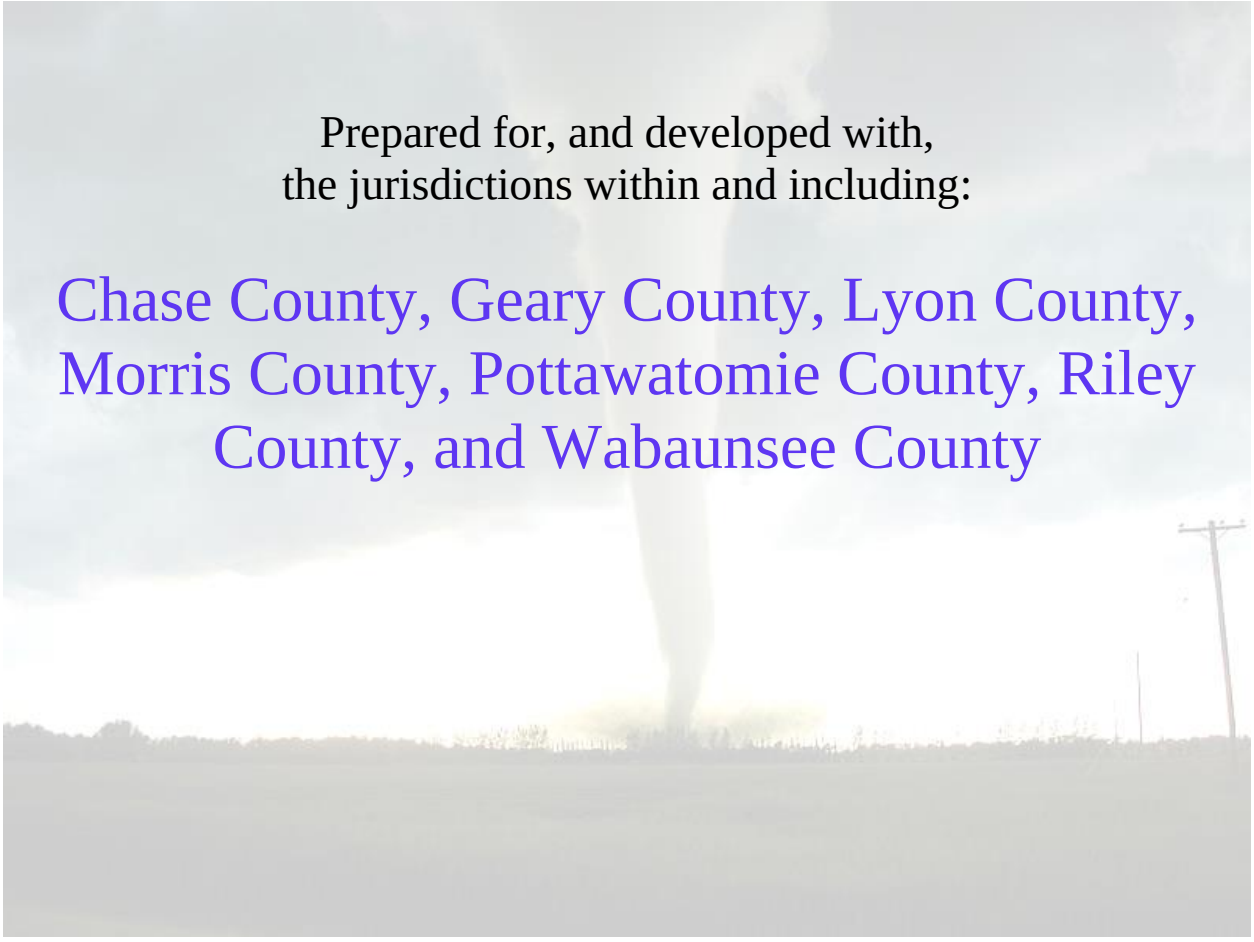
Kansas Homeland Security Region I Hazard Mitigation Plan



Prepared for, and developed with,
the jurisdictions within and including:

Chase County, Geary County, Lyon County, Morris County, Pottawatomie County, Riley County, and Wabaunsee County

July 2020

Prepared By:

Blue Umbrella Solutions, LLC

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List of Commonly Used Acronyms

Acronym	Meaning
CPRI	Calculated Priority Risk Index
CDC	Centers for Disease Control and Prevention
CWD	Chronic Wasting Disease
CFR	Code of Federal Regulations
CRS	Community Rating System
CWPP	Community Wildfire Protection Plans
EAB	Emerald Ash Borer
EAP	Emergency Action Plan
EMAP	Emergency Management Accreditation Program
EF	Enhanced Fujita
EPA	Environmental Protection Agency
ºF	Fahrenheit
FEMA	Federal Emergency Management Agency
HAZUS	FEMA Loss Estimation Software
FIRM	Flood Insurance Rate Map
GIS	Geographic Information System
GDP	Gross Domestic Product
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Planning
HazMat	Hazardous Materials
ISO	Insurance Service Office
KDA	Kansas Department of Agriculture
KDHE	Kansas Department of Health and Environment
KDOT	Kansas Department of Transportation
KDEM	Kansas Division of Emergency Management
KFS	Kansas Fire Service
KGS	Kansas Geological Survey
KSFM	Kansas State Fire Marshall
K.S.A	Kansas Statutes Annotated
KWO	Kansas Water Office
LEPC	Local Emergency Planning Committee
MPC	Mitigation Planning Committee
NCEI	National Centers for Environmental Information
NFIP	National Flood Insurance Program
NLCD	National Land Cover Database
NLD	National Levee Database
NLIR	National Levee Inventory Report
NLSP	National Levee Safety Program
NOAA	National Oceanic and Atmospheric Administration
NRCS	National Resource Conservation Service
NWS	National Weather Service
NSFHA	No Special Flood Hazard Area
NGO	Non-Governmental Organization

Acronym	Meaning
NRC	Nuclear Regulatory Commission
OHMS	Office of Hazardous Materials Safety
PDSI	Palmer Drought Severity Index
PHMSA	Pipeline and Hazardous Materials Safety Administration
PDM	Pre-Disaster Mitigation
PAL	Provisionally Accredited Levee
RL	Repetitive Loss
Risk MAP	Risk Mapping, Assessment and Planning
REC	Rural Electric Cooperative
SRL	Severe Repetitive Loss
SFHA	Special Flood Hazard Area
USD	Unified School District
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WUI	Wildland Urban Interface

1.0 Introduction, Assurances and Adoption

1.1 – Introduction

Mitigation is commonly defined as sustained action taken to reduce or eliminate long-term risk to people and their property from hazards and their effects. Hazard mitigation planning provides communities with a roadmap to aid in the creation and revision of policies and procedures, and the use of available resources, to provide long-term, tangible benefits to the community. A well-designed hazard mitigation plan provides communities with realistic actions that can be taken to reduce potential vulnerability and exposure to identified hazards.

This Hazard Mitigation Plan (HMP) was prepared to provide sustained actions to eliminate or reduce risk to people and property from the effects of natural and man-made hazards. This plan documents the State of Kansas Homeland Security Region I (hereafter referred to as Kansas Region I) and its participating jurisdictions planning process and identifies applicable hazards, vulnerabilities, and hazard mitigation strategies. This plan will serve to direct available community and regional resources towards creating policies and actions that provide long-term benefits to the community. Local and regional officials can refer to the plan when making decisions regarding regulations and ordinances, granting permits, and in funding capital improvements and other community initiatives.

Specifically, this hazard mitigation plan was developed to:

- Update the Kansas Region I 2015 Hazard Mitigation Plan
- Build for a safer future for all citizens
- Foster cooperation for planning and resiliency
- Identify, prioritize and mitigate against hazards
- Asist with sensible and effective planning and budgeting
- Educate citizens about hazards, mitigation and preparedness
- Comply with federal requirements

As stipulated in the Disaster Mitigation Act of 2000 (DMA 2000) Section 322, federally approved mitigation plans are a prerequisite for mitigation project grants. Development and Federal Emergency Management Agency (FEMA) approval of this plan will ensure future eligibility for federal disaster mitigation funds through the Hazard Mitigation Grant Program (HMPG), Pre-Disaster Mitigation Grant Program (PDM), Repetitive Flood Claims, and a variety of other state and federal programs. This Plan was prepared to meet the requirements of the DMA 2000, as defined in regulations set forth by the Interim Final Rule (44 CFR Part 201.6).

This plan has been designed to be a living document, a document that will evolve to reflect changes, correct any omissions, and constantly strive to ensure the safety of Kansas Region I.

1.2 – Participating Jurisdictions

44 CFR 201.6(a)(4): Multi-jurisdictional plans may be accepted, as appropriate, as long as each jurisdiction has participated in the process and has officially adopted the plan.

All eligible jurisdictions were invited to participate in the organization, drafting, completion and adoption of this plan. Invited jurisdictions included, but were not limited to, elected officials, relevant State of Kansas agencies, counties, cities, school districts, non-profit agencies, and businesses.

In order to have an approved hazard mitigation plan, DMA 2000 requires that each jurisdiction participate in the planning process. Each jurisdiction choosing to participate in the development of the plan were required to meet detailed participation requirements, which included the following:

- When practical and affordable, participation in planning meetings
- Provision of information to support the plan development
- Identification of relevant mitigation actions
- Review and comment on plan drafts
- Formal adoption of the plan

Based on the above criteria, the following jurisdictions participated in the planning process, and will individually as a jurisdiction adopt the approved hazard mitigation plan:

Table 1.1: Chase County Participating Jurisdictions

Jurisdiction	2015 HMP Participant	2020 HMP Participant
Chase County	x	x
Cedar Point	x	x
Cottonwood Falls	x	x
Elmdale	x	x
Matfield Green	x	x
Strong City	x	x
USD #284 – Chase County	x	x
All Rural Water Districts (RWDs)	x	x
Public Wholesale Water Supply District #26	x	x
Flint Hills REC	x	x
Lyon-Coffey Electric COOP	x	x

Table 1.2: Geary County Participating Jurisdictions

Jurisdiction	2015 HMP Participant	2020 HMP Participant
Geary County	x	x
Grandview Plaza	x	x
Junction City	x	x
Milford	x	x
Cloud County Community College	x	x
USD #475 – Geary County	x	x

Table 1.2: Geary County Participating Jurisdictions

Jurisdiction	2015 HMP Participant	2020 HMP Participant
All RWDs	x	x
Bluestem COOP	x	x
DS&O REC	x	x
Flint Hills REC	x	x

Table 1.3: Lyon County Participating Jurisdictions

Jurisdiction	2015 HMP Participant	2020 HMP Participant
Lyon County	x	x
Admire	x	x
Allen	x	x
Americus	x	x
Bushong	x	x
Emporia	x	x
Hartford	x	x
Neosho Rapids	x	x
Olpe	x	x
Reading	x	x
Emporia State University	x	x
Flint Hills Technical College	x	x
USD #251 – North Lyon County	x	x
USD #252 – Southern Lyon County	x	x
USD #253 - Emporia	x	x
All Rural Water Districts	x	x
Allen Creek Watershed District #89	x	x
Salt Creek Watershed Joint District #104	x	x
Upper Marais Des Cygnes Watershed Joint District #101	x	x
Flint Hills REC	x	x

Table 1.4: Morris County Participating Jurisdictions

Jurisdiction	2015 HMP Participant	2020 HMP Participant
Morris County	x	x
Council Grove	x	x
Dunlap	x	x
Dwight	x	x
Latimer	x	x
Parkerville	x	x
White City	x	x
Wilsey	x	x
USD #417 – Morris County	x	x
USD #481 – Rural Vista	x	x
All Rural Water Districts	x	x
Diamond Creek Watershed Joint District #61	x	x
Lyon Creek Watershed	x	x

Table 1.4: Morris County Participating Jurisdictions

Jurisdiction	2015 HMP Participant	2020 HMP Participant
Rock Creek Watershed Joint District #84	x	x
Flint Hills REC	x	x

Table 1.5: Pottawatomie County Participating Jurisdictions

Jurisdiction	2015 HMP Participant	2020 HMP Participant
Pottawatomie County	x	x
Belvue	x	x
Emmett	x	x
Havensville	x	x
Louisville	x	x
Olsburg	x	x
Onaga	x	x
St. George	x	x
St Mary's	x	x
Wamego	x	x
Westmoreland	x	x
Wheaton	x	x
USD #320 – Wamego	x	x
USD #321 – Kaw Valley	x	x
USD #322 – Onaga / Havensville / Wheaton	x	x
USD #323 – Rock Creek	x	x
USD #384 – Blue Valley	x	x
All Rural Water Districts	x	x
Belvue Drainage District	x	x
Cross Creek Watershed Joint District #42	x	x
Bluestem Electric COOP	x	x
Nemaha-Marshall Electric COOP	x	x

Table 1.6: Riley County Participating Jurisdictions

Jurisdiction	2015 HMP Participant	2020 HMP Participant
Riley County	x	x
Leonardville	x	x
Manhattan	x	x
Ogden	x	x
Randolph	x	x
Riley	x	x
Kansas State University	x	x
USD #378 – Riley County	x	x
USD #383 – Manhattan / Ogden	x	x
USD #384 – Blue Valley	x	x
Bluestem Electric COOP	x	x
Flint Hills REC	x	x

Table 1.7: Wabaunsee County Participating Jurisdictions

Jurisdiction	2015 HMP Participant	2020 HMP Participant
Wabaunsee County	x	x
Alma	x	x
Alta Vista	x	x
Eskridge	x	x
Harveyville	x	x
Maple Hill	x	x
McFarland	x	x
Paxico	x	x
USD #329 – Mill Creek Valley	x	x
USD #330 – Mission Valley	x	x
All Rural Water Districts	x	x
Bluestem Electric COOP	x	x
Flint Hills REC	x	x
Kaw Valley REC	x	x
Lyon-Coffey Electric COOP	x	x

Any Kansas Region I jurisdiction not covered in this HMP is either covered under another plan or declined to participate.

1.3 – Assurances

Kansas Region I and all participating jurisdictions certify that they will comply with all applicable Federal statutes and regulations during the periods for which it receives grant funding, in compliance with 44 CFR 13.11(c), and will amend its plan whenever necessary to reflect changes in State or Federal laws and statutes as required in 44 CFR 13.11(d).

This hazard mitigation plan was prepared to comply with all relevant the requirements of the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988, as amended by the DMA 2000. This plan complies with all the relevant requirements of:

- Code of Federal Regulation (44 CFR) pertaining to hazard mitigation planning
- FEMA planning directives and guidelines
- Interim final, and final rules pertaining to hazard mitigation planning and grant funding
- Relevant presidential directives
- Office of Management and Budget circulars
- Any additional and relevant federal government documents, guidelines, and rules.

1.4 – Authorities

For all jurisdictions within Kansas Region I all authority is subject to prescribed constraints, as all of Kansas political subdivisions must not act without proper delegation from the State. However, cities and counties in Kansas have broad home rule powers. Local governments in Kansas have a wide range of

tools available to them for implementing mitigation programs, policies, and actions. A local jurisdiction may utilize any or all of the following broad authorities granted by the State of Kansas:

- Regulation
- Acquisition
- Taxation
- Spending

In addition, Kansas local governments have been granted broad regulatory authority in their jurisdictions. Kansas Administrative Regulations bestow the general police power on local governments, allowing them to enact and enforce ordinances which define, prohibit, regulate or abate acts, omissions, or conditions detrimental to the health, safety, and welfare of the people, and to define and abate nuisances. Since hazard mitigation can be included under the police power (as protection of public health, safety, and welfare), towns, cities, and counties may include requirements for hazard mitigation in local ordinances. Local governments may also use their ordinance-making power to abate "nuisances", which could include, by local definition, any activity or condition making people or property more vulnerable to any hazard.

The Kansas Region IHMP relies on the authorities given to it by the State of Kansas and its citizens as encoded in state law. This plan is intended to be consistent with all policies and procedures that govern activities related to the mitigation programing and planning. In all cases of primacy, State of Kansas laws, statutes, and policies will supersede the provisions of the plan. This HMP attempts to be consistent following:

- Kansas Constitution, Article 12 Section 5: Home rule powers
- Kansas Administrative Regulation 56-2: Standards for local disaster agencies
- 2016 Kansas Statutes, Chapter 12, Article 7: Allows cities and municipalities to designate flood zones and restrict the use of land within these zones
- 2016 Kansas Statutes Chapter 24, Article 12: Establishes watershed districts
- 2016 Kansas Statutes, Chapter 48, Article 9: Promulgating the Kansas Emergency Management Act, requiring counties to establish and maintain a disaster agency responsible for emergency management and to prepare a county emergency response plan
- 2016 Kansas Statutes, Chapter 65, Article 57: Promulgating the Kansas Emergency Planning and Community Right to-Know Act
- The Robert T. Stafford Disaster Relief and Emergency Assistance Act as amended by the Disaster Mitigation Act of 2000 (Public Law 106-390 – October 30, 2000)
- 44 CFR Part 201.6: Local mitigation plans

In addition, this plan will be consistent with all relevant federal authorities as well as Emergency Management Accreditation Program (EMAP) mitigation standards.

1.5 – Adoption Resolutions

44 CFR Requirement 201.6(c)(5): Documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council). For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.

Upon review and approved pending adoption status by FEMA Region VII adoption resolutions will be signed by the participating jurisdictions and tracked by the Regional Mitigation Plan Project Manager with KDEM.

While not required, private, non-profit and charitable organizations that independently participated in this planning effort are encouraged to adopt the plan.

Adoption resolutions may be found in Appendix A.

2.0 Planning Process

2.1 – Documentation of the Planning Process

44 CFR 201.6(c)(1): Documentation of 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 March 2020, Kansas Region I and its participating jurisdictions began the process to update the Kansas Region I 2015 HMP. It was determined that Jennifer Ellerman, KDEM Mitigation Planner, would serve as the project manager, directing this plan update, and would act as the primary point-of-contact throughout the project.

The State of Kansas contracted with Blue Umbrella Solutions to assist in updating the 2015 Kansas Region I HMP. Blue Umbrella's roles included:

- Ensure that the hazard mitigation plan meets all regulatory requirements
- Assist with the determination and ranking of hazards
- Assist with the assessment of vulnerabilities to identified hazards
- Assist with capability assessments
- Identify and determine all data needs and solicit the information from relevant sources
- Assist with the revision and development of the mitigation actions
- Development of draft and final planning documents

Kansas Region I and its participating jurisdiction undertook the following steps to update and create a robust HMP:

- Review of the 2015 Kansas Region I HMP
- Review of current related planning documents
- Delivery of organizational and planning meetings
- Solicitation of public input as to plan development
- Assessment of potential risks
- Assessment of vulnerabilities and assets
- Development of the mitigation actions
- Development of a draft multi-hazard mitigation plan
- Implementation, adoption, and maintenance of the plan

The process established for this planning effort is based on DMA 2000 planning and update requirements and the FEMA associated guidance for hazard mitigation plans. The FEMA four step recommended mitigation planning process, as detailed below, was followed:

1. Organize resources
2. Assess risks
3. Develop a mitigation plan
4. Implement plan and monitor progress

To accomplish this, the following planning process methodology was followed:

- Inform, invite, and involve other mitigation plan stakeholders throughout the state, including federal agencies, state agencies, regional groups, businesses, non-profits, and local emergency management organizations.
- Conduct a thorough review of all relevant current and historic planning efforts
- Collect data on all related state and local plans and initiatives. Additionally, all related and relevant local plans were reviewed for integration and incorporation.
- Develop the planning and project management process, including methodology, review procedures, details about plan development changes, interagency coordination, planning integration, and the organization and contribution of stakeholders.
- Develop the profile of the county and participating jurisdictions.
- Complete a risk and vulnerability assessment using a Geographic Information System (GIS) driven approach using data from various local, state and federal agency resources.
- Develop a comprehensive mitigation strategy effectively addressing their hazards and mitigation program objectives. This included identifying capabilities, reviewing pre and post disaster policies and programs, identifying objectives and goals, identifying mitigation actions and projects, and assessing mitigation actions and projects.
- Determination and implementation of a plan maintenance cycle, including a timeline for plan upgrades and improvements.
- Submission of the plan to FEMA Region VII for review and approval and the petition all participating jurisdictional governments for a letter of formal plan adoption.

2.2 – 2020 Plan Changes

44 CFR 201.6(d)(3): A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within 5 years in order to continue to be eligible for mitigation project grant funding

The Kansas Region I HMP has undergone significant revision and upgrading since its last edition. Not only has the region made significant efforts to improve the functionality and effectiveness of the plan itself but is has significantly improved its hazard mitigation program. This grants the region's improved and robust hazard mitigation program a better base to further mold and improve its mitigation strategy over the next five years.

As part of this planning effort, each section of the previous mitigation plan was reviewed and completely revised. The sections were reviewed and revised against the following elements:

- Compliance with the current regulatory environment
- Completeness of data
- Correctness of data
- Capability differentials
- Current state environment

In addition to data revisions, the format and sequencing of the previous plan was updated for ease of use and plan clarity.

During this process, and after a thorough review and discussion with all participating jurisdictions and stakeholders, it was determined that the priorities of the overall community in relation to hazard mitigation planning have not changed during the five years of the previous planning cycle.

2.3 – Mitigation Planning Committee

Upon project initiation a mitigation planning committee (MPC), generally consisting of participating county emergency managers, was formed. From project inception to completion, the MPC was involved in each major plan development milestone, and fully informed through on-site meetings and electronic communication. Prior to the plan's submission to FEMA, the MPC was invited to review the plan and provide input.

In general, all MPC members were asked to participate in the following ways:

- Provide local engagement with all participating jurisdictions
- Attend and participate in meetings
- Assist with the collection of data and information
- Review planning elements and drafts
- Integrate hazard mitigation planning elements with other planning mechanisms
- Facilitate jurisdictional coordination and cooperation
- Assist with the revision and development of mitigation actions

MPC members who were unable to attend meetings due to budgetary or personnel constraints were contacted via email or phone to discuss hazard mitigation planning, including the process, goals, mitigation actions, local planning concerns and plan review.

Each MPC member was thoroughly interviewed regarding their jurisdiction's and sub-jurisdiction's mitigation related activities. These interviews were invaluable in fully integrating the resources necessary to produce this plan, document mitigation activities, and document the mitigation resources available to better increase resiliency.

Additionally, the MPC was used as a conduit to solicit input from all participating jurisdictions under the county. Where appropriate, the MPC solicited the assistance of technical experts from various agencies and groups. When the MPC updated and improved the plan's mitigation strategy, personnel from strategically selected agencies were interviewed to provide input on their mitigation capabilities.

The following participants were selected for the MPC.

Table 2.1: Kansas Region I Mitigation Planning Committee

Participant	Title	Organization
Scott Wiltse	Emergency Manager	Chase County
Mike Haase	Emergency Manager	Geary County
Jarrod Fell	Emergency Manager	Lyon County
Christopher Blackledge	Emergency Manager	Morris County
Jennifer Merrow	Emergency Manager	Pottawatomie County
Pat Collins	Emergency Manager	Riley County
Amy Terrapin	Emergency Manager	Wabaunsee County
Jennifer Ellerman	Hazard Mitigation Planner	State of Kansas
Jeanne Bunting	State Hazard Mitigation Officer	State of Kansas
Matt Eyer	Plan Author	Blue Umbrella Solutions

2.4 – Jurisdictional Representation

Each participating jurisdiction delegated a point of contact to represent that jurisdiction during the planning process. From project inception to completion these representatives were kept fully informed concerning the planning process, milestones, and participation requirements. In general, jurisdictional representatives were asked to participate in the following ways:

- If possible, attend and participate in meetings
- Provide jurisdiction specific data and information
- Review planning elements and drafts
- Integrate hazard mitigation planning elements with jurisdictional planning mechanisms
- Assist with the revision and development of mitigation actions

Participating jurisdictions who were unable to attend meetings due to budgetary or personnel constraints were contacted via email or phone to discuss hazard mitigation planning, including the process, goals, mitigation actions, local planning concerns and plan review by their representative MPC member.

The following details jurisdictional representation.

Table 2.2: Chase County Jurisdictional Representatives

Jurisdiction	Title
Chase County	Emergency Manager
City of Cedar Point	City Administrator
City of Cottonwood Falls	City Administrator
City of Elmdale	City Administrator
City of Matfield Green	City Administrator
City of Strong City	City Administrator
USD #284 – Chase County	Superintendent
Public Wholesale Water Supply District #26	Director
All RWDs	Director
Flint Hills REC	Director

Table 2.2: Chase County Jurisdictional Representatives

Jurisdiction	Title
Lyon-Coffey Electric COOP	Director

Table 2.3: Geary County Jurisdictional Representatives

Jurisdiction	Title
Geary County	Emergency Manager
City of Grandview Plaza	City Administrator
City of Junction City	City Administrator
City of Junction City	Police Chief
City of Junction City	Public Works Director
City of Milford	City Administrator
Cloud County Community College	Director of Auxiliary Services
USD #475 – Geary County	Superintendent
All RWDs	Directors
Bluestem COOP	Director
DS&O REC	Director
Flint Hills REC	Director

Table 2.4: Lyon County Jurisdictional Representatives

Jurisdiction	Title
Lyon County	Emergency Manager
City of Admire	City Administrator
City of Allen	City Administrator
City of Americus	City Administrator
City of Bushong	City Administrator
City of Emporia	City Administrator
City of Emporia	Police Chief
City of Emporia	Fire Chief
City of Hartford	City Administrator
City of Neosho Rapids	City Administrator
City of Olpe	City Administrator
City of Reading	City Administrator
Emporia State University	Director, Safety
Flint Hills Technical College	Dean Enrollment Management
USD #251 – North Lyon County	Superintendent
USD #252 – Southern Lyon County	Superintendent
USD #253 - Emporia	Superintendent
All Rural Water Districts	Directors
Allen Creek Watershed District #89	Director
Salt Creek Watershed Joint District #104	Director
Upper Marais Des Cygnes Watershed Joint District #101	Director
Flint Hills REC	Director

Table 2.5: Morris County Jurisdictional Representatives

Jurisdiction	Title
Morris County	Emergency Manager
City of Council Grove	City Administrator
City of Dunlap	City Administrator
City of Dwight	City Administrator
City of Latimer	City Administrator
City of Parkerville	City Administrator
City of White City	City Administrator
City of Wilsey	City Administrator
USD #417 – Morris County	Superintendent
USD #481 – Rural Vista	Superintendent
All RWDs	Directors
Diamond Creek Watershed Joint District #61	Director
Lyon Creek Watershed	Director
Rock Creek Watershed Joint District #84	Director
Flint Hills REC	Director

Table 2.6: Pottawatomie County Jurisdictional Representatives

Jurisdiction	Title
Pottawatomie County	Emergency Manager
City of Belvue	City Administrator
City of Emmett	City Administrator
City of Havensville	City Administrator
City of Louisville	City Administrator
City of Olsburg	City Administrator
City of Onaga	City Administrator
City of St. George	City Administrator
City of St Mary's	City Administrator
City of Wamego	City Administrator
City of Westmoreland	City Administrator
City of Wheaton	City Administrator
USD #320 – Wamego	Superintendent
USD #321 – Kaw Valley	Superintendent
USD #322 – Onaga / Havensville / Wheaton	Superintendent
USD #323 – Rock Creek	Superintendent
USD #384 – Blue Valley	Superintendent
All RWDs	Director
Belvue Drainage District	Director
Cross Creek Watershed Joint District #42	Director
Bluestem Electric COOP	Director
Nemaha-Marshall Electric COOP	Director

Table 2.7: Riley County Jurisdictional Representatives

Jurisdiction	Title
Riley County	Emergency Manager
City of Leonardville	City Administrator
City of Manhattan	City Administrator
City of Manhattan	Police Chief
City of Manhattan	Council Member
City of Ogden	City Administrator
City of Randolph	City Administrator
City of Riley	City Administrator
Kansas State University	Public Safety, Chief
USD #378 – Riley County	Superintendent
USD #383 – Manhattan / Ogden	Superintendent
USD #384 – Blue Valley	Superintendent
Bluestem Electric COOP	Director
Flint Hills REC	Director

Table 2.8: Wabaunsee County Jurisdictional Representatives

Jurisdiction	Title
Wabaunsee County	Emergency Manager
City of Alma	City Administrator
City of Alta Vista	City Administrator
City of Eskridge	City Administrator
City of Harveyville	City Administrator
City of Maple Hill	City Administrator
City of McFarland	City Administrator
City of Paxico	City Administrator
USD #329 – Mill Creek Valley	Superintendent
USD #330 – Mission Valley	Superintendent
All RWDs	Directors
Bluestem Electric COOP	Director
Flint Hills REC	Director
Kaw Valley REC	Director
Lyon-Coffey Electric COOP	Director

2.5 – Local and Regional Stakeholder Participation

44 CFR Requirement 201.6(b)(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

Within Kansas Region I there are many jurisdictions and organizations who have a vested interest in participating in the creation and adoption of the hazard mitigation plan. An integral part of the planning process included the identification, development, and coordination of these entities. The Kansas Region

I MPC provided the opportunity for neighboring communities, counties, and local and regional development agencies to be involved in the planning process. Where applicable, these entities were kept informed of the hazard mitigation process during state, regional and local emergency management meetings, gatherings and conferences, in person by MPC members, or were solicited for planning information.

It is worth noting that all neighboring Kansas counties are undergoing a similar mitigation planning effort, and as part of this statewide process all county and state planners are working together toward common mitigation goals. During the creation and adoption of this plan communication channels were opened to facilitate the cross pollination of ideas, to incorporate neighboring regions concerns, and to ensure the overall preparedness of the State of Kansas.

In addition, relevant federal, regional, state, local governmental, and private and non-profit entities were also invited to provide input and utilized for information and technical expertise, including, but not limited to:

- American Red Cross
- Center for Disease Control
- FEMA
- Kansas Adjutant General's Office
- Kansas Department of Agriculture, the Kansas Department of Health and Environment
- Kansas Department of Transportation
- Kansas Fire Service, Kansas Water Office
- Kansas Geological Survey
- Kansas State Fire Marshall
- Local and county planning and zoning offices (where available).
- Local business and non-profit entities
- National Oceanic and Atmospheric Administration
- National Weather Service
- Nuclear Regulatory Commission
- Pipeline and Hazardous Materials Safety Administration
- Salvation Army
- United States Army Corp of Engineers, National Resource Conservation Service
- United States Department of Agriculture
- United States Geological Survey

2.6 – Public Participation

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

As part of the overall planning process, the public were provided with numerous opportunities to contribute and comment on the creation and adoption of the plan. These opportunities included:

- Advertised meeting invitations on participating jurisdictional websites
- Open meeting opportunities with Kansas Region I MPC members
- Access to an online survey document to provide feedback
- Comment period upon completion of draft plan

Input from the general public provided the MPC with a clearer understanding of local concerns, increased the likelihood of citizen buy-in concerning proposed mitigation actions, and provided elected officials with a guide and tool to set regional ordinances and regulations. This public outreach effort was also an opportunity for adjacent jurisdictions and entities to be involved in the planning process.

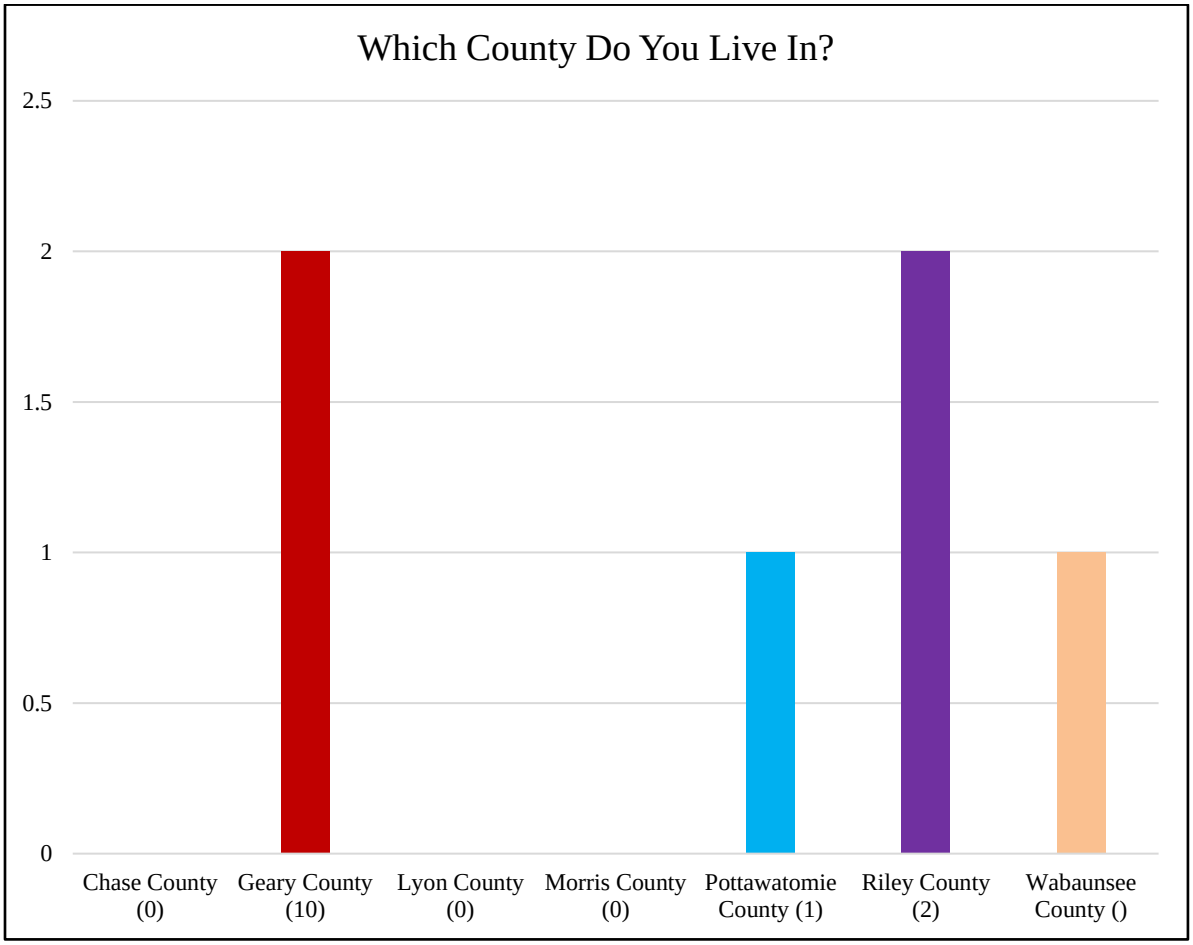
Public feedback was used to help shape the plan, including:

- Provide local level information on hazard impacts
- Determine and revise mitigation action items
- Gauge the importance of participation in the NFIP

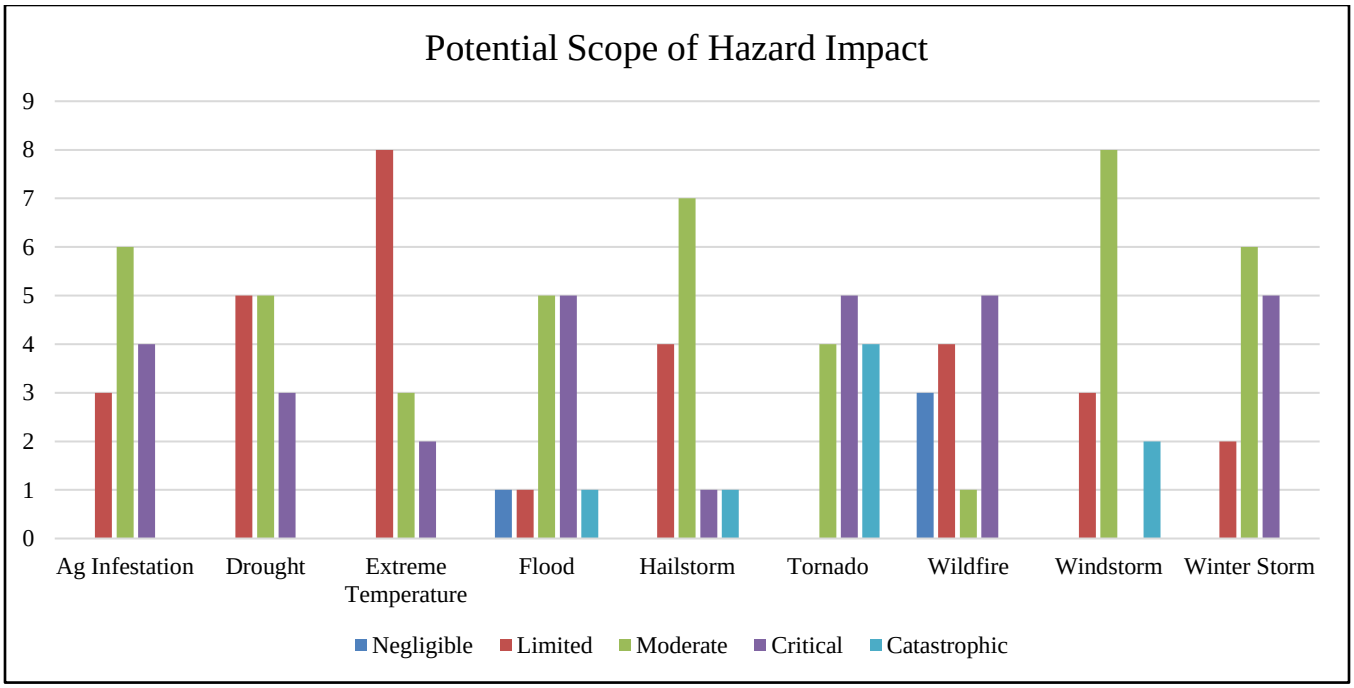
Additionally, as citizens were made more aware of potential hazards and the local process to mitigation against their impacts, it was believed that they would take a stronger role in making their homes, neighborhoods, schools, and businesses safer from the potential effects of natural hazards.

The following graphics represents the feedback received from the public from the online survey document (13 participants).

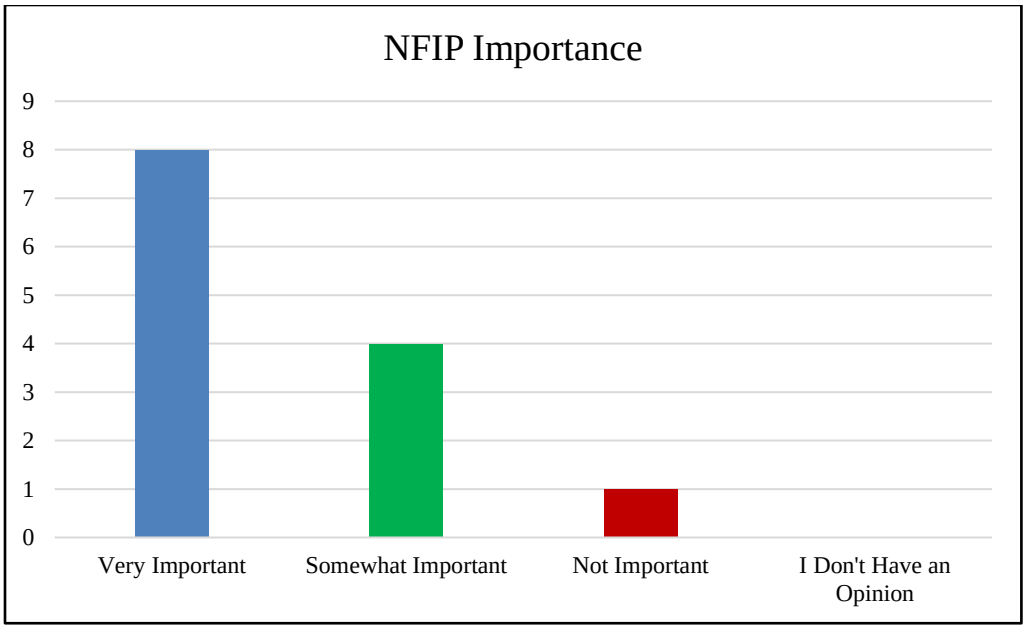
Question 1: In which county or jurisdiction do you live?



