outages
Lead Agency:	City of La Crosse
Partners:	KDEM, FEMA
Potential Funding Source:	HMGP
Total Cost:	$17,500
Benefits (Losses Avoided):	Reduce or eliminate power outages to the sewer plant
Completion Date:	To Be Determined

La Crosse-4	Enforcement of Floodplain Requirements
Issue/Background:	La Crosse is currently a participant in good standing in the National Flood Insurance Program and intends to continue compliance with this program, regulating development in the floodplain in accordance with their floodplain ordinance.
Plan for Implementation and Administration:	Enforcement of Existing floodplain ordinance and education to the public
Alternatives to the Project:	If the City does not continue compliance with the requirements of the National Flood Insurance Program, unregulated development could occur in the floodplain and flood insurance would be inaccessible to property owners in the City.
Lead Agency:	City of La Crosse
Partners:	Rush County Emergency Management, FEMA, Kansas Department of Agriculture, Division of Water Resources
Potential Funding Source:	Local funds
Total Cost:	$5,000 est. staff time/cost
Benefits (Losses Avoided):	Flood Insurance available to property owners and regulation of development in the floodplain to reduce future damages.
Completion Date:	ongoing

4.3.4 Actions Developed by the City of McCracken

Table 4.4. Mitigation Action Matrix-McCracken

Action ID	Action	Priority	STAPLEE Score	Goals	Hazards Addressed
McCracken-1	Re-join the National Flood Insurance Program	H	24	2,3	flood

McCracken-1	Re-join the National Flood Insurance Program
Issue/Background:	The City of McCracken was a participant in the NFIP. However, in November 1975, the City was sanctioned. During the planning process, the City voted to re-join the National Flood Insurance Program.
Plan for Implementation and Administration:	The City has been working with the Kansas Department of Agriculture, Division of Water Resources to complete the necessary steps to re-join the program, including adoption and enforcement of a floodplain management ordinance.
Alternatives to the Project:	Doing nothing would result in the unavailability of flood insurance in the city. In addition, the City may not regulate development as effectively without a floodplain management ordinance in effect.
Lead Agency:	City of McCracken
Partners:	FEMA, Kansas Department of Agriculture, Division of Water Resources, Rush County Emergency Management
Potential Funding Source:	City Budget
Total Cost:	Unknown
Benefits (Losses Avoided):	Prevent development on the floodplain and provide availability of flood insurance to property owners.
Completion Date:	6 months

4.3.5 Actions Developed by the City of Rush Center

Table 4.5. Mitigation Action Matrix-Rush Center

Action ID	Action	Priority	STAPLEE Score	Goals	Hazards Addressed
Rush Center-1	Continued Compliance with the National Flood Insurance Program Floodplain Ordinance	H	26	2,3	Flooding
Rush Center-2	Install Sewer Lagoon	H	24	3	Flooding

Rush Center-1	Continued Compliance with the National Flood Insurance Program Floodplain Ordinance
Issue/Background:	The City of Rush Center currently participates in the National Flood Insurance Program and is in good standing
Plan for Implementation and Administration:	The City of Rush Center will continue to participate in the National Flood Insurance Program including enforcement of the current floodplain management ordinance.
Alternatives to the Project:	Do Nothing—this would result in inaccessibility of flood insurance for property owners and development in the floodplain would not be regulated, resulting in potential future damages
Lead Agency:	City of Rush Center
Partners:	Rush County Emergency Management, FEMA, Kansas Department of Agriculture, Division of Water Resources
Potential Funding Source:	City budget
Total Cost:	Estimated $500/year
Benefits (Losses Avoided):	Availability of flood insurance, regulation of development in the floodplain to reduce future damages.
Completion Date:	Ongoing

Rush Center-2	Install Sewer Lagoon
Issue/Background:	With the current sludge treatment facility, there is the potential for raw sewage to be dumped into Walnut Creek if flooding conditions occur. The City currently has hired an engineer to develop a feasibility study for this project. However, funding to implement the project has not yet been secured.
Plan for Implementation and Administration:	Construct a new sanitary sewer 90-day effluent storage lagoon facility downstream from the existing sludge treatment facility, floating pumping station, and 4" force main. 1-site acquisition 2-irrigation land acquisition 3-construction of storage lagoon
Alternatives to the Project:	1-construct pipeline to La Crosse to carry sewage at a cost of $900,000 2-construct 3 storage lagoons north of the city at a cost of $1.2 Million
Lead Agency:	City of Rush Center
Partners:	None Specified
Potential Funding Source:	HMGP
Total Cost:	$352,300
Benefits (Losses Avoided):	Prevention of sewage being dumped in Walnut Creek during flooding.
Completion Date:	Ongoing

4.3.6 Actions Developed by Unified School District 395

Table 4.6. Mitigation Action Matrix-Unified School District 395

Action ID	Action	Priority	STAPLEE Score	Goals	Hazards Addressed
USD 395-1	Construct Saferooms in Schools	M	23	3	Tornado, Windstorm

USD 395-1	Construct Saferooms in Schools
Issue/Background:	Rush County is located in tornado-prone Kansas. The schools do not currently have saferooms built to FEMA standards to withstand an F5 tornado
Plan for Implementation and Administration:	Construct saferooms in accordance with FEMA standards
Alternatives to the Project:	Evaluate existing shelter locations and possibly retrofit for increased protection
Lead Agency:	USD 395 District Office/Superintendent
Partners:	N/A
Potential Funding Source:	Grants and/or local funds
Total Cost:	$250,000 per saferoom
Benefits (Losses Avoided):	Life safety
Completion Date:	3 months from securing funds

4.3.7 Actions Developed by Rural Electric Cooperatives

Table 4.7. Mitigation Action Matrix-Electric Cooperatives

Action ID	Action	Priority	STAPLEE Score	Goals	Hazards Addressed
Midwest Energy-1	Replace 14 Tie-Line structures	H	19	3	Windstorm, tornadoes
Midwest Energy-2	Replace 14 distribution poles	H	19	3	Windstorm, tornadoes

Midwest Energy-1	**Replace 14 Tie-Line structures that supply energy to the City of Lacrosse, Kansas.**
Issue/Background:	The service area has been subject to high winds and tornados over the past years. Existing structures have been changed out as high winds and tornadoes have caused damage to the tie-line. These remaining 14 structures do run through the town of Lacrosse. These structures are 115 KV Vertical Construction.
Plan for Implementation and Administration:	These 14 structures have not been changed in two aforementioned occurrences. This project would replace theses existing 14 structures that feed the City of Lacrosse.
Alternatives to the Project:	Do nothing
Lead Agency:	Midwest Energy, Inc.
Partners:	N/A
Potential Funding Source:	FEMA/KDEM
Total Cost:	$73,853
Benefits (Losses Avoided):	Reduction of power outages including Municipal serves such as water, wastewater, and electricity to homes, schools and hospitals and critical care facilities.
Completion Date:	12 months from receipt of funds

Midwest Energy-2	Replace 14 distribution poles that can serve as an alternate feed to the City of Lacrosse if primary feed is severed
Issue/Background:	This service area is subject to high winds and tornadoes. Existing storms have damaged the line in the past
Plan for Implementation and Administration:	Replace 14 distribution poles that can serve as a back feed to the City of Lacrosse if the primary feed becomes disabled.
Alternatives to the Project:	Do nothing
Lead Agency:	Midwest Energy, Inc.
Partners:	N/A
Potential Funding Source:	FEMA/KDEM
Total Cost:	$15,793
Benefits (Losses Avoided):	Reduction of power to the City of Lacrosse including Municipal services such as water, wastewater, and electricity to schools, homes and primary care facilities.
Completion Date:	12 months from receipt of funds

4.4 Mitigation Actions in Support of the National Flood Insurance Program

Of the communities participating in the plan, the cities of La Crosse and Rush Center are currently participating in the National Flood Insurance Program. Additionally, through the planning process, the City of McCracken determined to re-join the National Flood Insurance Program. Specific actions that were identified in support of the National Flood Insurance Program are summarized in Table 4.8 below:

Table 4.8 Specific Actions in Support of the NFIP

Action ID	Action
La Crosse-4	Enforcement of Floodplain Requirements
Rush Center-1	Continued Compliance with the National Flood Insurance Program Floodplain Ordinance
McCracken-1	Re-join the National Flood Insurance Program

Specifics on implementation of each of the above actions can be found in Section 4.3 in the tables following each jurisdiction's complete list of identified actions.

5 PLAN MAINTENANCE PROCESS

This chapter provides an overview of the overall strategy for plan maintenance and outlines the method and schedule for monitoring, updating, and evaluating the plan. The chapter also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

5.1 Monitoring, Evaluating, and Updating the Plan

44 CFR Requirement 201.6(c)(4): The plan maintenance process shall include a section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

5.1.1 Hazard Mitigation Planning Committee

With adoption of this plan, the Rush County Local Emergency Planning Committee (LEPC) will be tasked with monitoring, evaluating, and maintaining the plan. Most members of the HMPC that was formed for this planning effort are also members of the LEPC. The HMPC discussed the best method for reviewing the hazard mitigation plan on an annual basis. The group agreed that putting the plan on the LEPC agenda, at least annually, would be the most effective and efficient to monitor the mitigation plan. The Rush County Emergency Manager will coordinate the meeting time and place and notify other members. Thos HMPC committee members not currently on the LEPC were encouraged to join the LEPC. The participating jurisdictions and agencies, led by Rush County Emergency Management, agree to:

- Meet annually and after each local disaster to monitor and evaluate the implementation of the plan;
- Act as a forum for hazard mitigation issues;
- Disseminate hazard mitigation ideas and activities to all participants;
- Pursue the implementation of high priority, low- or no-cost recommended actions;
- Maintain vigilant monitoring of multi-objective, cost-share, and other funding opportunities to help the community implement the plan's recommended actions for which no current funding exists;
- Monitor and assist in implementation and update of this plan;
- Keep the concept of mitigation in the forefront of community decision making by identifying plan recommendations when other community goals, plans, and activities overlap, influence, or directly affect increased community vulnerability to disasters;
- Report on plan progress and recommended changes to the Rush County Board of Commissioners and governing bodies of participating jurisdictions; and
- Inform and solicit input from the public.

The primary duty of the LEPC in relation to this plan is to see it successfully carried out and to report to the community governing boards and the public on the status of plan implementation and mitigation opportunities. Other duties include reviewing and promoting mitigation proposals, hearing stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information on the County website.

5.1.2 Plan Maintenance Schedule

The LEPC will include a discussion of the mitigation plan on the agenda at least once annually and after each local disaster event to monitor progress and update the mitigation strategy. The Rush County Emergency Manager is responsible for initiating the plan reviews. In conjunction with the other participating jurisdictions and additional jurisdictions that may choose to participate in the future, a five-year written update of the plan will be submitted to the Kansas Division of Emergency Management and FEMA Region VII per Requirement §201.6(c)(4)(i) of the Disaster Mitigation Act of 2000 and adopted by participating jurisdictions within a five-year period from the final approval of this plan unless disaster or other circumstances (e.g., changing regulations) require a change to this schedule.

5.1.3 Plan Maintenance Process

Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in the plan. Changes in vulnerability can be identified by noting:

- Decreased vulnerability as a result of implementing recommended actions,
- Increased vulnerability as a result of failed or ineffective mitigation actions, and/or
- Increased vulnerability as a result of new development (and/or annexation).