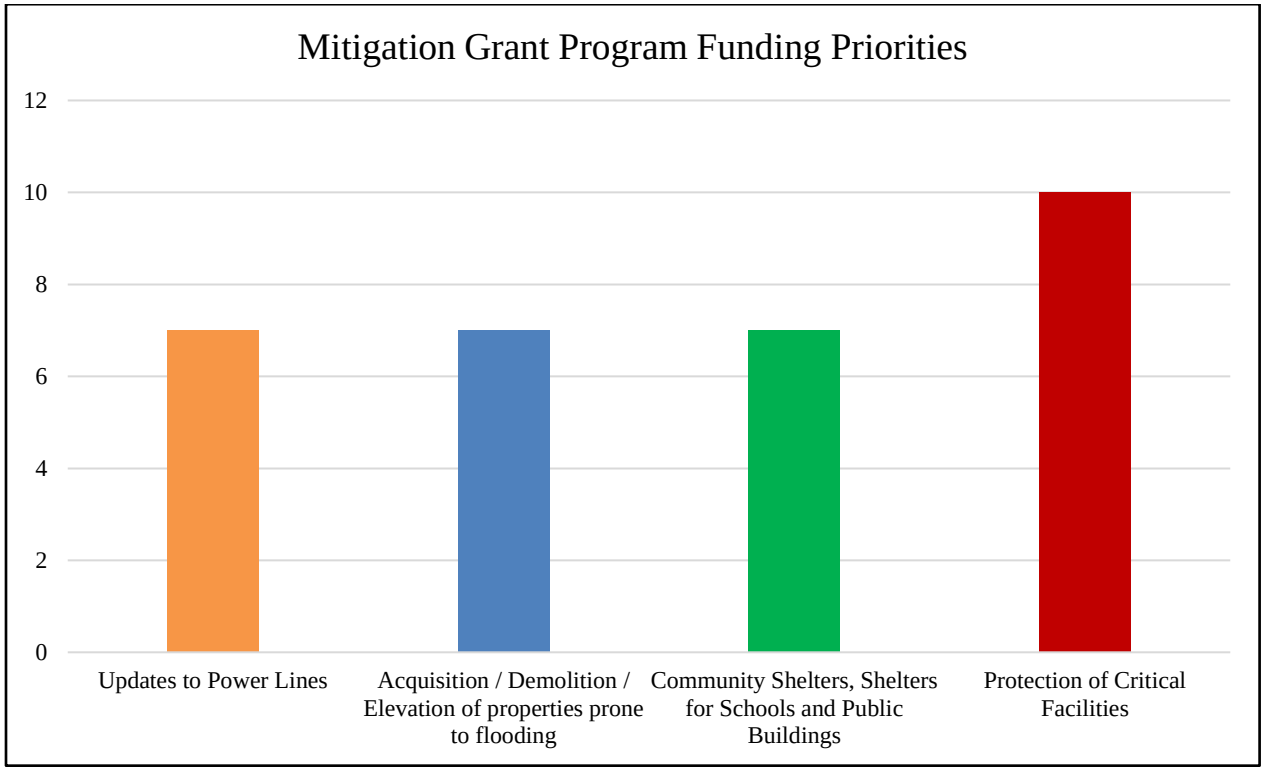
Question 2: In 2014, the Region consisting of Grant, Greeley, Hamilton, Kearny, Morton, Scott, Stanton, Stevens and Wichita Counties, the planning committee determined that the hazards listed below are important to the area. Indicate the level of risk, or the scope of potential impacts, in the Region, that you perceive for each hazard:



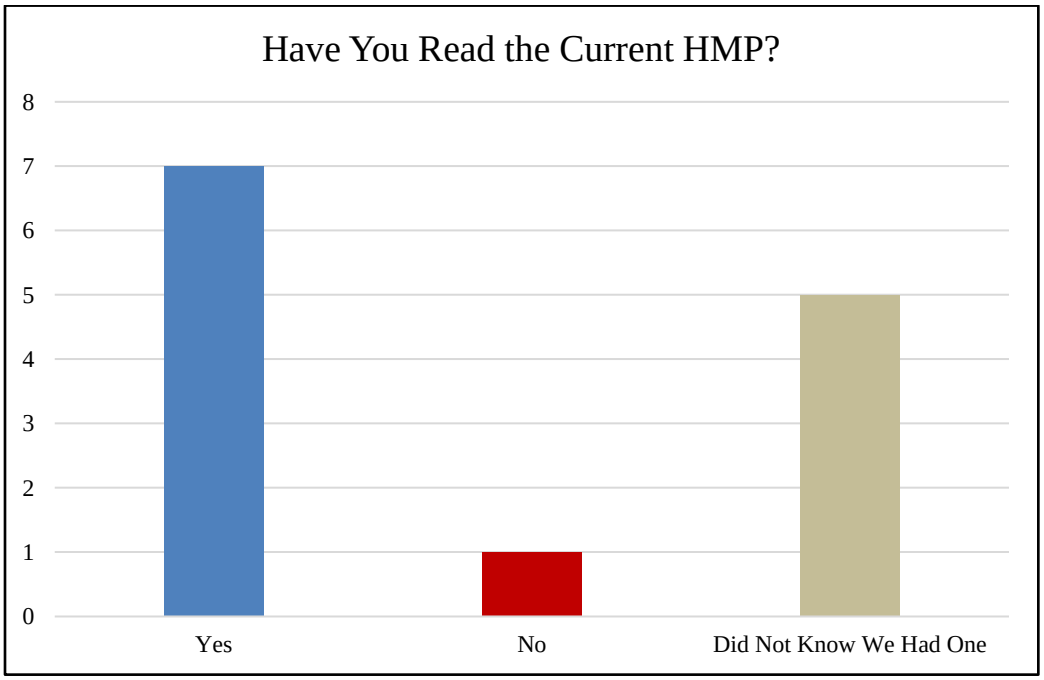
Question 3: In the Region, the planning committee has determined that a flood event is the third most critical hazard. How important is it for you to have your community participate in or continue to participate in the National Flood Insurance Program?



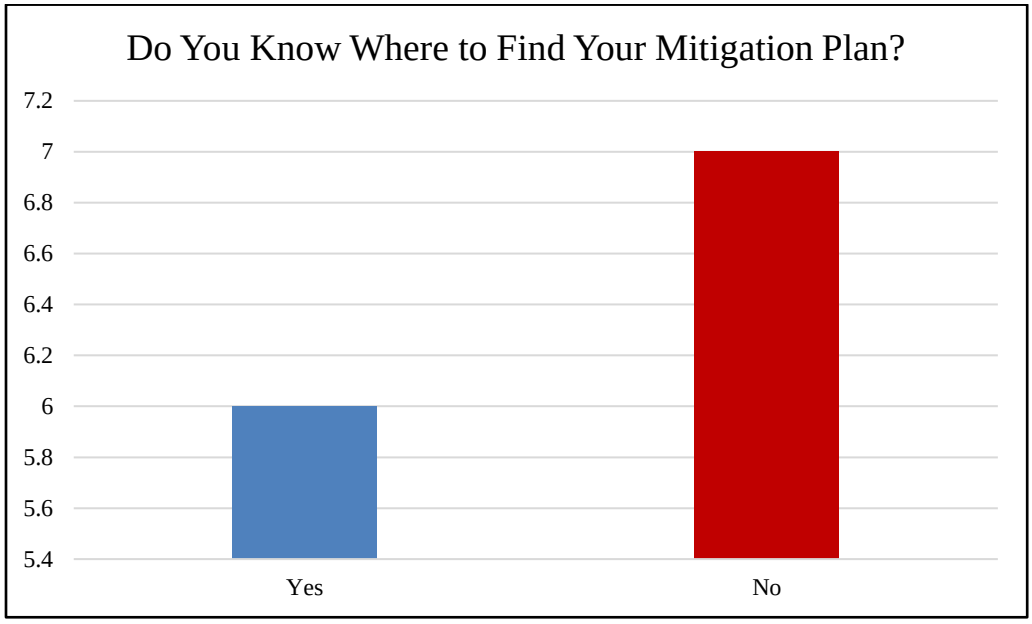
Question 4: The Kansas Division of Emergency Management currently reviews the application for funds for the FEMA Risk Mitigation Grant Program. Your current funding priorities are listed below. Please check those that could benefit your community.



Question 5: Have you had the opportunity to read your current Risk Mitigation Plan?



Question 6: Do you know where you can find the mitigation plan for your county if you would like to see it?



In addition, respondents were given the opportunity to address any local concerns or issues of concern to them.

Question 7: Your opinion is valuable to this planning process. Discuss any other problems that the planning committee should consider when developing a strategy to reduce future losses caused by natural hazard events.

Table 2.9: Kansas Region I Survey Comments, Areas of Concern

Jurisdiction	Comments
Geary County	Power and Communications systems need to be first and priority in case of disasters.
Pottawatomie	Due to the NABF research facility in Manhattan with activation in 2022 there are concerns on safety and security as well as possible aggression involving zoonotic diseases handling.
Riley County	Focus on cutting down the tall grass during spring and summer. Work on all the little cities water runoffs and the flow of their creeks.

Question 8: Do you have any mitigation project that you would like to see implemented and what are they?

Table 2.10: Kansas Region I Survey Comments, Requested Projects

Jurisdiction	Comments
Geary County	There are so many old utilities within Geary Co. and Junction City that need upgrading that it would not take a huge storm to leave the city completely shut down.
Geary County	Safe Rooms at governmental buildings

Table 2.10: Kansas Region I Survey Comments, Requested Projects

Jurisdiction	Comments
Pottawatomie	Primary for safety and security is having a flood secure bridge over the Blue River joining the campus area to Pottawatomie county. 1. The current Highway 24 is prone to flooding and is carrying ever increasing volume (did close in 2019 east of Excel road due to heavy rain) 2. FORT Riley during their Joint Land Use Study directed funds to Blue Township in Pottawatomie county because a large number of army personnel live in the area and it is critical to their efforts to: A) limit growth west side of Manhattan due to training noise and security and B) To assure a safe, all time route to the fort for pilots, officers, and all soldiers in critical situations. This route option, in their interest, is being further studied at their expense. A new Manhattan USD 393 grade school is being built starting this summer. They need a safe and secure bridge for students and staff. In recent survey folks in the area both support the secure bridge concept and express willingness to help finance it. Area counties, with NBAF, would benefit from a well-designed communication system with ' central' dispatch to assure clear, response and back up for all concerns listed in preliminary list of issues. Please
Riley County	Riley city runoff drains and finishing all runoffs near citizens homes.

2.7 – Planning Meetings

Within Kansas Region I there are many jurisdictions and organizations who have a vested interest in participating in the creation and adoption of the hazard mitigation plan. An integral part of the planning process included the identification, development, and coordination of all of these entities. As such, a series of three organizational and planning meetings were scheduled and all past and potential future participants were notified by the State of Kansas as to the dates and locations of the meetings. In addition, communities neighboring the region were invited to participate in the planning process.

It is worth noting that all neighboring Kansas counties are undergoing a similar mitigation planning effort, and as part of this statewide process all county and state planners are working together toward common mitigation goals. During the creation and adoption of this plan communication channels were opened to facilitate the cross pollination of ideas, to incorporate neighboring regions concerns, and to ensure the overall preparedness of the State of Kansas.

A series of kick-off meetings were held with MPC members, available representatives from jurisdictions within the planning region, local and regional stakeholders, and the public invited. At the kickoff meeting, the planning process, project coordination, scope, participation requirements, strategies for public involvement, and schedule were discussed in detail. During the meeting, participants were led through a guided discussion concerning hazard data sourced from their previous hazard mitigation plans. Additionally, research was conducted prior to the meeting on recent regional hazard events to further inform the discussion. Participants were encouraged to discuss past hazard events, past impacts, and the future probability for all identified hazards. At the conclusion of the meeting, all participants were provided with a data collection forms to solicit information needed to properly complete the HMP. The forms asked for information concerning data on historic hazard events, at risk populations and properties, and available capabilities. Additionally, participating jurisdictions were provided with their mitigation

actions from the previous plans for review and comment and asked to identify any additional mitigation actions.

Due to the current COVID-19 pandemic and considering many factors impacting the current planning environment including increased workload, non-standard work hours, staff reductions, and social distancing measures, the mid-term planning meeting was conducted with MPC members. Based upon the initial research, discussions held during the kickoff meetings, information obtained from the data collection forms, additional research, and subsequent discussion with MPC members, the results of the hazard identification, classification, and delineation were discussed in detail. In addition, sections of the HMP were made available for review and comment. Based on the supplied hazard information, participants were asked to assist in the development and review of mitigation goals and actions.

Due to the current COVID-19 pandemic and considering many factors impacting the current planning environment including increased workload, non-standard work hours, staff reductions, and social distancing measures, the final meeting was conducted online. To ensure wide circulation and participation, the Hazard Mitigation Committee members were tasked with conducting outreach to participating jurisdictions within their county. All participants were invited to submit any questions, plan additions, or plan modifications either via email or phone. Revision from this process included modifications to mitigation action items and modifications to capability assessments. The completed draft HMP was then made available for review and comment.

The following table presents the date and location of each planning meeting.

Table 2.11: Kansas Region I Planning Meetings

Meeting Number	Date	Location
1 (Kickoff)	10/05/2020	Geary County
	10/05/2020	Lyon County
2 (Mid-Term)	06/16/2020	On-Line
3 (Final)	07/07/2020	On-Line

Both the minutes and sign-in sheets from all meetings may be found in Appendix C.

2.8 – Existing Plan Incorporation

44 CFR 201.6(b)(3): Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

The hazard mitigation plan is an overarching document that is both comprised of, and contributes to, various other jurisdictional plans. In creating this plan, all the planning documents identified below were consulted and reviewed, often extensively. In turn, when each of these other plans is updated, they will be measured against the contents of the hazard mitigation plan.

Below is a list of the various planning efforts, sole or jointly administered programs, and documents reviewed and included in this hazard mitigation plan. While each plan can stand alone, their review and

functional understanding was pivotal in the development of this plan and further strengthens and improves Kansas Region I's resilience to disasters.

- All participating jurisdictions Codes and Ordinances
- All participating jurisdictions Comprehensive Plans
- All participating jurisdictions Critical Facilities Plans
- All participating jurisdictions Economic Development Strategic Plans
- All participating jurisdictions Emergency Operations Plans
- All participating jurisdictions Flood Mitigation Assistance Plan
- All participating jurisdiction Land-Use Plans
- Community Wildfire Protection Plans
- Any other newly created or relevant jurisdictional plan

Information from each of these plans and programs is utilized within the applicable hazard sections to provide data and fully inform decision making and prioritization.

State and Federal Level Plan Integration

The following list illustrates local, state and federal programs integrated, where applicable, and referenced in Kansas Region I's mitigation efforts.

- State of Kansas Hazard Mitigation Plan
- Hazard Mitigation Grant Program
- Flood Mitigation Assistance Program
- National Flood Insurance Program
- Pre-Disaster Mitigation Program
- Repetitive Loss & Severe Repetitive Loss Program
- FireWise Communities Program
- Relevant Dam Emergency Action Plans (if document not secured)
- Community Rating System

Integration Challenges

The 2015 plan update successfully integrated approved Kansas Region I local hazard mitigation plans into one regional HMP. This represents a success of our streamlined program of allowing jurisdictions to participate in multi-jurisdictional regional-level plans. This program not only reduces the cost and the burden to local jurisdictions, it also allows for closer collaboration and integration of local communities in all areas or planning and response. However, and as always, challenges exist due to the day to day demands of the working environment, including scheduling conflicts, budget restrictions, and staffing changes and shortages related to both the utilization and incorporation of the HMP and completion of identified hazard mitigation projects.

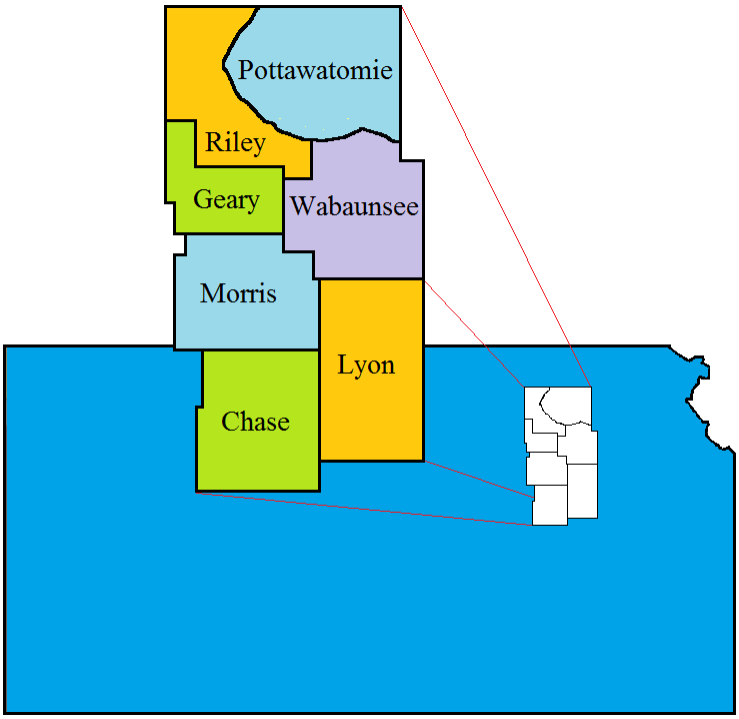
3.0 Planning Area

3.1 – Introduction

Kansas Region I consists of the following seven participating counties and their participating jurisdictions:

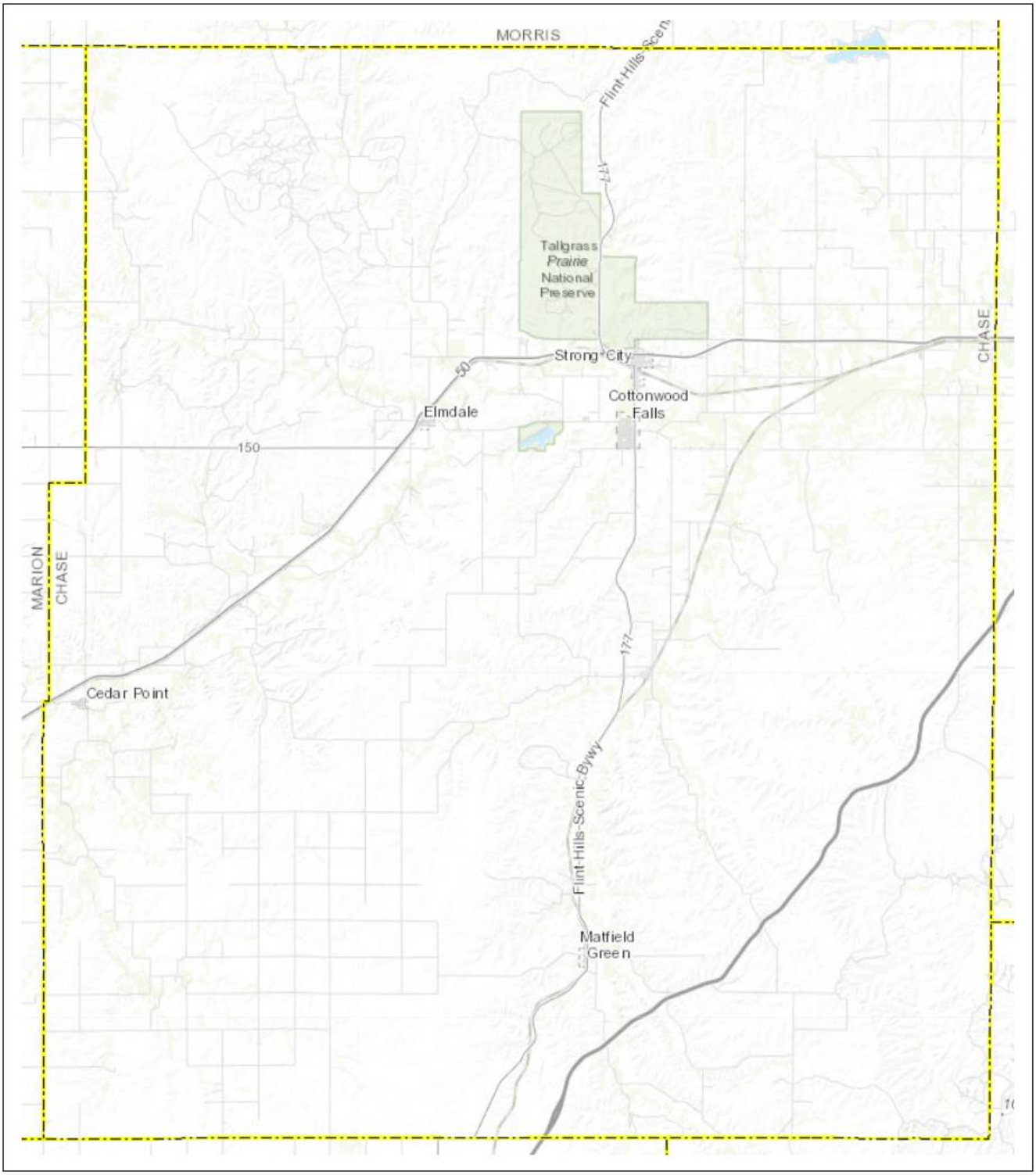
- Chase County
- Geary County
- Lyon County
- Morris County
- Pottawatomie County
- Riley County
- Wabaunsee County

The following map details the locations of these counties.



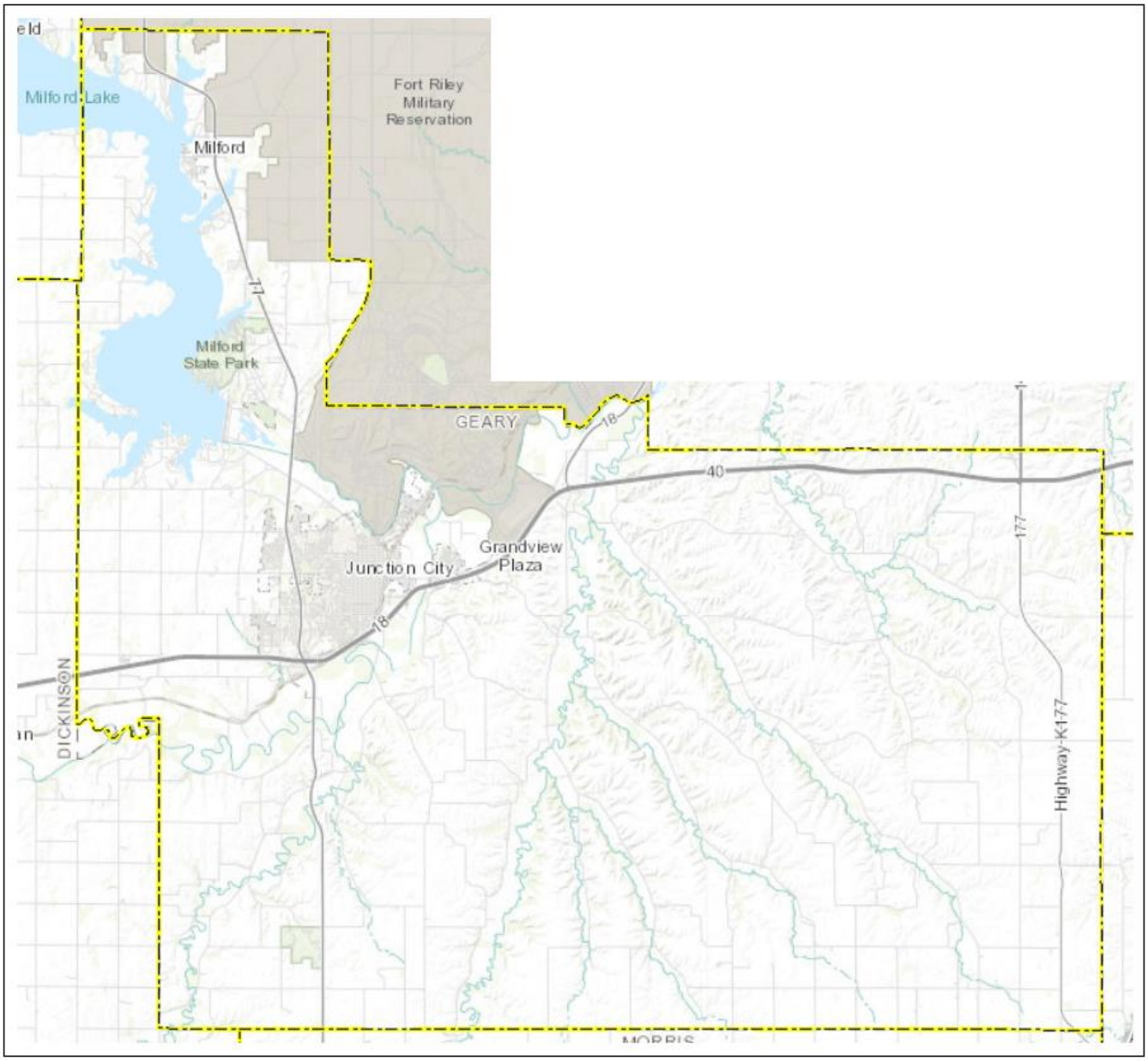
The following is a map of **Chase County,** provided by the Kansas Department of Transportation (KDOT).

Map of Chase County



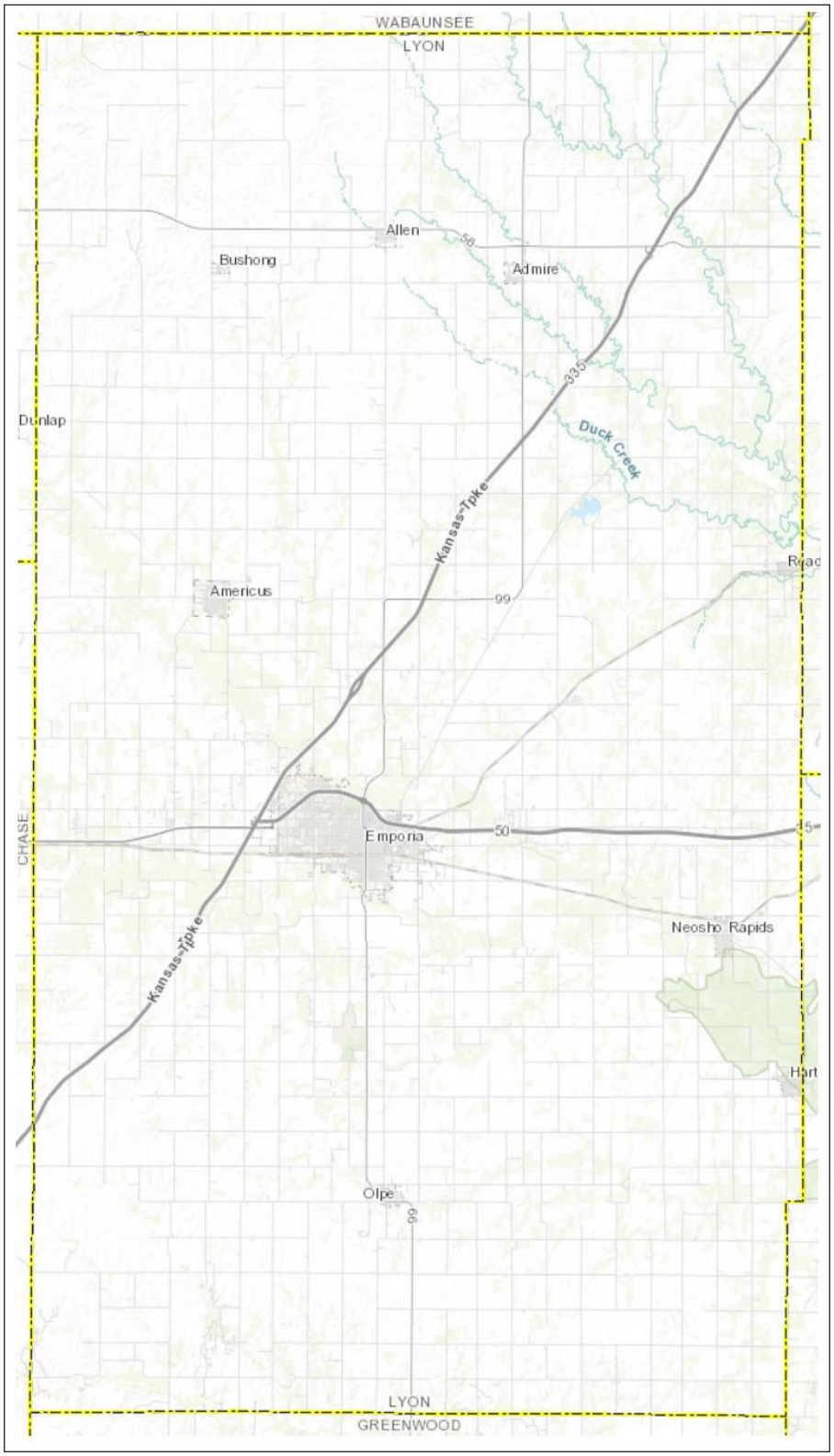
The following is a map of **Geary County,** provided by KDOT.

Map of Geary County



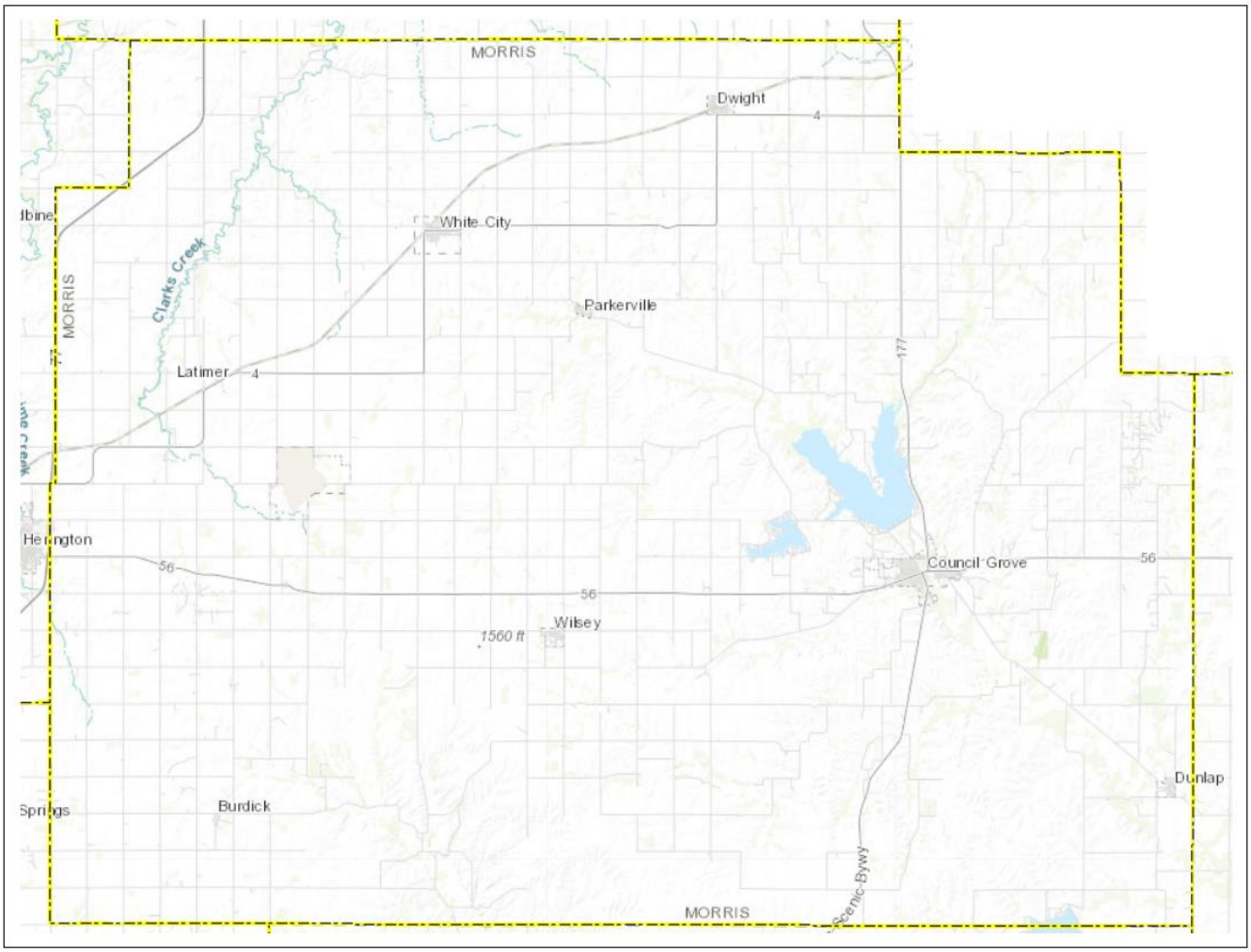
The following is a map of **Lyon County,** provided by KDOT.

Map of Lyon County



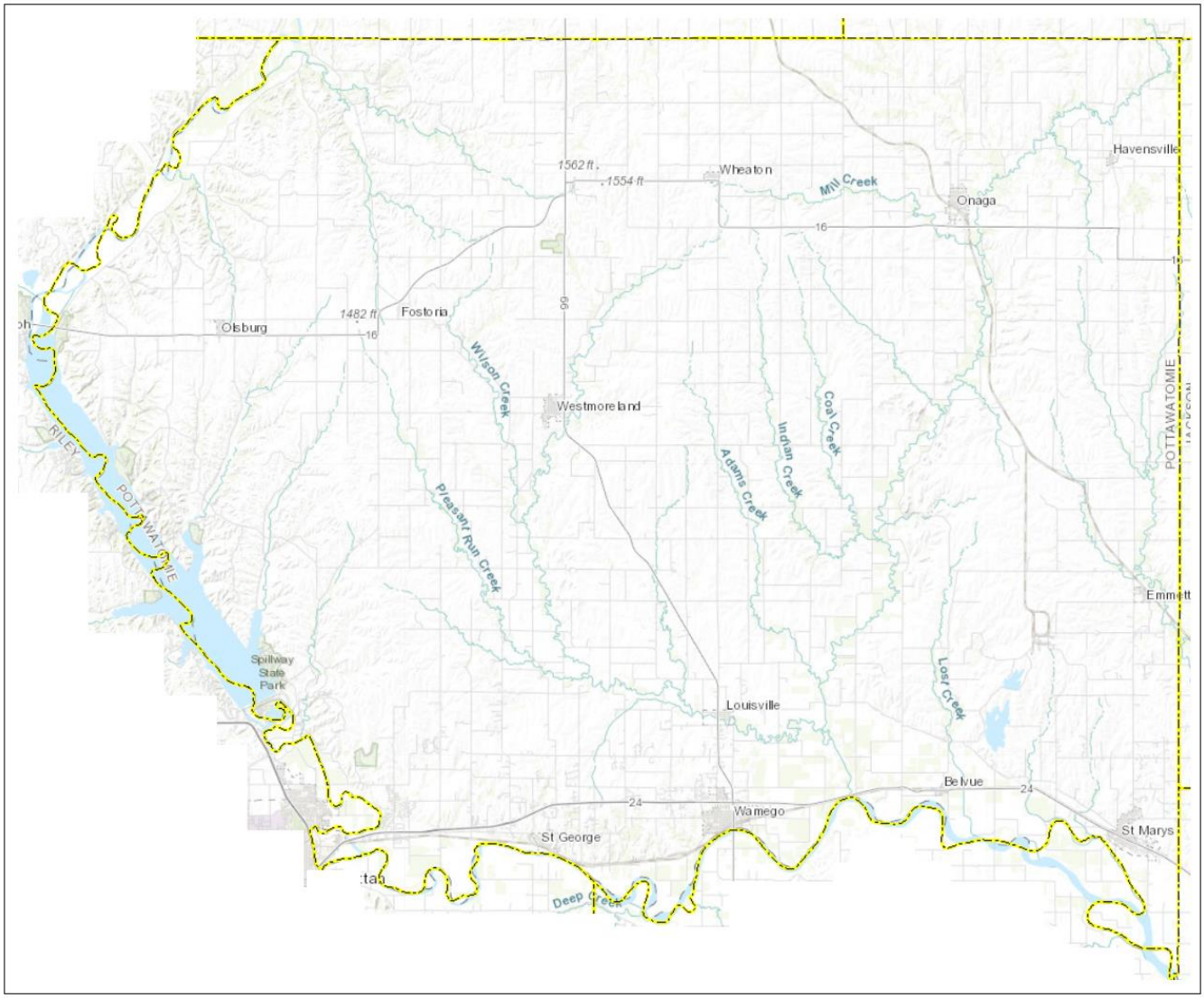
The following is a map of **Morris County,** provided by KDOT.

Map of Morris County



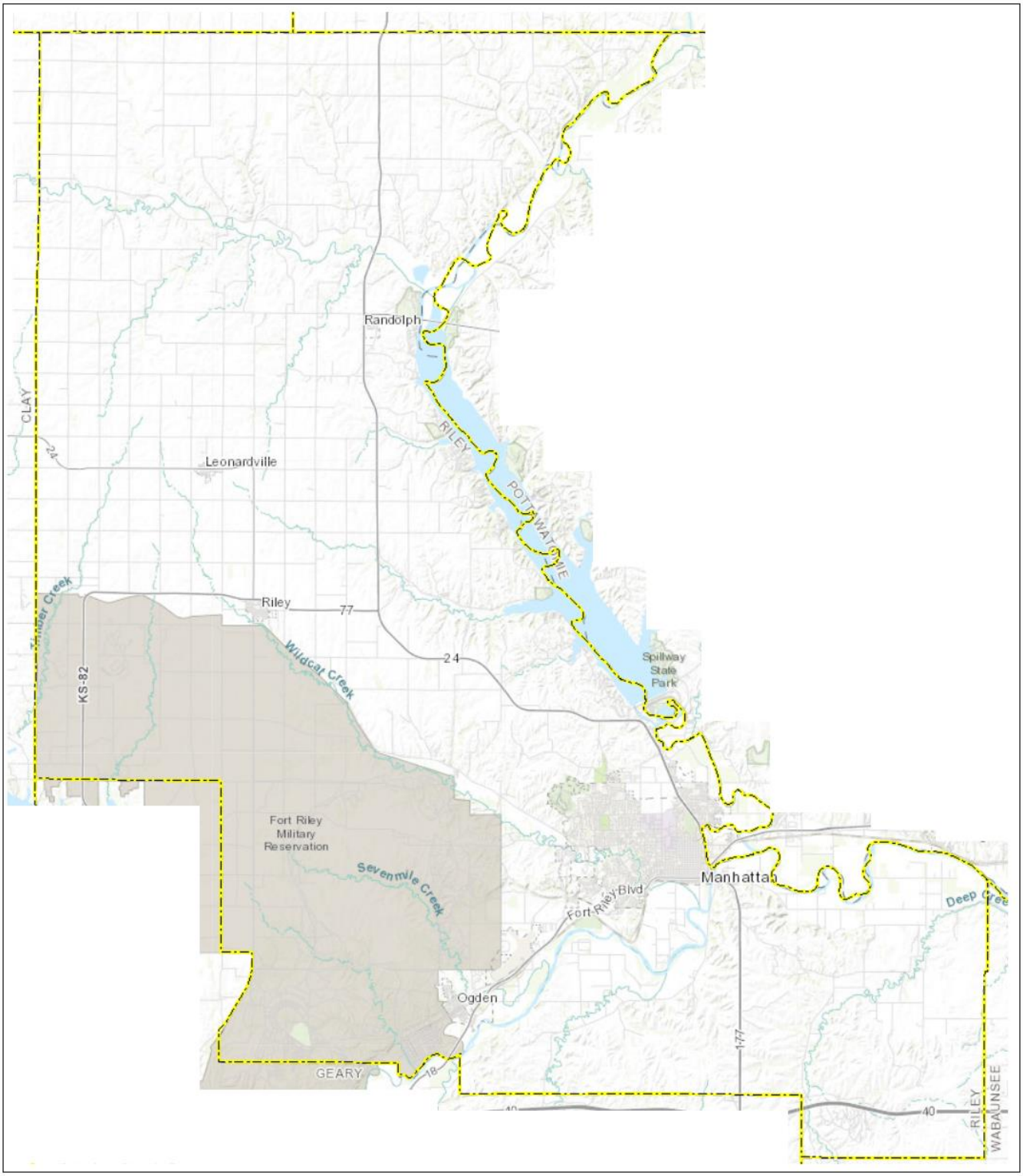
The following is a map of **Pottawatomie County,** provided by KDOT.