Updates to this plan will:

- Consider changes in vulnerability due to action implementation,
- Document success stories where mitigation efforts have proven effective,
- Document areas where mitigation actions were not effective,
- Document any new hazards that may arise or were previously overlooked,
- Incorporate new data or studies on hazards and risks,
- Incorporate new capabilities or changes in capabilities,
- Incorporate growth and development-related changes to inventories, and
- Incorporate new action recommendations or changes in action prioritization.

In order to best evaluate any changes in vulnerability as a result of plan implementation, the participating jurisdictions will undergo the following process:

- A representative from the responsible office identified in each mitigation action will be responsible for tracking and reporting to the jurisdictional lead annually on action status. The

representative will also provide input on whether the action as implemented meets the defined objectives and is likely to be successful in reducing vulnerabilities.

- If the action does not meet identified objectives, the jurisdictional lead will determine what additional measures may be implemented, and an assigned individual will be responsible for defining action scope, implementing the action, monitoring success of the action, and making any required modifications to the plan.

Changes will be made to the plan to accommodate actions that have failed or are not considered feasible after a review of their adherence to established criteria, time frame, community priorities, and/or funding resources. Actions that were not ranked high but were identified as potential mitigation activities will be reviewed during the monitoring and update of this plan to determine feasibility of future implementation. Updating of the plan will be enacted through written changes and submissions, as Rush County Emergency Management and participating jurisdictions deem appropriate and necessary, and as approved by the Rush County Board of Commissioners and the governing boards of the other participating jurisdictions.

5.2 Incorporation into Existing Planning Mechanisms

44 CFR Requirement §201.6(c)(4)(ii):[The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

Where possible, plan participants will use existing plans and/or programs to implement hazard mitigation actions. Based on the capability assessments of the participating jurisdictions, communities in Rush County will continue to plan and implement programs to reduce loss of life and property from hazards. This plan builds upon the momentum developed through previous related planning efforts and mitigation programs, and recommends implementing actions, where possible, through the following means:

- Rush County Basic Operations Plan
- Rush County Economic Development Plan
- General or master plans of participating jurisdictions
- Ordinances of participating jurisdictions such as the county wide dam breach inundation zone ordinance
- Capital improvement plans and budgets
- Other community plans within the County either in existence or developed in the future such as water conservation plans, stormwater management plans, and parks and recreation plans, and wildfire protection plans.

The governing bodies of the jurisdictions adopting this plan will encourage all other relevant planning mechanisms under their authority to consult this plan to ensure minimization of risk to natural hazards as well as coordination of activities.

The risk assessment in this plan will provide information for the hazard analysis in the next update of the Rush County Basic Operations Plan. In the future, Rush County Emergency Management will attempt to coordinate the annual review and update of both the multi-hazard mitigation plan and the emergency operations plan to promote the integration of the two plans.

HMPC/LEPC members involved in updating these existing planning mechanisms will be responsible for integrating the findings and actions of the mitigation plan, as appropriate. The HMPC/LEPC is also responsible for monitoring this integration and incorporating the appropriate information into the five-year update of the multi-hazard mitigation plan.

5.3 Continued Public Involvement

44 CFR Requirement §201.6(c)(4)(iii): [The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.

The update process provides an opportunity to publicize success stories from the plan's implementation and seek additional public comment. Information will be posted in the *Rush County News* and on the County website following the annual review of the mitigation plan. A public hearing(s) to receive public comment on plan maintenance and updating will be held during the update period. When the HMPC/LEPC reconvenes for the update, it will coordinate with all stakeholders participating in the planning process, including those who joined the planning committee after the initial effort, to update and revise the plan. Public notice will be posted and public participation will be invited, at a minimum, through available website postings and press releases to local media outlets.

APPENDIX A: REFERENCES

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APPENDIX B: PLANNING PROCESS DOCUMENTATION

The following materials are provided to help document the planning process:

1. Rush County Hazard Mitigation Planning Committee (HMPC) Members
2. Letter of Invitation to Kickoff Meeting
3. Invitation List for Kickoff Meeting
4. Kickoff Meeting Agenda
5. Kickoff Meeting Sign-In Sheet
6. Kickoff Meeting Minutes
7. HMPC Meeting #2 Sign-In Sheet
8. HMPC Meeting #2 Minutes
9. Public Questionnaire Distributed During Drafting Stage
10. Letter of Invitation to Comment on Draft Plan
11. Invitation List to Comment on Draft Plan
12. Flyer Announcing Final Public Review Period
13. Articles Announcing Final Public Review Period

1. Rush County Hazard Mitigation Planning Committee Members

First	Name	Phone Number	Email	Organization	Meeting #1	Meeting #2
Susan	Belt			AMEC Earth & Environmental		
David	Coltrain	785-222-2710	coltrain@ksu.edu	Walnut Creek Extension	X	
James	Fisher	785-222-3537	emjrf@gbta.net	Rush County Emergency Preparedness/City of Bison	X	X
Kathy	Janousek	222-3427	3angels@gbta.net	Health Dept.	X	X
Bruce	Jones	222-2511		City of La Crosse	X	X
Jeff	Keener	785-372-4385		City of Rush Center		X
Kim	Knieling	222-3427	gdayangel@gbta.net	Health Dept.	X	X
Norman	Legleiter	785-356-4445	lounur@gbta.net	Rush Co. Commissioner	X	
Duane	Moeder	222-2511	dmlax@gbta.net	City of La Crosse	X	
Bruce	Reifschneider	222-3270	blr_007@hotmail.com	Rush Co. Fire Dist. #4	X	
Kara	Renz	785-372-4267	krenz@gbta.net	City of Rush Center/USD 395		X
Ben	Rogers	785-222-2812	wwcwj@gbta.net	Wet Walnut Watershed District 358		X
Steve	Samuelson	785-296-4622	steve.samuelson@kda.ks.gov	KDA / DWR	X	
George	Stover	785-222-2545	gstover@rcmhosp.org	Rush County Memorial Hospital		X
Sue	Woods	785-372-4428	swoods@gbta.net	City of Rush Center		X
John	Zeller	785-394-2413	zeke@gbta.net	City of McCracken		X

2. Letter of Invitation to Kickoff Meeting

2.2.09

Re: Rush County Hazard Mitigation Plan

In late 2008 , Rush County received funding to develop a hazard mitigation plan. The purpose of this plan is to reduce or eliminate long term risk to the people and property of Rush County from the effects of natural hazard events. The Federal Disaster Mitigation Act of 2000 requires all local governments to assess their risks to natural hazards and identify actions that can be taken in advance to reduce future losses. The law requires all local governments and district to have an approved Multi-Hazard Mitigation Plan after November 1, 2004 to be eligible for certain federal disaster assistance and hazard mitigation funding programs.

Rush County Emergency Preparedness has begun the process of developing this plan. Rush County has hired a consultant, AMEC Earth and Environmental, to manage the planning project. Funding for our consultant is provided by a grant from KDEM. AMEC will Facilitate the planning process, collect the necessary data , and perform other technical services, including preparing the risk assessment and plan document. However, Rush County Emergency Preparedness and AMRC will need your help and expertise to successfully complete this project.

The hazard mitigation planning process is heavily dependent on the participation of representatives from local government agencies and departments, the public and other stakeholder groups. A Hazard Mitigation Planning Committee (HMPC) will be formed to support this project and will include representation from Rush County, Rush County Communities, special districts and other local, state, and Federal agencies serving Rush County.

Your participation on the committee is requested due to your ability to contribute needed information, technical knowledge, or other valuable experience to the plan. If you cannot participate, please designate a representative to serve on the committee and attend the kickoff meeting, which will discuss the benefits of developing a hazard mitigation plan, the project schedule, and the hazards that affect Rush County.

Rush County Hazard Mitigation Plan
Kickoff Meeting
February 24,2009, 1:30P.M. - 3:30P.M.
Rush County Extension Office
702 Main
LaCrosse Ks 67548

Please respond as to whether or not you or your representative will be able to attend the kickoff meeting by contacting me at (785)222-3537 or E-Mail emjrf@gbta.net. Thank you for your attention and response to this important project. The meeting will be conducted by Susan Belt, Senior Planner for AMEC Earth and Environmental. Your input is vital and greatly appreciated.

James R Fisher

James R Fisher

Rush County Emergency Preparedness

3. Invitation List for Kickoff Meeting

a) Invited by letter from Emergency Manager

Barbara Matal
County Clerk

Health Dept
Kim & Kathy
611 Peace
LaCrosse Ks 67548

Wet Walnut Watershed
Ben Rogers
PO Box 207
LaCrosse Ks 67548

County Extension Agent
David Coltrain
702 Main
LaCrosse Ks 67548

Rocky Brown
Highway Dept

County Commission
Norman Legeilter
Larry Wiedeman
Martin Daubert

Roger Brack
Mayor of Otis
Otis Kansas 67565

Mayor of Timken
Maynard Schuckman

Ward Corsir
PO Box 173
LaCrosse Ks 67548

John Zeller
Mayor of McCracken
401 1st
McCracken Ks 67556

Mayor of Liebenthal
Norman Matal
Liebental Ks

City Manager
Duane Moeder
LaCrosse Ks 67548
785-222-2511

Bill Keeley
LaCrosse USD #395
PO Box 778
LaCrosse Ks 67548

John Vincent
Otis-Bison USD #403
District Office
301 W Eagle Ave
Otis Ks 67565

George Stover
PO Box 520
LaCrosse Ks 67548

Rush Co News
Tim Engel
LaCrosse Ks 67548

Western Cooperative Electric Association
Dennis Deines
635 S 13th
Wakeeney Ks 67672

Rush Co Emergency Preparedness
PO Box 160
LaCrosse Ks 67548

Midwest Energy, Inc.
Chuck Staab
PO Box 898
Hays Ks 67601-0898

Duane Renfrow
Mayor of LaCrosse
614 Columbia
LaCrosse Ks 67548

Bill Greenway
Fire Chief
PO Box 324
McCracken Ks 67556

Jeff Keener
Mayor of Rush Center
217 W Florence
Rush Center Ks 67575

Bruce Reifschneider
Fire Chief
306 E 13th
LaCrosse Ks 67548

Kathy Herrman
Appraisers Office

mark Bays
PO Box 93
Alexander, Ks
67513

Invitee list for Rush County Mitigation Plan

b) Invited by e-mail from AMEC

State & Federal Agencies	SORTED ALPHABETICALLY BY AGENCY	
George Teagarden, Livestock Commissioner Karen Domer, HS & EM Coordinator	Kansas Animal Health Department 708 S.W. Jackson Street Topeka, Kansas 66603	gteagarden@kda.ks.gov kdomer@kda.ks.gov
Reginald Robinson, President and CEO	Kansas Board of Regents 1000 SW Jackson St., Suite 520 Topeka, Kansas 66612-1368 (785) 296-3421	rrobinson@ksbor.org
Tom Morey, National Flood Insurance Program Steve Samuelson, National Flood Insurance Program Sandy Johnson, Agricultural Homeland Security and Emergency Management	Kansas Department of Agriculture Division of Water Resources Kansas Department of Agriculture 109 SW 9th Street, Second floor Topeka, Kansas 66612 Phone: (785) 296-5440 Fax: 785-296-4835	tmorey@kda.state.ks.us ssamuelson@kda.state.ks.us Sandy.Johnson@kda.state.ks.us
Salih Doughramaji, Community Development	Kansas Department of Commerce 1000 S.W. Jackson Street, Suite 100 Topeka, KS 66612-1354 Phone: 785-296-3610 Fax: 785-296-3776	salih@kansascommerce.com
Dr. Alexa Posny, Kansas Commissioner of Education	Kansas Department of Education 120 SE 10th Avenue Topeka, KS 66612-1182 (785) 296-3202	aposny@ksde.org
Cathy Tucker-Vogel	Kansas Department of Health and Environment Curtis State Office Building 1000 SW Jackson Topeka, KS 66612 (785) 368-7130	ctuckerv@kdhe.state.ks.us.
Ken Powell	Kansas Department of Health and Environment Curtis State Office Building 1000 SW Jackson Topeka, KS 66612 (785) 296-1121	KPowell@kdhe.state.ks.us

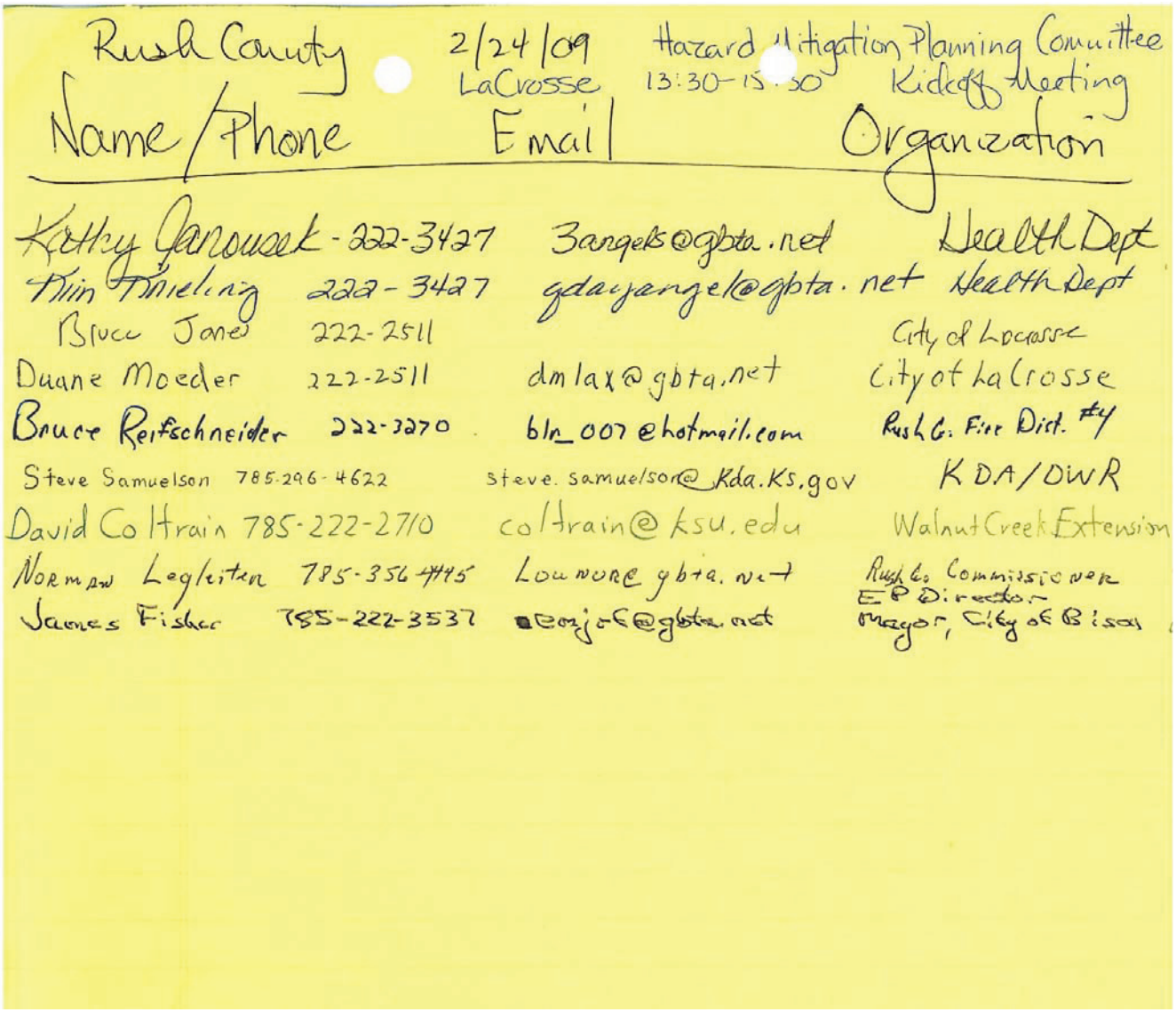
State & Federal Agencies	SORTED ALPHABETICALLY BY AGENCY	
Michael McNulty, BT Operations Officer	Kansas Department of Health and Environment Curtis State Office Building 1000 SW Jackson Topeka, KS 66612 (785) 296-5201	MCMcNult@kdhe.state.ks.us
Mark Krentz, Emergency Coordinator	Kansas Department of Transportation 700 S.W. Harrison Street Topeka, Kansas 66603-3754	krentz@ksdot.org
Rob Lader, Emergency Management Coordinator	Kansas Department of Wildlife and Parks (785) 273-6740	robl@wp.state.ks.us
Barbara Schoof Conant	Kansas Department on Aging Director of Public Affairs New England Building 503 South Kansas Avenue Topeka, KS 66603 (785) 296-6154	barbara.conant@aging.ks.gov
Brad Moeller, Hazard Mitigation Planner	Kansas Division of Emergency Management State Defense Bldg, Lower Level 2800 SW Topeka Blvd Topeka, KS 66611-1287	Brad.moeller@tag.ks.gov
Jacob Gray, Hazard Mitigation Officer	Kansas Division of Emergency Management State Defense Bldg, Lower Level 2800 SW Topeka Blvd Topeka, KS 66611-1287	Jacob.gray@tag.ks.gov
Jessica Frye, Homeland Security/GIS Coordinator	Kansas Division of Emergency Management State Defense Bldg, Lower Level 2800 SW Topeka Blvd	Jessica.frye@tag.ks.gov

State & Federal Agencies	SORTED ALPHABETICALLY BY AGENCY	
	Topeka, KS 66611-1287	
Dan Thompson	Kansas Fire Marshal's Office 700 SW Jackson St. Suite 600 Topeka, Ks. 66603-3714 (785) 296-3401	thompson@ksfm.state.ks.us
Capt Eric Pippin, Emergency Operations and assisted by Melanie Lawrence	Kansas Highway Patrol General Headquarters 122 SW 7th Topeka, KS 66603 (785) 368-8075 Capt Pippin (785) 368-7179 Ms. Lawrence	epippin@khp.ks.gov mlawrence@khp.ks.gov
Patrick Zollner, Director	Kansas Historical Society Cultural Resources 6425 SW Sixth Avenue Topeka KS 66615-1099 785-272-8681 (Telephone) 785-272-8682 (Fax)	pzollner@kshs.org
Robert Hoard, NAGPRA Coordinator	Kansas State Historical Society, 6425 SW Sixth Avenue, Topeka, KS (785) 272-8681 (extension 269)	rhoard@kshs.org
Ray Aslin, State Forester	Kansas State Forestry 2610 Claflin Road, Manhattan, KS 66502 785-532-3300 FAX 785-532-3305	raslin@ksu.edu Eward@ksu.edu hartmanj@ksu.edu rodney2@ksu.edu rhauck@ksu.edu
Tom Lowe	Kansas Water Office 109 SW 9th, Ste 300 Topeka, KS 66612	tlowe@kwo.state.ks.us
Andy Bailey, Warning	NOAA's National Weather Service	Andy.bailey@noaa.gov

State & Federal Agencies	SORTED ALPHABETICALLY BY AGENCY	
Coordination Meteorologist	Kansas City/Pleasant Hill, MO Weather Forecast Office 1803 North 7 Highway Pleasant Hill, MO 64080-9421 816-540-6021	
David Floyd, Warning Coordination Meteorologist	NOAA's National Weather Service Goodland, KS Weather Forecast Office 920 Armory Road Goodland, KS 67735-9273 785-899-7119	David.floyd@noaa.gov
Jeff Hutton, Warning Coordination Meteorologist	NOAA's National Weather Service Dodge City, KS Weather Forecast Office 104 Airport Road Dodge City, KS 67801-9351 620-225-6514	jeff.hutton@noaa.gov
Jennifer Stark, Warning Coordination Meteorologist	NOAA's National Weather Service Topeka, KS Weather Forecast Office 1116 NE Strait Avenue Topeka, KS 66616-1667 785-234-2592	Jennifer.stark@noaa.gov
Greg Gardner, Critical Infrastructure Protection Program Chuck Clanahan, Kansas Protective Security Advisor	US Department of Homeland Security	greg.gardner@dhs.gov chuck.clanahan@dhs.gov
Jud Kneuvean, Natural Disasters Program Manager	USACE, Kansas City District 601 E. 12th Street, Room 164 (OD-E) Kansas City, Missouri 64106-2896 (816) 983-3281	Eugene.J.Kneuvean@nwk02.usace.army.mil
Pete Navesky, Operations	USACE, Tulsa District 1645 S. 101st E. Ave. Tulsa, OK 74121-4629 (918) 669-7325 or 7327	peter.navesky@us.army.mil

4. Kickoff Meeting Agenda

5. Kickoff Meeting Sign-In Sheet



Rush County 2/24/09 Hazard Mitigation Planning Committee
LaCrosse 13:30–15:30 Kickoff Meeting

Name / Phone	Email	Organization
Kathy Janousek - 222-3427	3angels@gbta.net	Health Dept
Kim Knieling 222-3427	gdaiyangel@gbta.net	Health Dept
Bruce Jones 222-2511		City of Lacrosse
Duane Moeder 222-2511	dmlax@gbta.net	City of LaCrosse
Bruce Reifschneider 222-3270	blr_007@hotmail.com	Rush Co. Fire Dist. #4
Steve Samuelson 785-296-4622	steve.samuelson@kda.ks.gov	KDA/DWR
David Coltrain 785-222-2710	coltrain@ksu.edu	Walnut Creek Extension
Norman Legleiter 785-356-4445	Lounorc@gbta.net	Rush Co. Commissioner
James Fisher 785-222-3537	[illegible]@gbta.net	EP Director Mayor, City of Bison

6. Kickoff Meeting Minutes

Memo

To	**James Fisher, Rush County Emergency Management**
From	**Susan Belt, Senior Planner**
Tel / E-mail	**785-272-6830 / susan.belt@amec.com**
Date	**3/17/2009**
Subject	**Minutes from Rush County Mitigation Planning Kickoff Meeting held on 2/24/2009 in LaCrosse**

This document is a record of attendance, and a summary of the issues discussed during the above meeting, including an overview of natural hazard mitigation planning, identification of the planning committee, ideas for public involvement, identification of hazards affecting Rush County, and next steps in this process.

Attendees

Name	Agency Representing
David Coltrain	Walnut Creek Extension Office
James Fisher	City of Bison, Rush County Emergency Management
Kathy Janousek	Rush County Health Department
Bruce Jones	City of LaCrosse
Kim Knieling	Rush County Health Department
Norman Legleiter	Rush County Commission
Duane Moeder	City of LaCrosse
Bruce Reifschneider	Rush County Fire District #4
Steve Samuelson	Kansas Department of Agriculture / Division of Water Resources
AMEC Staff	
Susan Belt	AMEC

AMEC Earth & Environmental, Inc.
1129 SW Wanamaker Road , Suite 101
Topeka, KS 66604
Tel +(785) 272-6830
Fax +(785) 272-6878

Introductions

James Fisher, Rush County Emergency Manager, began the meeting by welcoming and thanking the attendees and introducing the consulting firm, AMEC Earth and Environmental, hired to assist in the development of the Rush County multi-jurisdictional hazard mitigation plan. Susan Belt, AMEC's designated planner facilitated the remainder of the meeting and answered questions from the group.