Map of Pottawatomie County



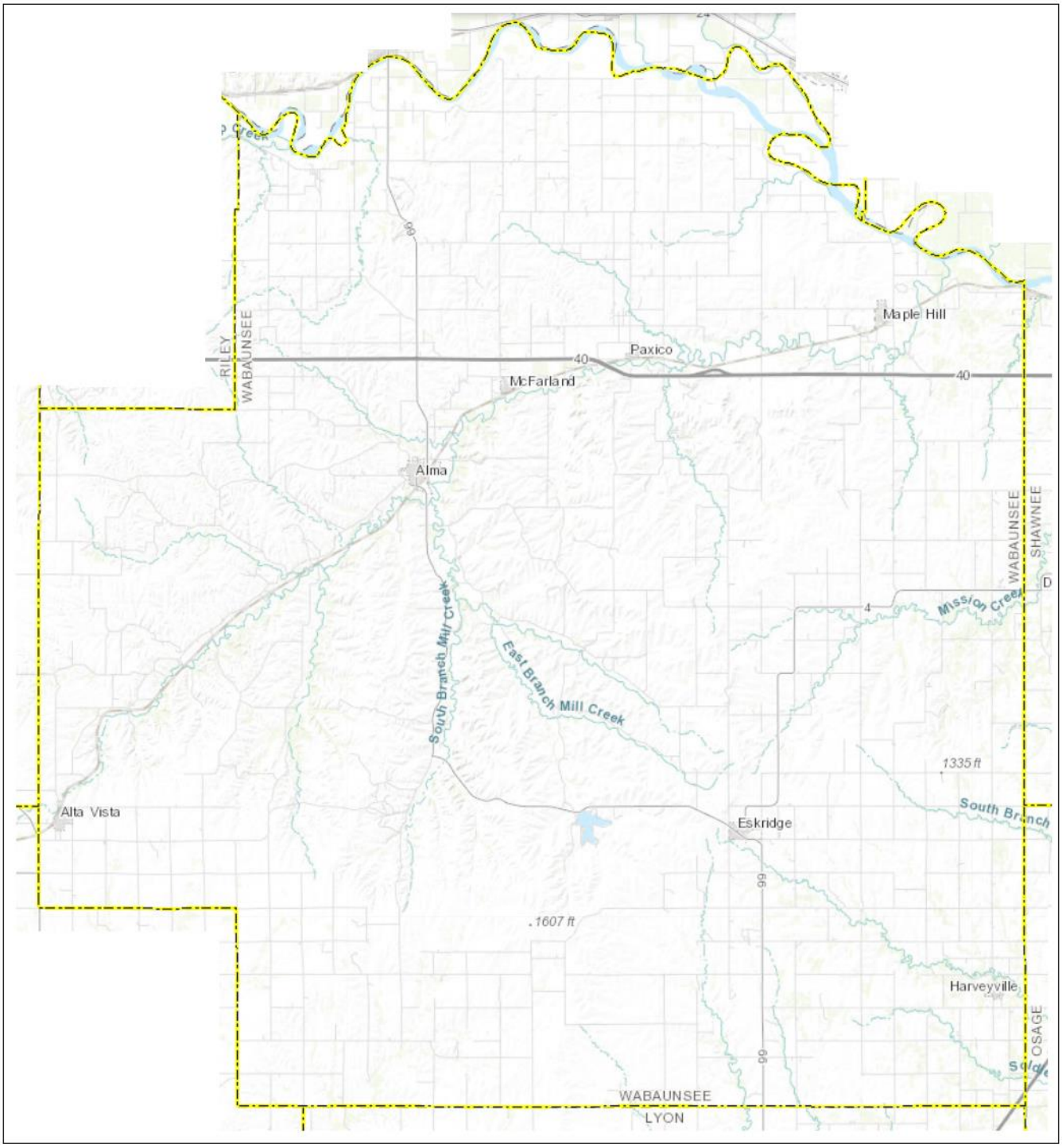
The following is a map of **Riley County,** provided by KDOT.

Map of Riley County



The following is a map of **Wabaunsee County,** provided by KDOT.

Map of Wabaunsee County



3.2 – Regional Population Data

The following tables present population data for counties and participating city jurisdictions in Kansas Region I. In general, the higher a jurisdiction's population the greater the potential vulnerability of its citizens to identified hazards.

Table 3.1: Chase County Population Data

Jurisdiction	Population 2000	Population 2010	Population 2018	Numeric Population Change 2000 - 2018	Percent Population Change 2000 to 2018	Population Density, per Square Mile 2018
Chase County	3,030	2,783	2,600	-430	-14.2%	3
Cedar Point	53	28	26	-27	-50.9%	325
Cottonwood Falls	966	903	858	-108	-11.2%	1,454
Elmdale	50	55	52	2	4.0%	306
Matfield Green	60	47	43	-17	-28.3%	307
Strong City	584	485	593	9	1.5%	1,289

Source: US Census Bureau

Of note for Chase County and its participating jurisdictions for the period 2000 to 2018:

- A population loss was noted in Chase County, -14.2% as a whole
- Population losses were noted in three out of five participating cities

Table 3.2: Geary County Population Data

Jurisdiction	Population 2000	Population 2010	Population 2018	Numeric Population Change 2000 - 2018	Percent Population Change 2000 to 2018	Population Density, per Square Mile 2018
Geary County	27,947	35,240	32,777	4,830	17.3%	81
Grandview Plaza	1,184	1,560	1,585	401	33.9%	1,887
Junction City	18,886	23,353	22,120	3,234	17.1%	1,810
Milford	502	530	521	19	3.8%	386

Source: US Census Bureau

Of note for Geary County and its participating jurisdictions for the period 2000 to 2018:

- A population gain was noted in Geary County, 17.3% as a whole
- Population gains were noted in all participating cities

Table 3.3: Lyon County Population Data

Jurisdiction	Population 2000	Population 2010	Population 2018	Numeric Population Change 2000 - 2018	Percent Population Change 2000 to 2018	Population Density, per Square Mile 2018
Lyon County	35,935	33,649	33,300	-2,635	-7.3%	39
Admire	177	156	153	-24	-13.6%	464

Table 3.3: Lyon County Population Data

Jurisdiction	Population 2000	Population 2010	Population 2018	Numeric Population Change 2000 - 2018	Percent Population Change 2000 to 2018	Population Density, per Square Mile 2018
Allen	211	177	195	-16	-7.6%	722
Americus	938	894	887	-51	-5.4%	785
Bushong	55	34	33	-22	-40.0%	220
Emporia	26,760	24,916	24,765	-1,995	-7.5%	2,074
Hartford	500	371	370	-130	-26.0%	974
Neosho Rapids	274	265	268	-6	-2.2%	525
Olpe	504	546	539	35	6.9%	674
Reading	247	231	229	-18	-7.3%	1,145

Source: US Census Bureau

Of note for Lyon County and its participating jurisdictions for the period 2000 to 2018:

- A population loss was noted in Lyon County, -7.3% as a whole
- Population losses were noted in eight out of nine participating cities

Table 3.4: Morris County Population Data

Jurisdiction	Population 2000	Population 2010	Population 2018	Numeric Population Change 2000 - 2018	Percent Population Change 2000 to 2018	Population Density, per Square Mile 2018
Morris County	6,104	5,918	5,521	-583	-9.6%	8
Council Grove	2,321	2,182	2,327	6	0.3%	1,158
Dunlap	81	30	28	-53	-65.4%	122
Dwight	330	272	255	-75	-22.7%	689
Latimer	21	20	19	-2	-9.5%	211
Parkerville	73	59	59	-14	-19.2%	236
White City	518	618	569	51	9.8%	452
Wilsey	191	153	161	-30	-15.7%	212

Source: US Census Bureau
-: No data available

Of note for Morris County and its participating jurisdictions for the period 2000 to 2018:

- A population loss was noted in Morris County, -9.6% as a whole
- Population losses were noted five out of seven participating cities

Table 3.5: Pottawatomie County Population Data

Jurisdiction	Population 2000	Population 2010	Population 2018	Numeric Population Change 2000 - 2018	Percent Population Change 2000 to 2018	Population Density, per Square Mile 2018
Pottawatomie County	18,209	21,728	24,209	6,000	33.0%	28
Belvue	228	205	195	-33	-14.5%	1,625

Table 3.5: Pottawatomie County Population Data

Jurisdiction	Population 2000	Population 2010	Population 2018	Numeric Population Change 2000 - 2018	Percent Population Change 2000 to 2018	Population Density, per Square Mile 2018
Emmett	277	191	188	-89	-32.1%	2,089
Havensville	146	133	154	8	5.5%	1,027
Louisville	209	188	218	9	4.3%	445
Olsburg	192	219	220	28	14.6%	1,158
Onaga	704	702	690	-14	-2.0%	1,078
St. George	461	639	989	528	114.5%	1,433
St Mary's	2,198	2,627	2,636	438	19.9%	2,234
Wamego	4,246	4,372	4,762	516	12.2%	2,116
Westmoreland	631	778	757	126	20.0%	1,456
Wheaton	92	95	110	18	19.6%	733

Source: US Census Bureau
-: No data available

Of note for Pottawatomie County and its participating jurisdictions for the period 2000 to 2018:

- A population gain was noted in Pottawatomie County, 33.0% as a whole
- Population gains were noted eight out of 11 participating cities

Table 3.6: Riley County Population Data

Jurisdiction	Population 2000	Population 2010	Population 2018	Numeric Population Change 2000 - 2018	Percent Population Change 2000 to 2018	Population Density, per Square Mile 2018
Riley County	62,843	71,553	73,703	10,860	17.3%	118
Leonardville	398	449	486	88	22.1%	1,736
Manhattan	44,831	52,281	55,489	10,658	23.8%	2,953
Ogden	1,762	2,087	1,745	-17	-1.0%	1,051
Randolph	175	163	158	-17	-9.7%	632
Riley	886	939	1,434	548	61.9%	2,988

Source: US Census Bureau

Of note for Riley County and its participating jurisdictions for the period 2000 to 2018:

- A population gain was noted in Riley County 17.3% as a whole
- Population gains were noted in three out of five participating cities

Table 3.7: Wabaunsee County Population Data

Jurisdiction	Population 2000	Population 2010	Population 2018	Numeric Population Change 2000 - 2018	Percent Population Change 2000 to 2018	Population Density, per Square Mile 2018
Wabaunsee County	6,885	7,049	6,912	27	0.4%	9
Alma	805	832	779	-26	-3.2%	1,320

Table 3.7: Wabaunsee County Population Data

Jurisdiction	Population 2000	Population 2010	Population 2018	Numeric Population Change 2000 - 2018	Percent Population Change 2000 to 2018	Population Density, per Square Mile 2018
Alta Vista	442	444	555	113	25.6%	1,542
Eskridge	589	534	555	-34	-5.8%	1,067
Harveyville	267	236	247	-20	-7.5%	1,900
Maple Hill	469	620	648	179	38.2%	2,592
McFarland	271	256	243	-28	-10.3%	1,279
Paxico	211	221	212	1	0.5%	1,514

Source: US Census Bureau

Of note for Wabaunsee County and its participating jurisdictions for the period 2000 to 2018:

- A slight population gain was noted in Wabaunsee County, 0.4% as a whole
- Population losses were noted in four out of seven participating cities

3.3 – At-Risk Population Data

The National Response Framework defines at-risk populations as "populations whose members may have additional needs before, during, and after an incident in functional areas, including but not limited to maintaining independence, communication, transportation, supervision, and medical care."

In general, at risk populations may have difficulty with medical issues, poverty, extremes in age, and communications due to language barriers. Several principles may be considered when discussing potentially at-risk populations, including:

- Not all people who are considered at risk are at risk
- Outward appearance does not necessarily mark a person as at risk
- The hazard event will, in many cases, affect at risk population in differing ways

The following tables present information on select potential at risk populations within each participating Region I jurisdiction, by county. The higher a jurisdiction's at-risk population the greater the potential vulnerability to identified hazards.

Table 3.8: Kansas Region I Potentially Vulnerable Population Data, Jurisdictions Over 5,000 Persons

Jurisdiction	Percentage of Population 5 and Under (2018)	Percentage of Population 65+ (2018)	Percentage of Population Speaking Language Other Than English (2018)	Percentage of Population Living Below Poverty Level (2018)	Persons with a Disability, Under the Age of 65 (2018)
Chase County	5.1%	25.1%	3.4%	10.3%	13.0%
Geary County	11.9%	8.6%	15.7%	10.3%	9.1%
Lyon County	6.0%	15.2%	17.7%	16.1%	9.6%
Morris County	5.4%	24.7%	3.4%	11.4%	11.2%
Pottawatomie County	7.8%	14.3%	4.3%	8.0%	7.3%

Table 3.8: Kansas Region I Potentially Vulnerable Population Data, Jurisdictions Over 5,000 Persons

Jurisdiction	Percentage of Population 5 and Under (2018)	Percentage of Population 65+ (2018)	Percentage of Population Speaking Language Other Than English (2018)	Percentage of Population Living Below Poverty Level (2018)	Persons with a Disability, Under the Age of 65 (2018)
Riley County	5.6%	9.5%	11.8%	20.7%	8.3%
Wabaunsee County	5.8%	20.0%	1.6%	8.1%	11.2%

Source: US Census Bureau

Of note for Kanas Region I and its participating jurisdictions:

- Regionally, 6.8% of the total population is under the age of 5
- Regionally, 16.8% of the total population is above the age of 65
- Regionally, 8.3% of the total population speak a language other than English at home
- Regionally, 12.1% of the total population is living below the poverty line
- Regionally, 10.0% of persons under the age of 65 have an identified disability

3.4 – Regional Housing Data

Closely tracking population data, but tending to lag population changes, housing data is a good indicator of changing demographics and growth. Over the period 2000 to 2018 the majority of Kansas Region I has been experiencing a yearly decrease in housing stock. In general, the higher a jurisdiction's housing stock, the higher the hazard vulnerability.

Table 3.9: Chase County Housing Data

Jurisdiction	Housing Units 2000	Housing Units 2018	Numeric Housing Change 2000 - 2018	Percentage Housing Change 2000 - 2018	Percentage Mobile Homes 2018	Housing Density, per Square Mile 2018
Chase County	1,529	1,492	-37	-2.4%	9.0%	2
Cedar Point	28	17	-11	-39.3%	14.0%	213
Cottonwood Falls	427	365	-62	-14.5%	10.0%	619
Elmdale	36	35	-1	-2.8%	20.0%	206
Matfield Green	34	34	0	0.0%	0.0%	243
Strong City	287	254	-33	-11.5%	15.0%	552

Source: US Census Bureau

Of note for Chase County and its participating jurisdictions for the period 2000 to 2018:

- Housing levels remained static in Chase County, with a small -2.4% decline
- Housing losses were noted in all participating cities

Table 3.10: Geary County Housing Data

Jurisdiction	Housing Units 2000	Housing Units 2018	Numeric Housing Change 2000 - 2018	Percentage Housing Change 2000 - 2018	Percentage Mobile Homes 2018	Housing Density, per Square Mile 2018
Geary County	11,959	15,385	3,426	28.6%	6.0%	28.6%
Grandview Plaza	985	912	-73	-7.4%	27.0%	-7.4%
Junction City	8,740	11,052	2,312	26.5%	5.0%	26.5%
Milford	245	226	-19	-7.8%	39.0%	-7.8%

Source: US Census Bureau

Of note for Geary County and its participating jurisdictions for the period 2000 to 2018:

- A housing gain was noted in Geary County, 28.6% as a whole
- Housing losses were noted in two out of three participating cities

Table 3.11: Lyon County Housing Data

Jurisdiction	Housing Units 2000	Housing Units 2018	Numeric Housing Change 2000 - 2018	Percentage Housing Change 2000 - 2018	Percentage Mobile Homes 2018	Housing Density, per Square Mile 2018
Lyon County	14,757	15,387	630	4.3%	8.0%	18
Admire	73	43	-30	-41.1%	23.0%	130
Allen	93	99	6	6.5%	2.0%	367
Americus	383	386	3	0.8%	18.0%	342
Bushong	22	16	-6	-27.3%	0.0%	107
Emporia	11,019	11,313	294	2.7%	5.0%	947
Hartford	220	191	-29	-13.2%	28.0%	503
Neosho Rapids	115	115	0	0.0%	33.0%	225
Olpe	215	274	59	27.4%	10.0%	343
Reading	108	93		-13.9%	8.0%	465

Source: US Census Bureau

Of note for Lyon County and its participating jurisdictions for the period 2000 to 2018:

- A housing gain was noted in Lyon County, 4.3% as a whole
- Housing gains were noted in four out of nine participating cities

Table 3.12: Morris County Housing Data

Jurisdiction	Housing Units 2000	Housing Units 2018	Numeric Housing Change 2000 - 2018	Percentage Housing Change 2000 - 2018	Percentage Mobile Homes 2018	Housing Density, per Square Mile 2018
Morris County	3,160	3,209	49	1.6%	9.0%	5
Council Grove	1,099	1,095	-4	-0.4%	12.0%	545
Dunlap	28	22	-6	-21.4%	23.0%	96
Dwight	163	119	-44	-27.0%	11.0%	322
Latimer	13	11	-2	-15.4%	0.0%	122
Parkerville	32	30	-2	-6.3%	33.0%	120
White City	253	297	44	17.4%	9.0%	236
Wilsey	86	78	-8	-9.3%	6.0%	103

Source: US Census Bureau

Of note for Morris County and its participating jurisdictions for the period 2000 to 2018:

- Housing levels remained static in Morris County, with a small 1.6% increase
- Housing losses were noted in six out of seven participating cities

Table 3.13: Pottawatomie County Housing Data

Jurisdiction	Housing Units 2000	Housing Units 2018	Numeric Housing Change 2000 - 2018	Percentage Housing Change 2000 - 2018	Percentage Mobile Homes 2018	Housing Density, per Square Mile 2018
Pottawatomie County	7,311	9,488	2,177	29.8%	10.0%	11
Belvue	82	92	10	12.2%	22.0%	767
Emmett	139	68	-71	-51.1%	50.0%	756
Havensville	74	67	-7	-9.5%	4.0%	447
Louisville	84	132	48	57.1%	42.0%	269
Olsburg	85	102	17	20.0%	12.0%	537
Onaga	347	388	41	11.8%	2.0%	606
St. George	198	315	117	59.1%	12.0%	457
St Mary's	818	834	16	2.0%	3.0%	707
Wamego	1,740	2,109	369	21.2%	8.0%	937
Westmoreland	293	312	19	6.5%	6.0%	600
Wheaton	41	46	5	12.2%	28.0%	307

Source: US Census Bureau

Of note for Pottawatomie County and its participating jurisdictions for the period 2000 to 2018:

- A housing gain was noted in Pottawatomie County, 29.8% as a whole
- Housing losses were noted in nine out of 11 participating cities

Table 3.14: Riley County Housing Data

Jurisdiction	Housing Units 2000	Housing Units 2018	Numeric Housing Change 2000 - 2018	Percentage Housing Change 2000 - 2018	Percentage Mobile Homes 2018	Housing Density, per Square Mile 2018
Riley County	23,397	31,340	7,943	33.9%	5.0%	50
Leonardville	198	235	37	18.7%	4.0%	839
Manhattan	17,688	23,440	5,752	32.5%	4.0%	1,247
Ogden	851	986	135	15.9%	20.0%	594
Randolph	83	60	-23	-27.7%	13.0%	240
Riley	376	591	215	57.2%	4.0%	1,231

Source: US Census Bureau

Of note for Riley County and its participating jurisdictions for the period 2000 to 2018:

- A housing gain was noted in Riley County, 33.9% as a whole
- Housing gains were noted in four out of five participating cities

Table 3.15: Wabaunsee County Housing Data

Jurisdiction	Housing Units 2000	Housing Units 2018	Numeric Housing Change 2000 - 2018	Percentage Housing Change 2000 - 2018	Percentage Mobile Homes 2018	Housing Density, per Square Mile 2018
Wabaunsee County	3,033	3,297	264	8.7%	5.0%	4
Alma	354	490	136	38.4%	1.0%	831
Alta Vista	216	266	50	23.1%	7.0%	739
Eskridge	238	281	43	18.1%	3.0%	540
Harveyville	109	123	14	12.8%	7.0%	946
Maple Hill	187	233	46	24.6%	0.0%	932
McFarland	115	137	22	19.1%	13.0%	721
Paxico	90	103	13	14.4%	16.0%	736

Source: US Census Bureau

Of note for Wabaunsee County and its participating jurisdictions for the period 2000 to 2018:

- A housing gain was noted in Wabaunsee County, 8.7% as a whole
- Housing gains were noted in all participating cities

3.5 – Regional Property Valuations

This section quantifies the built environment exposed to potential hazards in Kansas Region I. The following tables provide monetary value of structures, by category and where available, for each county in Kansas Region I. In addition to the population information presented above, this information forms the basis of the vulnerability and risk assessment presented in this plan. This information was derived from inventory data associated with FEMA's loss estimation software HAZUS.

Table 3.16: Kansas Region I Property Valuations, Residential, Commercial, and Industrial

County	Residential	Commercial	Industrial
Chase	$277,473,000	$25,784,000	$4,928,000
Geary	$2,597,116,000	$354,699,000	$72,177,000
Lyon	$2,705,819,000	$686,951,000	$154,942,000
Morris	$609,991,000	$88,187,000	$37,230,000
Pottawatomie	$1,762,317,000	$301,373,000	$83,868,000
Riley	$5,394,685,000	$751,222,000	$86,075,000
Wabaunsee	$682,047,000	$40,199,000	$18,660,000

Source: HAZUS

Table 3.17: Kansas Region I Property Valuations, Agriculture, Government and Education

County	Agriculture	Government	Education
Chase	$8,119,000	$2,744,000	$5,056,000
Geary	$13,452,000	$29,002,000	$47,463,000
Lyon	$28,866,000	$38,569,000	$357,560,000
Morris	$34,357,000	$8,303,000	$11,572,000
Pottawatomie	$30,822,000	$12,650,000	$30,118,000
Riley	$41,563,000	$52,137,000	$218,209,000
Wabaunsee	$14,382,000	$5,663,000	$38,633,000

Source: HAZUS

Table 3.18: Kansas Region I Property Total Valuations

County	Total
Chase	$328,770,000
Geary	$3,163,291,000
Lyon	$4,037,043,000
Morris	$805,916,000
Pottawatomie	$2,254,592,000
Riley	$6,656,737,000
Wabaunsee	$812,583,000

Source: HAZUS

3.6 – Critical Facility Data

A critical facility is essential in providing utility or direction either during the response to an emergency or during the recovery operation, with facilities determined from jurisdictional feedback. The following are examples of critical facilities and assets:

- Communications facilities
- Emergency operations centers
- Fire stations
- Government buildings
- Hospitals and other medical facilities
- Police stations

Details concerning critical facilities have been deemed as sensitive information, and as such their specific information is not contained in the body of this HMP, but is included in the restricted from public view Appendix D.

3.7 – Unified School Districts, Colleges and Universities

Each participating county is served by multiple Unified School Districts (USDs), with these USDs providing educational coverage for each participating jurisdiction. The following table presents participating USD enrollment information, the number of school structures, and the insured valuation of these structures and contents within (if information is available).

Table 3.19: Participating USD Information

School District	Enrollment (2014)	Enrollment (2019)	Enrollment Change (2014-2019)	School Buildings (2019)	Total Insured Valuation of Structures (2018)
Chase County					
USD #284 – Chase County	356	350	-6	13	$23,000,000
Geary County					
USD #475 – Geary County	8,332	7,279	-1,053	29	-
Lyon County					
USD #251 – North Lyon County	422	347	-75	8	-
USD #252 – Southern Lyon County	521	485	-36	9	-
USD #253 - Emporia	4,535	4,658	123	20	-
Morris County					
USD #417 – Morris County	745	812	67	10	-
USD #481 – Rural Vista	303	271	-32	8	-
Pottawatomie County					
USD #320 – Wamego	1,561	1,551	-10	11	-
USD #321 – Kaw Valley	1,181	1,117	-64	10	-
USD #322 – Onaga / Havensville / Wheaton	316	317	1	7	-
USD #323 – Rock Creek	948	1,087	139	10	-
USD #384 – Blue Valley	194	215	21	8	-
Riley County					
USD #378 – Riley County	681	669	-12	6	-
USD #383 – Manhattan / Ogden	6,371	6,723	352	25	-
USD #384 – Blue Valley	194	215	21	8	-
Wabaunsee County					
USD #329 – Mill Creek Valley	475	453	-22	11	-
USD #330 – Mission Valley	474	439	-35	6	-

Source: Kansas State Department of Education and participating USDs
-: Information unavailable

The following table presents participating college and university enrollment information, the number of school structures, and the insured valuation of these structures and contents within (if information is available).

Table 3.20: Participating College and University Information

School District	Estimated Enrollment (2019)	Buildings (2019)	Total Insured Valuation of Structures (2019)
Geary County			
Cloud County Community College	1,873	21	-
Lyon County			
Emporia State University	5,877	20	-
Flint Hills Technical College	2,182	8	-
Riley County			
Kansas State University	20,799	104	-

Source: Participating College or University
-: Information unavailable

3.8 – Regional Land Use

In general, land use is determined by three major types of regulation, zoning ordinances, floodplain ordinances and building code requirements.

- 2017 Kansas Statutes, KS Stat § 12-741 (2017): This act is enabling legislation for the enactment of planning and zoning laws and regulations by cities and counties for the protection of the public health, safety and welfare, and is not intended to prevent the enactment or enforcement of additional laws and regulations on the same subject which are not in conflict with the provisions of this act.
- 2012 Kansas Statutes, Chapter 19 Counties and County Officers, Article 33 Flood Control: Allows cities and counties to develop stormwater management and flood control projects and programs, provide local funding, and enter into agreements with other agencies to develop and use flood control works.
- The Kansas State Legislature has not implemented a statewide building code, nor does it require comprehensive planning by local governments.

These three types of regulations can assist in preventing the following:

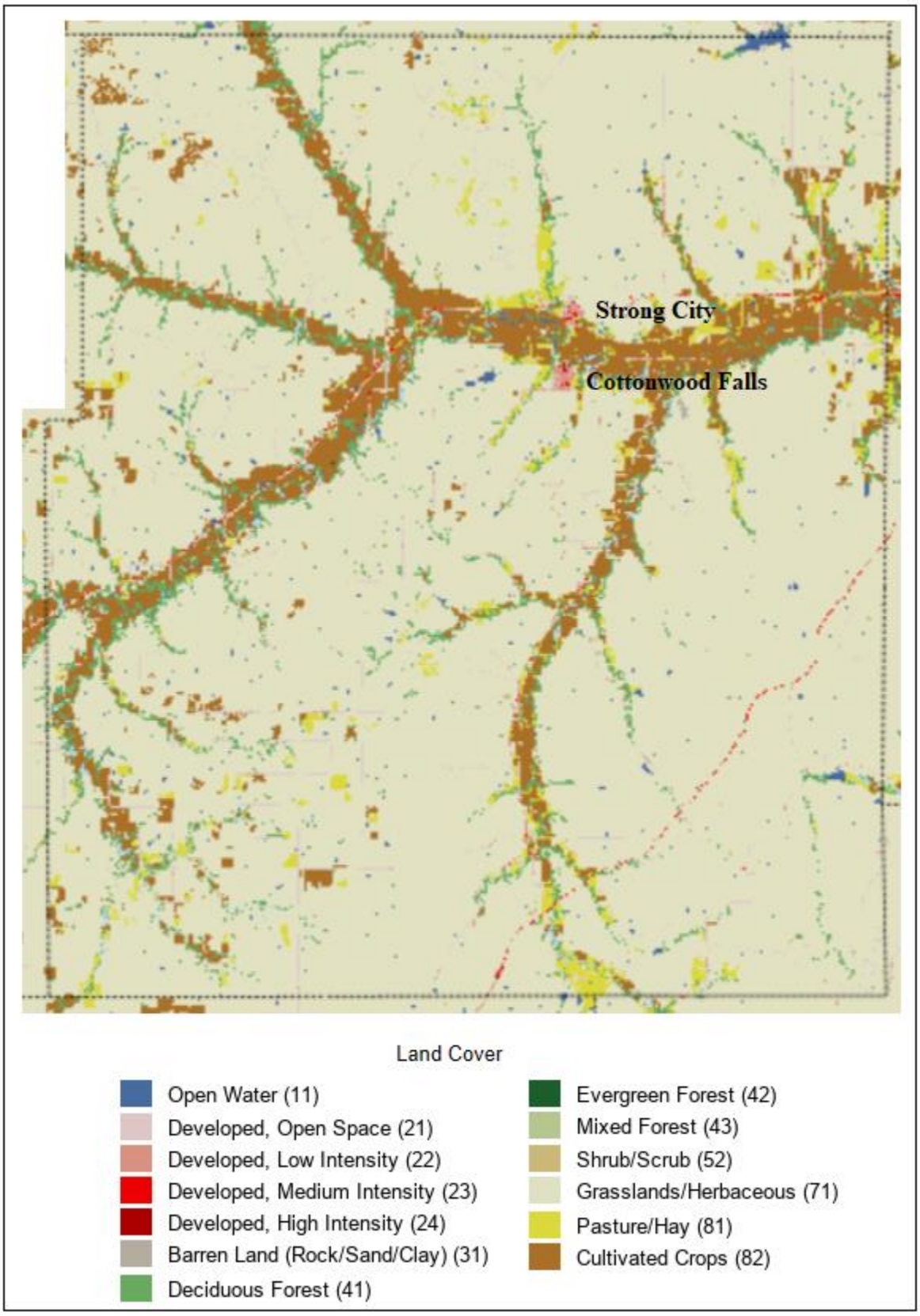
- Unrestricted residential growth which can increase a population's exposure to identified hazard prone areas
- Rapid, unchecked development that can put a strain on a community's vulnerable resources such as its energy infrastructure
- Residential development constructed quickly and inexpensively to meet consumer demand that often lacks long term mitigation measures and resiliency
- Rapid development under pressure to meet consumer demand can alter the landscape in ways affecting urban runoff, drainage, or other environmental considerations which have drastic effects on floodplains

Information on relevant codes and ordinances may be found in Section 5 of this HMP.

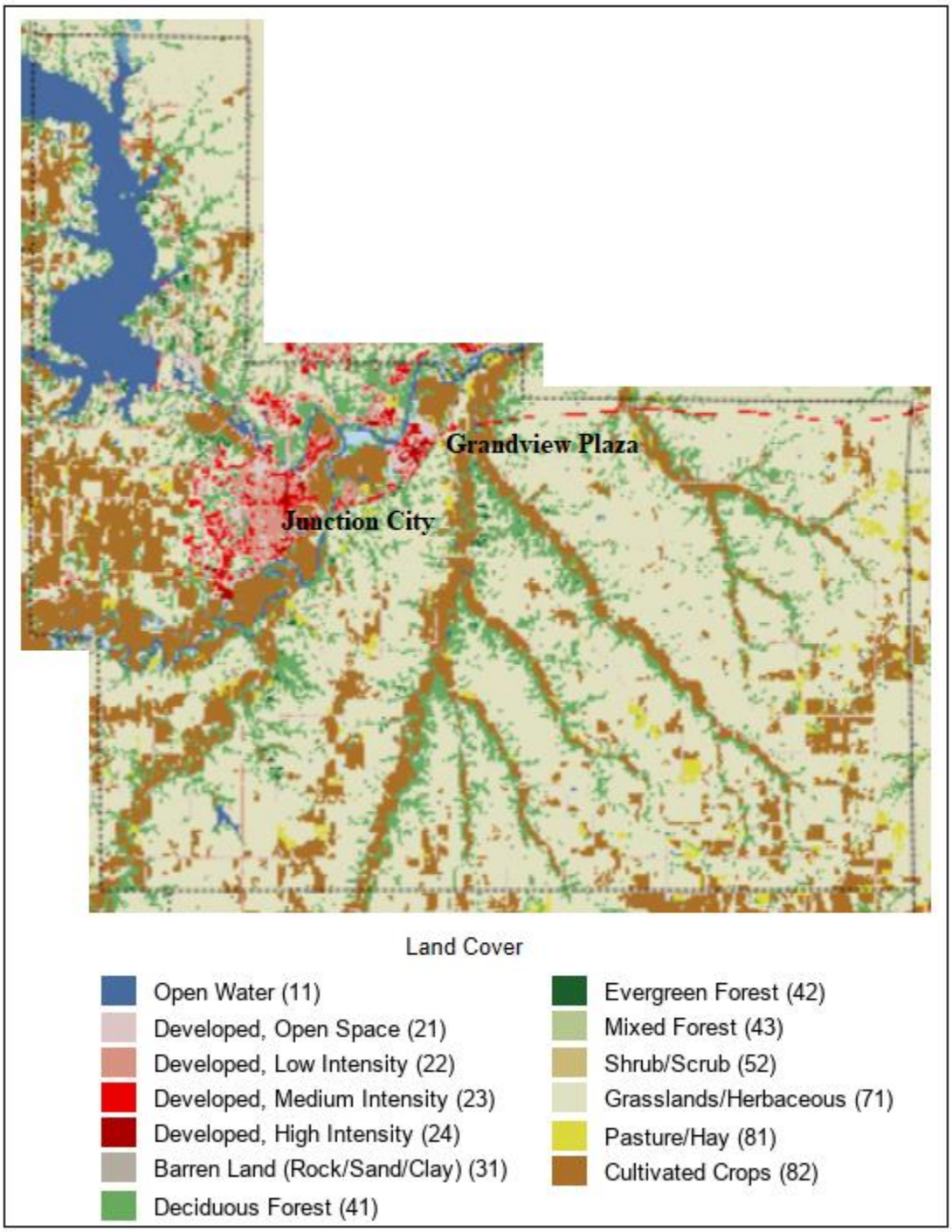
3.9 – Regional Land Cover

The 2016 USGS land cover map illustrates land usage. As indicated by the following maps, large areas of the region are grasslands and cultivated crops. Additionally, each county has at least one area of low to high intensity development corresponding with larger cities.