Overview of Natural Hazard Mitigation Planning

Mrs. Belt presented information on the purpose and requirements of the Disaster Mitigation Act of 2000. The presentation addressed the benefits, including eligibility for federal funding programs, for local governments and districts who are participating in the mitigation plan

Mrs. Belt also described the role of the Hazard Mitigation Planning Committee. Participation in the committee requires:

- Attending and participating in meetings,
- Providing available data as requested,
- Reviewing and commenting on plan drafts,
- Advertising and assisting with the public input process, and
- Coordinating the formal adoption.

The planning process consists of 10 steps (below) designed to meet the requirements of the Federal Disaster Mitigation Act and FEMA's associated guidance.

10-Step Mitigation Planning Process

10-Step Planning Process
1. Organize Resources
2. Plan for Public Involvement
3. Develop Risk Assessment
4. Identify Goals and Objectives
5. Identify Mitigation Actions
6. Establish Plan Maintenance Process
7. Draft the Plan
8. Review and Revise Plan
9. Submit the Plan
10. Adopt the Plan

Representatives from fire districts, cities, Rush County government, and other interested parties were present at the meeting and indicated intent to participating in the multi-jurisdictional plan. The group held a discussion regarding the needed involvement from all the cities, unified school districts and other "jurisdictions" in the planning process. Mr. Fisher indicated he would contact each jurisdiction again and provide them with handouts from the kickoff meeting.

Planning for Public Involvement

The meeting attendees discussed methods for involving stakeholders and the public in the plan. The group discussed methods that are routinely used to engage the public. Many members of the group also suggested the use of websites, school newsletters, and church bulletins. Use of water bills was also discussed for some cities. A community television station is also available if needed. The group felt it would be good idea to invite the press to the next meeting of the HMPC. The possibility of holding public meetings in the county was discussed and the idea rejected. The group indicated that this method had not been effective in the past for reaching the public. A copy of the draft plan will be placed in each public library for public comment during the final draft stage. Each member of the committee agreed to assist AMEC with conducting a brief survey of the public in their jurisdiction during the drafting stage of the plan.

Introduction to Hazard Identification

AMEC worked with the group to examine the prior hazard analysis developed for Rush County and worked through a list of potential hazards that could affect the planning area. They discussed past hazard events, types of damage, and where additional information might be found. Members of the group discussed the advantages and disadvantages of including man-made or technological hazards in the plan. After much discussion, the group decided that the man-made hazards of hazardous materials, major disease outbreak, radiological, and terrorism are hazards that are covered in sufficient detail in the Local Emergency Operations Plan and Rush County Public Health Plans. It was explained to the group that each hazard that is described in the state plan must be addressed in some way by the Rush County plan, but if a hazard is determined not to be of significance to Rush County, then it may be included with only a justification for no further analysis / mitigation. After discussing each hazard, the HMPC decided that Rush County was not sufficiently affected by earthquake, expansive soils, fog, and landslide and land subsidence and those hazards will not be included in the plan.

The hazards that the Rush County plan will focus on are:

• Agricultural Infestation • Dam and Levee Failure • Drought • Extreme Temperatures • Flood • Hailstorm	• Lightning • Soil Erosion and Dust • Tornado • Utility/Infrastructure Failure • Wildfire • Windstorm • Winter Storm

During the meeting, the HMPC actually reviewed each hazard (including those eventually not included in the plan) and assigned a score for Warning Time, Duration, Magnitude and Probability. Although the committee will review their decisions at the next meeting, below is the completed analysis showing the assigned Calculated Priority Risk Index. The CPRI is assigned using a formula utilized by the Kansas Hazard Mitigation Plan. Planning significance is assigned as follows: High (3.00 or greater) Moderate (2.00 to 2.99) Low (1.00 to 1.99)

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Hazard	Warning Time	Duration	Magnitude/ Severity	Probability of Future Events	Calculated Priority Index	Planning Significance
Agricultural Infestation	1	4	2	2	2.05	Moderate
Dam & Levee Failure	2	4	2	1	1.75	Low
Drought	1	4	2	3	2.50	Moderate
Extreme Temps	1	4	1	2	1.75	Low
Flood	4	2	2	2	2.30	Moderate
Hail Storm	4	1	3	4	3.40	High
Lighting	4	1	2	2	2.20	Moderate
Soil Erosion / Dust	1	4	2	2	2.05	Moderate
Tornado	4	1	2	3	2.65	Moderate
Utility Infrastructure	4	3	3	4	3.60	High
Wildfire	4	2	3	4	3.50	High
Wind Storm	2	2	2	4	2.90	Moderate
Winter Storm	2	3	3	4	3.30	High

Data Collection Process

HMPC members were provided with hard copies of data collection forms for specific entities such as health care facilities, local units of government, water districts, and schools. A generic form was provided for all other entity types. James Fisher collected sufficient forms to be distributed to other jurisdictions unable to attend the kickoff meeting. Mrs. Belt indicated that all the forms were available electronically and an e-mail address was provided for any entities that wanted the forms electronically. Data was requested to be returned to AMEC by 3/27/2009.

Next Steps

Attendees were asked to review the informational needs listed in the data collection guide and to talk with other staff in their organizations that may be knowledgeable about needed data. AMEC staff will coordinate with participants regarding gathering the required information in the data collection guides.

Data collection guides need to be returned to AMEC by 3/27/2009.

Goals & Objectives Meeting:
The second meeting of the Hazard Mitigation Planning Committee will be held 5/6/2009 from 1:30pm to 3:30pm in LaCrosse and will involve finalizing the results of the risk assessment and developing plan goals and objectives and preliminary discussions regarding projects.

Actions Meeting:
The third and final meeting of the Hazard Mitigation Planning Committee will be held 7/1/2009 from 1:30pm to 3:30pm in LaCrosse and will involve finalization of the plan and project development.

GOALS & OBJECTIVES MEETING - SIGN-IN SHEET

Project:	Hazard Mitigation Plan, Rush County	**Meeting Date:**	5/6/2009
Facilitator:	Susan Belt	**Place/Room:**	LaCrosse, KS

Name (PRINT)	Agency/Organization	Email	Phone #	Signature
James R. Fisher	Rush County EP City of Bison	emjrf@gbta.net	785-222 3537	James R Fisher
Ben Rogers	WET Walnut Creek WATERSHED #56	wwcwj@gbta.net	222 2812	Ben Rogers
JOHN H ZELLER	City of McCracken	ZEKE@GBTA.NET	785 394-2413	JOHN H ZELLER
Saye Woods	City of Rush Center	swoods@gbta.net	785- 372-4428	Saye Woods
JEFF KEENER	CITY OF RUSH CENTER		785 372-4385	Jeffrey S. Keener
KARA RENZ	City of Rush Center	Krenz@gbta.net	785- 372-4267	Kara L Renz
Tim Dreiling	Rush Co. Health Dept	gdayangle@gbta.net	785-222- 3427	Tim Dreiling
Kathy Jandusek	Rush County Health Dept	3ample@gbta.net	785- 222- 3427	Kathy Jandusek
George M Stover	Rush Co. Memorial Hosp.	gstover@rcmhosp.org	785-222 2595	George M Stover
Bruce Jones	City of Lacrosse		222-2511	
Kara Renz	USD 395 School Board	Krenz@gbta.net	785- 372-4267	Kara L Renz
Susan Belt	AMEC	susan.belt@amec.com	785 272-6830	Susan Belt

8. HMPC Meeting #2 Minutes

amec

Memo

To	**Jim Fisher, Rush County Emergency Management**
From	**Susan Belt, Senior Planner**
Tel / E-mail	**785-272-6830 / susan.belt@amec.com**
Date	**5/11/2009**
Subject	**Minutes from Rush County Mitigation Planning Meeting held on 5/6/2009**

This document is a record of attendance, and a summary of the issues discussed during the above meeting, including the actions discussed at the meeting and the next steps in this process.

Attendees

Name	Agency Representing
James Fisher	Rush County Emergency Management / City of Bison
Kathy Janousek	Rush County Health Department
Bruce Jones	City of LaCrosse
Jeff Keener	City of Rush Center
Kim Knieling	Rush County Health Department
Kara Renz	City of Rush Center / USD 395
Ben Rogers	Wet Walnut Watershed Dist #58
George Stover	Rush County Memorial Hospital
Sue Woods	City of Rush Center
John Zeller	City of McCracken
AMEC Staff	
Susan Belt	AMEC

Introductions & Review of Kickoff Meeting Activities

Jim Fisher, Rush County Emergency Manager, began the meeting by welcoming the attendees and introducing the facilitator from AMEC Earth and Environmental. The meeting participants introduced themselves. A few new participants were present at this meeting, and the group reviewed the Hazard Mitigation Planning process and the activities completed at the first meeting. The current status of HMGP funding in Kansas was also explained by the AMEC facilitator. As of 4/30/2009, there remained $31 million for HMGP projects. Approx $25 million of those funds expire at the end of August 2009.

Participation and Planning Status by Jurisdiction

The group reviewed information about each jurisdiction's status for participation in the plan. The six "jurisdictions" participating in the plan are: (1) City of LaCrosse, (2) City of Bison, (3) City of Rush Center, (4) City of McCracken, (5) Unincorporated Rush County and USD #395. Data collection forms are still needed from the City of McCracken and USD #395. During the first mitigation planning meeting, participants recommended that the local hospital and school districts be invited to future meetings to participate in the planning process. At this meeting, the hospital emergency preparedness coordinator did attend. The local emergency manager made special efforts following the first meeting of the planning committee to re-contact and encourage the school districts to attend the meetings. He explained the process used by FEMA to define "jurisdiction" and the ramifications of failure of the USDs to participate. All but USD 395 declined to participate.

Review of Hazard Analysis and Vulnerability Assessment

During this meeting, members of the committee undertook a detailed review of the draft of the Hazard Analysis and Vulnerability Assessment. The following issues were discussed in detail:

- Flood – the HMPC discussed flooding issues in the county and each jurisdiction discussed their wastewater treatment facility. The representative from McCracken informed the group about the "urgent need grant" the city received to replace their wastewater treatment plant. The representative from the hospital questioned the hospital's status as in the identified floodplain. The group also discussed the issue of electric poles within the floodplain making them inaccessible during floods. The hospital and a water treatment facility are served by these lines.
- Utility Infrastructure Failure – Kara Renz provided information about the telephone and cable television service in Rush County. She reported that an Emergency Alert System is available through local cable service. Additionally maximum modem speeds were updated.
- Winter Storm – the HMPC discussed the most recent 2009 snow storm.
- Tornado – the HMPC discussed several of the tornados listed in the previous occurrences section of the hazard analysis and agreed to provide information about the effects of each storm on their jurisdiction. Jim Fisher agreed to research the tornados in the local newspaper archives and send information to the contractor.
- Dams – the HMPC discussed the dams and levees section of the plan extensively. The group was concerned that amount of potential damage from dams in Ness County was over estimated. They also agreed to provide dam inundation maps for each of the dams that did not have one in the plan currently. The group was also made aware of the countywide breach inundation zone ordinance by the Walnut Creek Watershed representative.