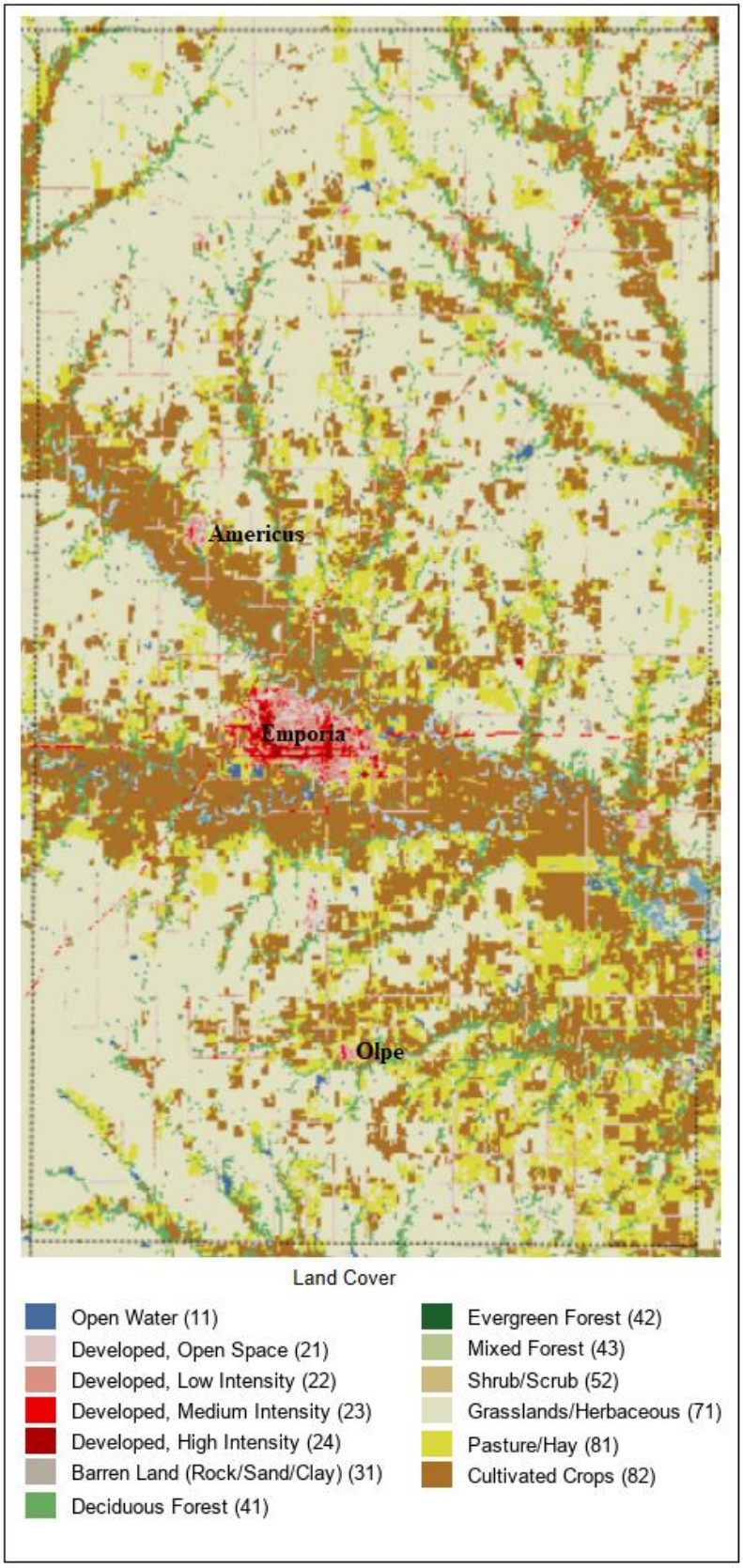
Chase County Land Cover Map



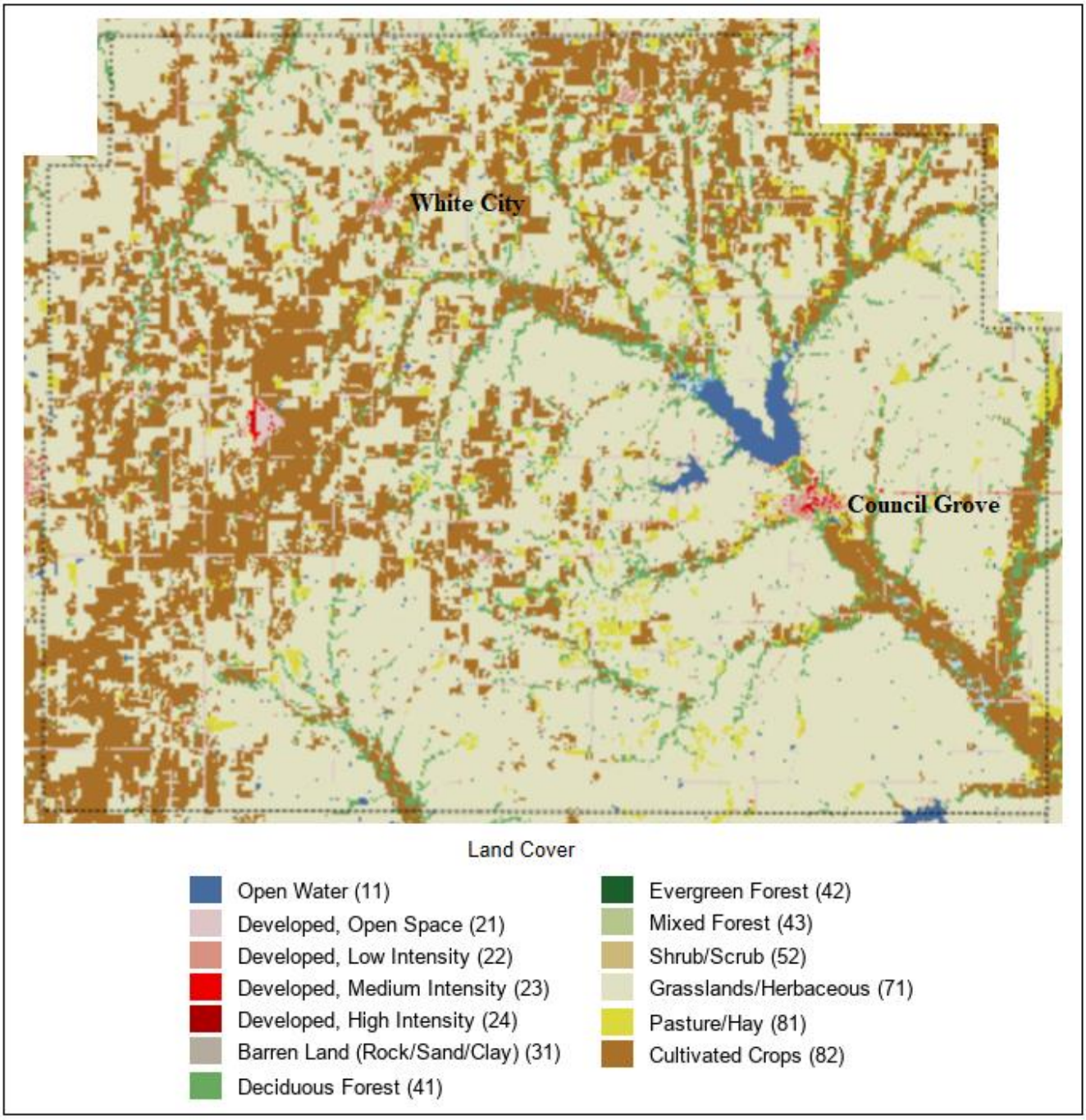
Geary County Land Cover Map



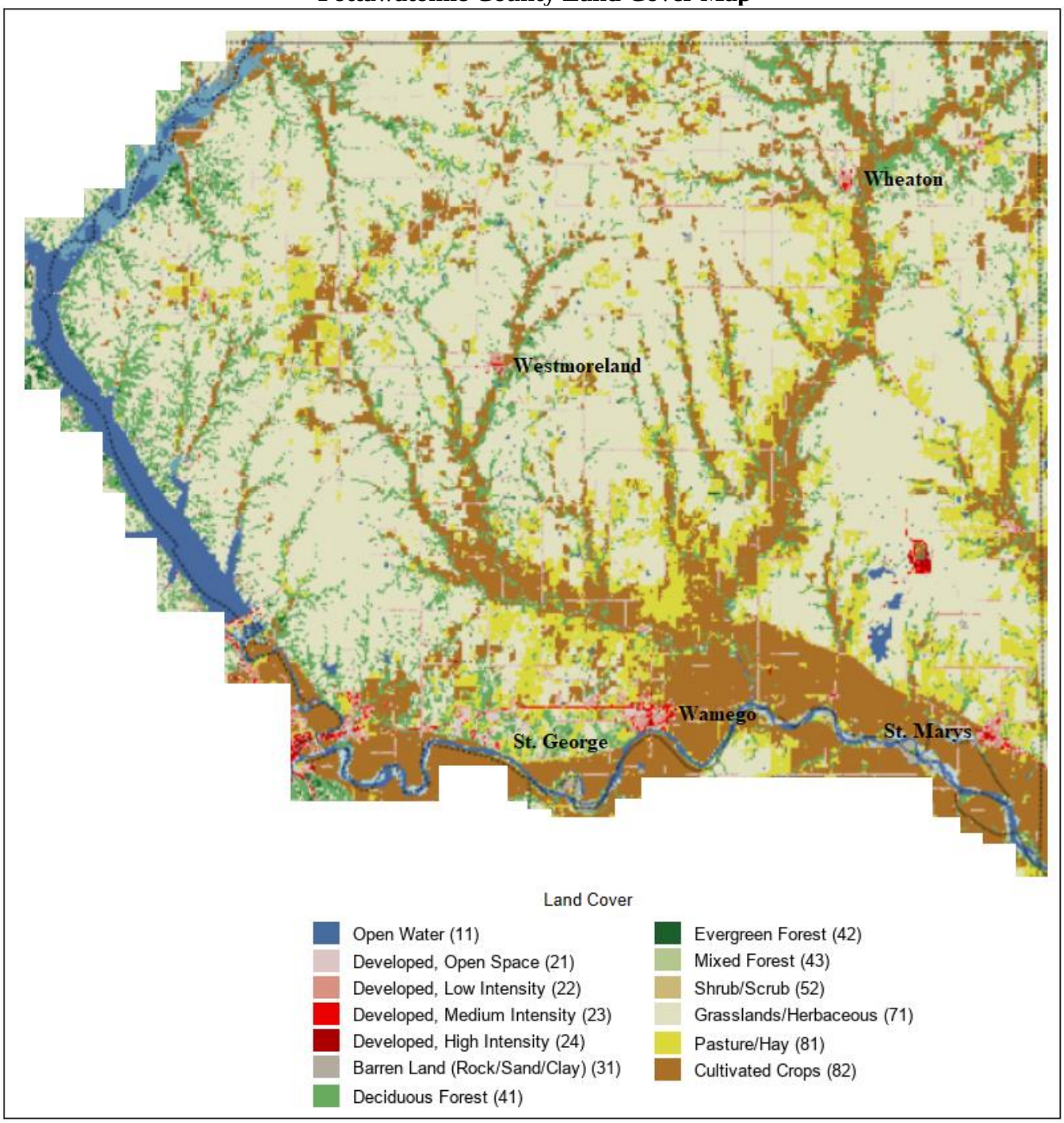
Lyon County Land Cover Map



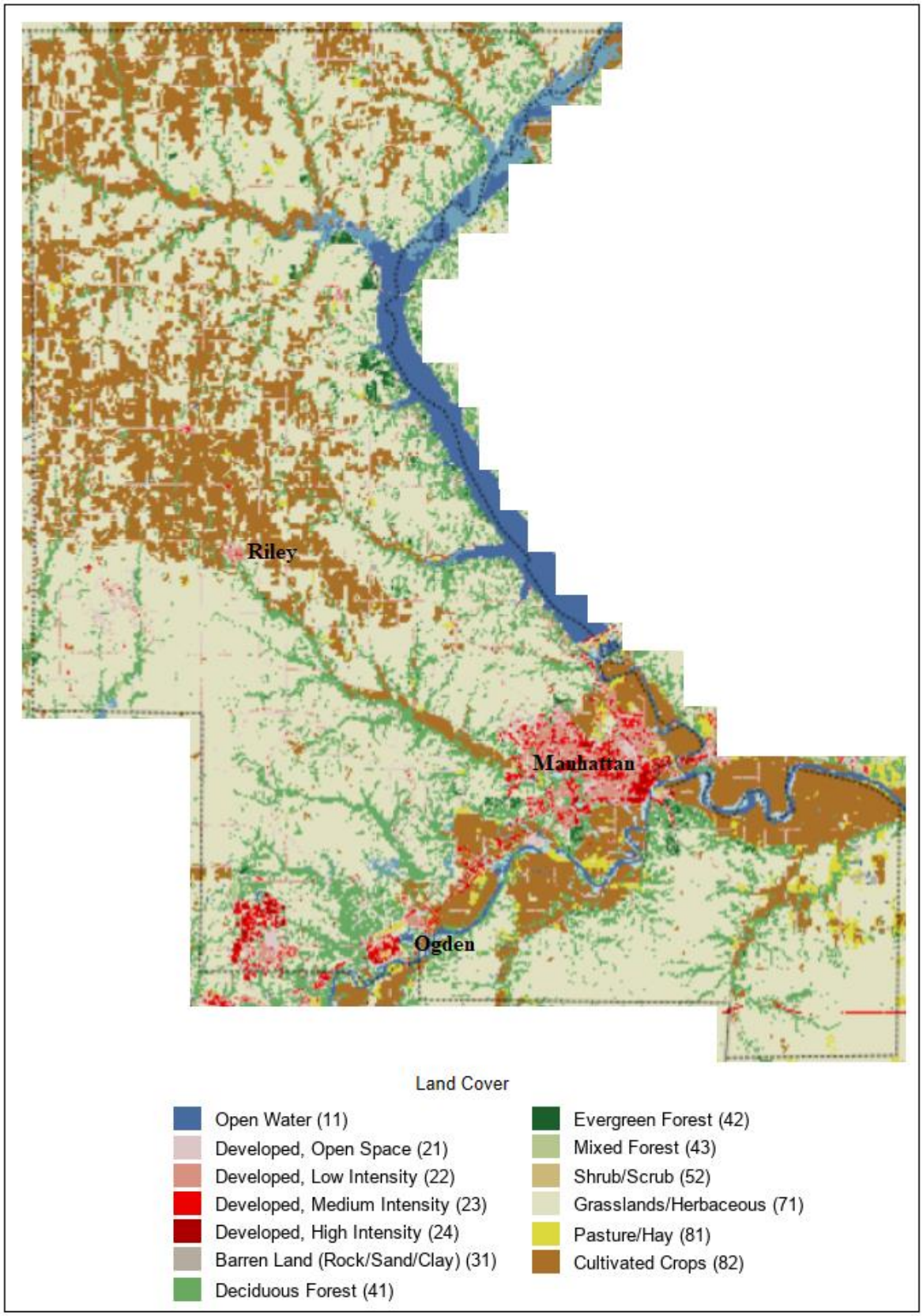
Morris County Land Cover Map



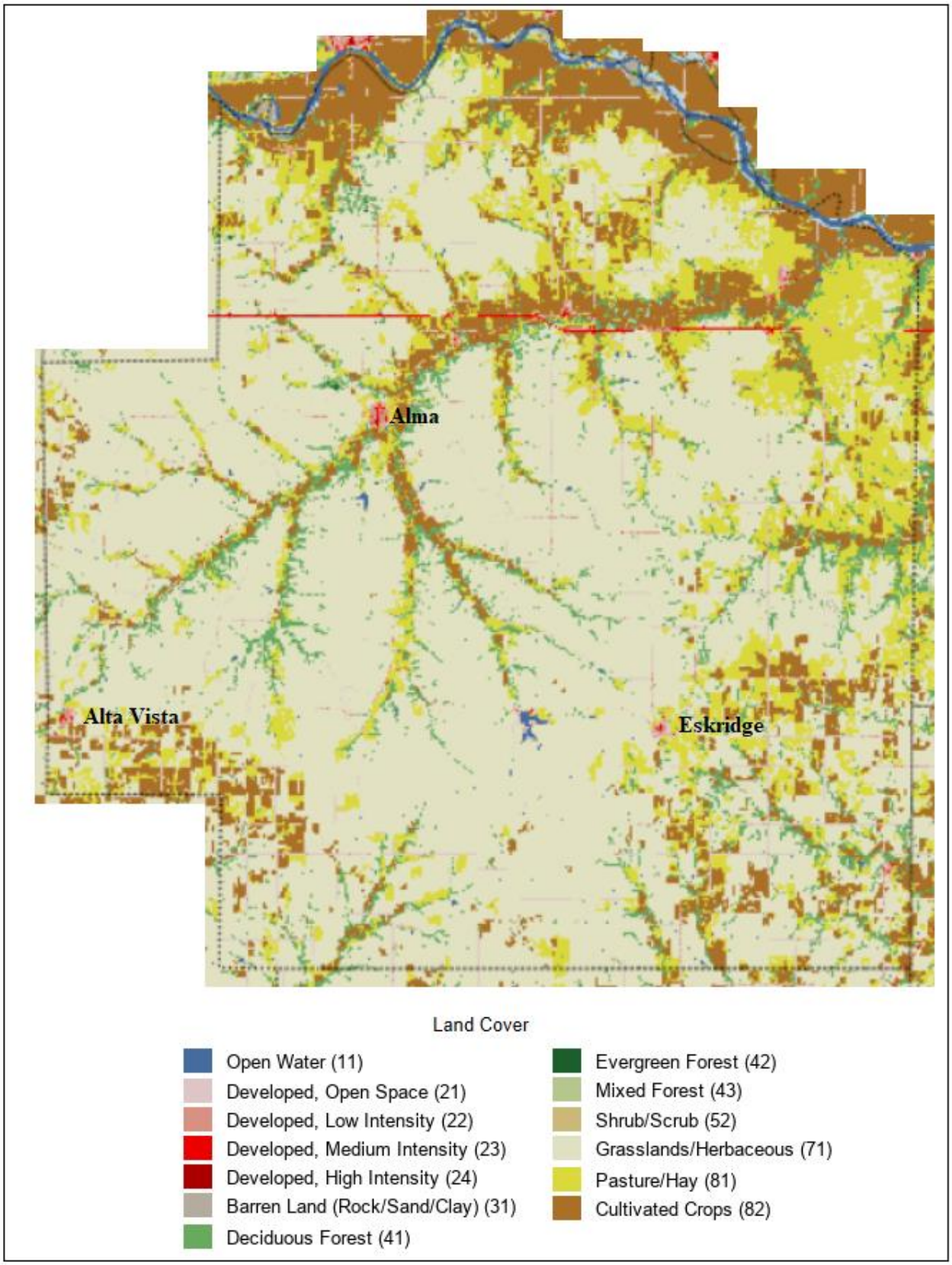
Pottawatomie County Land Cover Map



Riley County Land Cover Map



Wabaunsee County Land Cover Map



3.10 – Regional Agricultural Data

Agriculture is a major component of the economy of Kansas. According to the Kansas Department of Agriculture, Agriculture is the largest economic driver in Kansas, valued at nearly $67.5 billion and accounting for 44.5 percent of the state's total economy. In Kansas, there are approximately 46,000,000 acres of farmland, which accounts for 88% of all Kansas land.

The following tables present information from the USDA National Agricultural Statistics Service 2017 Census of Agriculture (the latest availed data) relating to farm totals, agricultural acreage and livestock (cattle, hogs and pigs) for Kansas Region I.

Table 3.21: Kansas Region I Farm Data, 2017 Census of Agriculture

County	Number of Farms	Farm Acreage	Percent of Acreage as Cropland	Percent of Acreage as Pastureland	Market Value of Products Sold (Yearly)	Percentage of State Agriculture Sales
Chase	238	360,077	18%	79%	$85,430,000	<0.5%
Geary	213	155,153	42%	52%	$31,833,000	<0.5%
Lyon	867	522,934	51%	44%	$134,440,000	1.0%
Morris	430	409,269	42%	55%	$138,615,000	1.0%
Pottawatomie	774	406,031	39%	52%	$101,363,000	1.0%
Riley	504	214,311	50%	44%	$51,171,000	<0.5%
Wabaunsee	638	378,759	30%	63%	$63,146,000	<0.5%

Source: United States Department of Agriculture National Agricultural Statistics Service

Table 3.22: Kansas Region I Livestock Data, 2017 Census of Agriculture

County	Cattle	Hogs and Pigs
Chase	68,586	-
Geary	11,627	-
Lyon	73,261	-
Morris	101,018	-
Pottawatomie	50,643	-
Riley	16,830	-
Wabaunsee	37,103	-

Source: United States Department of Agriculture National Agricultural Statistics Service
-: Data not reported

3.11 – Regional Development Trends

44 CFR 201.6 (c)(2)(ii)(A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas

Future development speaks to the potential impacts of land use and demographic changes in hazard prone areas. Data in this section is based on the best available data but is speculative as future conditions are subject to numerous unpredictable factors. While past trends are used to inform the discussion, previous historical trends are no guarantee of future conditions.

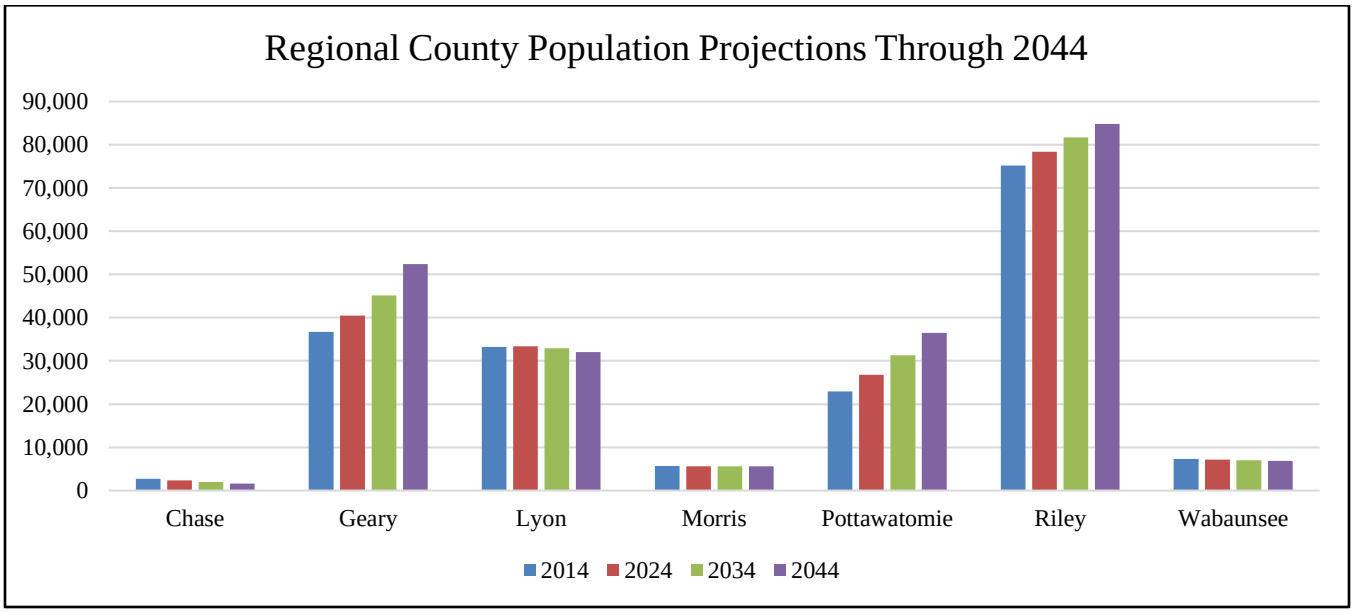
The University of Kansas Institute for Policy and Social Research developed population projections for the region using historical and trend data. Indications are the region will experience an increase in population through the year 2044.

Table 3.23: Kansas Region I Population Projections Through 2044

County	2014	2024	2034	2044	Projected Growth Percentage Through 2044
Chase	2,692	2,319	1,972	1,624	-39.7%
Geary	36,713	40,469	45,138	52,379	42.7%
Lyon	33,212	33,387	32,927	32,044	-3.5%
Morris	5,698	5,638	5,631	5,593	-1.8%
Pottawatomie	22,897	26,744	31,328	36,459	59.2%
Riley	75,194	78,415	81,690	84,826	12.8%
Wabaunsee	7,322	7,164	6,988	6,858	-6.3%

Source: University of Kansas Institute for Policy and Social Research

The following chart illustrates the above data.



US Census Bureau data was used to develop housing projections for the region using historical and trend data. Indications are the region will experience steady growth in housing through the year 2051.

Table 3.24: Kansas Region I Housing Projections Through 2051

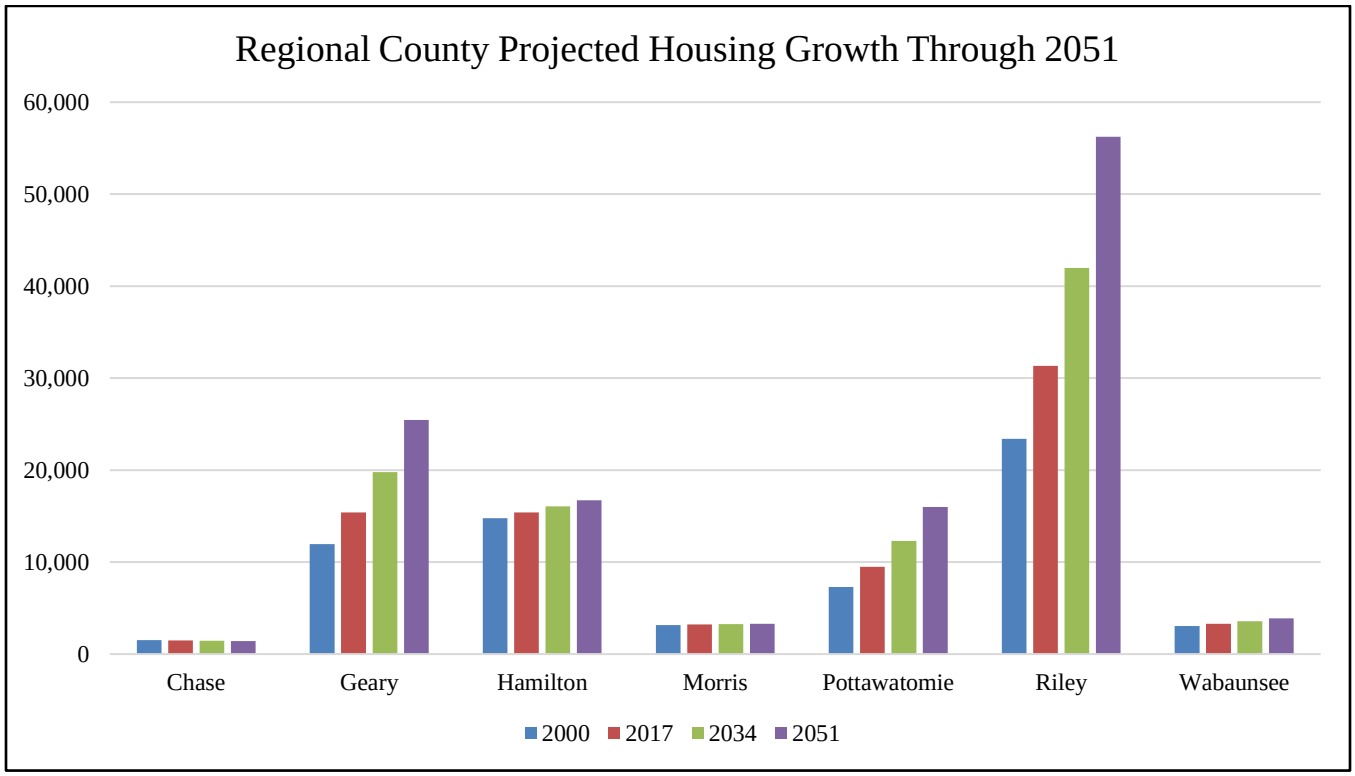
County	2000	2017	2034	2051	Projected Growth Percentage Through 2051
Chase	1,529	1,492	1,456	1,421	-2.4%
Geary	11,959	15,385	19,792	25,463	28.6%
Lyon	14,757	15,387	16,044	16,729	4.3%
Morris	3,160	3,209	3,259	3,309	1.6%

Table 3.24: Kansas Region I Housing Projections Through 2051

County	2000	2017	2034	2051	Projected Growth Percentage Through 2051
Pottawatomie	7,311	9,488	12,313	15,980	29.8%
Riley	23,397	31,340	41,980	56,231	33.9%
Wabaunsee	3,033	3,297	3,584	3,896	8.7%

Source: US Census Bureau

The following chart illustrates the above data.



FEMA's loss estimation software HAZUS data was used to developed property valuation projections for the region using historical and trend data. Indications are the region will experience steady growth in the property valuation through the year 2030.

Table 3.25: Kansas Region I Property Valuation Projections Through 2030

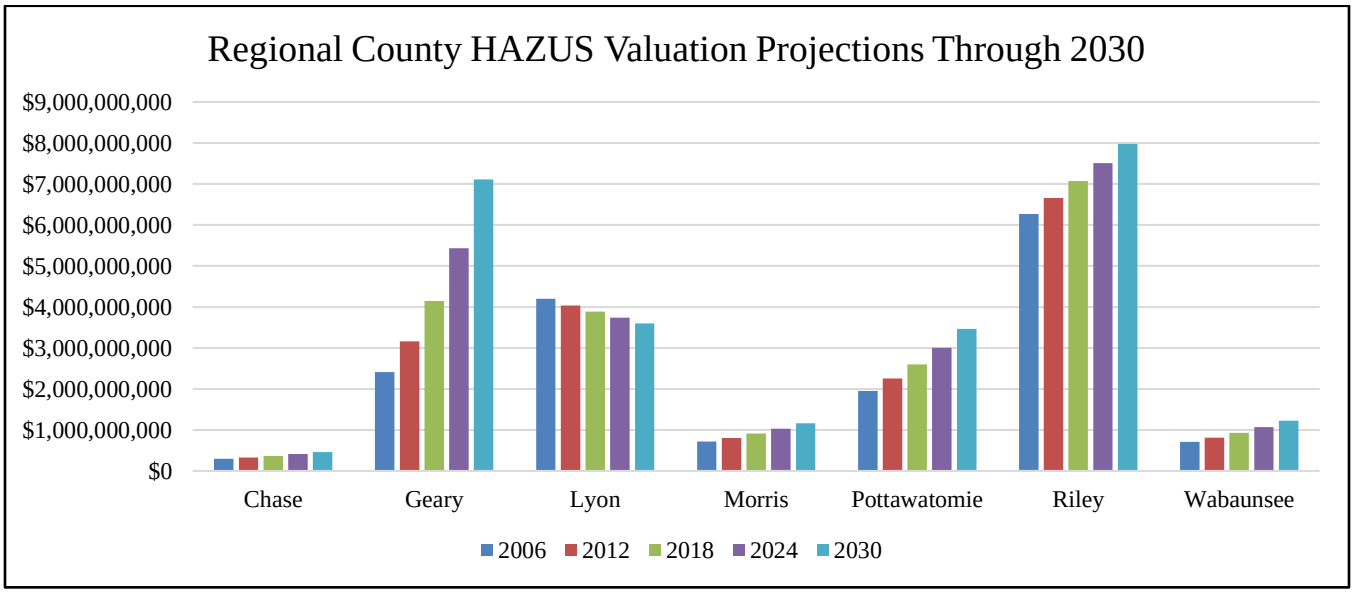
County	2006	2012	2018	2024	2030	Projected Growth Percentage Through 2030
Chase	$293,677,000	$328,770,000	$368,056,446	$412,037,435	$461,273,942	11.9%
Geary	$2,414,437,000	$3,163,291,000	$4,144,407,144	$5,429,823,109	$7,113,919,548	31.0%
Lyon	$4,195,254,000	$4,037,043,000	$3,884,798,437	$3,738,295,307	$3,597,317,087	-3.8%
Morris	$713,015,000	$805,916,000	$910,921,368	$1,029,608,220	$1,163,759,161	13.0%
Pottawatomie	$1,953,285,000	$2,254,592,000	$2,602,377,577	$3,003,811,357	$3,467,168,926	15.4%
Riley	$6,267,333,000	$6,656,737,000	$7,070,335,578	$7,509,631,999	$7,976,222,929	6.2%

Table 3.25: Kansas Region I Property Valuation Projections Through 2030

County	2006	2012	2018	2024	2030	Projected Growth Percentage Through 2030
Wabaunsee	$709,282,000	$812,583,000	$930,928,928	$1,066,510,952	$1,221,839,366	14.6%

Source: HAZUS

The following chart illustrates the above data.



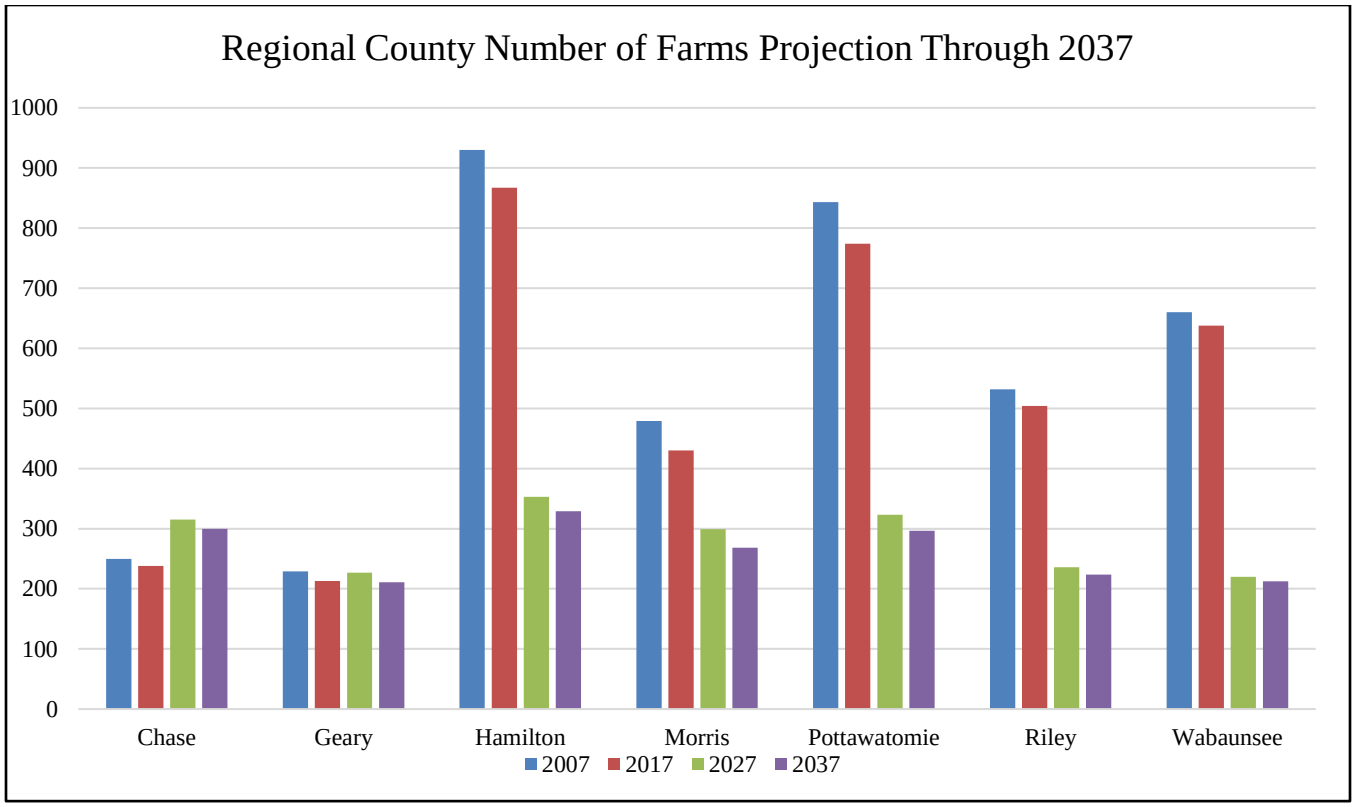
The United States Department of Agriculture (USDA) National Agricultural Statistics Service data was used to develop agricultural projections for the region using historical and trend data. Indications are the region will experience a steady decrease in the number of farms through the year 2037.

Table 3.26: Kansas Region I Number of Farms Data Projections Through 2037

County	Number of Farms, 2007	Number of Farms, 2012	Number of Farms, 2017	Number of Farms, 2022	Projected Growth Percentage Through 2037
Chase	250	238	315	300	-4.8%
Geary	229	213	227	211	-7.0%
Lyon	930	867	353	329	-6.8%
Morris	479	430	299	268	-10.2%
Pottawatomie	843	774	323	297	-8.2%
Riley	532	504	236	224	-5.3%
Wabaunsee	660	638	220	213	-3.3%

Source: United States Department of Agriculture National Agricultural Statistics Service

The following chart illustrates the above data.



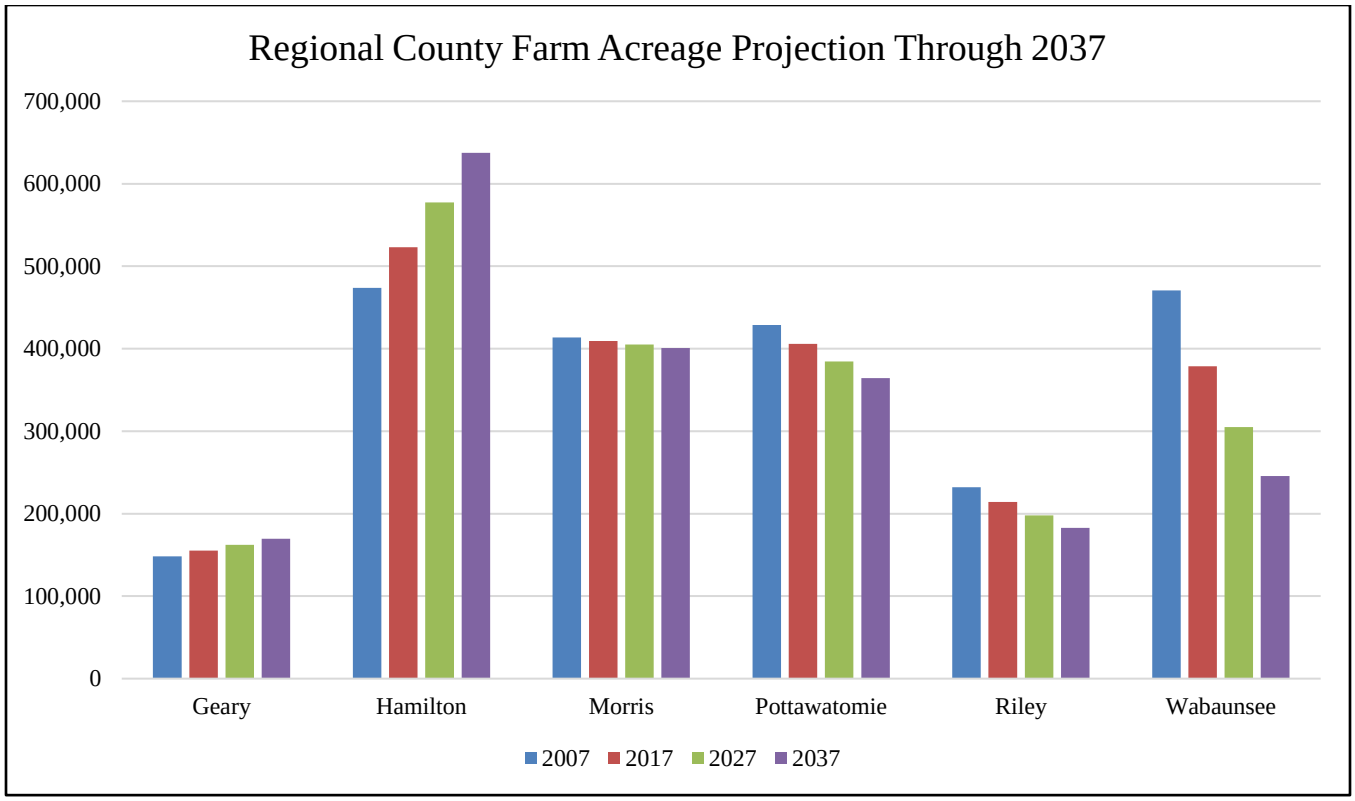
USDA National Agricultural Statistics Service data indicates the region will experience a steady state in farm acreage through the year 2037.

Table 3.27: Kansas Region I Farm Acreage Data Projections, Through 2037

County	Farm Acreage, 2007	Farm Acreage, 2017	Farm Acreage, 2027	Farm Acreage, 2037	Projected Growth Percentage Through 2037
Chase	319,921	360,077	405,273	456,143	12.6%
Geary	148,465	155,153	162,142	169,446	4.5%
Lyon	473,679	522,934	577,311	637,342	10.4%
Morris	413,558	409,269	405,024	400,824	-1.0%
Pottawatomie	428,601	406,031	384,650	364,394	-5.3%
Riley	231,960	214,311	198,005	182,939	-7.6%
Wabaunsee	470,474	378,759	304,923	245,481	-19.5%

Source: United States Department of Agriculture National Agricultural Statistics Service

The following chart illustrates the above data.



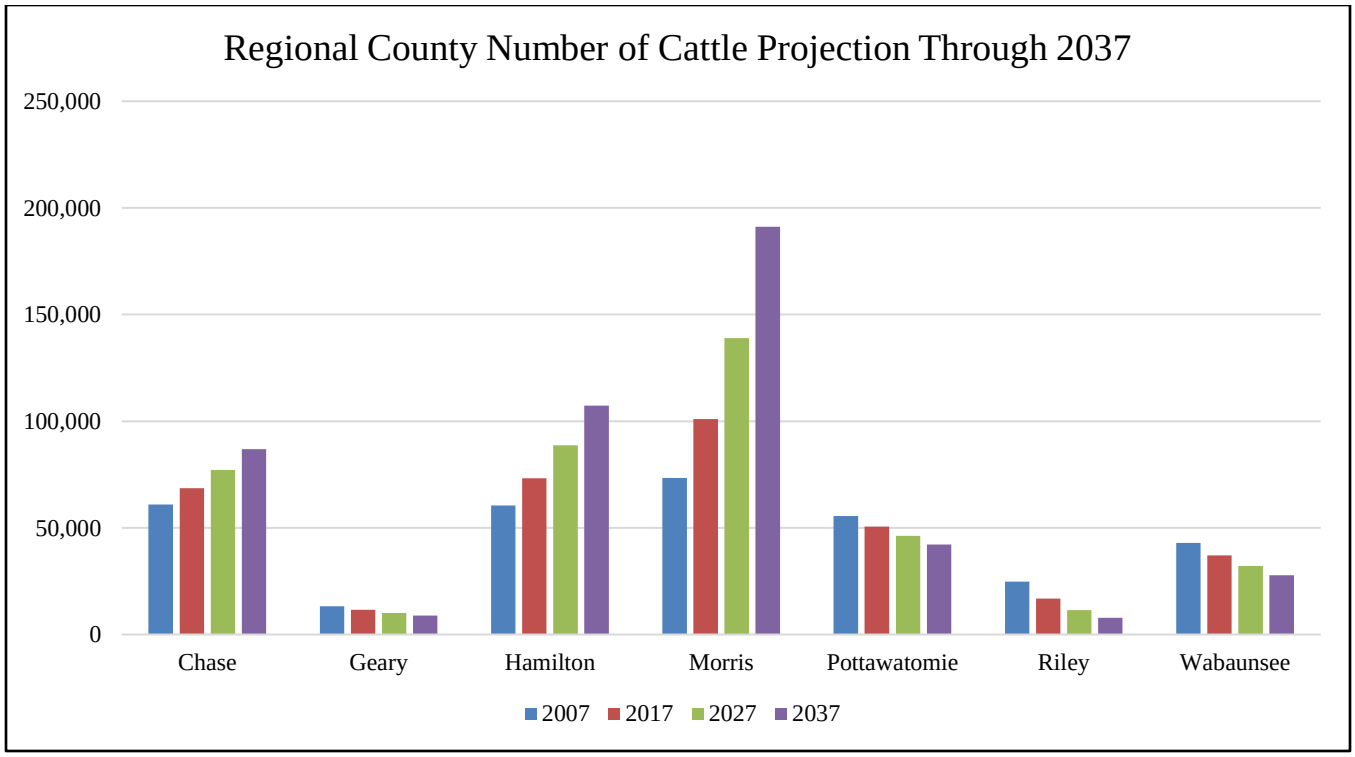
USDA National Agricultural Statistics Service data indicates the region will experience a static state in the number of cattle through the year 2037.

Table 3.28: Kansas Region I Total Cattle Data Projections Through 2037

County	Cattle, 2012	Cattle, 2017	Cattle, 2027	Cattle, 2037	Projected Growth Percentage Through 2037
Chase	60,929	68,586	77,205	86,908	12.6%
Geary	13,304	11,627	10,161	8,881	-12.6%
Lyon	60,545	73,261	88,648	107,266	21.0%
Morris	73,439	101,018	138,954	191,136	37.6%
Pottawatomie	55,528	50,643	46,188	42,124	-8.8%
Riley	24,740	16,830	11,449	7,788	-32.0%
Wabaunsee	42,910	37,103	32,082	27,740	-13.5%

Source: United States Department of Agriculture National Agricultural Statistics Service

The following chart illustrates the above data.



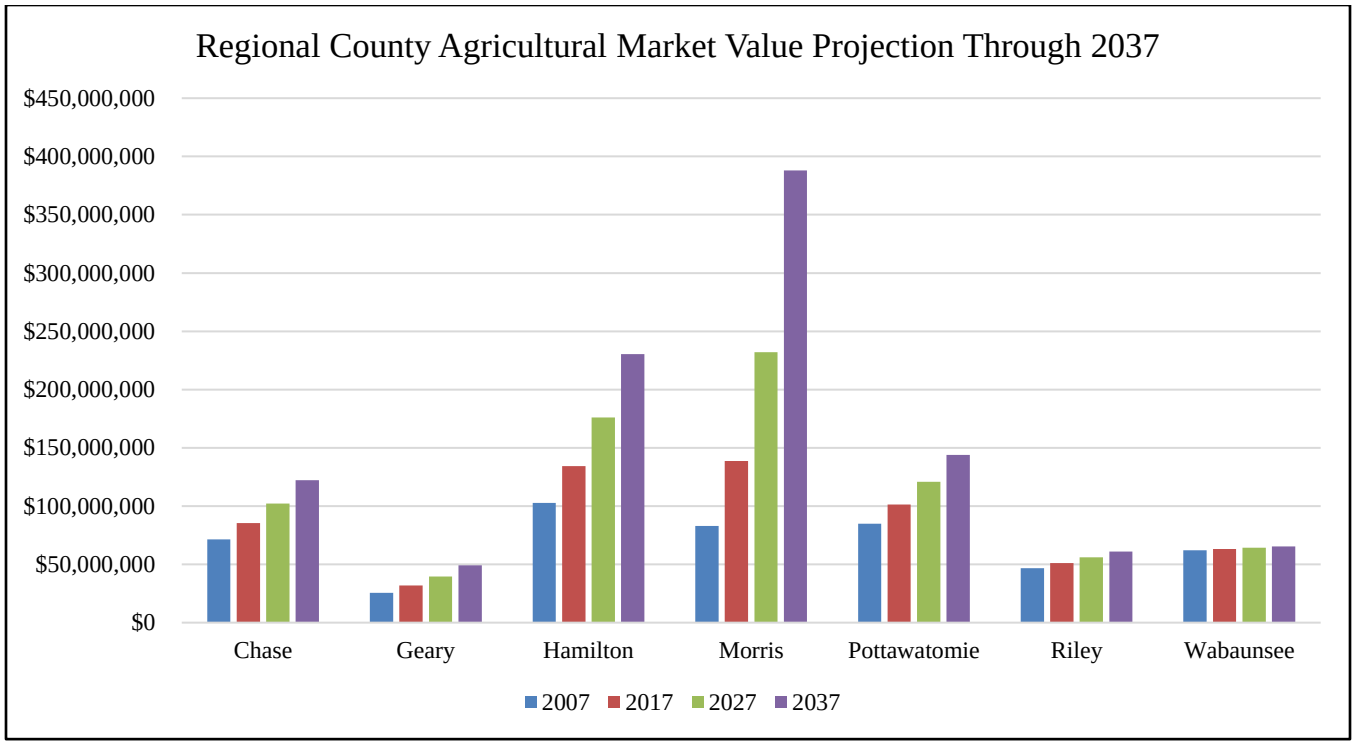
USDA National Agricultural Statistics Service data indicates the region will experience a continued increase in the market value of agricultural products through the year 2037.

Table 3.29: Kansas Region I Agricultural Market Value Data Projections, Through 2037

County	Market Value, 2007	Market Value, 2012	Market Value, 2017	Market Value, 2022	Projected Growth Percentage Through 2037
Chase	$71,438,000	$85,430,000	$102,162,503	$122,172,270	19.6%
Geary	$25,594,000	$31,833,000	$39,592,869	$49,244,346	24.4%
Lyon	$102,707,000	$134,440,000	$175,977,427	$230,348,519	30.9%
Morris	$82,841,000	$138,615,000	$231,939,719	$388,096,765	67.3%
Pottawatomie	$85,028,000	$101,363,000	$120,836,169	$144,050,390	19.2%
Riley	$46,818,000	$51,171,000	$55,928,729	$61,128,818	9.3%
Wabaunsee	$62,020,000	$63,146,000	$64,292,443	$65,459,700	1.8%

Source: United States Department of Agriculture National Agricultural Statistics Service

The following chart illustrates the above data.



Future development speaks to the potential impacts of land use and demographic changes in hazard prone areas. Future development data is speculative as future conditions are subject to numerous unpredictable factors. While past trends are used to inform the discussion, these historical trends are no guarantee of future conditions.

For hazards that affect the entire planning area, the predicted regional increase in population will tend to increase potential vulnerability. It is difficult to quantify the exact change in vulnerability, but it can be depicted as generally directly proportional to the population change itself.

For hazards that affect the entire planning area, the predicted increase in the number of structures will tend to increase the potential vulnerability. It is difficult to quantify the exact change in vulnerability, but it can be depicted as generally directly proportional to the change in the number of structures.

As indicated in the data above, the predicted static state in regional farm acreage, and the market value increase of regional agricultural goods could result in increased exposure to both natural and man-made hazards.

Of potential future concern to the agricultural base of the region, the USDA is working with the U.S. Department of Homeland Security (DHS) to bring online a new National Bio and Agro-Defense Facility (NBAF) in Riley County. This state-of-the-art facility will be a national asset that helps protect the nation's agriculture, farmers and citizens against the threat and potential impact of serious animal diseases. The DHS Science and Technology Directorate is building the facility to standards that fulfill the mission needs of the USDA which will own, manage and operate the NBAF once construction and commissioning

activities are complete. USDA's Agricultural Research Service and Animal and Plant Health Inspection Service will conduct foreign animal disease research, training and diagnostics in the facility.

3.12 – Regional Economic Activity Patterns

Kansas Region I's continued economic growth can impact future vulnerability in two ways, by location-based growth in identified hazard prone areas or by the industry type itself, as is the case with chemical manufacturing.

Gross domestic product (GDP) is a measure of the entire output of a defined economy, and roughly equals the total dollar amount of all goods and services produced within a defined area. GDP is the most comprehensive measure of economic activity and business growth. The following table, using data from the Bureau of Economic Analysis, details GDP for all Kansas Region I counties for the period 2015 to 2018 (the latest available data).

Table 3.30: Kansas Region I Gross Domestic Product, 2015 to 2018

County	2015	2016	2017	2018	State Rank in 2018 (out of 105)
Chase	$111,252,000	$117,690,000	$113,197,000	$113,451,000	98
Geary	$2,772,747,000	$2,624,842,000	$2,583,215,000	$2,540,165,000	8
Lyon	$1,190,211,000	$1,184,861,000	$1,191,689,000	$1,244,636,000	20
Morris	$210,025,000	$231,872,000	$213,854,000	$183,131,000	78
Pottawatomie	$1,346,577,000	$1,286,248,000	$1,272,609,000	$1,255,957,000	19
Riley	$2,498,660,000	$2,516,075,000	$2,453,994,000	$2,469,027,000	9
Wabaunsee	$127,029,000	$127,855,000	$127,022,000	$130,256,000	94

Source: Bureau of Economic Analysis

The following table, using data from the Bureau of Economic Analysis, details the percentage GDP change from the preceding period for 2012 to 2015 (the latest available data).

Table 3.31: Kansas Region I GDP Percentage Change from Preceding Period, 2016 to 2018

County	2016	2017	2018	State Rank in 2018 (out of 105)
Chase	5.8%	-3.8%	0.2%	75
Geary	-5.3%	-1.6%	-1.7%	89
Lyon	-0.4%	0.6%	4.4%	33
Morris	10.4%	-7.8%	-14.4%	104
Pottawatomie	-4.5%	-1.1%	-1.3%	88
Riley	0.7%	-2.5%	0.6%	72
Wabaunsee	0.7%	-0.7%	2.5%	45

Source: Bureau of Economic Analysis

The average Kansas Region I unemployment rate for May 2020 of 7.3% is lower than the average State of Kansas unemployment rate of 10.0%. The following table details the regional unemployment rates, using data from the Kansas Department of Labor, for the months of May 2019 and May 2020. The large increase in the unemployment rate is likely attributed to job losses caused by the COVID-19 pandemic.

Table 3.32: Kansas Region I Unemployment Rate, May 2019 to May 2020

County	May 2019	May 2020
Chase	2.8%	7.3%
Geary	4.4%	10.7%
Lyon	3.4%	7.2%
Morris	2.7%	5.4%
Pottawatomie	2.9%	6.5%
Riley	2.8%	7.9%
Wabaunsee	3.0%	6.3%

Source: Kansas Department of Labor

3.13 – Climate Change

For hazards related to weather patterns, climate change should be considered as it may cause significant changes in patterns and event frequency. There is a scientific consensus that climate change is occurring, and recent climate modeling results indicate that extreme weather events may become more common. Rising average temperatures produce a more variable climate system which may result in an increase in the frequency and severity of some extreme weather events, including:

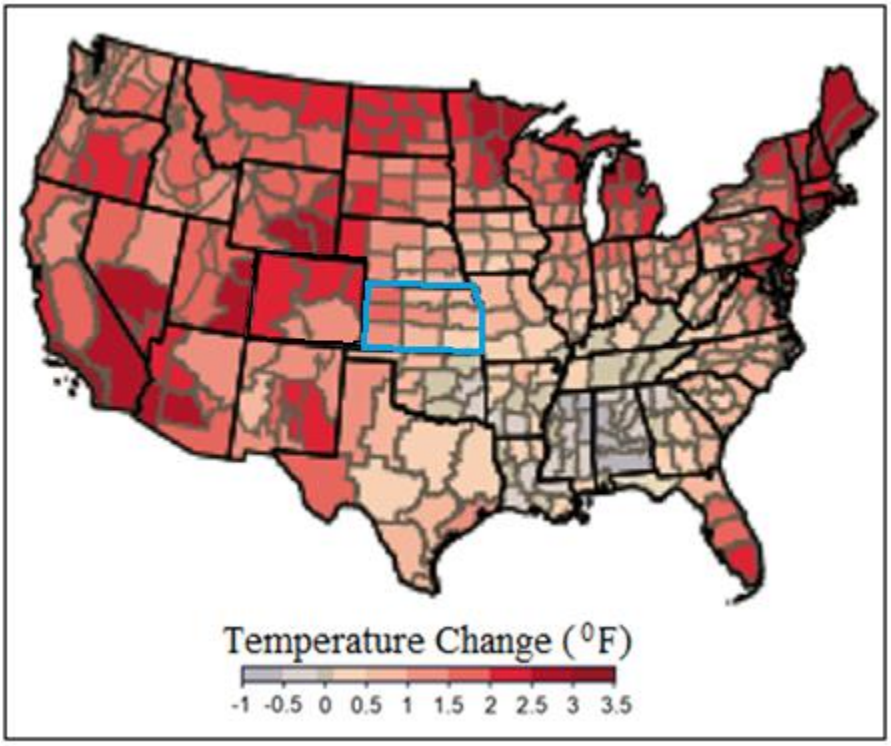
- Longer and hotter heat waves
- An increased risk of wildfires
- Higher wind speeds
- Greater rainfall intensity
- Increased tornado activity.

As climate modeling improves, future plan updates should include climate change as a factor in the ranking of natural hazards as these are expected to have a significant impact on Kansas Region I communities. Where applicable, potential climate change factors will be addressed in subsequent sections for relevant identified hazards.

According to the United State Environmental Protection Agency (USEPA) "What Climate Change Means for Kansas" (August 2016), "In the past century, most of the state has warmed by at least half a degree (F). The soil is becoming drier. Rainstorms are becoming more intense, and floods are becoming more severe. Warming winters and changes in the timing and size of rainfall events have altered crop yields. In the coming decades, summers are likely to become increasingly hot and dry, creating problems for agriculture and possibly human health."

The following map, from the USEPA Climate Change Indicators in the United States, illustrates modeled temperature changes during the last century.

USEPA Modeled Temperature Changes During Last Century



Concerning potential impacts on agriculture, the report states "Rising temperatures, drier soils, and decreasing water availability are likely to present challenges for Kansas's farms. Yields would decline by about 50 percent in fields that can no longer be irrigated. Even where ample water is available, higher temperatures would reduce yields of corn. Increased concentrations of carbon dioxide, however, may increase yields of wheat and soybean enough to offset the impact of higher temperature. Although warmer and shorter winters may allow for a longer growing season, they may also promote the growth of weeds and pests, and shorten the dormancy for many winter crops, which could increase crop losses during spring freezes. The early flowering of winter wheat could have negative repercussions on livestock farmers who depend on it for feed. Livestock themselves may also be affected by more intense heat waves and lack of water. Hot weather causes cows to eat less, grow more slowly, and produce less milk, and it can threaten their health."

Concerning potential impacts on rainfall, flooding, and drought, the report states "Although summer droughts are likely to become more severe, floods may also intensify. During the last 50 years, the amount of rain falling during the wettest four days of the year has increased about 15 percent in the Great Plains. River levels associated with flooding have increased in eastern Kansas. Over the next several decades, the amount of rainfall during the wettest days of the year is likely to continue to increase, which would increase flooding."

Concerning potential impacts on tornados, the report states "Scientists do not know how the frequency and severity of tornados will change. Rising concentrations of greenhouse gases tend to increase humidity, and thus atmospheric instability, which would encourage tornados. But wind shear is likely to decrease, which would discourage tornados. Research is ongoing to learn whether tornados will be more or less

frequent in the future. Because Kansas experiences about 100 tornados a year, such research is closely followed by meteorologists in the state."

Concerning potential impacts on human health, the report states "By 2050, Kansas is likely to have four times as many days above 100°F. Certain people are especially vulnerable, including children, the elderly, the sick, and the poor. The elderly may be particularly prone to heat stress and other heat-related health problems, including dehydration, cardiovascular strain, and respiratory problems. Those with low incomes may be particularly vulnerable due to a lack of air conditioning. Power failures due to severe weather can also present risks, especially in lightly populated areas where access to the necessary support services may be limited."

4.0 Hazard Profiles

4.1 – Introduction

The ultimate purpose of this HMP is to minimize the loss of life and property. To accomplish this, all relevant hazards and vulnerabilities the region faces have been identified. Once this identification has been completed, Kansas Region I and all participating jurisdictions can use the accumulated data to assist in the development of and prioritization of mitigation action to defend against these potential risks.

4.2 – Methodology

Each hazard that has historically, or could potentially, affect Kansas Region I is reviewed and discussed in detail. In general, each hazard details the following information:

- Location and Extent
- Previous Occurrences
- Hazard Probability Analysis
- Vulnerability Assessment

Data sets used for this HMP were designed to follow the lead of the 2018 State of Kansas Hazard Mitigation Plan. Ten-year data sets from the National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI) were used, where applicable, for hazard occurrence and impact data. Ten-year data sets from the United States Department of Agriculture (USDA) Risk Management Agency were used to determine agricultural losses. The ten-year data set was used to reflect the change in the climate and more accurately depict changes in the region. Where data sets were unavailable for a hazard, local reporting from participating jurisdictions was relied upon.

In addition, to ensure compliance with EMAP standards, a hazard consequence analysis was conducted for each hazard detailing the following potential impacts:

- Health and Safety of the Public
- Health and Safety of Responders
- Continuity of Operations; Property, Facilities, and Infrastructure
- Environment
- Economic Conditions
- Public Confidence in the Jurisdiction's Governance.

4.3 – Declared Federal Disasters

Historical events of significant magnitude or impact can result in a Secretarial or Presidential Disaster Declaration. The MPC reviewed the historical federal disaster declarations to assist in hazard identification. Since the approval of the previous Kansas Region I hazard mitigation plan in 2015, there have been four federal disaster declarations for the region, as follows:

- DR 4504: Declared on March 29, 2020 – COVID-19 Pandemic

- DR 4449: Declared on June 20, 2019 – Severe Storms, Straight-line Winds, Tornados, Flooding, Landslides, and Mudslides
- DR 4403: Declared on October 19, 2018 – Severe Storms, Straight-Line Winds and Flooding
- DR 4230: July 20, 2015 – Severe Storms, Tornados, Straight-line Winds, and Flooding

Additionally, since the 2015 plan, there has been one Emergency Declaration for the region, as follows:

- EM3481: Declared on March 12, 2020 – COVID-19

Finally, since the 2015 plan, there has been one Fire Management Assistance Declaration for the region, as follows:

- FM5121: Declared on April 5, 2016 – Burr Oak Fire

For the 20-year period from 2010 to 2020, Kansas Region I has had 17 federal disaster declarations, one emergency declaration, and one Fire Management Assistance declaration. These declarations included the following identified hazards:

- Flooding
- Ice Storm
- Landslides
- Major Disease Outbreak
- Severe Storms
- Straight-Line Winds
- Severe Winter Storms
- Tornados
- Wildfires

Information on past declared disasters are presented in the subsequent, relevant sections.

4.4 – Identified Potential Hazards

Based on the above data, and data contained in previous mitigation plans, Kansas Region I's MPC met to discuss previously identified hazards and deliberate on any changes or additions. Based on this review, no changes, additions, or subtractions were indicated for any identified hazard. Additionally, a thorough and comprehensive revision of data for each hazard was completed as part of this plan update.

The MPC confirmed sixteen natural hazards that may impact Kansas Region I, as listed below:

- Agricultural Infestation
- Dam/Levee Failure
- Drought
- Earthquake
- Expansive Soils
- Extreme Temperatures

- Flood
- Hailstorm
- Land Subsidence
- Landslide
- Lightning
- Soil Erosion and Dust
- Tornado
- Wildfire
- Windstorm
- Winter Storm

Additionally, the MPC confirmed six man-made hazards that may impact Kansas Region I, as listed below:

- Civil Disorder
- Hazardous Materials Incident
- Major Disease Outbreak
- Radiological Event
- Terrorism/Agri-Terrorism
- Utility/Infrastructure Failure

Based on discussion with the MPC, a lack of identified risk or history, and geographic improbability, numerous FEMA identified hazards such as coastal erosion, hurricane, tsunami were not included in the scope of this plan.

4.5 – Hazard Planning Significance

Previous planning efforts used the calculated priority risk index (CPRI) methodology to assign a planning significance to each of the identified hazards. CPRI considers the following four elements of risk:

- Probability of an Impactful Event
- Magnitude/Severity
- Warning Time
- Duration

Each element was then assigned a number based on pre-established rating parameters. The following tables provide a summary for each of the risk elements, including a rationale behind each numerical rating.

Table 4.1: CPRI Element Ratings

CPRI Element	Rating Number and Definition			
	1	2	3	4
Probability	Unlikely (10% chance of occurrence)	Occasional (20% chance of occurrence)	Likely (33% chance of occurrence)	Highly Likely (100% chance of occurrence)
Magnitude	Negligible (Minor injuries and <10% of property severely damaged)	Limited (Multiple injuries and 10-25% of property severely damaged)	Critical (Multiple disabling injuries and 25-50% of property severely damaged)	Catastrophic (Multiple deaths and 50% of property severely damaged)
Warning Time	24+ hours	12-24 hours	6-12 hours	<6 hours
Duration	< 6 hours	< 1 day	< 1 week	1 week +

Using the rankings, the following weighted formula was used to determine each hazard's CPRI:

(Probability x 0.45) + **(Magnitude/Severity x 0.30)** + **(Warning Time x 0.15)** + **(Duration x 0.10)**

Each planning significance category was assigned a CPRI range, with a higher score indicating greater planning criticality. The following table details planning significance CPRI ranges.

Table 4.2: CPRI Planning Significance Range

	CPRI Range	
Planning Significance	**Low CPRI**	**High CPRI**
High	3.0	4.0
Moderate	2.0	2.9
Low	1.0	1.9

The terms high, moderate and low indicate the level of planning significance for each hazard, and do not indicate the potential impact of a hazard occurring. Hazards rated with moderate or high planning significance were more thoroughly investigated and discussed due to the availability of data and historic occurrences, while those with a low planning significance were generally addressed due to lack of available data and historical occurrences. The following table shows the CPRI ratings for Kansas Region I.

Table 4.3: Kansas Region I Natural Hazard CPRI Planning Significance

Hazard	Probability	Magnitude/Severity	Warning Time	Duration	CPRI
Agricultural Infestation	2.0	2.0	1.0	4.0	2.1
Dam and Levee Failure	1.5	3.0	2.0	3.0	2.2
Drought	3.0	2.5	1.0	4.0	2.7
Earthquake	1.0	1.5	4.0	1.0	1.6
Expansive Soils	1.0	1.0	1.0	4.0	1.3
Extreme Temperature	3.0	2.0	1.0	3.0	2.4

Table 4.3: Kansas Region I Natural Hazard CPRI Planning Significance

Hazard	Probability	Magnitude/Severity	Warning Time	Duration	CPRI
Flood	4.0	3.5	2.5	2.5	3.5
Hailstorm	4.0	2.0	3.0	1.0	3.0
Land Subsidence	1.0	1.0	2.0	4.0	1.5
Landslide	1.0	1.0	4.0	1.0	1.5
Lightning	1.0	1.0	4.0	1.0	1.5
Soil Erosion & Dust	2.0	1.0	1.0	3.5	1.7
Tornado	3.0	3.0	3.5	1.0	2.9
Wildfire	3.0	2.5	4.0	2.0	2.9
Windstorm	3.5	3.0	2.5	2.0	3.1
Winter Storm	3.5	3.0	2.0	2.5	3.0

Table 4.4: Kansas Region I Man-Made Hazard CPRI Planning Significance

Hazard	Probability	Magnitude/Severity	Warning Time	Duration	CPRI
Civil Disorder	1.0	1.0	4.0	1.0	1.5
Hazardous Materials Event	1.5	1.5	4.0	1.5	1.9
Major Disease Outbreak	4.0	3.0	1.0	4.0	3.3
Radiological Event	1.0	1.0	4.0	4.0	1.8
Terrorism, Agri-Terrorism	1.0	2.0	4.0	1.0	1.8
Utility / Infrastructure Failure	2.5	1.5	4.0	2.0	2.4

The average CPRI for each identified hazard remained the same as the calculated CPRI for the 2015 planning effort, where individual county rankings were combined into a regional ranking, with the exception of Major Disease Outbreak. As of this plan a worldwide pandemic is taking place from the SARS COV-2 virus. The revised ranking reflects this on-going event, with a complete description provided in the Major Disease Outbreak section.

4.6 – Hazard Profiles

44 CFR 201.6(c)(2)(i) A description of the type, 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.

Each identified hazard is profiled in the subsequent sections, with the level of detail varying based on available information. Sources of information are cited in the detailed hazard profiles below.

With each update of this plan, new information will be incorporated to provide for better evaluation and prioritization of the hazards.

The following hazards are presented in alphabetical order, and not by planning significance, for ease of reference. Additionally, man-made hazards are presented, again in alphabetical order, after natural hazards.

4.7 – Agricultural Infestation

Agricultural infestation is the naturally occurring infection of vegetation, crops or livestock with insects, vermin (to include lice, roaches, mice, coyote, fox, fleas, etc.), or diseases that render the crops or livestock unfit for consumption or use. The levels and types of agricultural infestation will vary according to many factors, including cycles of heavy rains and drought. A certain level of agricultural infestation is normal; however, infestation becomes an issue when the level of an infestation escalates suddenly, or a new infestation appears, overwhelming normal control efforts. Infestation of crops or livestock can pose a significant risk to state and local economies due to the dominance of the agricultural industry.

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.

4.7.1 –Location and Extent

The entire planning area may be affected by agricultural infestation. While rural areas within the region are more susceptible to crop and livestock infestation, urban and suburban areas are also at risk due to landscaping, urban gardens and parks, all of which add value to homes and communities, may be susceptible to damage or loss. The magnitude and severity of an agricultural infestation is relative to the type of infestation. A foreign animal disease like foot and mouth could potentially cause the economy to crumble, whereas an infestation of fleas would be manageable. The MPC has determined that the magnitude of this hazard in the planning area would be limited, as most infestations are manageable in scope.

Animal Disease

Of key concern regarding this hazard is the potential introduction of a rapid and economically devastating foreign animal disease, including Foot and Mouth disease and Bovine Spongiform Encephalopathy (BSE) disease. Because Kansas is a major cattle state, with cattle raised locally as well as imported into the state, the potential for highly contagious diseases such as these is a continuing, significant threat. The loss of production, death of animals, and other lasting problems resulting from an outbreak could cause continual and severe economic losses, as well as widespread unemployment. It would affect not only farmers, ranchers, and butchers, but also support and related industries

Of particular concern are Confined Animal Feeding Operations (CAFO) facilities, defined as facilities with 300 or more animal units. The CAFO facilities are regulated by the Kansas Department of Health & Environment (KDHE), Bureau of Water, and Livestock Waste Management. The CAFO includes beef, dairy, sheep, swine, chicken, turkey, and horses. The following is a list of the number of CAFOs per county, using the latest available data, in Kansas Region I:

- Chase County: 8
- Geary County: 7
- Lyon County: 14
- Morris County: 11
- Pottawatomie County: 23
- Riley County: 11
- Wabaunsee County: 5

Knowing where diseased and at-risk animals are, where they've been and when, is important to ensuring a rapid response when animal disease events take place. The Kansas Department of Agriculture (KDA), Division of Animal Health monitors and reports on animal reportable diseases. Producers are required by state law to report any of the reportable animal diseases.

Crop Pests and Diseases

Many factors influence disease development in plants, including hybrid/variety genetics, plant growth stage at the time of infection, weather (e.g., temperature, rain, wind, hail, etc.), single versus mixed infections, and genetics of the pathogen populations.

Field crops in the region are also subject to various types of infestation. According to KDA, Plant Protection and Weed Control Division, the following are the highest risk crop pests to this region and the potentially impacted crop:

- Aspergillus Ear Rot (Alfatoxin): Corn
- Austro-Asian Rust: Soybean
- Black Stem Rust, Blast: Wheat
- South American strains, Stripe Rust, Leaf Rust, Karnal: Wheat

Infestation is not only a risk to crops in the field, but insect infestation can also cause major losses to stored grain. It is estimated that damage to stored grain by the lesser grain borer, rice weevil, red flour beetle, and rusty grain beetle costs the United States about $500 million annually.

Tree Pests

According to the KDA, Plant Protection and Weed Control Division, the following are the highest risk plant pests by host to Kansas Region I:

- Emerald Ash Borer (EAB): Ash Trees
- Asian Longhorned Beetle: Maple, Birch, Willow, Mimosa, Ash, Sycamore & Poplar Trees
- Thousand Cankers: Walnut Trees

As of this plan, neither the Asian Longhorned Beetle nor Thousand Cankers have been detected in Kansas.

As of this plan, the EAB has been discovered in numerous Kansas countries to the east of Kansas Region I. However, no instances of EAB have been detected in Kanas Region I or in any adjacent counties.

Wildlife Pests

The region's farmers also lose a significant amount of crops each year as a result of wildlife foraging. This can be particularly problematic in areas where natural habitat has been diminished or in years where weather patterns such as early/late frost deep snow, or drought has caused the wild food sources to be limited. Also, of concern are the following wildlife diseases:

- Chronic Wasting Disease (CWD), affecting deer and captive elk populations.
- Hemorrhagic Disease (HD), affecting white-tailed deer

In a continuing effort to monitor the prevalence and spread of CWD in Kansas deer, the Kansas Department of Wildlife, Parks and Tourism (KDWPT) has collected and tested samples from 360 deer in 2018 and 2019. Thirty-seven of those samples were confirmed positive. The 37 confirmed positives came from deer taken in Cheyenne, Rawlins, Decatur, Norton, Phillips, Smith, Thomas, Sheridan, Gove, Rooks, Osborne, Scott, Lane, Hamilton, Haskell, Hodgeman, Ford, Morris, Stafford, Reno, and Wabaunsee counties. While most positives are still coming from northwest Kansas, new counties were added to the list this year, including several that show the disease's spread to the south and east.

These diseases can seriously damage the populations of the captive deer and elk farms and the wild deer populations but also affect the annual $350 million-dollar regional and statewide hunting economy.

4.7.2 – Previous Occurrences

There have been no major reported or recorded agricultural infestations, above what is considered a normal level, for Kansas Region I.

Crop loss data from the USDA Risk Management Agency detailing cause of loss was researched to determine the financial impacts of agricultural infestation on the region's agricultural base. Crop loss data for the ten-year period of 2009- 2018 (with 2009 and 2018 being full data years) for the region indicates 203 claims on 16,830 acres for $1,080,048.

Table 4.5: USDA Risk Management Agency Cause of Loss Indemnities 2010-2019, Agricultural Infestation

County	Number of Reported Claims	Acres Lost	Total Amount of Loss
Chase	10	637	$48,617
Geary	25	2,137	$109,057
Lyon	46	3,175	$171,655
Morris	34	6,011	$374,960
Pottawatomie	37	1,444	$129,559
Riley	35	2,650	$179,615
Wabaunsee	16	776	$66,586

Source: USDA Farm Service Agency

4.7.3 – Hazard Probability Analysis

Kansas Region I experiences agricultural losses every year because of insects, vermin or diseases that impact plants and livestock. Data from the UDSA Risk Management Agency indicates that there has been

at least one claimed incident of agricultural infestation for Kansas Region I for the period 2009 through 2018. Using the binomial probability equation (number of years with an event divided by total number of years in reporting period) we derive a probability 100% of a reportable agricultural infestation event in a given year. However, the large majority of events are expected to be small and limited in scope.

4.7.4 – Vulnerability Assessment

Regional populations and facilities are not directly vulnerable to losses as a result of agricultural infestation. The USDA 2017 Census of Agriculture (the latest available data) provides data on the crop exposure value, the total dollar value of all crops, for each Kansas Region I County. The USDA Risk Management Agency provides information on insured crop losses related to identified hazard, with data from the ten-year period of 2009 to 2018 (with 2009 and 2018 being full data set years) used for analysis. The higher the percentage loss, the higher the potential vulnerability the county has to agricultural infestation events.

Table 4.6: Agricultural Infestation Acres Impacted and Crop Insurance Paid per County from 2009-2018

Jurisdiction	Farm Acreage	Annualized Acres Impacted	Percentage of Total Acres Impacted Yearly	Market Value of Products Sold	Annualized Crop Insurance Paid	Percentage of Market Value Impacted Yearly
Chase	360,077	64	0.02%	$85,430,000	$4,862	0.01%
Geary	155,153	214	0.14%	$31,833,000	$10,906	0.03%
Lyon	522,934	317	0.06%	$134,440,000	$17,165	0.01%
Morris	409,269	601	0.15%	$138,615,000	$37,496	0.03%
Pottawatomie	406,031	144	0.04%	$101,363,000	$12,956	0.01%
Riley	214,311	265	0.12%	$51,171,000	$17,961	0.04%
Wabaunsee	378,759	214	0.06%	$63,146,000	$10,906	0.02%

Source: USDA

This table only reflects insured losses that were claimed. According to the 2017 Kansas Crop Insurance Profile Report issued by the USDA Risk Management Agency, 75-94% percent of major Kansas row crops were insured. Data regarding the number or value of livestock and wildlife lost to disease or infestation was not available for this planning effort.

In addition, threats have been identified which, while currently not impacting Kansas, may present a future risk. According to the KDA, Plant Protection and Weed Control Division the following table lists the highest risk plant pests to Kansas.

Table 4.7: Potential High-Risk Plant Pests

Pest (Disease Insect, or weed)	Crop or Host Plant	Current Distribution	Type of Loss
Rust, Austro-Asian	Soybean	Australia, Japan, Pacific, Gulf of Mexico	Direct Loss to production
Aspergillus ear rot (Alfatoxin)	Corn	Worldwide, endemic to Kansas	Toxin renders the grain unusable

Table 4.7: Potential High-Risk Plant Pests

Pest (Disease Insect, or weed)	Crop or Host Plant	Current Distribution	Type of Loss
Black Stem Rust UG99 strain	Wheat	Africa, Asia	Direct Loss to production
Blast – South American strains	Wheat	South America	Direct Loss to production
Stripe Rust (new races)	Wheat	North America	Direct Loss to production
Leaf Rust (new races)	Wheat	North America	Direct Loss to production
Karnal Bunt	Wheat	Asia, Mexico, Arizona	International export quarantines, degradation of flour quality
Thousand Cankers	Walnut	Western US states and PA, VA, Tenn	Death of municipal trees, loss of nut crop, loss of timber
Emerald Ash Borer	Ash	Eastern Kansas	Death of trees. Cost of removal and re-vegetation.
Asian Longhorned Beetle	Maples, Birches, Willows, Mimosa, Ash, Sycamore, Poplar trees	Small parts of Ohio, New York, and Massachusetts	Death of trees. Cost of removal and re-vegetation.
Hydrilla	Water Bodies	Southern U.S. and one park pond in Olathe	Economic and environmental.

4.7.5 – Impact and Consequence Analysis

As per EMAP standards, the information in the following table provides the Consequence Analysis.

Table 4.8: Agricultural Infestation Consequence Analysis

Subject	Impacts of Agricultural Infestation
Health and Safety of the Public	Impact in the area would be minimal. If the infestation is unrecognized, then there is the potential for the food supply to be contaminated.
Health and Safety of Responders	Impact would be minimal with protective clothing, gloves, etc as these diseases cause no risk to humans.
Continuity of Operations	Minimal expectation of execution of the COOP.
Property, Facilities, and Infrastructure	Localized impact to facilities and infrastructure in the incident area is minimal to non-existent.
Environment	Impact could be severe to the incident area, specifically, plants, trees, bushes, and crops.
Economic Conditions	Impacts to the economy will depend on the severity of the infestation. The potential for economic loss to the community and state could be severe if the infestation is hard to contain, eliminate, or reduce. Impact could be minimized due to crop insurance.
Public Confidence in the Jurisdiction's Governance	Confidence could be in question depending on timeliness and steps taken to warn the producers and public, and treat/eradicate the infestation.

4.8 – Dam and Levee Failure

A dam is a barrier across flowing water that obstructs, directs or slows down the flow, often creating a reservoir, lake or impoundments. Common reasons for dam failure include:

- Flooding
- Sub-standard construction materials/techniques
- Spillway design error
- Geological instability caused by changes to water levels during filling or poor surveying
- Sliding of a mountain into the reservoir
- Poor maintenance, especially of outlet pipes
- Human, computer or design error
- Internal erosion, especially in earthen dams
- Earthquakes

A levee is an artificial barrier, usually an earthen embankment, constructed along rivers to protect adjacent lands from flooding. Common reasons for levee failure include:

- Surface erosion due to water velocities
- Subsurface actions
- Flood waters exceeding the design capacity of the structure

4.8.1 – Dam Location and Extent

In Kansas, the State has regulatory jurisdiction over non-federal dams that meet the following definition of a "jurisdictional" dam as defined by K.S.A. 82a-301 et seq, and amendments thereto:

- *any artificial barrier including appurtenant works with the ability to impound water, waste water or other liquids that has a height of 25 feet or more; or has a height of six feet or greater and also has the capacity to impound 50 or more acre feet. The height of a dam or barrier shall be determined as follows: (1) A barrier or dam that extends across the natural bed of a stream or watercourse shall be measured from the downstream toe of the barrier or dam to the top of the barrier or dam; or (2) a barrier or dam that does not extend across a stream or watercourse shall be measured from the lowest elevation of the outside limit of the barrier or dam to the top of the barrier or dam.*

The KDA Division of Water Resources (KDA-DWR) is the State agency responsible for regulation of jurisdictional dams. Within the DWR, the Water Structures Program has the following responsibilities:

- Reviewing and approving of plans for constructing new dams and for modifying existing dams
- Ensuring quality control during construction,
- Monitoring dams that, if they failed, could cause loss of life, or interrupt public utilities or services

The KDA-DWR uses a three-tiered classification system to describe the potential risk and severity associated with dam failure, with the tiers relating to potential downstream impact rather than the physical condition of the dam.

- **High Hazard (Class C):** Dams assigned the high hazard-potential classification are those 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 in hazard class B. Emergency Action Plans (EAPs) are required for all High Hazard Dams.
- **Significant Hazard (Class B):** Dams assigned the significant hazard-potential classification are those dams where failure could endanger a few lives, damage an isolated home, damage traffic on moderate volume roads that meet the requirements for hazard class B dams, 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 (Class A):** Dams assigned the low hazard-potential classification are those 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 hazard class A dams.

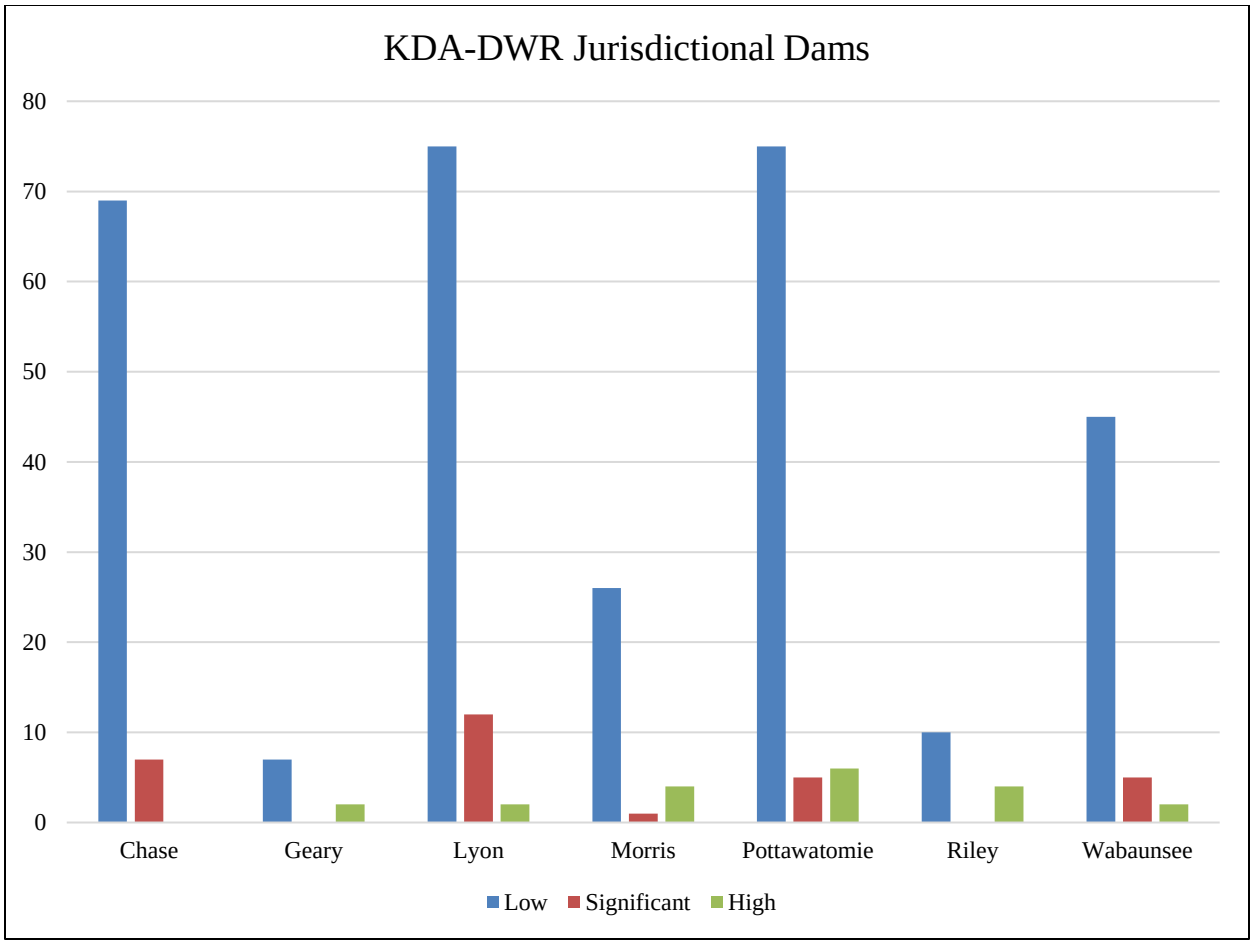
According to the KDA-DWR, there are 113 jurisdictional dams in Kansas Region I. These dams are classified as follows.

Table 4.9: Kansas Region I KDA-DWR Jurisdictional Dams

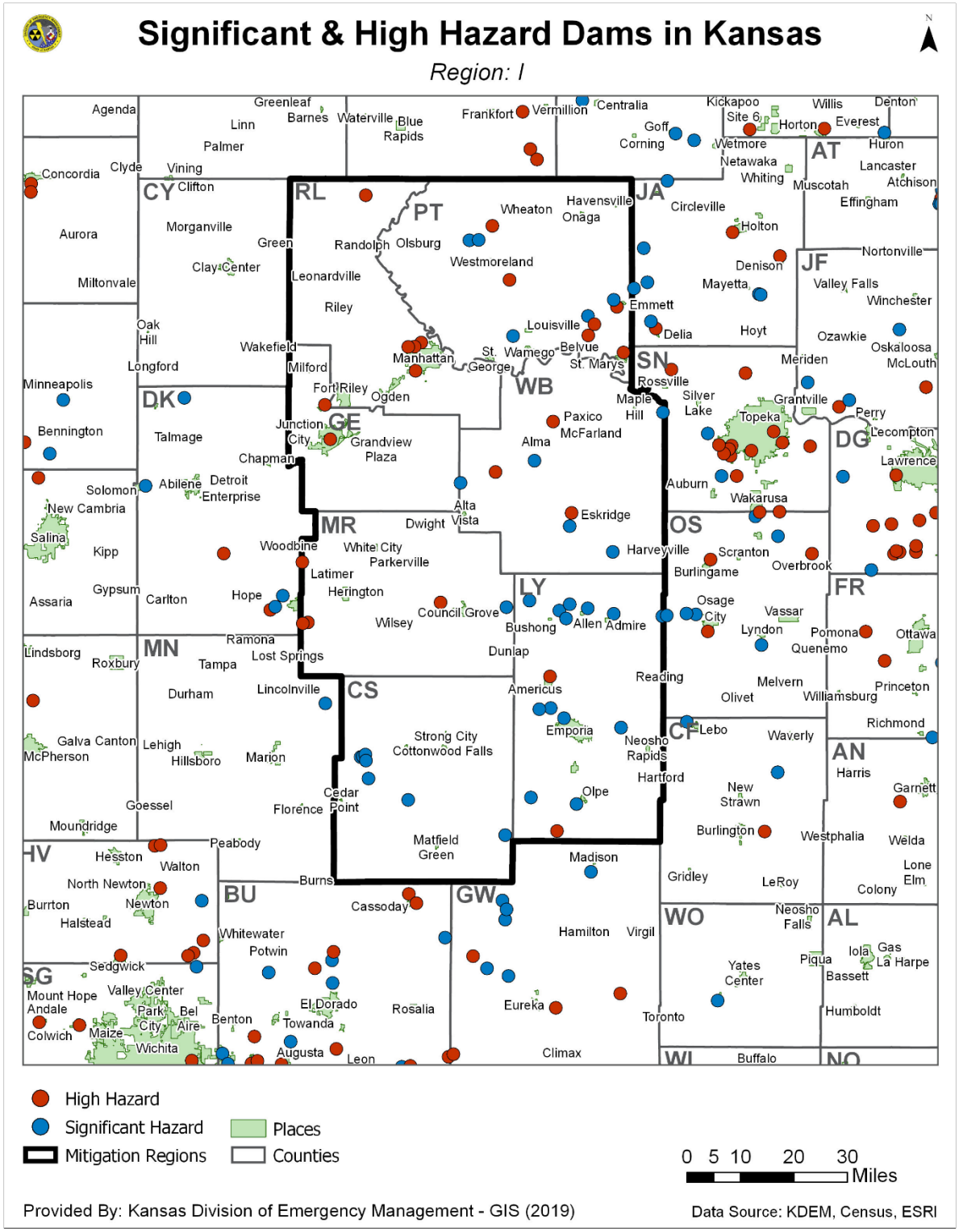
County	Low	Significant	High	High Hazard Without EAP
Chase	69	6	0	0
Geary	7	0	2	0
Lyon	75	12	2	0
Morris	26	1	4	0
Pottawatomie	75	5	6	0
Riley	10	0	4	2
Wabaunsee	45	5	3	0

Source: KDA-DWR

The following maps show all identified dams within Kansas Region I with a Significant or High classification, and available inundation and location mapping. Please note that information related to dams may have been classified and unable for review.