Key Issues for Rush County

The committee reviewed the Key Issues document prepared as a result of the previous meeting. The identified key issues for Rush County for specific hazards are identified below.

Utility/Infrastructure Failure

- Can be a secondary impact of many other hazards including hailstorm, winter storm, windstorm, tornado, flood, lightning, dam and levee failure, and extreme temperature.

Wildfire

- From 2003-2006, Rush County lost 1,058 acres to wildfires.

Hailstorm

- 203 events in a 51.3 year period caused $3,792,000 in property damages and $7,500,000 in crop damages.

Winter Storm

- Three out of the seven major presidential disaster declarations since 1955 in Rush County have been related to Winter Storm.
- Damages to power lines and poles occur with winter storms
- Damages to roads widespread in Rush County, exacerbated by heavy electrical utility vehicles repairing power lines
- DR-1675was one of Kansas' worst disasters on record.
- Winter storm can impact ranchers making it impossible to feed and water livestock
- Causes closure of businesses and schools

Windstorm

- Rush County is in Wind Zones III and IV with winds as high as 200-250 mph
- 52 separate thunderstorm/wind events in Rush County between 1993 and 2008 caused $1,156,000 in property damages and $165,000 in crop damages.
- Causes power outages from downed power lines
- Mobile homes, campers and light buildings at increased risk of damages.

Tornado

- 29 tornado events in Rush County between January 1950 and December 2008
- 8 injuries and over $591,000 in reported property damages

Drought

- City of Alexander is a drought vulnerable public water supply
- USDA crop insurance payments as a result of drought totaled $2,902,847 from 2005-2007.

Flood

- La Crosse, Rush Center, and Timken participate in the National Flood Insurance Program—the unincorporated county and other cities do not participate in the program—flood insurance is not available to residents in those areas.

- 100-year flood scenario shows damages in all areas of the county except Bison and Otis
- The area with the highest amount of affected population is La Crosse followed by Rush Center and the unincorporated portions of the county.
- Critical facilities in the 100-year floodplain

Flooded Critical Facility	Name	Near City	Flood Depth (ft)
Elderly Facility	Rush County Nursing Home	La Crosse	1.7
Fire Station	Rush County Rural Fire District 1	Alexander	1.5
Fire Station	Rush County Fire District 6	Liebenthal	4.2
Fire Station	Rush County Fire District 3	Rush Center	1.3
Fire Station	Rush County Fire District 2	Timken	1.3
Petroleum Facility	Facility ID 11598	Timken	7.1
Scour Critical Bridge	KS017865	McCracken	10.2
Scour Critical Bridge	KS023218	Rush Center	1
Scour Critical Bridge	KS023219	Rush Center	8.5
Waste Water Treatment	Rush Center City of STP	Rush Center	17.9

- The power line that supplies the hospital, rest home and assisted living center runs through a flood zone area and a small pasture that cannot be accessed in adverse weather
- The power line that supplies the sewer plant in La Crosse runs through a pasture that is vulnerable to flooding.

Lightning

- Can cause power outages, damage electronic equipment
- Previous events have started structure fires

Agricultural Infestation

- Agriculture is important to the economy of Rush County

Dam and Levee Failure

- Thirty-six state- regulated dams in Rush County
- Seven significant hazard dams in the county
- One high hazard and one significant hazard dam in Ness County could impact Rush County
- Dam Breach Analysis and Emergency Action Plans are only available for 5 of the significant hazard dams
- Emergency Action Plans for 5 significant hazard dams show following vulnerabilities: highways (4 locations), railroads (4 locations), county roads (numerous), City Roads in Rush Center, house inundations (4), house evacuations (13)

Goals and Objectives

During the committee meeting, members discussed goals for the mitigation plan. Examples of goals from other plans were provided and the group discussed the purposes and goals of other plans already in use in Rush County such as the local emergency operations plan, and local risk management plans.

Goal #1: Improve the level of responder, government, business, and citizen awareness and preparedness for disaster in Rush County.
Goal #2: Adopt new or modify existing policies / regulations that will reduce the potential damaging effects of natural hazards in Rush County.
Goal #3: Reduce or eliminate the impact of disasters to residents and property in Rush County through mitigation actions.

Action /Project Development Selection Process

The HMPC reviewed the Kansas Division of Emergency Management HMPG funding priorities list, and the types of mitigation projects generally recognized by FEMA. The group discussed the types of mitigation actions / projects that could be done in Rush County and the other jurisdictions. Consideration was given to the identified key issues and the anticipated success for each project type. HMPC committee members discussed issues such as how many shelter projects the county could reasonably support and where best to place shelters if funds were limited. Projects such as emergency preparedness drills were discussed, but were given low priority because such mitigation actions occur on a routine basis as a requirement of other plans. Additionally complex projects which would necessitate use of large numbers of county staff were discussed. This allowed the jurisdictions wishing to complete projects / actions to understand the committee's priorities and to allow for discussion of the types of projects most beneficial to jurisdictions within Rush County. Projects were discussed within the context of the priorities and likelihood of success /failure for each was determined. Careful consideration was given to cost of each project as related to cost savings. Following the project /action discussions, action forms were distributed to all committee members along with a modified form of the STAPLEE process to evaluate each action. Action /project worksheets and STAPLEE forms were requested to be finalized and returned to AMEC by 5/15/2009. Once projects are received by AMEC, an "electronic" meeting will be conducted with committee members to prioritize the projects and finalize plans.

Public Information

During the meeting the HMPC reviewed the requirements for public input into the hazard mitigation plan. The group felt that, based on past history, a formal public meeting was not the best method for reaching the public. Committee members were reminded of their obligation to inform their constituents regarding the process. For the public input into the plan during the draft stage, a limited survey regarding hazard identification, prioritization and vulnerabilities was drafted. The survey also included questions for the public regarding the types of actions / projects being considered by the committee and the priorities established by the State of Kansas. Each committee member agreed to take copies of the survey for distribution within their jurisdiction. Surveys were requested to be returned by 5/15/2009. For the final public

comment, multiple methods will be utilized to reach the public. A copy of the draft plan will be placed at the public libraries in Rush County. Each city's representative is going to provide the contractor with the librarian's contact information and make introductions. Additionally a copy of the plan will be placed on the Rush County website. The group discussed placement of the draft plan on the Rush County Economic Development website, but decided against the idea. A notice will be placed in the newspaper informing the public about the comment period. The anticipated comment period is June 15-19, 2009. The shortened comment period is proposed to meet the KDEM deadline for application of mitigation funds from disaster DR-1741 which expire in August 2009.

Plan Maintenance

Rush County has an Local Emergency Planning Committee (LEPC) that meets regularly. Most members of the HMPC are also members of the LEPC. The committee discussed the best methods for reviewing the hazard mitigation plan on an annual basis. The group agreed that putting the plan on the LEPC agenda and requiring members to review their own jurisdiction's information and bring changes to the LEPC meeting was an effective way to maintain the plan's information. Those HMPC committee members not currently on the LEPC were encouraged to join the second committee, and Jim Fisher, Rush County Emergency Manager indicated that reminder notices would be provided to HMPC committee members when the mitigation plan was up for review. The HMPC also indicated that they felt it was important to review the mitigation plan after each local disaster.

Next Steps

Committee members were also reminded of their responsibility to gather resolutions of adoption for the plan once the plan is finalized. Each jurisdiction was provided with an example resolution, but encouraged to use their normal format if possible.

Additional Data Collection forms / data due to AMEC: May 15, 2009

Action / Project forms due to AMEC: May 15, 2009

Plan Public Comment Period: June 15-19, 2009

Proposed submittal to KDEM / FEMA: June 30, 2009

9. Public Questionnaire Distributed During Drafting Stage

Rush County Multi-Jurisdictional Hazard Mitigation Plan

New rules from the federal government require all states and local governments to have hazard mitigation plans approved by FEMA that are consistent with the Disaster Mitigation Act of 2000 (DMA 2000). This is required to maintain eligibility for certain types of federal disaster assistance, such as pre-disaster and post-disaster funding.

Over the last few months, Rush County officials have been drafting a All Hazard Mitigation Plan, and now seek public comment and review. This plan is intended to identify feasible strategies to reduce the potential loss of life, human suffering, and loss of property from manmade or natural disasters, such as floods, fires, snow and ice storms, tornados, power outages, and public health emergencies.

Please take a minute to review the material below and complete the very short questionnaire and return it to your planning committee representative.

Ranking of Hazards Likely to Affect Rush County

The hazards addressed in the Multi-Hazard Mitigation Plan are listed below. Please indicate the level of risk, or extent of potential impacts, in Rush County that you perceive for each hazard. Please rate the hazards 1 through 5 as follows: 1 = negligible, 2= limited, 3= moderate, 4= critical, 5= catastrophic by placing an X in the column corresponding to your ranking.

Hazard	1	2	3	4	5
Agricultural Infestation					
Drought					
Extreme Temperatures					
Flood					
Hail Storm					
Lightning					
Soil Erosion / Dust					
Tornado					
Utility Infrastructure					
Wildfire					
Wind Storm					
Wind Storm					
Winter Storm					

Public Questionnaire Regarding Hazard Mitigation Planning in Rush County

Funding requests for FEMA Hazard Mitigation Grant Program funds are currently reviewed initially by the Kansas Division of Emergency Management. Listed below are the state's current funding priorities. Please check those that could benefit your community:

- ☐ Acquisition / Demolition / Elevation of Flood Prone Properties
- ☐ Community Shelters, Shelters for Schools and Public Buildings
- ☐ Power Line Upgrades
- ☐ Protection of Critical Facilities

Review the types of mitigation actions being considered in Rush County. Please place a check mark next to the **three (3) types** of mitigation actions that you believe should have the **HIGHEST priority** in the Rush County Multi-Hazard Mitigation Plan.

- ☐ Indoor / Outdoor Warning Sirens
- ☐ Power Line Maintenance / Upgrades
- ☐ Participation in the National Flood Insurance Program
- ☐ Floodprone Property Buyout
- ☐ Installation of Generators
- ☐ Planning
- ☐ Public Education regarding Natural Hazards
- ☐ Wildfire Mitigation
- ☐ Saferoom Construction
- ☐ Upgrade of Culverts

Please comment on any other issues that the planning committee should consider in developing a strategy to reduce future losses caused by natural disasters.

10. Letter of Invitation to Comment on Draft Plan

TO: Any Interested Parties

Re: Draft Rush County Multi-Hazard Mitigation Plan Available for Review

Rush County, incorporated cities and USD 395 have worked together to develop the Rush County Multi-Hazard Mitigation Plan. The purpose of this plan is to develop a strategy to reduce the vulnerability of people and property in the County to the impacts of natural hazards and to become eligible for mitigation funding programs from the Federal Emergency Management Agency (FEMA). Additionally, proactive mitigation planning will help reduce the costs of disaster response and recovery by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruptions.

The plan addresses a comprehensive list of natural hazards—ranging from flooding to tornados, severe winter weather, and drought—and assesses the likely impacts of these hazards to communities in Rush County. It also sets goals and prioritizes projects to reduce the impacts of future disasters on people and property in the county.

We encourage you to please review and comment on the final draft version of this plan, which must be approved by the Rush County Board of Commissioners, the governing bodies of each participating jurisdiction, the State of Kansas, and FEMA. Your comments will be considered by the Hazard Mitigation Planning Committee and incorporated into the plan, as appropriate.