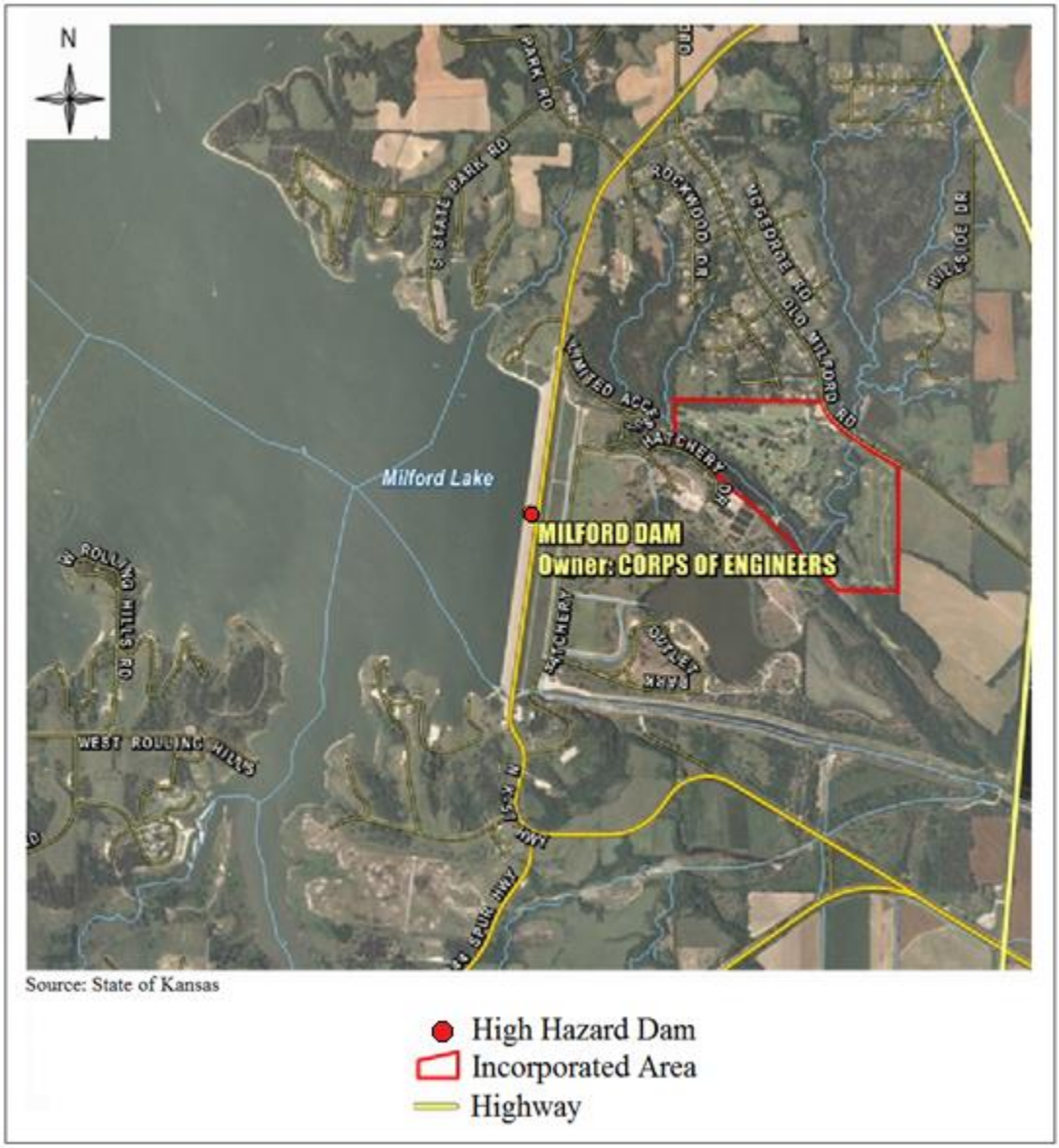

KDA-DWR Jurisdictional Dams
80
70
60
50
40
30
20
10
0
Chase
Geary
Lyon
Morris
Pottawatomie
Riley
Wabaunsee
Low
Significant
High

Kansas Region I Significant and High Hazard Dams



Camp Moon Lake High Hazard Dam Map (Geary County)

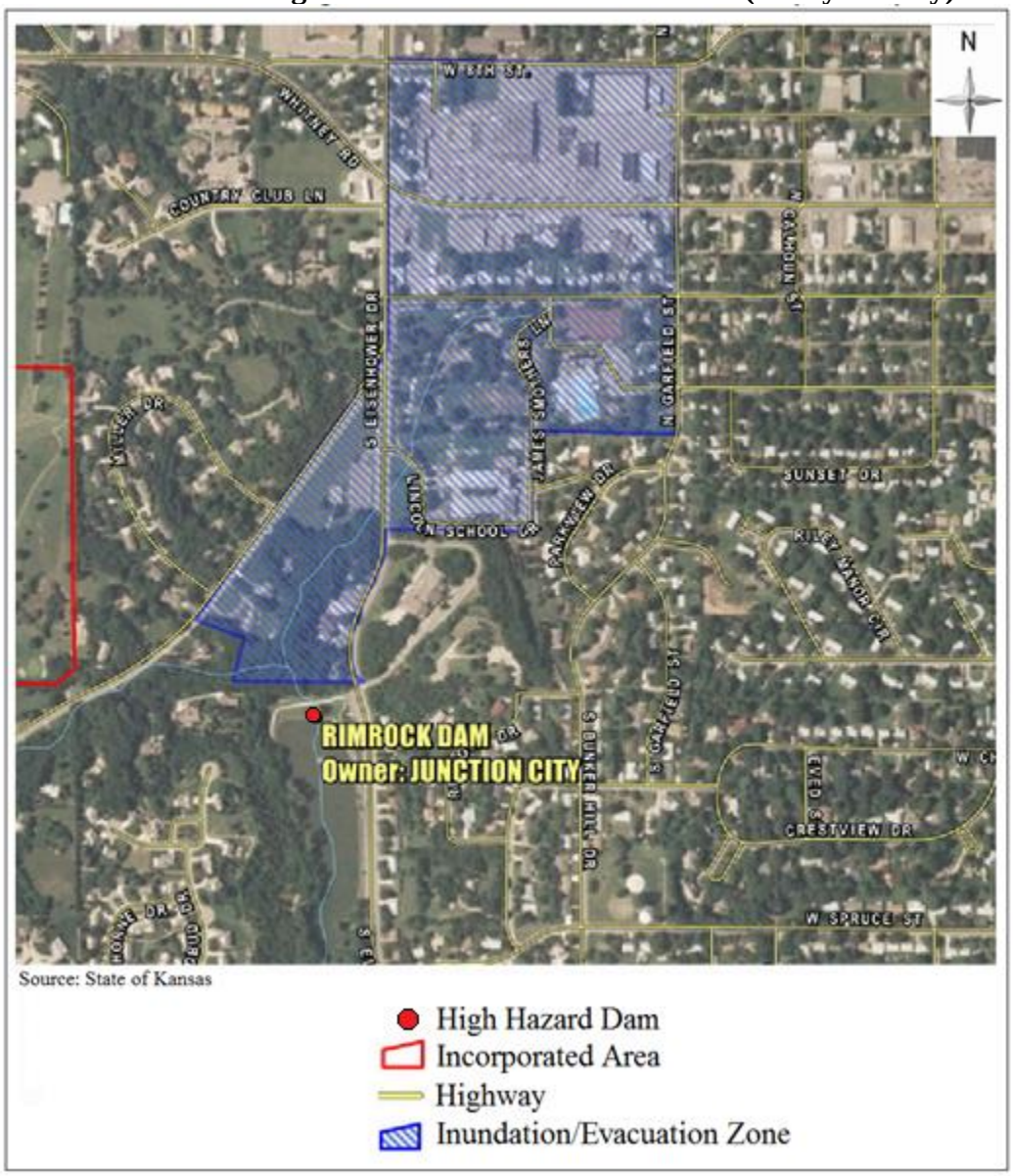
Milford High Hazard Dam Map (Geary County)



Source: State of Kansas

High Hazard Dam
Incorporated Area
Highway

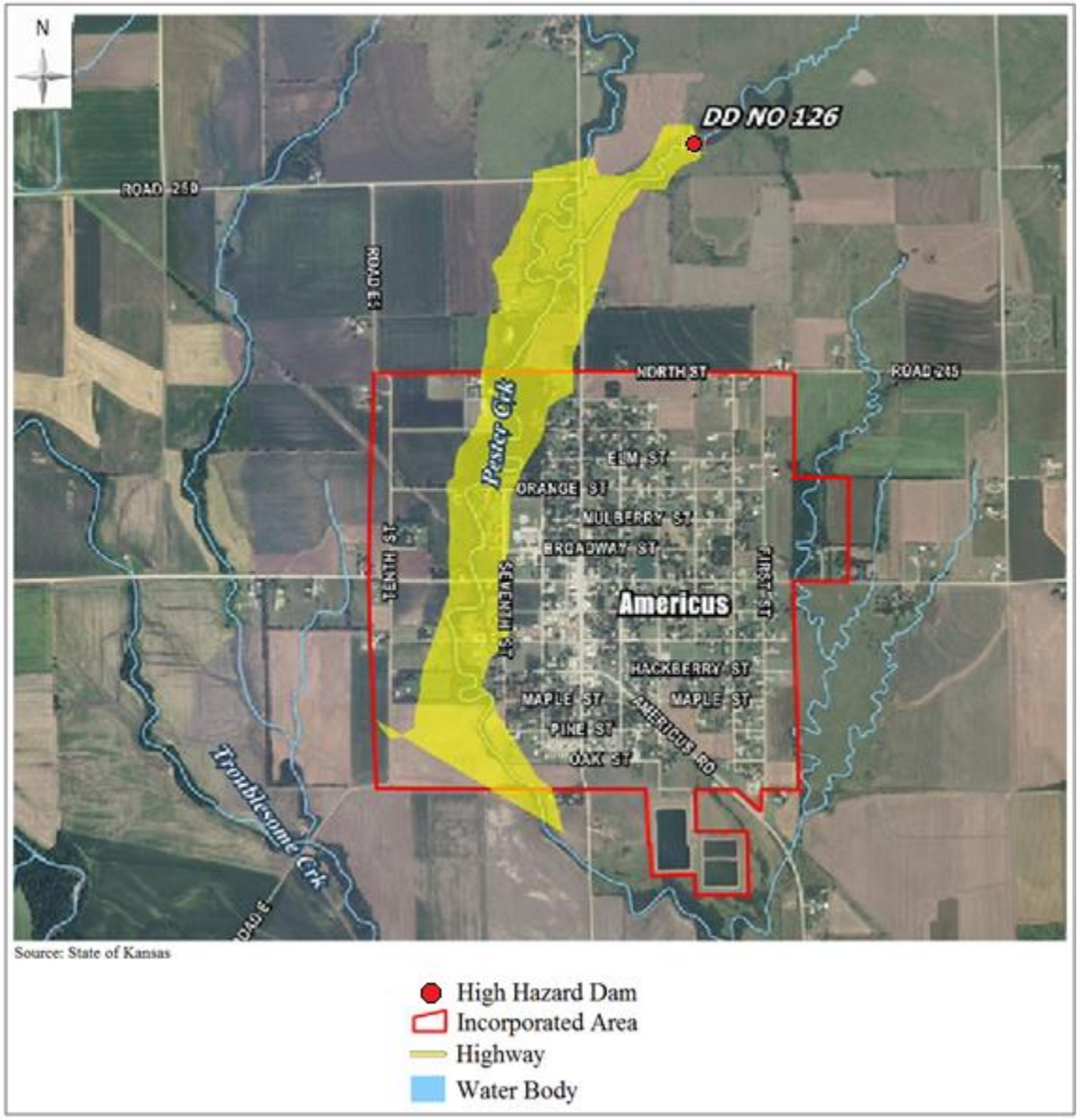
Rimrock Pond High Hazard Dam Inundation Area (Geary County)



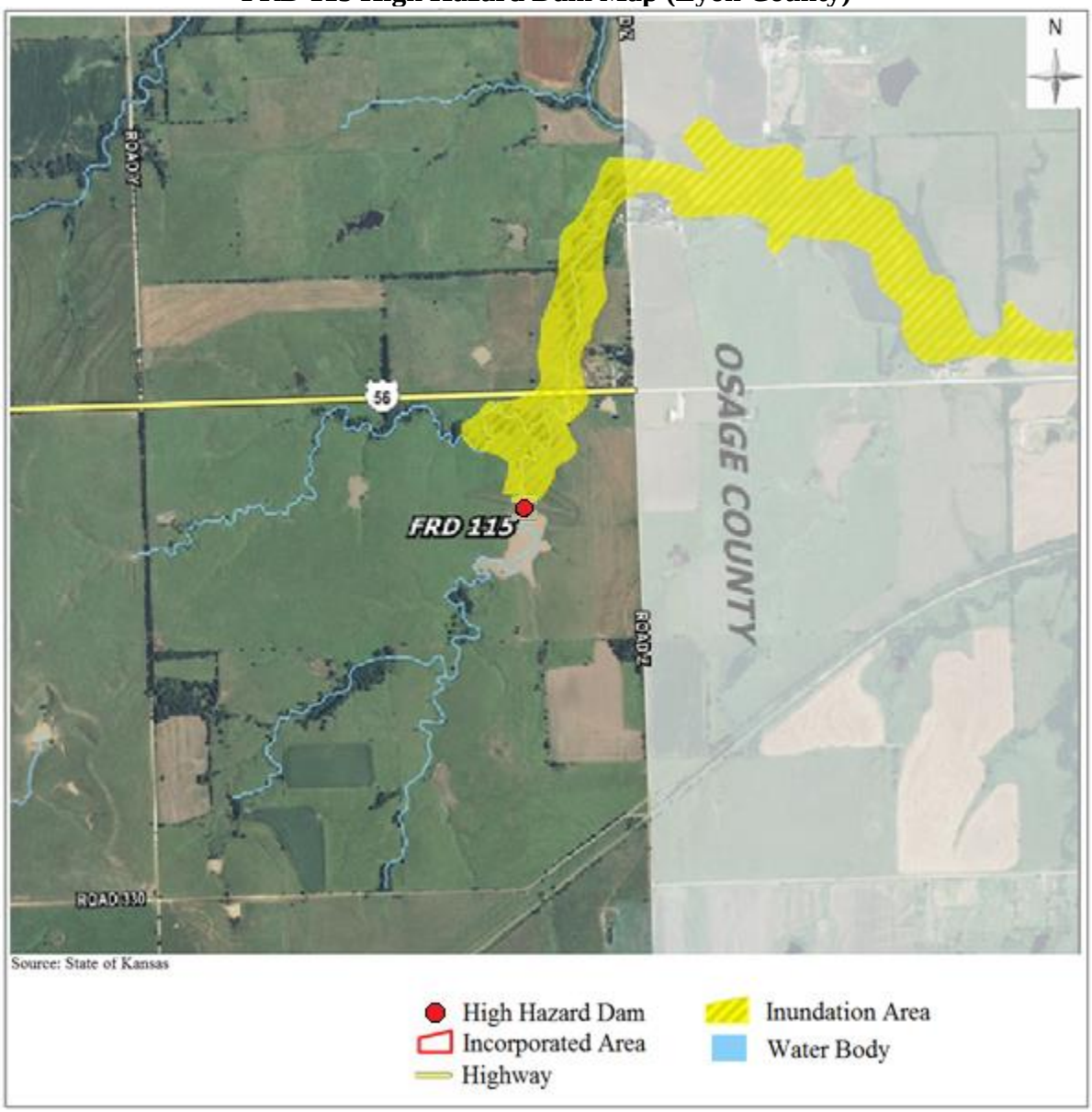
Source: State of Kansas

High Hazard Dam
Incorporated Area
Highway
Inundation/Evacuation Zone

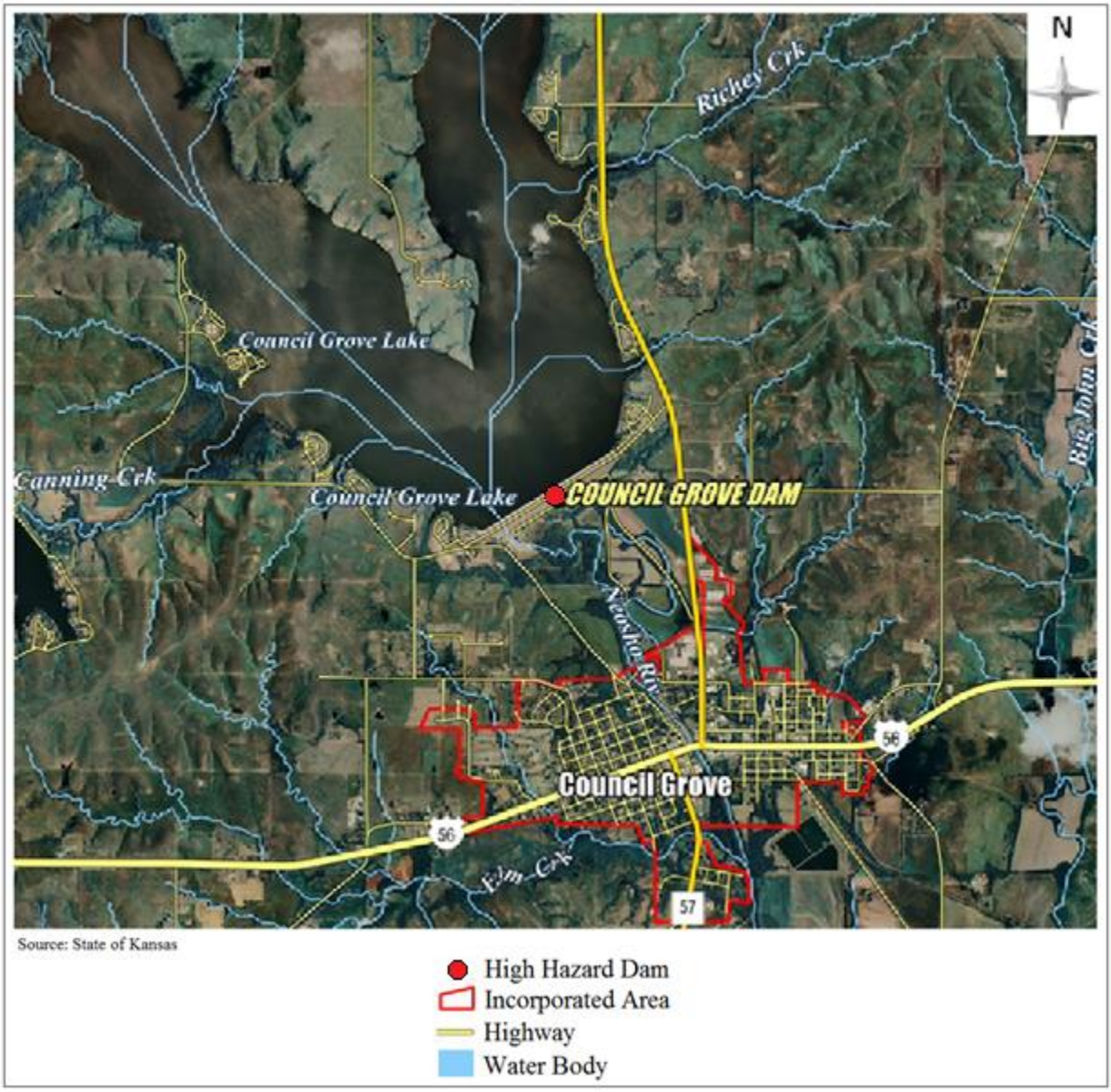
Dam Number 126 High Hazard Dam Map (Lyon County)



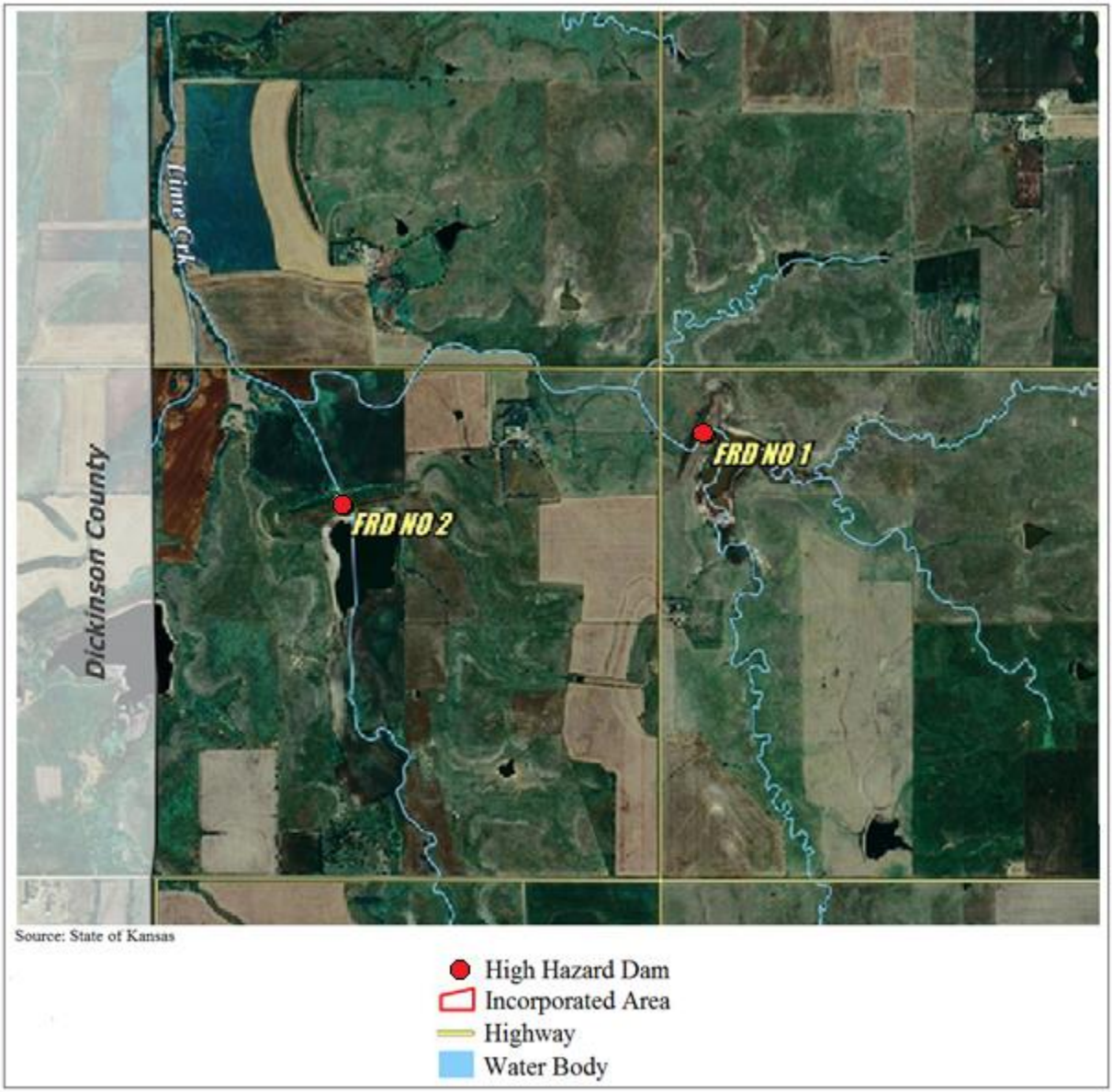
FRD 115 High Hazard Dam Map (Lyon County)



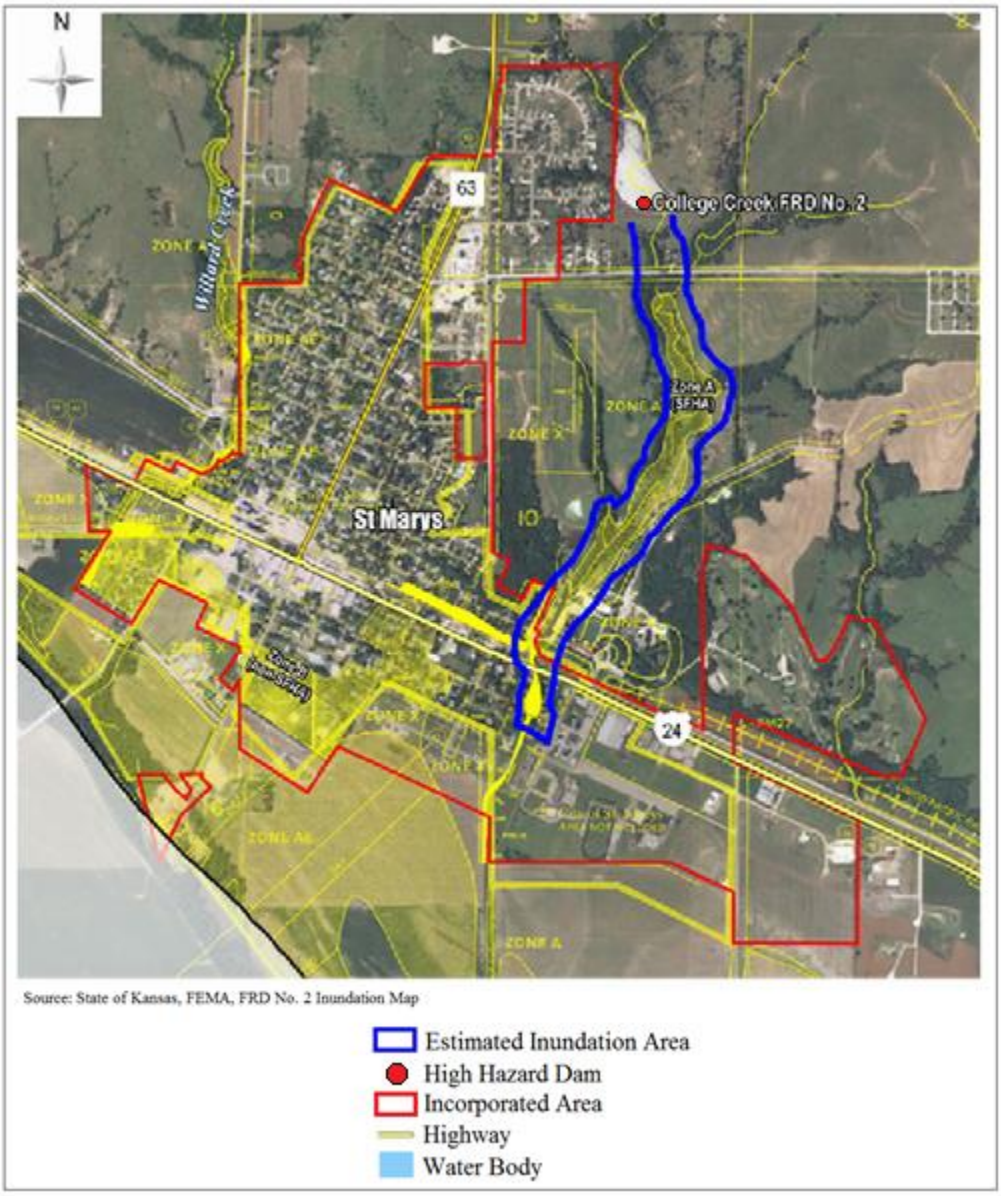
Council Grove Lake High Hazard Dam Map (Morris County)



FRD No.1 and FRD No.2 High Hazard Dam Map (Morris County)



College Creek FRD No. 2 High Hazard Dam Map (Pottawatomie County)



Source: State of Kansas, FEMA, FRD No. 2 Inundation Map

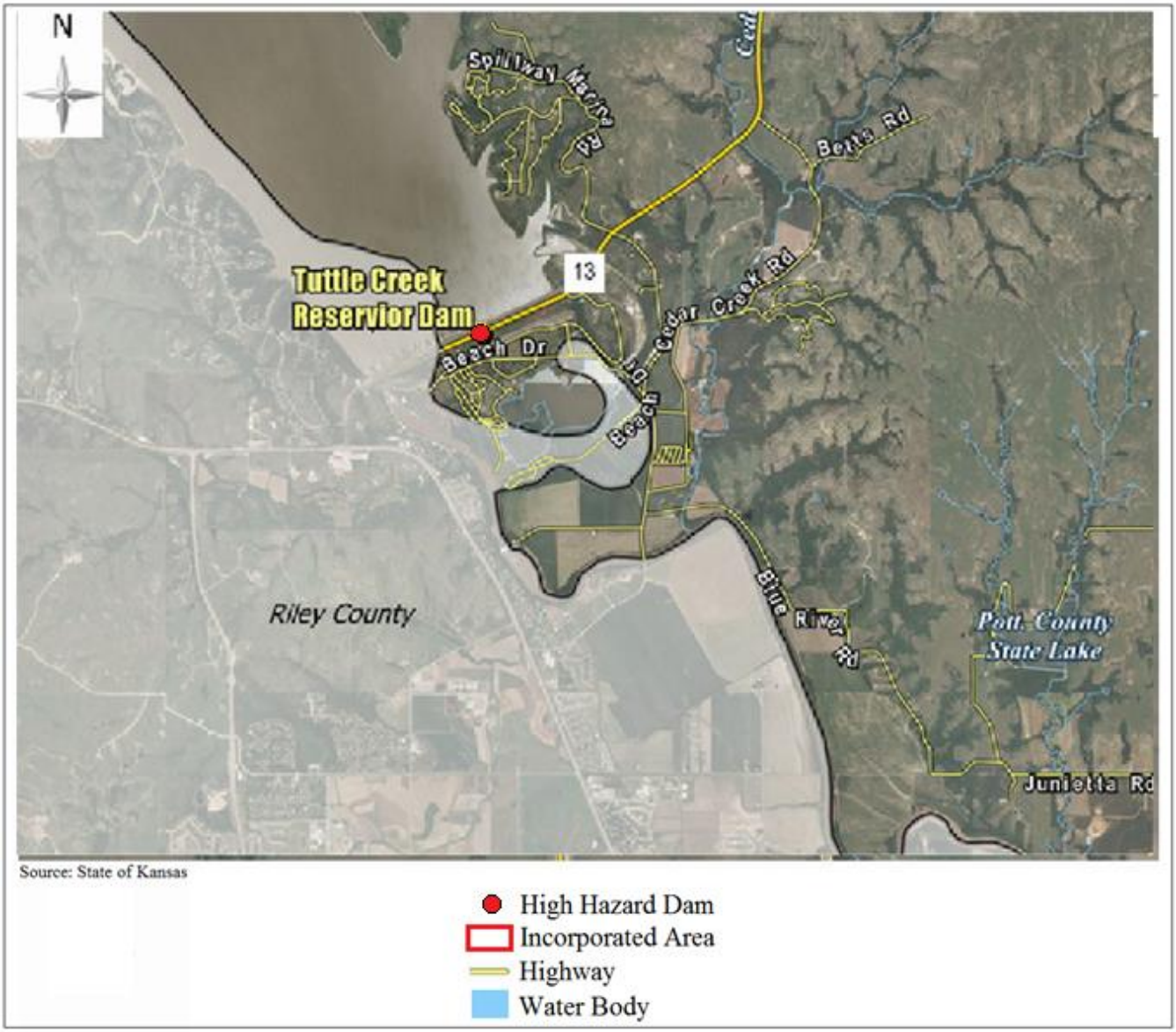
Jeffery Energy Center No. 1 and Auxiliary High Hazard Dam Map (Pottawatomie County)

Source: State of Kansas, Pottawatomie County

High Hazard Dam
Incorporated Area
Highway

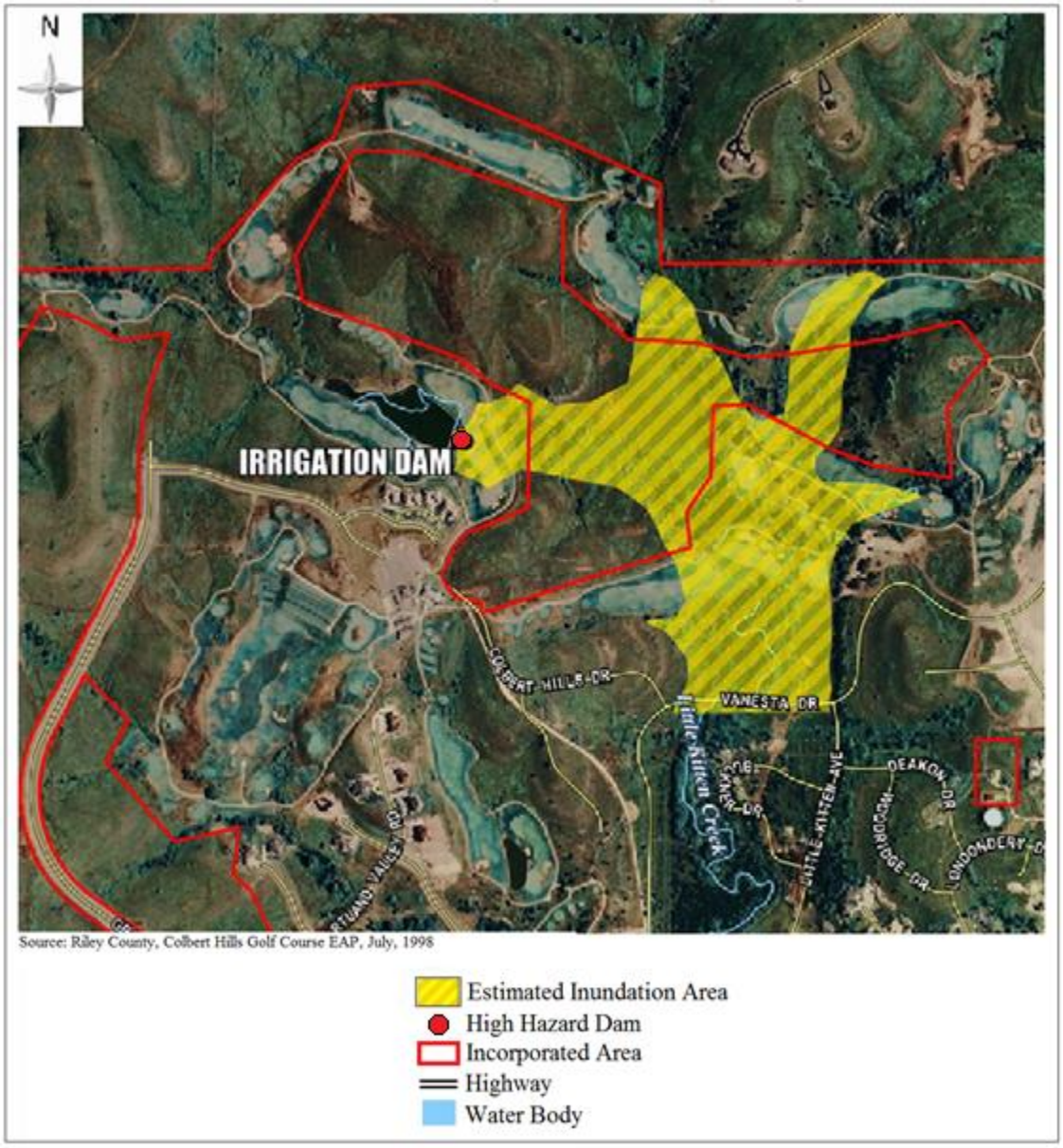
Pottawatomie State Lake No. 1 High Hazard Dam Map (Pottawatomie County)

Tuttle Creek Reservoir High Hazard Dam Map (Pottawatomie County)