From August 31-September 11, 2009, the final draft plan will be available for your review at the following locations:

On-line at: http://www.rushcountykansas.org/MV2Base.asp?VarCN=13

In Hard Copy at the following locations during normal hours of operation:

Rush County Courthouse
715 Elm St
La Crosse, KS 67548
(785) 222-3417

Rush County Emergency Management Office
804 W. 1st
La Crosse, KS 67548
Phone: 785.222.3537

Barnard Library
521 Elm St
La Crosse, KS 67548-9713
(785) 222-2826

Bison Library
202 Main St
Bison, KS 67520-9792
(785) 356-4803

McCracken Public Library
303 Main / P. O. Box 125
McCracken, KS 67556
(785) 394-2444

Otis Community Library
122 S Main St
Otis, KS 67565
(785) 387-2287

Please respond with any comments in one of the following ways by September 11, 2009:

Mail or e-mail comments to:

Jim Fisher, Director
Rush County Emergency Management
804 W. 1st, P.O. Box 160
La Crosse, KS 67548
Phone: 785.222.3537
e-mail: emjrf@gbta.net

E-mail comments to:

Laurie Bestgen
AMEC Earth and Environmental
Email: laurie.bestgen@amec.com

If you have questions on this project, please contact Jim Fisher, Rush County Emergency Manager at 785-785.222.3537 or emjrf@gbta.net.

Sincerely,

Jim Fisher
Rush County Emergency Manager

11. Invitation List to Comment on Draft Plan

Members of the HMPC Identified in this appendix, Item #1 as well as the following…..

State, Federal, and Local Agencies	SORTED ALPHABETICALLY BY AGENCY	
George Teagarden, Livestock Commissioner Karen Domer, HS & EM Coordinator	Kansas Animal Health Department 708 S.W. Jackson Street Topeka, Kansas 66603	gteagarden@kda.ks.gov kdomer@kda.ks.gov
Reginald Robinson, President and CEO	Kansas Board of Regents 1000 SW Jackson St., Suite 520 Topeka, Kansas 66612-1368 (785) 296-3421	rrobinson@ksbor.org
Tom Morey, National Flood Insurance Program Steve Samuelson, National Flood Insurance Program Sandy Johnson, Agricultural Homeland Security and Emergency Management	Kansas Department of Agriculture Division of Water Resources Kansas Department of Agriculture 109 SW 9th Street, Second floor Topeka, Kansas 66612 Phone: (785) 296-5440 Fax: 785-296-4835	tmorey@kda.state.ks.us ssamuelson@kda.state.ks.us Sandy.Johnson@kda.state.ks.us
Salih Doughramaji, Community Development	Kansas Department of Commerce 1000 S.W. Jackson Street, Suite 100 Topeka, KS 66612-1354 Phone: 785-296-3610 Fax: 785-296-3776	salih@kansascommerce.com
Dr. Alexa Posny, Kansas Commissioner of Education	Kansas Department of Education 120 SE 10th Avenue Topeka, KS 66612-1182 (785) 296-3202	aposny@ksde.org
Cathy Tucker-Vogel	Kansas Department of Health and Environment Curtis State Office Building 1000 SW Jackson Topeka, KS 66612 (785) 368-7130	ctuckerv@kdhe.state.ks.us.

State, Federal, and Local Agencies	SORTED ALPHABETICALLY BY AGENCY	
Ken Powell	Kansas Department of Health and Environment Curtis State Office Building 1000 SW Jackson Topeka, KS 66612 (785) 296-1121	KPowell@kdhe.state.ks.us
Michael McNulty, BT Operations Officer	Kansas Department of Health and Environment Curtis State Office Building 1000 SW Jackson Topeka, KS 66612 (785) 296-5201	MCMcNult@kdhe.state.ks.us
Mark Krentz, Emergency Coordinator	Kansas Department of Transportation 700 S.W. Harrison Street Topeka, Kansas 66603-3754	krentz@ksdot.org
Rob Lader, Emergency Management Coordinator	Kansas Department of Wildlife and Parks (785) 273-6740	robl@wp.state.ks.us
Barbara Schoof Conant	Kansas Department on Aging Director of Public Affairs New England Building 503 South Kansas Avenue Topeka, KS 66603 (785) 296-6154	barbara.conant@aging.ks.gov
Brad Moeller, Hazard Mitigation Planner	Kansas Division of Emergency Management State Defense Bldg, Lower Level 2800 SW Topeka Blvd Topeka, KS 66611-1287	Brad.moeller@tag.ks.gov
Jacob Gray, Hazard Mitigation Officer	Kansas Division of Emergency Management State Defense Bldg, Lower Level 2800 SW Topeka Blvd	Jacob.gray@tag.ks.gov

State, Federal, and Local Agencies	SORTED ALPHABETICALLY BY AGENCY	
	Topeka, KS 66611-1287	
Jessica Frye, Homeland Security/GIS Coordinator	Kansas Division of Emergency Management State Defense Bldg, Lower Level 2800 SW Topeka Blvd Topeka, KS 66611-1287	Jessica.frye@tag.ks.gov
Dan Thompson	Kansas Fire Marshal's Office 700 SW Jackson St. Suite 600 Topeka, Ks. 66603-3714 (785) 296-3401	thompson@ksfm.state.ks.us
Capt Eric Pippin, Emergency Operations and assisted by Melanie Lawrence	Kansas Highway Patrol General Headquarters 122 SW 7th Topeka, KS 66603 (785) 368-8075 Capt Pippin (785) 368-7179 Ms. Lawrence	epippin@khp.ks.gov mlawrence@khp.ks.gov
Patrick Zollner, Director	Kansas Historical Society Cultural Resources 6425 SW Sixth Avenue Topeka KS 66615-1099 785-272-8681 (Telephone) 785-272-8682 (Fax)	pzollner@kshs.org
Robert Hoard, NAGPRA Coordinator	Kansas State Historical Society, 6425 SW Sixth Avenue, Topeka, KS (785) 272-8681 (extension 269)	rhoard@kshs.org
Ray Aslin, State Forester	Kansas State Forestry 2610 Claflin Road, Manhattan, KS 66502 785-532-3300 FAX 785-532-3305	raslin@ksu.edu Eward@ksu.edu hartmanj@ksu.edu rodney2@ksu.edu

State, Federal, and Local Agencies	SORTED ALPHABETICALLY BY AGENCY	
		rhauck@ksu.edu
Tom Lowe	Kansas Water Office 109 SW 9th, Ste 300 Topeka, KS 66612	tlowe@kwo.state.ks.us
Andy Bailey, Warning Coordination Meteorologist	NOAA's National Weather Service Kansas City/Pleasant Hill, MO Weather Forecast Office 1803 North 7 Highway Pleasant Hill, MO 64080-9421 816-540-6021	Andy.bailey@noaa.gov
David Floyd, Warning Coordination Meteorologist	NOAA's National Weather Service Goodland, KS Weather Forecast Office 920 Armory Road Goodland, KS 67735-9273 785-899-7119	David.floyd@noaa.gov
Jeff Hutton, Warning Coordination Meteorologist	NOAA's National Weather Service Dodge City, KS Weather Forecast Office 104 Airport Road Dodge City, KS 67801-9351 620-225-6514	jeff.hutton@noaa.gov
Jennifer Stark, Warning Coordination Meteorologist	NOAA's National Weather Service Topeka, KS Weather Forecast Office 1116 NE Strait Avenue Topeka, KS 66616-1667 785-234-2592	Jennifer.stark@noaa.gov
Greg Gardner, Critical Infrastructure Protection Program Chuck Clanahan, Kansas	US Department of Homeland Security	greg.gardner@dhs.gov

State, Federal, and Local Agencies	SORTED ALPHABETICALLY BY AGENCY	
Protective Security Advisor		chuck.clanahan@dhs.gov
Jud Kneuvean, Natural Disasters Program Manager	USACE, Kansas City District 601 E. 12th Street, Room 164 (OD-E) Kansas City, Missouri 64106-2896 (816) 983-3281	Eugene.J.Kneuvean@nwk02.usace.army.mil
Pete Navesky, Operations	USACE, Tulsa District 1645 S. 101st E. Ave. Tulsa, OK 74121-4629 (918) 669-7325 or 7327	peter.navesky@us.army.mil
	Neighboring County Stakeholders	
Trego County	Kathleen Fabrizius, Coordinator Trego County Emergency Management 216 Main WaKeeney , KS 67672 Office: (785) 743-2753 Fax: (785) 743-2917 Sheriff: (785) 743-5721	mrsfab@yahoo.com
Ellis County	Bill Ring, Coordinator Ellis County Emergency Management 105 West 12th Street Hays, KS 67601-3648 Office: (785) 625-1060 Fax: (785) 625-1081 Sheriff: (785) 625-1040	disaster@ellisco.net
Russell County	Keith Haberer, KCEM, Coordinator Russell County Emergency Management 850 N. Elm Street P.O. Box 158 Bunker Hill, KS 67626 Office: (785) 483-5100 Fax: (785) 483-2303 Sheriff: (785) 483-2121	russellcountyem@rfd5.org
Barton County	Amy Miller, KCEM,Coordinator Barton County Emergency Management 1400 Main St. , Room 108 Great Bend , KS 67530 -4037 Office: (620) 793-1919 Fax: (620) 793-1983 Sheriff: (620) 793-1920/1876	emermgnt@bartoncounty.org
Pawnee County	Mark Wagner, Coordinator/LEPC Chairperson Pawnee County Emergency Preparedness 715 Broadway Rm #5 Larned , KS 67550 Office: 620-285-8966 Fax: (620) 285-8910 Sheriff: (620) 285-2211	mwagner@pcem.kscoxmail.com
Ness County	David Snyder, Coordinator/LEPC Chairperson Ness County Emergency Management 105 S. Penn Ness City , KS 67560 Office: (785) 798-4864 Fax: (785) 798-3680 Sheriff: (785) 798-3611	dsnyder512@gbta.net

12. Flyer Announcing Final Public Review Period

Your Input Is Needed on the Rush County Multi-Hazard Mitigation Plan

Rush County, incorporated cities, special districts and rural electric cooperatives have worked together to develop the Rush County Multi-Hazard Mitigation Plan. The purpose of this plan is to develop a strategy to reduce the vulnerability of people and property in the County to the impacts of natural hazards and to become eligible for mitigation funding programs from the Federal Emergency Management Agency (FEMA).

The plan addresses a comprehensive list of natural hazards—ranging from flooding to tornados severe winter weather, and drought—and assesses the likely impacts of these hazards to communities in Rush County. It also sets goals and prioritizes projects to reduce the impacts of future disasters on people and property in the county.

We would like YOUR input on this important plan, which must be approved by the Rush County Board of County Commissioners, the governing bodies of each participating jurisdiction, the State of Kansas, and FEMA. Your comments will be considered by the Hazard Mitigation Planning Committee and incorporated into the plan, as appropriate.

From August 31-September 11, 2009, the final draft plan will be available for your review at the following locations:

On-line at: http://www.rushcountykansas.org/MV2Base.asp?VarCN=13

In Hard Copy at the following locations during normal hours of operation:

Rush County Courthouse
715 Elm St
La Crosse, KS 67548
(785) 222-3417

Rush County Emergency Management Office
804 W. 1st
La Crosse, KS 67548
Phone: 785.222.3537

Barnard Library
521 Elm St
La Crosse, KS 67548-9713
(785) 222-2826

Bison Library
202 Main St
Bison, KS 67520-9792
(785) 356-4803

McCracken Public Library
303 Main / P. O. Box 125
McCracken, KS 67556
(785) 394-2444

Otis Community Library
122 S Main St
Otis, KS 67565
(785) 387-2287

Please respond with any comments in one of the following ways by September 11, 2009:

Mail or e-mail comments to:

Jim Fisher, Director
Rush County Emergency Management
804 W. 1st, P.O. Box 160
La Crosse, KS 67548
Phone: 785.222.3537
e-mail: emjrf@gbta.net

E-mail comments to:

Laurie Bestgen
AMEC Earth and Environmental
Email: laurie.bestgen@amec.com

If you have questions on this project, please contact Jim Fisher, Rush County Emergency Manager at 785-785.222.3537 or emjrf@gbta.net.

13. News Articles Announcing Final Public Review Period

RUSH COUNTY NEWS Thursday, August 27, 2009 Page A-8

Comments sought on Hazard Mitigation

The public is encouraged to review and comment on the Rush County Multi-Hazard Mitigation Plan before it is finalized. This plan was created to develop a strategy to reduce losses to communities from damage caused by natural hazard events.

Taxpayers pay billions of dollars each year for disaster recovery. Some events are predictable, and often, damages can be reduced or eliminated. The federal Disaster Mitigation Act of 2000 requires communities to develop an approved local hazard mitigation plan to remain eligible for certain federal funding.

The Rush County Emergency Manager, Jim Fisher, invited all jurisdictions in Rush County to work together to develop this plan. The planning committee addressed natural hazards ranging from flooding to tornados, severe winter weather, and drought and considered the impacts of these events on local communities. Based on the results of a risk assessment of the hazards, committee members suggested ways for their jurisdiction to reduce damages caused by natural events. The committee consulted with AMEC Earth and Environmental Corporation to assist with the plan development and ensure that the final plan meets federal regulations.

From August 31 through September 11, 2009, the final draft plan will be available for review at the following locations:

On-line at www.rushcountykansas.org/MV2Base.asp?VarCN=13.

In Hard Copy at the following locations during normal hours of operation:

In La Crosse - Rush County Courthouse, 715 Elm St., Rush County Emergency Management Office, 804 W. 1st and the Barnard Library, 521 Elm St.; in Bison at the Bison Library, 202 Main; in McCracken at the McCracken Public Library, 303 Main; and in Otis at the Otis Community Library, 122 S. Main.

Interested persons are asked to respond with any comments in one of the following ways by September 11, 2009:

Mail or e-mail comments to: Jim Fisher, Director, Rush County Emergency Management, PO Box 160, La Crosse KS 67548, e-mail emjrf@gbta.net.

E-mail comments to: Laurie Bestgen, AMEC Earth and Environmental, laurie.bestgen@amec.com.

Public comments will be documented by the planning committee, and incorporated into the plan, as appropriate. The final plan must be approved by the governing body of each participating jurisdiction, the Rush County Commissioners, the State of Kansas, and FEMA before becoming official.

If you have questions on this project, contact Jim Fisher, Rush County Emergency Manager at 785-222-3537 or emjrf@gbta.net.

APPENDIX C: MITIGATION ACTION ALTERNATIVES & PRIORITIZATION

Mitigation Action
1. Support a program to replace existing overhead primary electric lines to underground
2. Create additional acceptable community storm shelters for residents
3. Identify critical facilities that are vulnerable to natural and man-made hazards.
4. Identify and clearly mark evacuation routes.
5. Identify and seek additional methods of financial and technical assistance for hazard mitigation projects.
6. Develop and implement a local hazard training plan.
7. Upgrade and enhance power lines to endure ice and wind conditions and provide back-up power between substations.
8. Support an electric power upgrade program designed to protect lines including tree trimming and pole replacement.
9. Replace water lines in jeopardy of being damaged due to expansive soils.
10. Acquire a permanent back-up generator for the Rural Water District #3 water plant.
11. Acquire a series of variable speed pumps to assure the ability of Rural Water District _____ to supply water during natural and man-made disasters.
12. Acquire outdoor tornado warning sirens for the Croweburg area.
13. Acquire audio and visual emergency communication and notification systems for interior and exterior of University grounds.
14. Acquire and install emergency generators for buildings prioritized on building usage for University grounds.
15. Reduce the damage from flooding in University buildings by evaluating storm and sanitary sewers and prioritizing repairs on University grounds.
16. Evaluate cost effective solutions to assure protection of electrical and building systems during lightning storms.
17. Evaluate existing buildings for safe areas from severe weather, and prioritize replacements and upgrades to existing facilities.
18. Acquire outdoor warning systems and other early warning devices for unincorporated areas such as _____
19. Create a storm shelter / saferoom at the.
20. Create a storm shelter / saferoom at the
21. Create a storm shelter / saferoom at the
22. Acquire or conduct structural remediation of flood-prone properties in the _____ area.
23. Construct communication "huts" at three strategically placed locations throughout _____ County.
24. Acquire and install a permanently mounted emergency generator for the _____ County courthouse.
25. Study drainage issued throughout the county in flood prone areas, and make recommendations for flood control measures, flood management procedures, and low-water crossing improvements.
26. Acquire Light Detection and Ranging (LIDAR) mapping system to assist with flood control projects.
27. Continue to participate in the National Flood Insurance Program.
28. Provide additional support to the Community Rating System to raise the rating to the next level.
29. Provide homeowner education on wildfire mitigation in wildland-urban interface.
30. Reduce hazardous fuel loads in prioritized wildfire risk areas.
31. Increase public and fire department training on wildland-urban interface fires.
32. Improve coordination, planning, and investment in long-term water supplies to meet demands of ongoing growth and development.
33. Enhance existing GIS program to improve capabilities in mitigation, preparedness, and response for all hazards.

34. Assess vulnerability of critical infrastructure and lifeline utilities, including water distribution systems, to identify and prioritize projects for multi-hazard risk reduction.
35. Assess vulnerability of critical facilities, including police/fire stations, hospitals, schools, and others, to identify and prioritize projects for multi-hazard risk reduction.
36. Preserve open space in the floodplain through regulatory and non-regulatory methods.
37. Develop a program or system for supporting vulnerable populations during emergency events.
38. Develop a plan for supporting medically fragile and special needs students at each school site during emergency events.
39. Implement natural hazards review criteria for new development to improve long-term loss prevention.
40. Establish a livestock disposal plan and compost team to address livestock fatality during extreme heat events.
41. Update flood damage prevention ordinance to include new FEMA digital flood insurance rate maps.
42. Ensure the maintenance and enhancement of established disaster evacuation routes.
43. Improve lighting and traffic controls at critical intersections and roadways to improve safety during fog events.
44. Develop an awareness plan to educate people about the dangers of naturally-occurring diseases, such as influenza and vaccine-preventable diseases.
45. Continue and enhance housing rehabilitation program.
46. Provide educational materials about natural hazards and risks in _____ County to customers in utility bills.
47. Conduct regular emergency preparedness drills for school children at all levels, including tornado drills, and fire evacuation drills.

County-1

Jurisdiction: Rush County	Mitigation Action #:
Action Title: Minimize Flood Damage	Goal Supported: Reduce or eliminate Road Damage & Flooding of Selected areas

Criteria	Evaluation Rating Definitely YES = 3 Maybe YES = 2 Probably NO = 1 Definitely NO = 0
Does it reduce disaster damage or save lives?	3
Will historic structures be saved or protected?	0
Could it be implemented quickly?	2
S: Is it Socially acceptable?	3
T: Is it Technically feasible and potentially successful?	3
A: Does the jurisdiction have the administrative capacity to execute this project? This criterion is to be addressed at a later date, if and when the jurisdiction decides to implement this project.	
P: Is it Politically acceptable?	Yes -3
L: Is there Legal authority to implement?	Yes -3
E: Is it Economically beneficial?	Yes -3
E: Will the project have either a neutral or positive impact on the natural environment? (score a 3 if positive impact, 2 if neutral impact)	2
Total Score 2 1/3	22

Score 11

County-2

Jurisdiction: Rush County	Mitigation Action #:
Action Title: Flood Hazard Ave D, CR 300	Goal Supported: Remove Flood Hazard, Continuous Road Closure & Repair

Criteria	Evaluation Rating Definitely YES = 3 Maybe YES = 2 Probably NO = 1 Definitely NO = 0	Score 10
Does it reduce disaster damage or save lives?	3	
Will historic structures be saved or protected?	0	
Could it be implemented quickly?	1	
S: Is it Socially acceptable?	3	
T: Is it Technically feasible and potentially successful?	3	
A: Does the jurisdiction have the administrative capacity to execute this project? This criterion is to be addressed at a later date, if and when the jurisdiction decides to implement this project.		
P: Is it Politically acceptable?	Yes -3	
L: Is there Legal authority to implement?	Yes -3	
E: Is it Economically beneficial?	Yes -3	
E: Will the project have either a neutral or positive impact on the natural environment? (score a 3 if positive impact, 2 if neutral impact)	2	
Total Score	21	

County-3

Jurisdiction: Rush Co Health	Mitigation Action #:
Action Title: Add'l entrance to storm shelter	Goal Supported:

Criteria	Evaluation Rating Definitely YES = 3 Maybe YES = 2 Probably NO = 1 Definitely NO = 0	Score
Does it reduce disaster damage or save lives?		3
Will historic structures be saved or protected?		0
Could it be implemented quickly?		1
S: Is it Socially acceptable?		3
T: Is it Technically feasible and potentially successful?		2
A: Does the jurisdiction have the administrative capacity to execute this project? This criterion is to be addressed at a later date, if and when the jurisdiction decides to implement this project.		
P: Is it Politically acceptable?		2
L: Is there Legal authority to implement?		3
E: Is it Economically beneficial?		1
E: Will the project have either a neutral or positive impact on the natural environment? (score a 3 if positive impact, 2 if neutral impact)		2
Total Score		17

County-4

Jurisdiction: Rush Co Health	Mitigation Action #:
Action Title: Outreach Educati including special needs	Goal Supported:

Criteria	Evaluation Rating Definitely YES = 3 Maybe YES = 2 Probably NO = 1 Definitely NO = 0	Score
Does it reduce disaster damage or save lives?		0
Will historic structures be saved or protected?		0
Could it be implemented quickly?		1
S: Is it Socially acceptable?		3
T: Is it Technically feasible and potentially successful?		3
A: Does the jurisdiction have the administrative capacity to execute this project? This criterion is to be addressed at a later date, if and when the jurisdiction decides to implement this project.		
P: Is it Politically acceptable?		3
L: Is there Legal authority to implement?		3
E: Is it Economically beneficial?		1
E: Will the project have either a neutral or positive impact on the natural environment? (score a 3 if positive impact, 2 if neutral impact)		2
Total Score		16

Bison-1

Jurisdiction: City of Bison	Mitigation Action #:
Action Title: Storm water Reduction	Goal Supported: Improve drainage for City of Bison