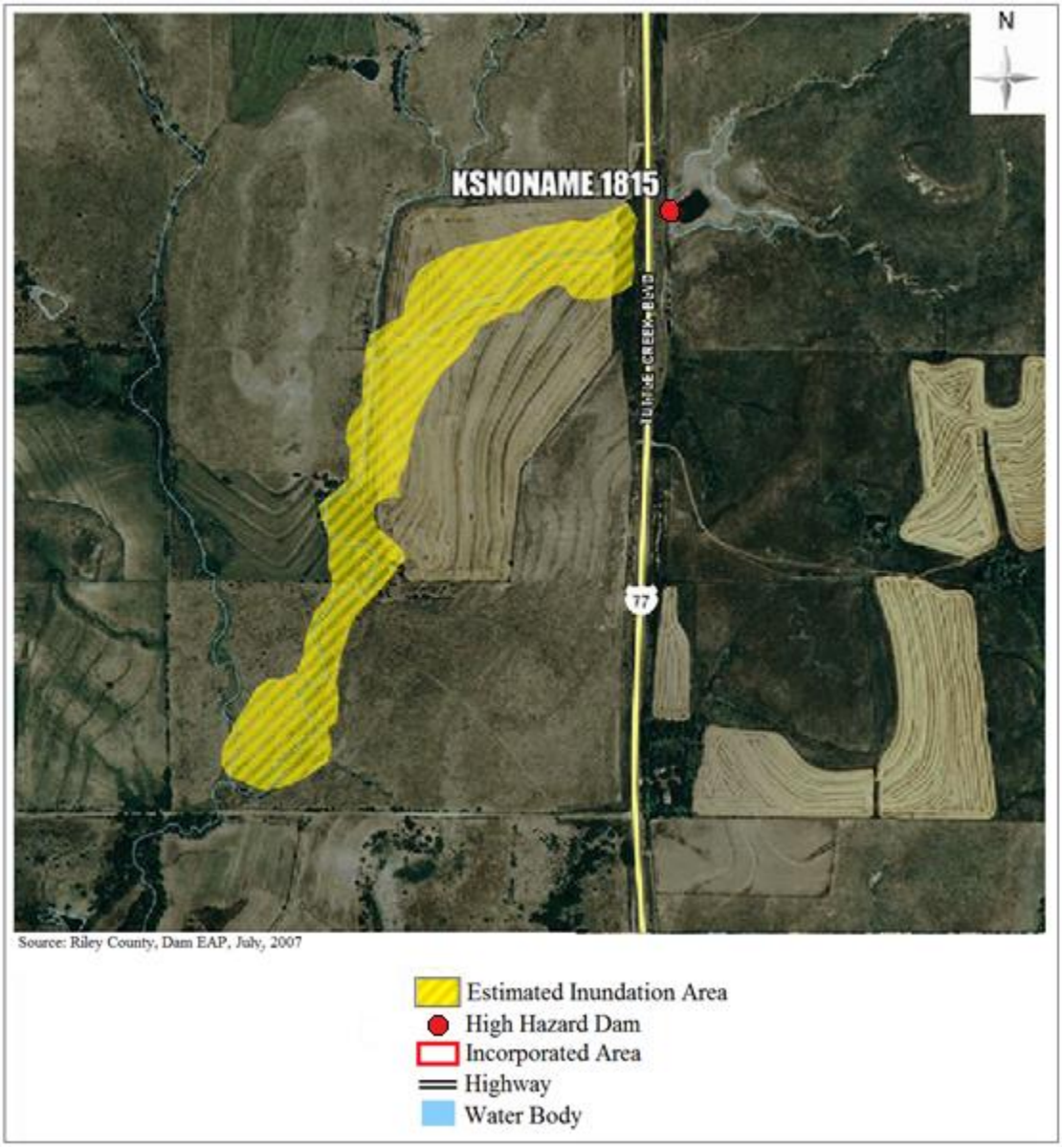


Source: State of Kansas

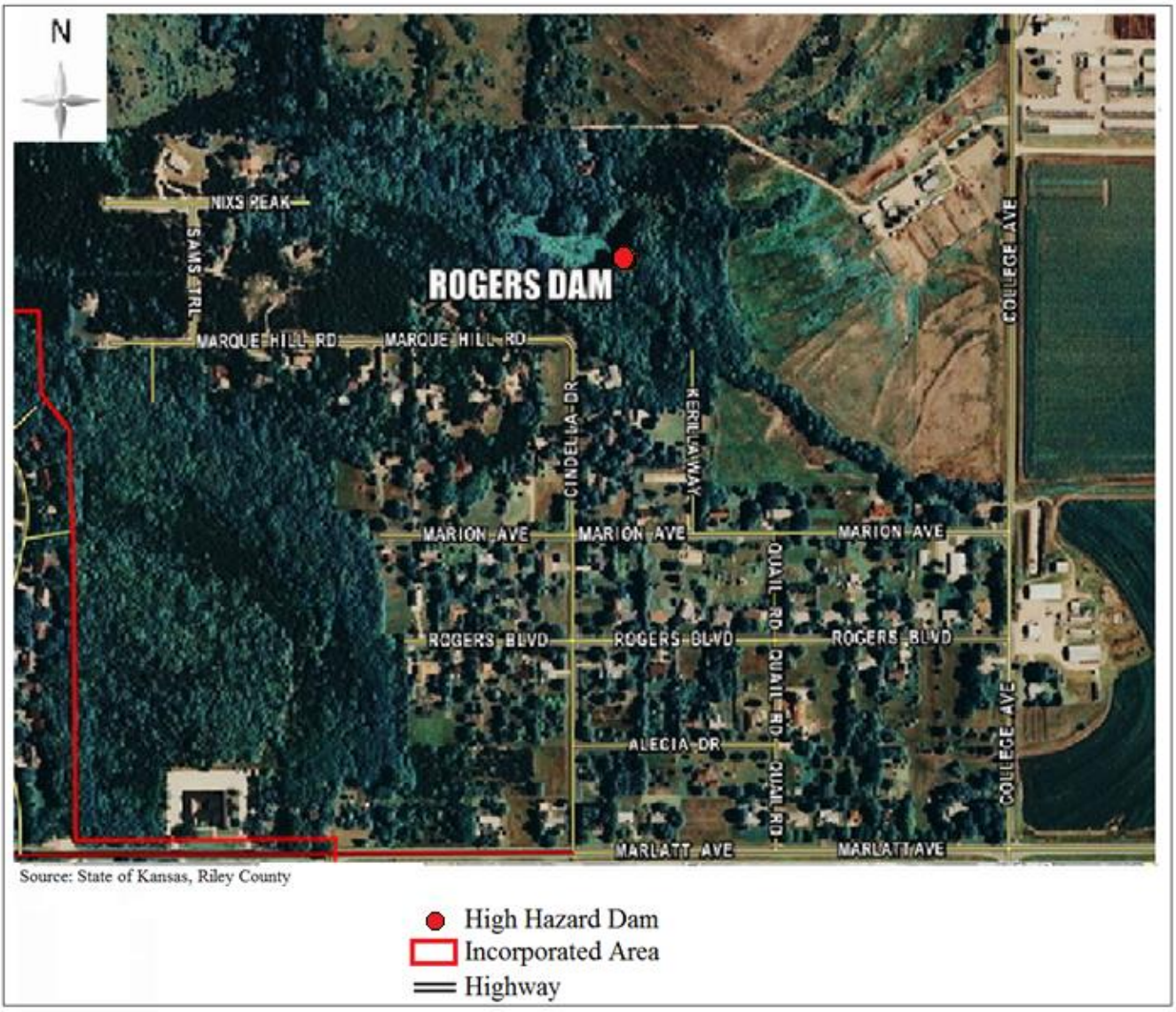
Kansas State University Golf Course High Hazard Dam Inundation Map (Riley County)



KSNoName 1815 High Hazard Dam Map (Riley County)

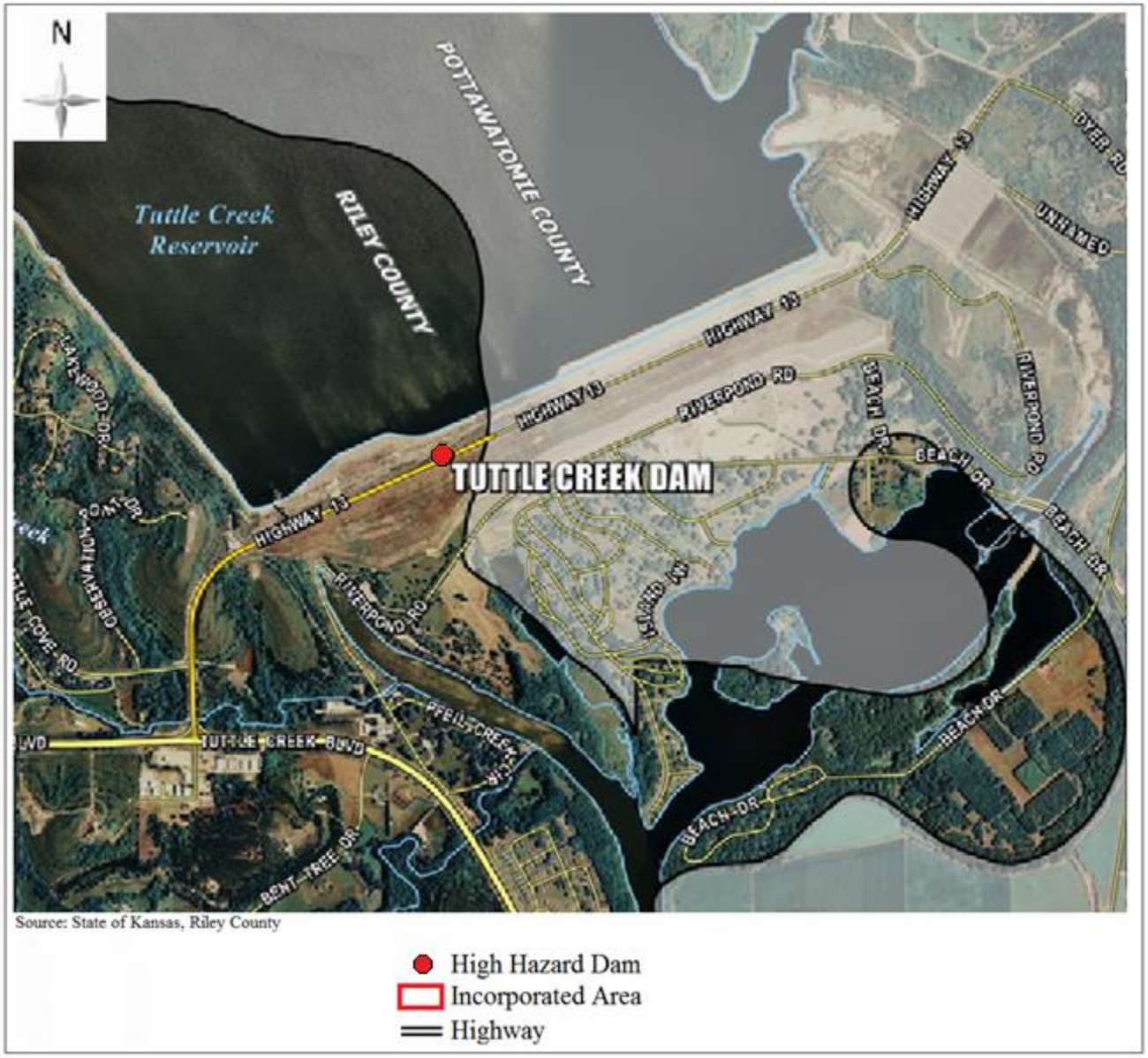


Rogers High Hazard Dam Map (Riley County)

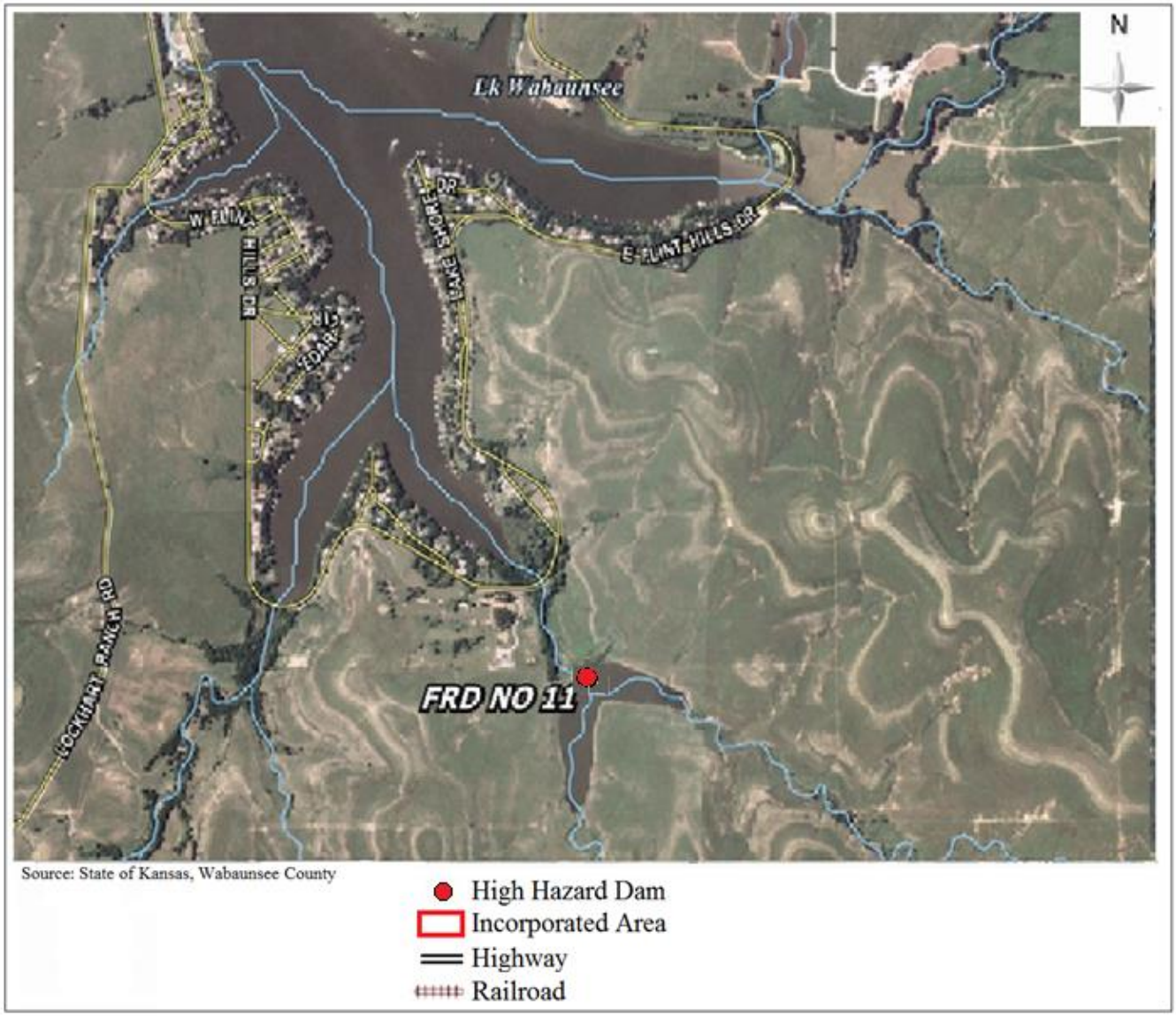


Source: State of Kansas, Riley County

Tuttle Creek High Hazard Dam Map (Riley County)



FRD No.11 High Hazard Dam Map (Wabaunsee County)



Lake Wabaunsee High Hazard Dam Map (Wabaunsee County)

In addition, the KDA-DWR indicates that there are three federally operated reservoirs within Kansas Region I.

Table 4.10: Kansas Region I Federally Operated Reservoirs

County	Federal Reservoir Name	Operating Agency
Geary	Camp Moon Lake Dam	US Army
Pottawatomie	Tuttle Creek	USACE - Kansas City
Morris	Council Grove	USACE - Tulsa

Source: KDA-DWR

To the west of the region, a failure of the dam on Milford Lake in Clay County could potentially present flooding consequences for Riley and Geary Counties. This dam is federally owned and regulated. A failure of the Lovewell Reservoir dam in Jewell County could potentially cause an inundation surge on the Republican River that could affect northern regional counties. A failure of the Marion Reservoir dam in Marion County could potentially cause an inundation surge that could affect southern regional counties. No other dams in adjacent regions were identified that would cause major impacts to the planning region in the event of a catastrophic failure.

4.8.2 – Levee Location and Extent

As there is no one, comprehensive list of all levees within the region, two sources of data were reviewed to determine a list of all known levees. These sources are:

- The U.S. Army Corps of Engineers (USACE) Integrated National Levee Database (NLD), containing levees enrolled in the USACE National Levee Safety Program (NLSP).
- The FEMA National Levee Inventory Report (NLIR)

According the USACE Integrated NLD, there are 40 levees in the NLSP in Kansas Region I. However, the majority of these levees are farm levees (22 of the 40) providing no protection to either structures or people with minimal information available in the system. The following table provides available information on the eight identified levees that provide protection to people and/or structures.

Table 4.11: Kansas Region I USACE NLD Levees

County(ies)	Jurisdiction(s)	Name	Waterway	Levee Miles	Leveed Area in Square Miles	Last Inspection Date
Chase	Tallgrass Prairie	Tallgrass Prairie Levee	-	0.36	0.035	-
Geary	Fort Riley	Ft. Riley Forsyth	Kansas River	2.75	1.04	08/06/2019
Geary	Fort Riley	Ft. Riley Marshall Field	Kansas River	2.77	1.18	07/12/2018
Lyon	Hartford	Hartford Levee	Neosho River	1.5	0.21	-
Morris	Council Grove	Council Grove Left Bank	Neosho River	1.66	0.23	-
Morris	Council Grove	Council Grove Right Bank	Neosho River	1.39	0.23	-
Pottawatomie	Belvue	Belvue Levee 1	Unnamed Stream	0.62	0.096	-
Pottawatomie	St Mary's	College Creek-St. Mary's - Left	College Creek	0.79	0.54	-
Pottawatomie	St Mary's	College Creek-St. Mary's - Right	College Creek	0.81	0.34	-
Pottawatomie	St. George	Kansas River Levee- St. George 1	Kansas River	7.75	2.45	-
Pottawatomie	St. George	Kansas River Levee- St. George 2	Kansas River	1.08	0.23	-

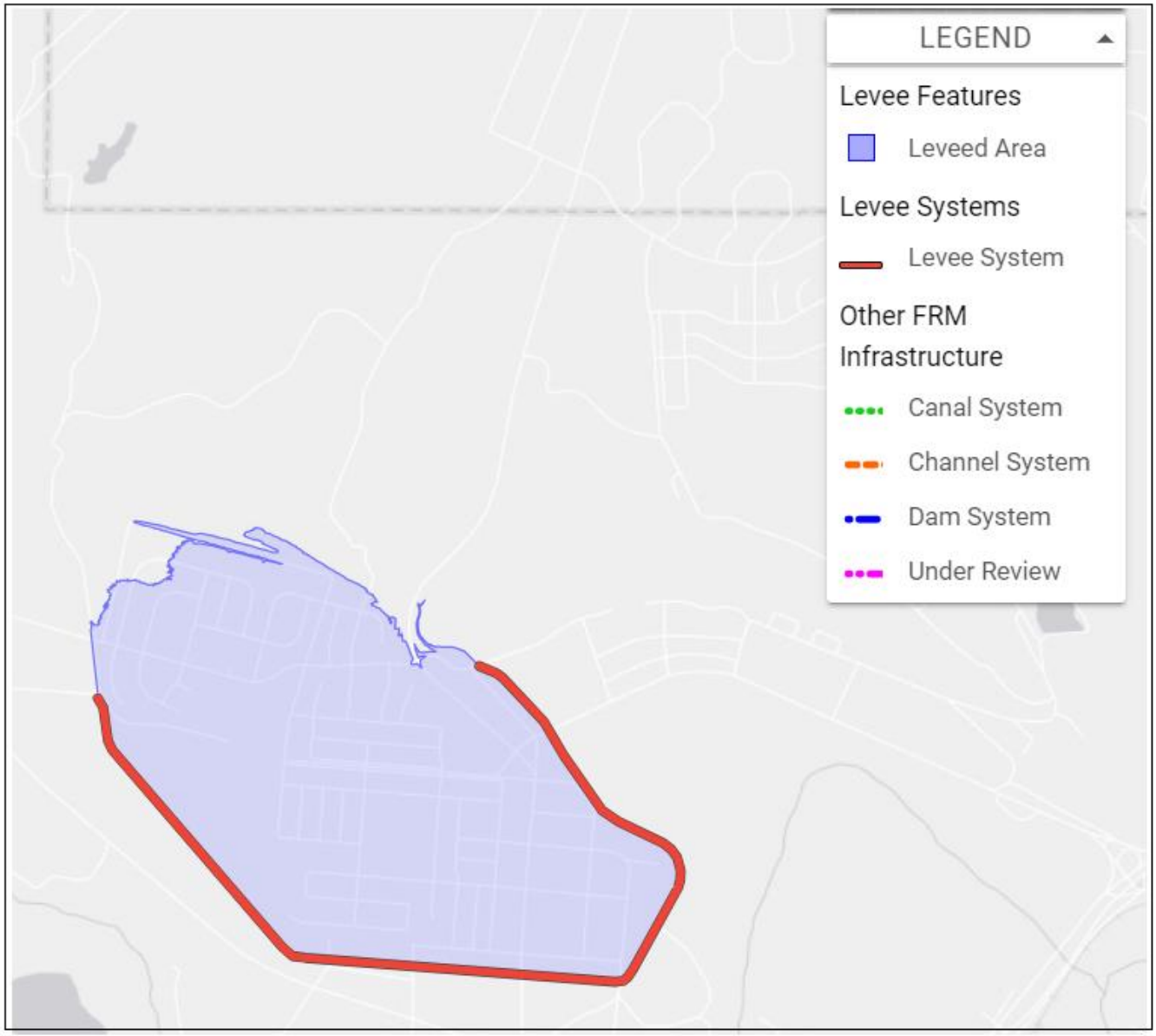
Table 4.11: Kansas Region I USACE NLD Levees

County(ies)	Jurisdiction(s)	Name	Waterway	Levee Miles	Leveed Area in Square Miles	Last Inspection Date
Pottawatomie and Riley	Manhattan	Kansas River	Kansas River	5.39	2.35	05/03/2019
Riley and Wabaunsee	St. George	Deep Creek Levee	Deep Creek, Kansas River	4.24	1.34	-
Riley	Ogden	Ft. Riley Funston	Kansas River	3.92	1.42	07/12/2018
Riley	Manhattan	LRL-0041-FF	Wildcat Creek	0.48	0.05	-
Riley and Wabaunsee	St. George	LWB0017	Kansas River	1.47	0.30	-
Wabaunsee	Wamego	Kansas River Wabaunsee 1	Kansas River	3.29	2.73	-
Wabaunsee	Rossville	Tri-County Drainage District No.1, Section	Kansas River	6.08	6.36	01/18/2018

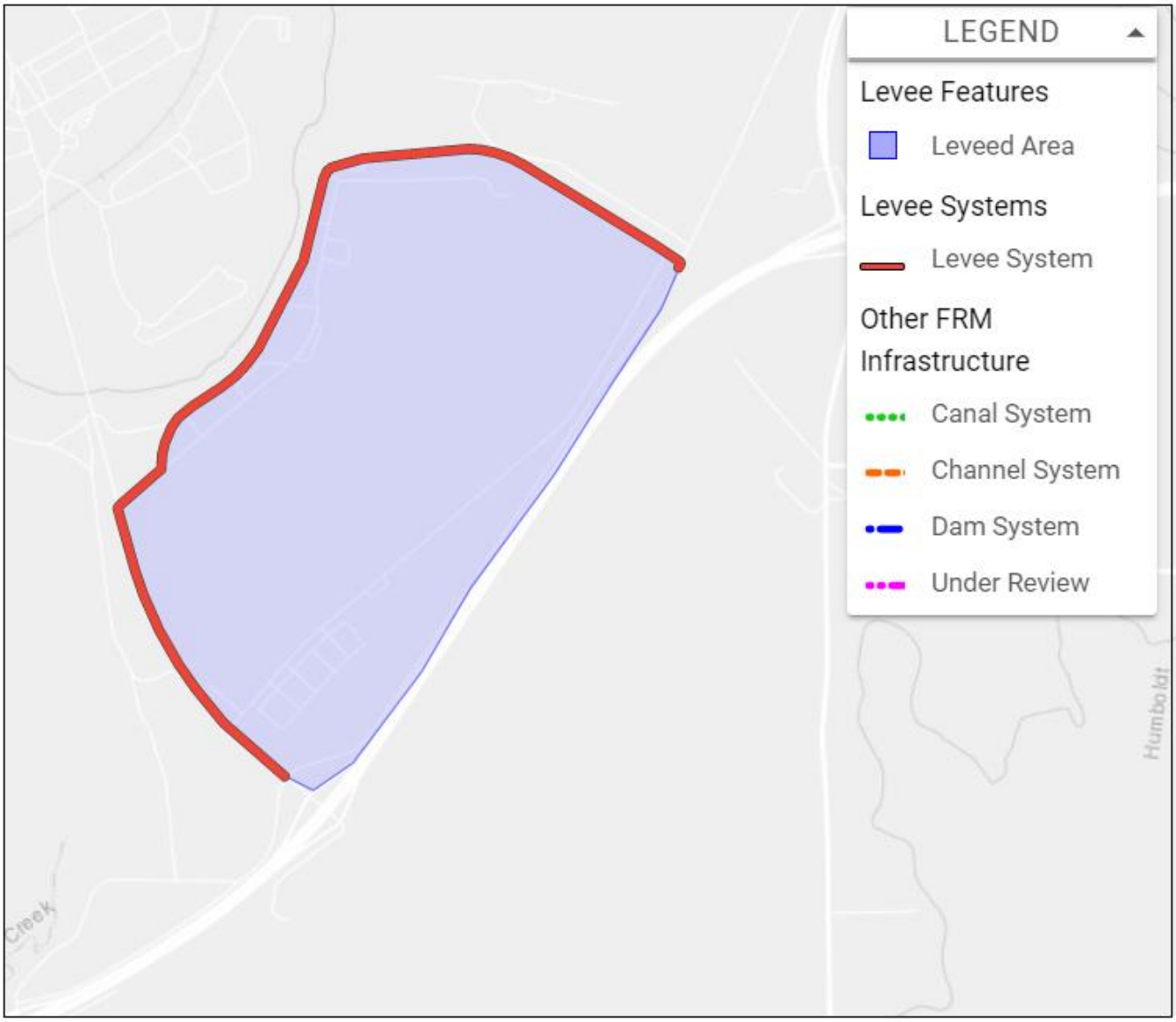
Source: USACE
-: Data unknown

The following maps detail select individual levees identified as protecting larger populations.

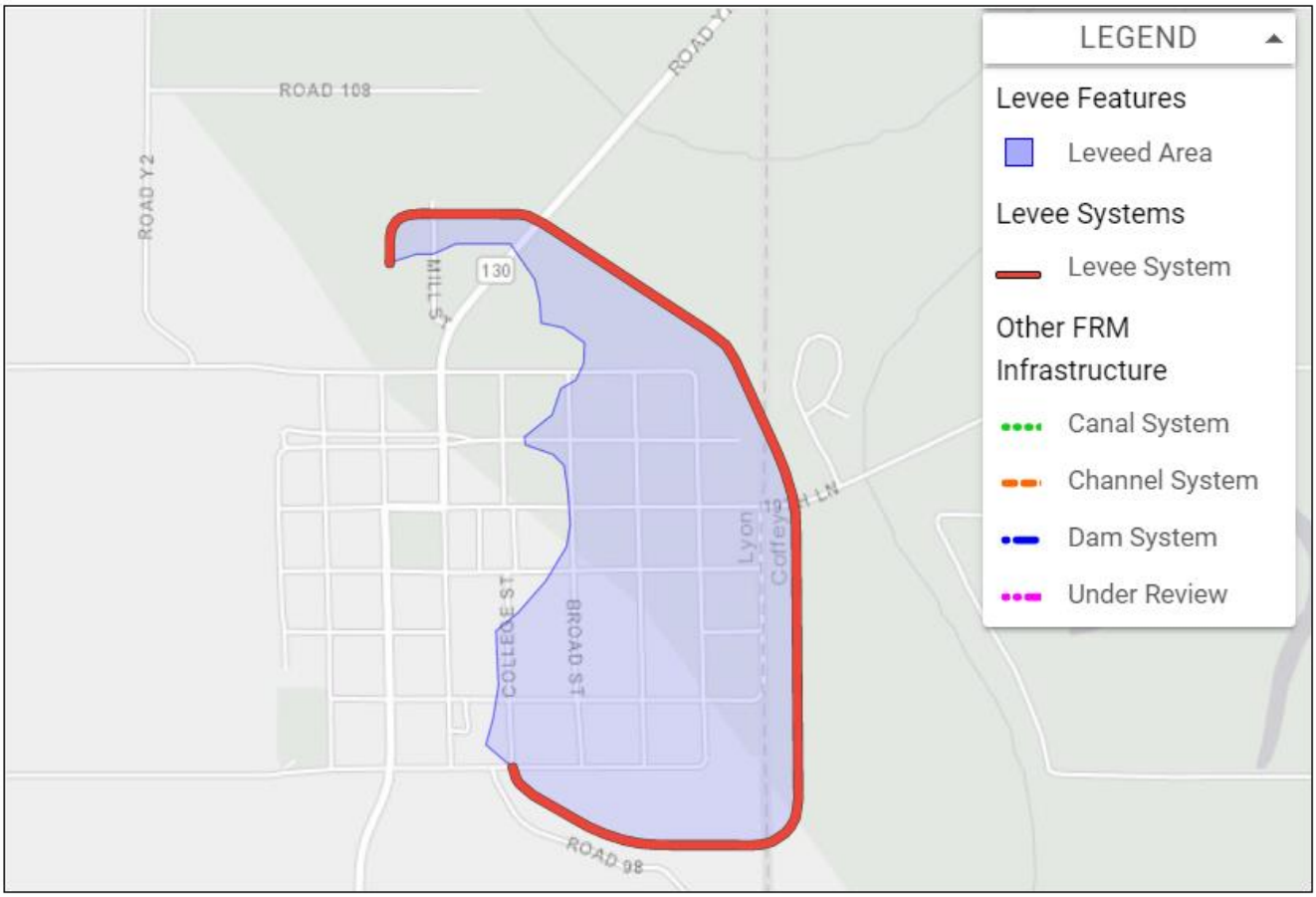
Ft. Riley Forsyth (Ft, Riley, Geary County)



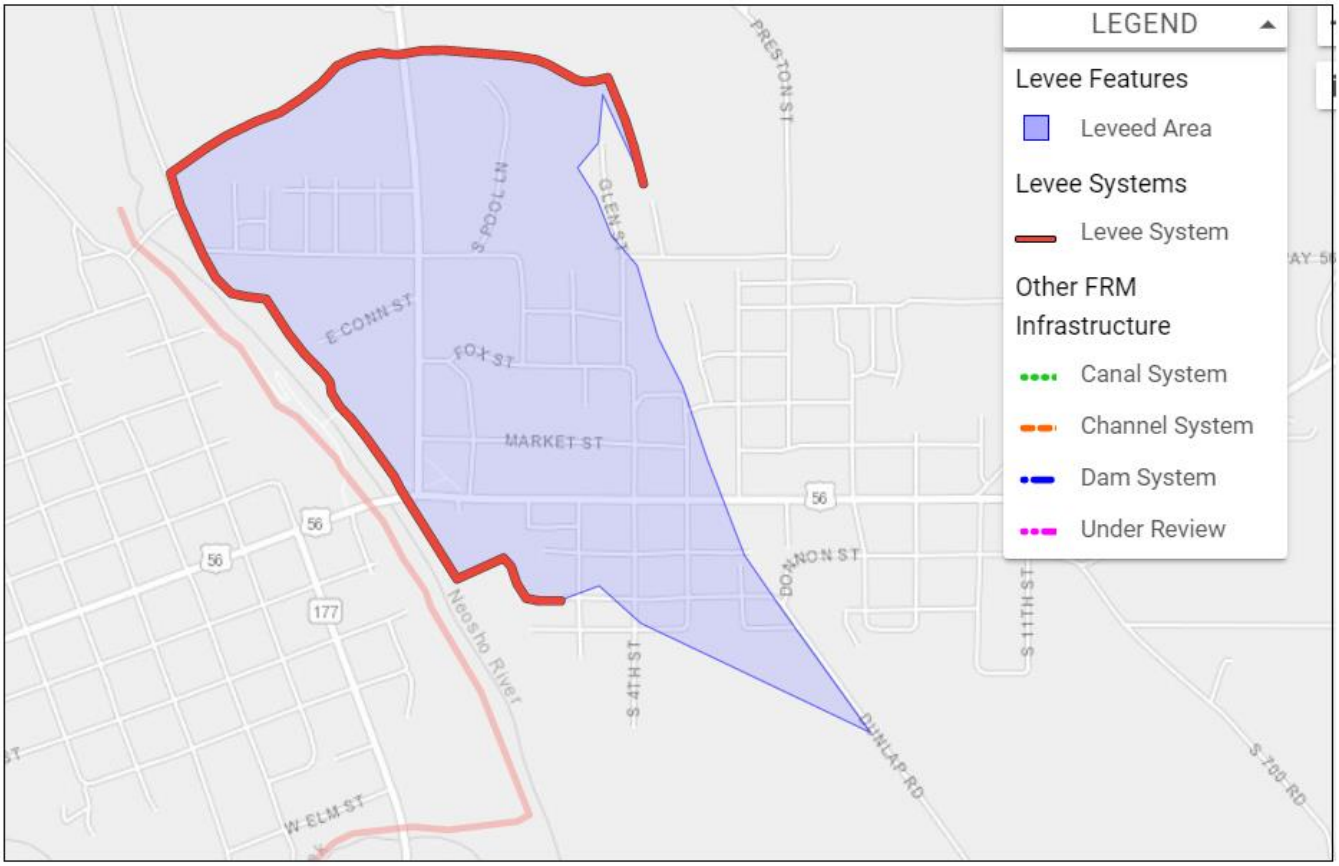
Ft. Riley Marshall Field (Ft. Riley, Geary County)



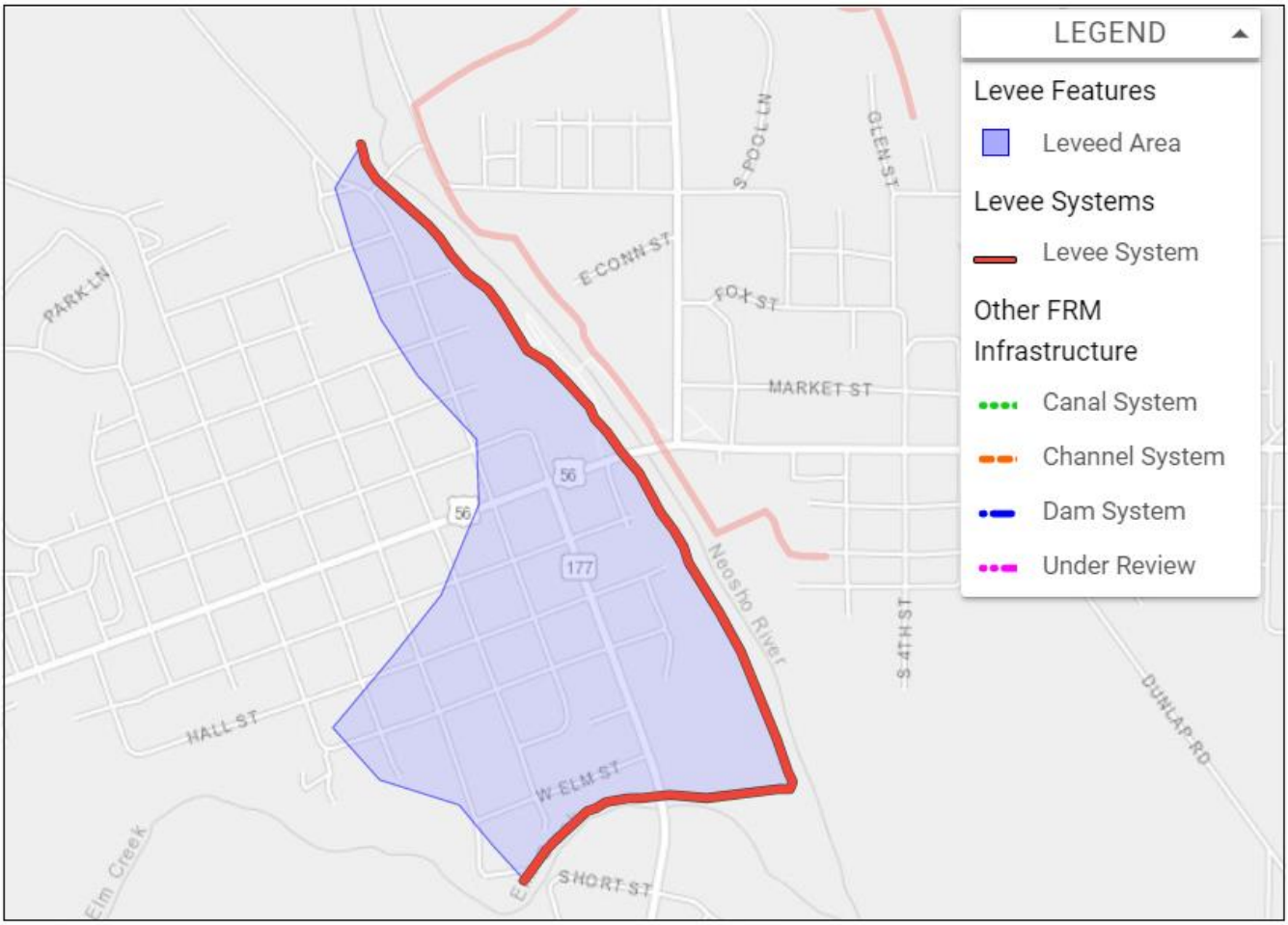
Hartford Levee (Hartford, Lyon County)



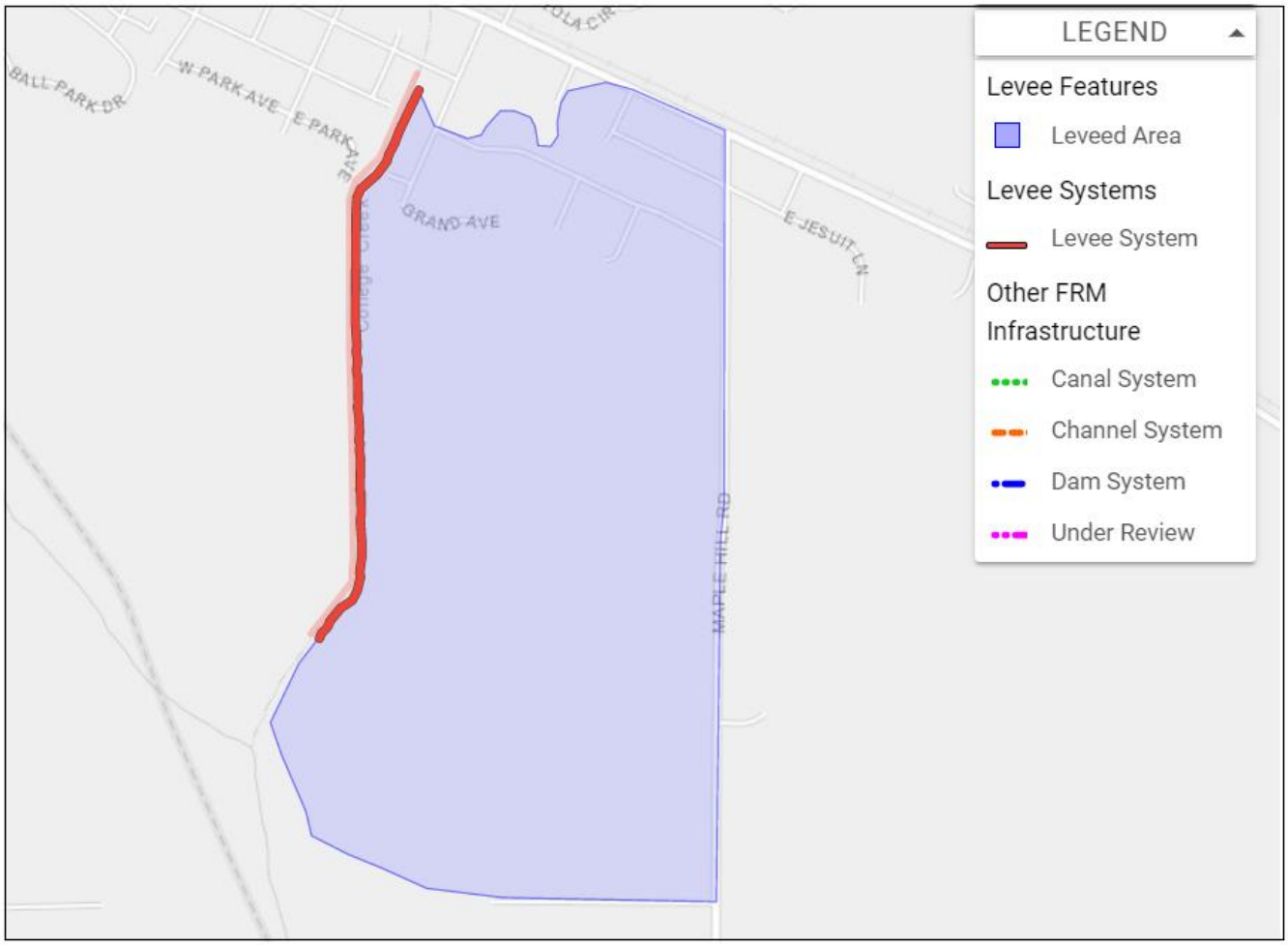
Council Grove Left Bank (Council Grove, Morris County)