Criteria	Evaluation Rating Definitely YES = 3 Maybe YES = 2 Probably NO = 1 Definitely NO = 0
Does it reduce disaster damage or save lives?	3
Will historic structures be saved or protected?	3
Could it be implemented quickly?	1
S: Is it Socially acceptable?	3
T: Is it Technically feasible and potentially successful?	3
A: Does the jurisdiction have the administrative capacity to execute this project? This criterion is to be addressed at a later date, if and when the jurisdiction decides to implement this project.	
P: Is it Politically acceptable?	Yes 3
L: Is there Legal authority to implement?	Yes 3
E: Is it Economically beneficial?	Yes 3
E: Will the project have either a neutral or positive impact on the natural environment? (score a 3 if positive impact, 2 if neutral impact)	3
Total Score	3 1 4 25

Score 13

Bison-2

Jurisdiction: City of Bison	Mitigation Action #:
Action Title: Tree and Over-hanging Branch Removal	Goal Supported: Reduce Power Outages Debris Removal

Criteria	Evaluation Rating Definitely YES = 3 Maybe YES = 2 Probably NO = 1 Definitely NO = 0
Does it reduce disaster damage or save lives?	3
Will historic structures be saved or protected?	2
Could it be implemented quickly?	3
S: Is it Socially acceptable?	3
T: Is it Technically feasible and potentially successful?	3
A: Does the jurisdiction have the administrative capacity to execute this project? This criterion is to be addressed at a later date, if and when the jurisdiction decides to implement this project.	
P: Is it Politically acceptable?	Yes -3
L: Is there Legal authority to implement?	Probably -2
E: Is it Economically beneficial?	Yes -3
E: Will the project have either a neutral or positive impact on the natural environment? (score a 3 if positive impact, 2 if neutral impact)	2
Total Score	24

Score 19

MAY 15 2009

LaCrosse-1

Jurisdiction: City of LaCrosse, Rush Co.	Mitigation Action #:
Action Title: Rest Home Feeder update	Goal Supported: Reduce outages @ Nursing Home

Criteria	Evaluation Rating Definitely YES = 3 Maybe YES = 2 Probably NO = 1 Definitely NO = 0	Score
Does it reduce disaster damage or save lives?		3
Will historic structures be saved or protected?		1
Could it be implemented quickly?		2
S: Is it Socially acceptable?		3
T: Is it Technically feasible and potentially successful?		3
A: Does the jurisdiction have the administrative capacity to execute this project? This criterion is to be addressed at a later date, if and when the jurisdiction decides to implement this project.		
P: Is it Politically acceptable?		3
L: Is there Legal authority to implement?		3
E: Is it Economically beneficial?		2
E: Will the project have either a neutral or positive impact on the natural environment? (score a 3 if positive impact, 2 if neutral impact)		2
Total Score		22

LaCrosse-2

Jurisdiction: City of LaCrosse, Rush County	Mitigation Action #:
Action Title: Tree trimming	Goal Supported: Eliminate Power Outages

Criteria	Evaluation Rating Definitely YES = 3 Maybe YES = 2 Probably NO = 1 Definitely NO = 0	Score
Does it reduce disaster damage or save lives?	2	
Will historic structures be saved or protected?	2	
Could it be implemented quickly?	3	
S: Is it Socially acceptable?	3	
T: Is it Technically feasible and potentially successful?	3	
A: Does the jurisdiction have the administrative capacity to execute this project? This criterion is to be addressed at a later date, if and when the jurisdiction decides to implement this project.		
P: Is it Politically acceptable?	3	
L: Is there Legal authority to implement?	3	
E: Is it Economically beneficial?	2	
E: Will the project have either a neutral or positive impact on the natural environment? (score a 3 if positive impact, 2 if neutral impact)	2	
Total Score		

MAY 15 2009 LaCrosse-3

Jurisdiction:	Mitigation Action #:
Action Title: Sewer Plant line Relocation	Goal Supported: Reduce outages to Sewer Plant

Criteria	Evaluation Rating Definitely YES = 3 Maybe YES = 2 Probably NO = 1 Definitely NO = 0	Score
Does it reduce disaster damage or save lives?		1
Will historic structures be saved or protected?		1
Could it be implemented quickly?		3
S: Is it Socially acceptable?		3
T: Is it Technically feasible and potentially successful?		3
A: Does the jurisdiction have the administrative capacity to execute this project? This criterion is to be addressed at a later date, if and when the jurisdiction decides to implement this project.		
P: Is it Politically acceptable?		3
L: Is there Legal authority to implement?		3
E: Is it Economically beneficial?		2
E: Will the project have either a neutral or positive impact on the natural environment? (score a 3 if positive impact, 2 if neutral impact)		2
Total Score		

LaCrosse-4

Jurisdiction: City of La Crosse, Rush County	Mitigation Action #: N/A
Action Title: Enforcement of FloodPlain Requirements	Goal Supported: Reduce Damage caused By Flooas

Criteria	Evaluation Rating **Definitely YES = 3** **Maybe YES = 2** **Probably NO = 1** **Definitely NO = 0**	Score
Does it reduce disaster damage or save lives?		2
Will historic structures be saved or protected?		1
Could it be implemented quickly?		2
S: Is it Socially acceptable?		0
T: Is it Technically feasible and potentially successful?		2
A: Does the jurisdiction have the administrative capacity to execute this action? This criterion is to be addressed at a later date, if and when the jurisdiction decides to implement this action.		
P: Is it Politically acceptable?		2
L: Is there Legal authority to implement?		3
E: Is it Economically beneficial?		2
E: Will the project have either a neutral or positive impact on the natural environment? (score a 3 if positive impact, 2 if neutral impact)		2
Total Score		

McCracken-1

Jurisdiction: City of McCracken	Mitigation Action #:
Action Title: NFIP reapplication	Goal Supported: Provide Flood Insurance Availability City of McCracken

Criteria	Evaluation Rating Definitely YES = 3 Maybe YES = 2 Probably NO = 1 Definitely NO = 0
	Score ~~28~~ 24
Does it reduce disaster damage or save lives?	3
Will historic structures be saved or protected?	0
Could it be implemented quickly?	3
S: Is it Socially acceptable?	3
T: Is it Technically feasible and potentially successful?	3
A: Does the jurisdiction have the administrative capacity to execute this project? This criterion is to be addressed at a later date, if and when the jurisdiction decides to implement this project.	
P: Is it Politically acceptable?	Yes - 3
L: Is there Legal authority to implement?	Yes - 3
E: Is it Economically beneficial?	Yes - 3
E: Will the project have either a neutral or positive impact on the natural environment? (score a 3 if positive impact, 2 if neutral impact)	3
Total Score ~~28~~ 24	

Rush Center-1

Jurisdiction: Rush Center - Rush Co, KS	Mitigation Action #: 2
Action Title: NFIP Participation	**Goal Supported:** Positive Economic Impact incase of a Emergency

Criteria	Evaluation Rating Definitely YES = 3 Maybe YES = 2 Probably NO = 1 Definitely NO = 0	Score
Does it reduce disaster damage or save lives?	D-yes	3
Will historic structures be saved or protected?	M-yes	2
Could it be implemented quickly?	D-yes	3
S: Is it Socially acceptable?	D-yes	3
T: Is it Technically feasible and potentially successful?	D-yes	3
A: Does the jurisdiction have the administrative capacity to execute this project? This criterion is to be addressed at a later date, if and when the jurisdiction decides to implement this project.		
P: Is it Politically acceptable?	D-yes	3
L: Is there Legal authority to implement?	D-yes	3
E: Is it Economically beneficial?	D-yes	3
E: Will the project have either a neutral or positive impact on the natural environment? (score a 3 if positive impact, 2 if neutral impact)	Positive Impact	3
Total Score		26

Rush Center-2

Jurisdiction: Rush Center - Rush Co, KS	Mitigation Action #: 1
Action Title: Install Sewer Lagoon	Goal Supported: Positive Environmental Impact

Criteria	Evaluation Rating Definitely YES = 3 Maybe YES = 2 Probably NO = 1 Definitely NO = 0	Score
Does it reduce disaster damage or save lives?	Definitely "Yes"	3
Will historic structures be saved or protected?	D - NO	0
Could it be implemented quickly?	D - YES	3
S: Is it Socially acceptable?	D - YES	3
T: Is it Technically feasible and potentially successful?	D - YES	3
A: Does the jurisdiction have the administrative capacity to execute this project? This criterion is to be addressed at a later date, if and when the jurisdiction decides to implement this project.		
P: Is it Politically acceptable?	D - Yes	3
L: Is there Legal authority to implement?	D - yes	3
E: Is it Economically beneficial?	D - yes	3
E: Will the project have either a neutral or positive impact on the natural environment? (score a 3 if positive impact, 2 if neutral impact)	Positive Impact	3
Total Score		24

USD 395-1

Jurisdiction: La Crosse USD 395	Mitigation Action #: N/A
Action Title: Building Saferooms	**Goal Supported: Safety**

Criteria	Evaluation Rating **Definitely YES = 3** **Maybe YES = 2** **Probably NO = 1** **Definitely NO = 0**	Score
Does it reduce disaster damage or save lives?		3
Will historic structures be saved or protected?		1
Could it be implemented quickly?		2
S: Is it Socially acceptable?		3
T: Is it Technically feasible and potentially successful?		3
A: Does the jurisdiction have the administrative capacity to execute this action? This criterion is to be addressed at a later date, if and when the jurisdiction decides to implement this action.		
P: Is it Politically acceptable?		3
L: Is there Legal authority to implement?		3
E: Is it Economically beneficial?		3
E: Will the project have either a neutral or positive impact on the natural environment? (score a 3 if positive impact, 2 if neutral impact)		2
Total Score		

Midwest Energy - 1

Jurisdiction:	Mitigation Action #: N/A
Action Title: **LaCross 115 KV Structures**	**Goal Supported:** Power Line Upgrade

Criteria	Evaluation Rating **Definitely YES = 3** **Maybe YES = 2** **Probably NO = 1** **Definitely NO = 0**	Score
Does it reduce disaster damage or save lives?		3
Will historic structures be saved or protected?		0
Could it be implemented quickly?		2
S: Is it Socially acceptable?		2
T: Is it Technically feasible and potentially successful?		3
A: Does the jurisdiction have the administrative capacity to execute this action? This criterion is to be addressed at a later date, if and when the jurisdiction decides to implement this action.		
P: Is it Politically acceptable?		2
L: Is there Legal authority to implement?		2
E: Is it Economically beneficial?		3
E: Will the project have either a neutral or positive impact on the natural environment? (score a 3 if positive impact, 2 if neutral impact)		2
Total Score		19

Midwest Energy - 2

Jurisdiction:	Mitigation Action #: N/A
Action Title: LaCross, Kansas Distribution	**Goal Supported:** Power Line Upgrade

Criteria	Evaluation Rating **Definitely YES = 3** **Maybe YES = 2** **Probably NO = 1** **Definitely NO = 0**	Score
Does it reduce disaster damage or save lives?		3
Will historic structures be saved or protected?		0
Could it be implemented quickly?		2
S: Is it Socially acceptable?		2
T: Is it Technically feasible and potentially successful?		3
A: Does the jurisdiction have the administrative capacity to execute this action? This criterion is to be addressed at a later date, if and when the jurisdiction decides to implement this action.		
P: Is it Politically acceptable?		2
L: Is there Legal authority to implement?		2
E: Is it Economically beneficial?		3
E: Will the project have either a neutral or positive impact on the natural environment? (score a 3 if positive impact, 2 if neutral impact)		2
Total Score		19

APPENDIX E: ADOPTION RESOLUTIONS

Placeholder for adoption resolutions.

Governing Boards of participating jurisdictions will formally adopt the plan after KDEM and FEMA provide preliminary approval of the plan.