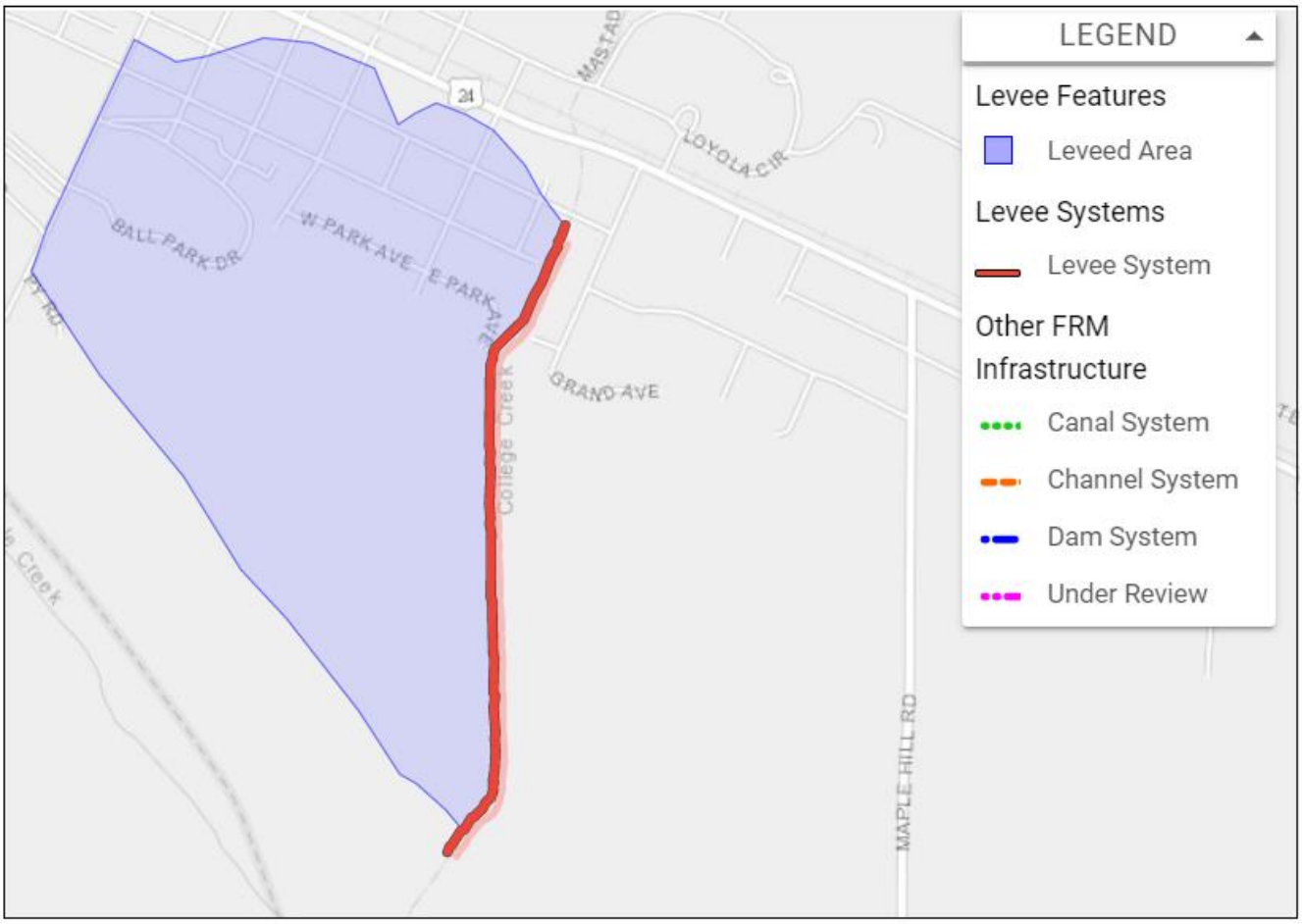
Council Grove Right Bank (Council Grove, Morris County)



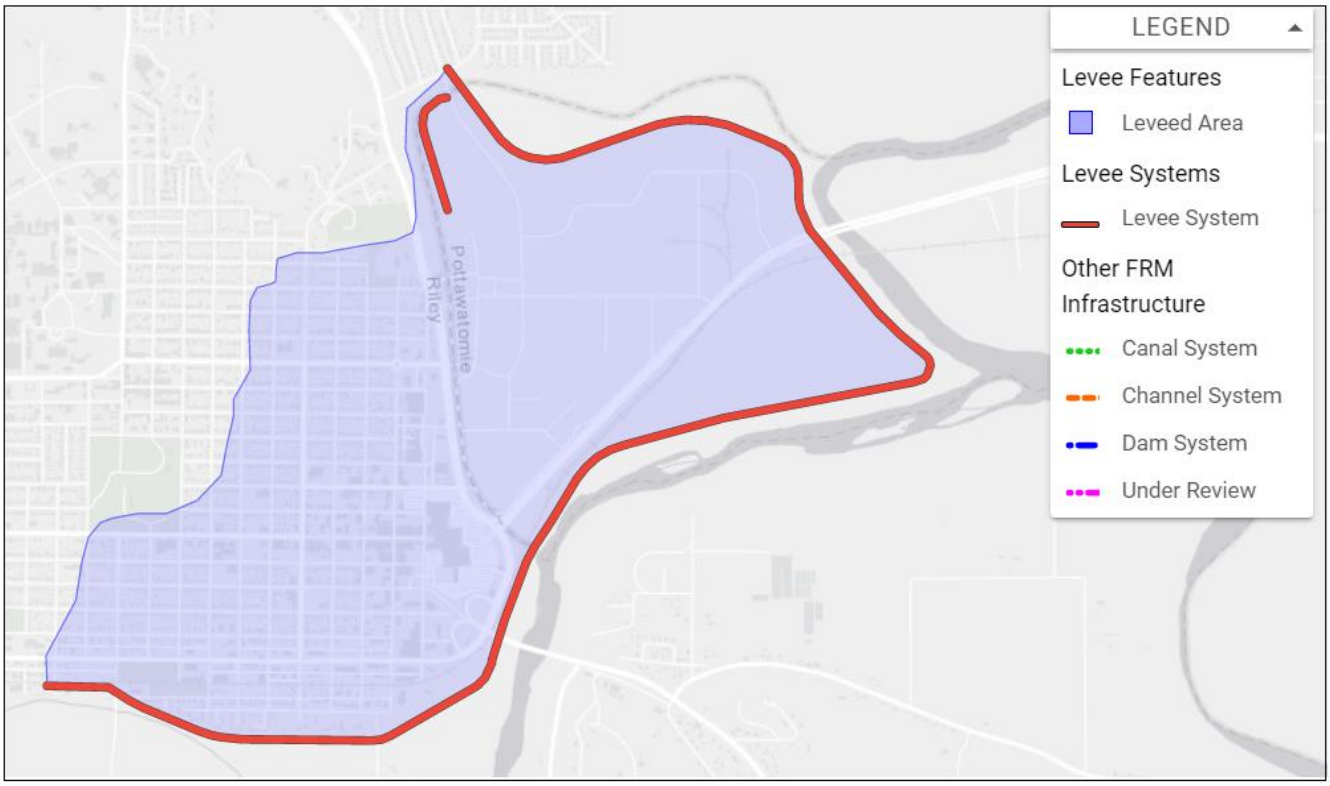
College Creek - St. Mary's - Left (St. Mary's, Pottawatomie County)



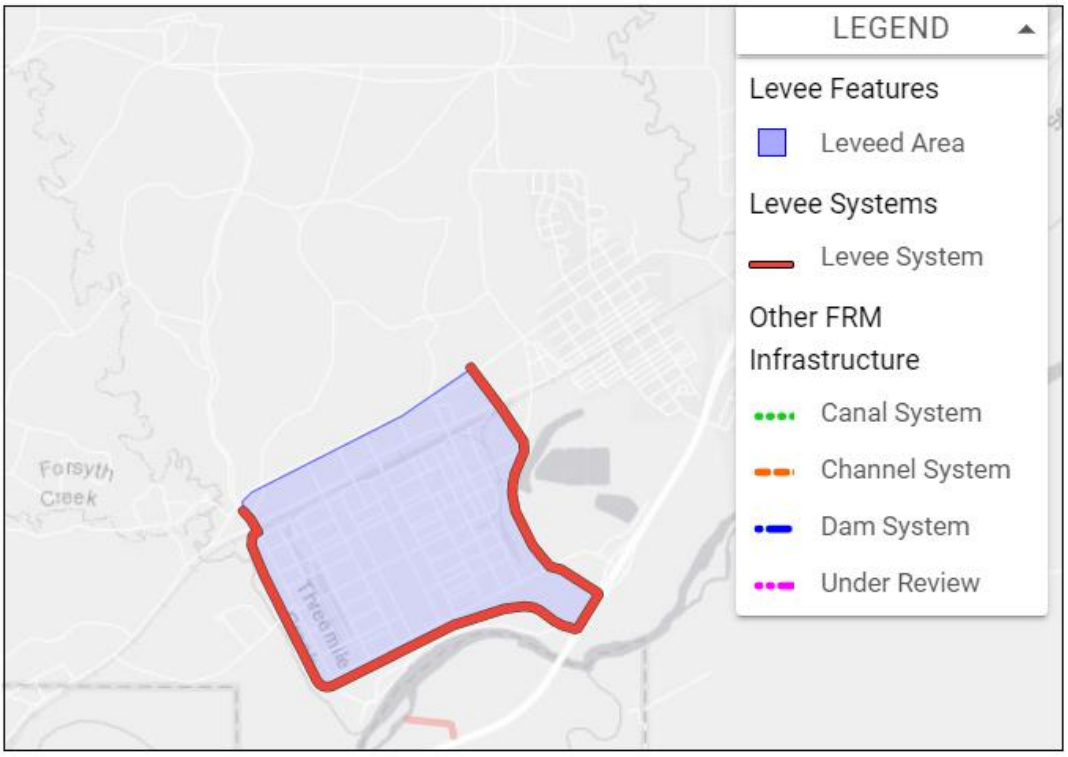
College Creek - St. Mary's - Right (St. Mary's, Pottawatomie County)



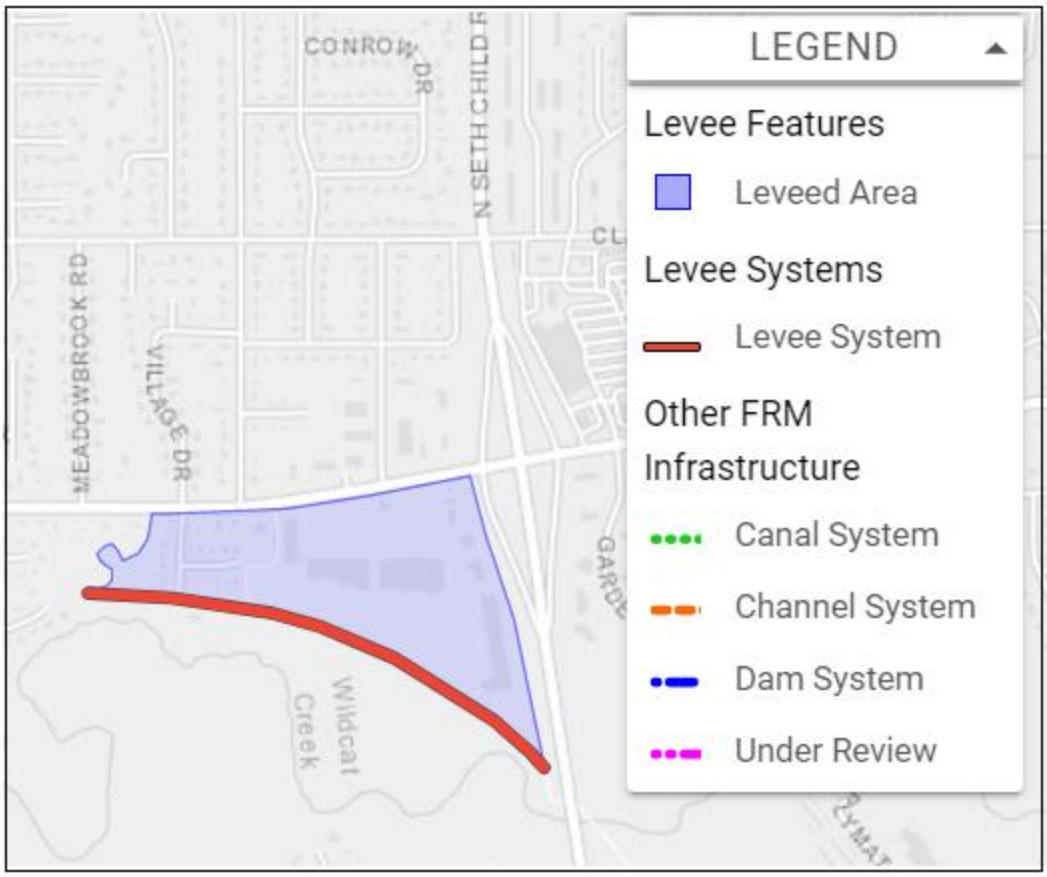
Manhattan Unit (Manhattan, Pottawatomie County and Riley County)



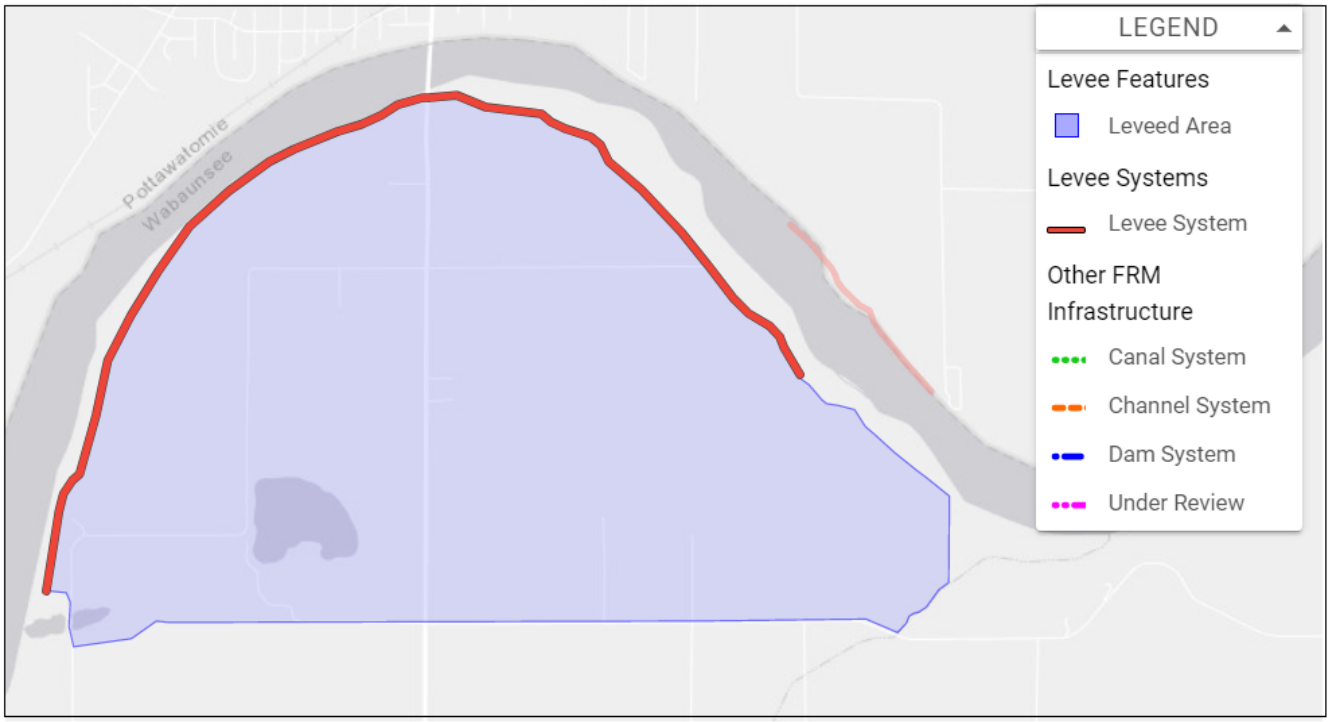
Ft. Riley Funston (Ogden, Riley County)



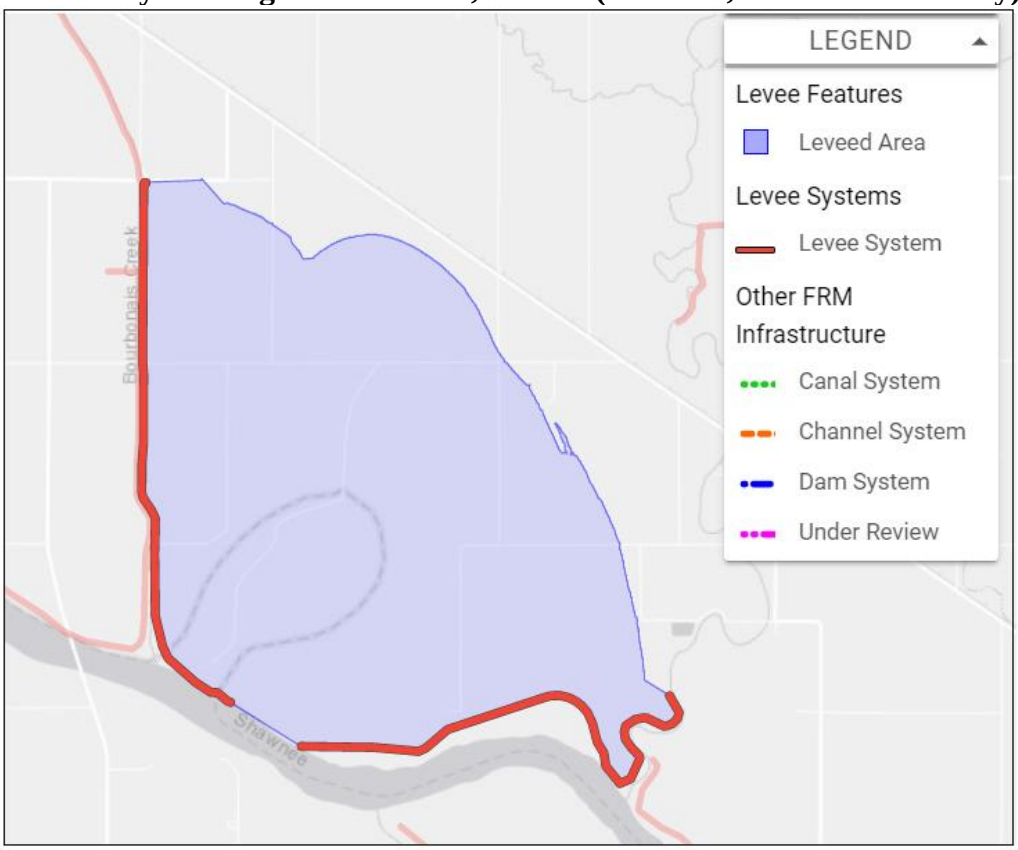
LRL-0041-FF (Manhattan, Riley County)



Kansas River Wabaunsee 1 (Wamego, Wabaunsee County)



Tri-County Drainage District No.1, Section (Rossville, Wabaunsee County)



4.8.3 – Previous Occurrences

Kansas Region I has no recorded dam failures for the 20-year period from 2000-2019.

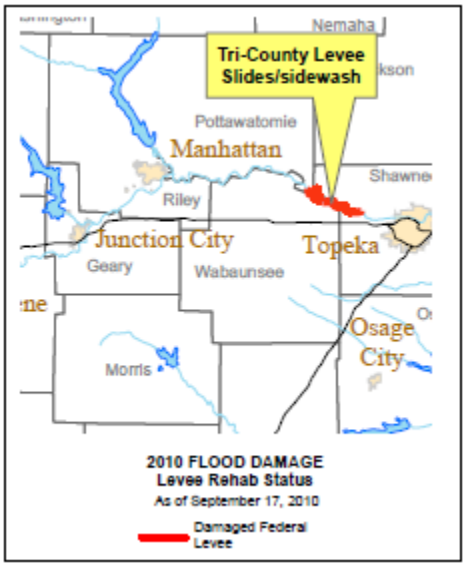
Table 4.12: Kansas Region I Dam Incidents

County	Dam Name	Incident Type	Failure	Incident Date	Deaths
None Reported					

Source: National Inventory of Dams

Kansas Region I has had two recorded dam failures for the 20-year period from 2000-2019, as detailed below.

- **2010:** Regional: Flooding in 2010 damage the federal Tri-County levee.



June and July 2007: Regional: Heavy rains in the region caused widespread flooding. The following map shows damaged regional levees in Kansas that are under the jurisdiction of the USACE Kansas City District.

Regional Levees Impacted by 2007 Flooding

Source: USACE KC District Website

4.8.4 – Hazard Probability Analysis

Due to the variability of the size and construction of the dams in Region I, estimating the probability of dam failure is difficult on any scale greater than a case-by-case basis. Historically, the limited available data indicates there have been no reported dam failure events in Kansas Region I over a 20-year period. Using the binomial probability equation (number of years with an event divided by total number of years in reporting period) we derive a probability 0% of a dam failure in a given year. However, because past non-occurrence does not guarantee future non-occurrence, any regional dam may be damaged in future catastrophic events.

Historically, the limited available data indicates there have been two reported levee failure events in Kansas Region I over a 20-year period. Using the binomial probability equation, we derive a probability of 10% for levee damages in a given year.

4.8.5 – Vulnerability Assessment, Dams

Following the metric established in the State of Kansas 2018 Hazard Mitigation Plan, an analysis of vulnerability to dam failure was completed by points being assigned to each type of dam and then aggregated for a total point score for each county. This analysis does not intend to demonstrate vulnerability in terms dam structures that are likely to fail, but rather provides a general overview of the counties that have a high number of dams, with weighted consideration given to dams whose failure would result in greater damages. Points were assigned as follows:

- Low Hazard Dams: 1 point
- Significant Hazard Dams: 2 point
- High Hazard Dams: 3 points
- High Hazard Dams without an EAP: 2 points

- Federal Reservoir Dams: 3 points.

Based on these categories, an awarded point total was determined for each participating county and a vulnerability rating assigned based on the following schedule.

Table 4.13: Dam Vulnerability Rating Schedule

	Low	Medium-Low	Medium	Medium-High	High
Awarded Point Range	0 – 26	27 – 50	51 – 100	101 – 200	201 - 327

The following table presents the dam failure vulnerability rating for each Kansas Region I participating county.

Table 4.14: Kansas Region I County Vulnerability Assessment for Dam Failure

County	Low Hazard Dams	Significant Hazard Dams	High Hazard Dams	High Hazard Dams Without EAP	Federal Reservoirs	Vulnerability Rating	Vulnerability Level
Chase	69	6	0	0	0	83	Medium
Geary	7	0	2	0	1	16	Low
Lyon	75	12	2	0	0	105	Medium-High
Morris	26	1	4	0	1	43	Medium-Low
Pottawatomie	75	5	6	0	1	106	Medium-High
Riley	10	0	4	2	0	26	Low
Wabaunsee	45	5	3	0	0	64	Medium

Source: Analysis by KDEM utilizing data from: Kansas Department of Agriculture, Division of Water Resources, Water Structures program; U.S. Army Corps of Engineers; Bureau of Reclamation; U.S. Army, U.S. Fish and Wildlife.

Counties with a higher identified population are to be considered to have a potentially greater vulnerability to potential dam failure events. The following table indicates the total county population and registered growth over the period 2000 to 2018.

Table 4.15: Kansas Region I Population Vulnerability Data for Dam Failure

County	2018 Population	Percent Population Change 2000 to 2018
Chase	2,600	-14.2%
Geary	32,777	17.3%
Lyon	33,300	-7.3%
Morris	5,521	-9.6%
Pottawatomie	24,209	33.0%
Riley	73,703	17.3%
Wabaunsee	6,912	0.4%

Source: US Census Bureau

4.8.6 – Vulnerability Assessment, Levees

Data was obtained from the USACE NLD to help determine the vulnerability of participating jurisdictions to potential levee failure. Available data includes:

- Number of people at risk
- Structures at risk
- Property value for structures at risk
- Levee safety action risk classification

Additionally, for the NFIP, FEMA will only recognize a levee system in its flood risk mapping effort that meet minimum design, operation, and maintenance standards as established by 44 CFR 65.10 – Mapping of Areas Protected by Levee Systems. In general, evaluated levees are assigned to one of these categories:

- **Accredited Levee:** Area behind the levee is mapped as a moderate risk, with no mandatory flood insurance requirement.
- **To Be Accredited:** A levee system that has been approved for accreditation.
- **Provisionally Accredited Levee (PAL):** Area behind the levee is mapped as a moderate risk, with no mandatory flood insurance requirement, for a two-year grace period while compliance with 44 CFR 65.10 is sought
- **Non-Accredited Levee:** Area behind the levee is mapped according to FEMA protocols, likely resulting in a high-risk area designation and associate flood insurance requirements
- **To Be Non-Accredited:** A levee system that no longer meets the requirements stipulated in 44 CFR 65.10 and is scheduled to lose accredited status

The following table presents the above information for each vulnerable jurisdiction.

Table 4.16: Kansas Region I Levee Failure Vulnerability Data

County	Jurisdiction	Name	People at Risk	Structures at Risk	Property Value	Levee Safety Action Risk Classification	Levee System Status on Effective FIRM
Chase	Tallgrass Prairie	Tallgrass Prairie Levee	8	4	$6,350,000	Not Screened	-
Geary	Fort Riley	Ft. Riley Forsyth	2,752	386	$365,000,000	Not Screened	-
Geary	Fort Riley	Ft. Riley Marshall Field	34	13	$176,000,000	Not Screened	-
Lyon	Hartford	Hartford Levee	141	88	$40,000,000	Not Screened	Accredited
Morris	Council Grove	Council Grove Left Bank	361	181	$90,500,000	Not Screened	Non-Accredited
Morris	Council Grove	Council Grove Right Bank	616	232	$113,000,000	Not Screened	Non-Accredited
Pottawatomie	Belvue	Belvue Levee 1	25	6	$1,100,000	Not Screened	Non-Accredited

Table 4.16: Kansas Region I Levee Failure Vulnerability Data

County	Jurisdiction	Name	People at Risk	Structures at Risk	Property Value	Levee Safety Action Risk Classification	Levee System Status on Effective FIRM
Pottawatomie	St Mary's	College Creek-St. Mary's - Left	673	13	$24,100,000	Not Screened	Accredited
Pottawatomie	St Mary's	College Creek-St. Mary's - Right	397	127	$51,000,000	Not Screened	Accredited
Pottawatomie	St. George	Kansas River Levee- St. George 1	13	5	$627,000	Not Screened	Accredited
Pottawatomie	St. George	Kansas River Levee- St. George 2	4	2	$411,000	Not Screened	Non-Accredited
Pottawatomie	St. George	Kansas River Levee- St. George 5	0	2	$51,600	Not Screened	Accredited
Pottawatomie and Riley	Manhattan	Kansas River	10,589	1,734	$1,320,000,000	Moderate	Accredited
Riley and Wabaunsee	St. George	Deep Creek Levee	3	4	$1,260,000	Not Screened	Non-Accredited
Riley	Ogden	Ft. Riley Funston	0	4	$99,900,000	Not Screened	Non-Accredited
Riley	Manhattan	LRL-0041-FF	58	30	$57,100,000	Not Screened	Non-Accredited
Riley	St. George	LWB0017	3	2	$1,260,000	Not Screened	Non-Accredited
Wabaunsee	Wamego	Kansas River Wabaunsee 1	44	11	$4,380,000	Not Screened	Non-Accredited
Wabaunsee	Rossville	Tri-County Drainage District No.1, Section	49	27	$5,340,000	Low	Non-Accredited

Source: USACE
-: Data unknown

The following table indicates the total number of county structures and the associated percentage of the total number of county structures, and the total population and associated percentage of the total county population identified as at risk to levee failure.

Table 4.17: Kansas Region I Population Vulnerability Data for Levee Failure

County	Structures Identified as at Risk to Levee Failure	Percentage of Structures Identified at Risk	Population Identified as at Risk to Levee Failure	Percentage of County Population Identified at Risk
Chase	4	0.3%	8	0.26%
Geary	399	2.6%	2,786	66.3%

Table 4.17: Kansas Region I Population Vulnerability Data for Levee Failure

County	Structures Identified as at Risk to Levee Failure	Percentage of Structures Identified at Risk	Population Identified as at Risk to Levee Failure	Percentage of County Population Identified at Risk
Lyon	88	0.6%	141	0.39%
Morris	413	12.9%	977	2.31%
Pottawatomie	155	1.6%	1,112	6.11%
Riley	1,774	5.7%	10,650	17.2%
Wabaunsee	38	1.2%	93	1.35%

Source: US Census Bureau and FEMA

4.8.7 – Local Concerns

The following detail specific local concerns as related to dam and levee failure:

- In Geary County, Milford Reservoir has 15,700 surface acres of water and 163 miles of shoreline, making it the largest in Kansas. Milford Dam is located on the Republican River in Geary County, approximately five miles northwest of Junction City, Kansas. A review of the EAP, dated November 2002, indicated that warning times for normal high pool with dam breach would range from approximately one hour (Junction City) to two hours (Fort Riley Military Reservation). Arrival times for a spillway design flood with dam failure (at a distance of 8.3 miles from the dam) would be approximately three hours and 30 minutes, with peak flood time at 50 hours. At a distance of 9.8 miles from the dam, arrival time would be four hours, with peak flood time at 52 hours. It was reported that the dam failure inundation maps for this Federal Reservoir are classified under the Patriot Act and were not available for review or inclusion in this plan.
- In Lyon County, the KDA-DWR identified two high-hazard dams, Kitzenberger Dam and Dam No. 115. A review of the January 2007 EAP for the Allen Creek Watershed District No. 89 Site 126 (Kitzenberger) Dam indicates that it is an earthen structure with uncontrolled spillway discharges and a height of 25 feet. The dam was constructed in 1987 for flood protection for rural areas and people living along Pester Creek. The EAP identified twenty-two homes which could potentially be impacted by a major flood following a sudden breach of the dam. Of these homes, fifteen were identified in the breach zone of the dam, with the additional seven being located in the area adjacent to the breach zone. The Salt Creek Watershed Joint District operates and maintains Dam No.115 for floodwater retarding and detention purposes. A review of the EAP, dated November of 2001, indicates that the dam is an earthfill structure with a vegetated emergency spillway to release runoff when the reservoir storage capacity has been exceeded. The EAP reported that the dam is classified as High Hazard due to its close proximity to a major highway. The EAP indicates that in the event of a breach the estimated inundation time of US Highway 56 would be five minutes.
- In Morris County, the Council Grove Reservoir is a federal reservoir located one-mile northwest of Council Grove. The dam is a rolled earthfill embankment that is 6,500 feet long and rises 96 feet above the streambed. A roadway crosses the embankment and spillway. A review of the EAP for the Council Grove Dam, dated October 2000, indicated that warning times for a spillway design event with dam failure would be approximately 30 to 45 minutes for Council Grove. Warning times for normal high pool with dam failure would range from approximately 20 minutes to seven hours for Morris County. The inundation maps for this federal reservoir are classified.

- In Pottawatomie County College Creek FRD No. 2, Jeffery Energy Center Dam No. 1, Auxiliary Make-Up / Westar Energy, Pottawatomie State Lake No. 1 Dam and Tuttle Creek Reservoir (shared with Riley County) could impact the county in the event of breach or dam failure. A review of the College Creek FRD No. 2 EAP, revised on September 2, 2009, indicated that in the event of dam failure, 13 structures and one road could be potentially impacted and may require evacuation. A review of the Jeffery Energy Center Dam No. 1 and the Auxiliary Make-Up Dam EAP indicates that seven residences would require notification for evacuation in the event of a dam emergency. A review of the Pottawatomie County State Lake No.1 EAP indicates there are two residences that would require notified and evacuated in the event of an emergency. Additionally, State Highway 99 traverses the top of the dam and could be lost if dam failure were to occur.
- In Pottawatomie County Tuttle Creek Reservoir, operated by the USACE, is formed by a compacted earthfill dam impoundment of the Big Blue River. Tuttle Dam is shared between Pottawatomie and Riley counties, and is located 5-miles north of Manhattan (in Riley County). A potential breach or overtopping of the dam could cause significant flooding in low-lying areas and could potentially affect residential, commercial, and agricultural areas downstream, with potential life, social, and economic consequences. Inundation maps for this Federal Reservoir are classified.
- In Riley County KDA-DWR identified four high-hazard dams that could impact the county in the event of breach or dam failure, Rogers Dam, Tuttle Creek Dam, KSNONAME 1815 and KSU Golf Course Irrigation Dam. The EAP for KSNONAME 1815 indicated that no downstream damage was expected in the event of a failure, but the dam is an overpass for Highway 77 and would become impassable if the structure failed. KSU Golf Course Irrigation Dam was included as part of the Colbert Hills Golf Course Development northwest of Manhattan, Kansas. The conditions around the dam include a golf course, clubhouse, and residential development. No EAP was available for Rogers Dam.
- In Riley County Tuttle Creek Reservoir, operated by the USACE, is formed by a compacted earthfill dam impoundment of the Big Blue River. Tuttle Dam is shared between Pottawatomie and Riley counties, and is located five miles north of Manhattan. A potential breach or overtopping of the dam could cause significant flooding in low-lying areas and could potentially affect residential, commercial, and agricultural areas downstream, with potential life, social, and economic consequences. Critical facilities located within the potential inundation area include a wastewater treatment plant, sewage disposal facility, municipal waterworks facility, City of Manhattan administrative offices, and Manhattan fire and police stations. Inundation maps for this Federal Reservoir are classified.
- In Wabaunsee County,a failure of the Lake Wabaunsee Dam could impact isolated farm and ranch land adjacent to the creek and potentially residents located along Mill Creek on Hessdale Road. Mill Creek WJD Dam No.85 is an earthfill structure with a vegetated emergency spillway to release runoff when the reservoir. The EAP indicates that there is one road, one home, and a major railroad that are located directly downstream of the dam's location. The asphalt road is lightly traveled, and flooding would only constitute a minor disruption. Additionally, modeling predicts that a breach of the dam would overtop the railroad tracks to a maximum depth of two feet for a duration of approximately fifteen minutes.

4.8.8 – Impact and Consequence Analysis

As per EMAP standards, the information in the following table provides the Consequence Analysis.

Table 4.18: Dam and Levee Failure Consequence Analysis

Subject	Impacts of Dam and Levee Failure
Health and Safety of the Public	In areas of inundation, the impact to the public is expected to be severe. Impacts to the public in adjacent areas is expected to be minimal to moderate.
Health and Safety of Responders	Impact to responders is expected to be minimal with proper training. Impact could be severe if there is lack of training.
Continuity of Operations	Temporary relocation may be necessary if facilities or infrastructure is damaged.
Property, Facilities, and Infrastructure	In areas of inundation, impacts could be severe to facilities and infrastructure. .
Environment	In areas of inundation, impact to the environment are expected to be severe. Impact will lessen as distance increases.
Economic Conditions	In areas of inundation, impacts to the economy will depend on the scope of the inundation and the time it takes for the water to recede.
Public Confidence in the Jurisdiction's Governance	Perception of whether the failure could have been prevented, warning time, and response and recovery time will greatly impact the public's confidence.

4.9 – Drought

Drought is an abnormally dry period lasting months or years when an area has a deficiency of water and precipitation in its surface and/or underground water supply. The hydrological imbalance can be grouped into the following non-exclusive categories.

- ***Agricultural:*** When the amount of moisture in the soil no longer meets the needs of previously grown crops.
- ***Hydrological:*** When surface and subsurface water levels are significantly below their normal levels.
- ***Meteorological:*** When there is a significant departure from the normal levels of precipitation.
- ***Socio-Economic:*** When the water deficiency begins to significantly affect the population.

4.9.1 – Location and Extent

While all of Kansas Region I is vulnerable to drought, it is most disastrous in rural areas where the majority of agricultural businesses are located.

4.9.2 – Previous Occurrences

One of the best indicators of historic drought periods is provided by the U.S. Drought Monitor, which lists weekly drought conditions for the State of Kansas. The following table details the U.S. Drought Monitor categories.

Table 4.19: U.S. Drought Monitor Categories

Rating	Described Condition
None	No drought conditions
D0	Abnormally Dry
D1	Moderate Drought
D2	Severe Drought
D3	Extreme Drought
D4	Exceptional Drought

Source: U.S. Drought Monitor

Historical data was gathered from the U.S. Drought Monitor weekly reports from the 10-year period 2010 through 2019 (with 2010 and 2019 being full data set years). This data was compiled and aggregated to provide a yearly estimate of the percentage of the year Kansas Region I was in each Drought Monitor category. This data was compiled and aggregated to provide a yearly estimate of the percentage of the year Kansas Region I was in each Drought Monitor category, with category data overlapping.

Table 4.20: Percentage of Kansas Region I in U.S. Drought Monitor Category, 2010-2019

Year	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
2019	97.5%	2.5%	0.0%	0.0%	0.0%	0.0%
2018	12.0%	88.0%	70.0%	56.5%	26.8%	3.0%
2017	60.0%	40.0%	0.0%	0.0%	0.0%	0.0%
2016	92.4%	1.8%	1.3%	1.1%	0.5%	0.1%
2015	42.8%	57.2%	15.9%	0.0%	0.0%	0.0%
2014	0.0%	100.0%	42.3%	8.9%	0.0%	0.0%
2013	28.3%	71.7%	45.9%	34.9%	26.4%	0.0%
2012	35.5%	64.5%	56.6%	55.8%	45.6%	10.7%
2011	11.0%	89.0%	43.5%	14.8%	0.0%	0.0%
2010	97.5%	2.5%	0.0%	0.0%	0.0%	0.0%

Source: U.S. Drought Monitor

Another good indicator of historical droughts is USDA Disaster Declarations. The following table details USDA Drought Declarations during the five-year period 2015 through 2019 (with 2015 and 2019 being full data set years) for Kansas Region I.

Table 4.21: Kansas Region I Secretarial Drought Declarations, 2014-2018

Year	Number of Secretarial Drought Disaster Declarations
2019	0
2018	4
2017	1
2016	4
2015	0

Source: USDA

Crop loss data from the USDA Risk Management Agency detailing cause of loss was researched to determine the financial impacts of drought on the region's agricultural base. Crop loss data for the ten-year period of 2009- 2018 (with 2009 and 2018 being full data years), for the region, indicates 783 claims on 560,064 acres for $85,017,032.

Table 4.22: USDA Risk Management Agency Cause of Loss Indemnities 2010-2019, Drought

County	Number of Reported Claims	Acres Lost	Total Amount of Loss
Chase	75	41,600	$6,447,624
Geary	92	32,610	$5,452,954
Lyon	128	137,758	$23,879,015
Morris	153	142,436	$22,076,386
Pottawatomie	99	70,203	$9,101,963
Riley	143	53,749	$4,715,859
Wabaunsee	93	81,708	$13,343,231
Stafford	75	41,600	$6,447,624

Source: USDA

4.9.3 – Hazard Probability Analysis

Reviewing historical data from the U.S. Drought Monitor weekly reports from the ten-year period of 2010 through 2019 (with 2010 and 2019 being full data set years) a yearly average can be created indicating the percentage of the region in each Drought Monitor category. This average can be used to extrapolate the potential likelihood of future drought conditions.

Table 4.23: Kansas Region I Estimated Probability of Being in U.S. Drought Monitor Category

None	D0-D4	D1-D4	D2-D4	D3-D4	D4
47.7%	51.7%	27.6%	17.2%	9.9%	1.4%

Source: U.S. Drought Monitor

Additionally, over the five-year period 2014 to 2018 two years recorded a USDA Declared Secretarial Drought Disaster, equating to 40% chance of occurrence.

Data was reviewed from the USDA Risk Management agency to determine vulnerability to drought. The following table summarizes drought event data for **Chase County**

Table 4.24: Chase County Drought Agricultural Probability Summary

Data	Recorded Impact
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	75
Average Number of Claims per Year	8
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	41,600
Average Number of Acres Damaged per Year	4,160
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$6,447,624
Average Crop Damage per Year	$644,762

Source: USDA

According to the USDA Risk Management Agency, Chase County can expect on a yearly basis, relevant to drought occurrences:

- Eight insurance claims
- 4,160 acres impacted
- $644,762 in insurance claims

The following table summarizes drought event data for **Geary County**.

Table 4.25: Geary County Drought Agricultural Probability Summary

Data	Recorded Impact
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	92
Average Number of Claims per Year	9
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	32,610
Average Number of Acres Damaged per Year	3,261
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$5,452,954
Average Crop Damage per Year	$545,295

Source: USDA

According to the USDA Risk Management Agency, Geary County can expect on a yearly basis, relevant to drought occurrences:

- Nine insurance claims
- 3,261 acres impacted
- $545,295 in insurance claims

The following table summarizes drought event data for **Lyon County**.

Table 4.26: Lyon County Drought Agricultural Probability Summary

Data	Recorded Impact
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	128
Average Number of Claims per Year	13
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	137,758
Average Number of Acres Damaged per Year	13,776
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$23,879,015
Average Crop Damage per Year	$2,387,901

Source: USDA

According to the USDA Risk Management Agency, Lyon County can expect on a yearly basis, relevant to drought occurrences:

- 13 insurance claims
- 13,776 acres impacted
- $2,387,901 in insurance claims

The following table summarizes drought event data for **Morris County**.

Table 4.27: Morris County Drought Agricultural Probability Summary

Data	Recorded Impact
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	153
Average Number of Claims per Year	15
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	142,436
Average Number of Acres Damaged per Year	14,244
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$22,076,386
Average Crop Damage per Year	$2,207,639

Source: USDA

According to the USDA Risk Management Agency, Morris County can expect on a yearly basis, relevant to drought occurrences:

- 15 insurance claims
- 14,244 acres impacted
- $2,207,639 in insurance claims

The following table summarizes drought event data for **Pottawatomie County**.

Table 4.28: Pottawatomie County Drought Agricultural Probability Summary

Data	Recorded Impact
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	99
Average Number of Claims per Year	10
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	70,203
Average Number of Acres Damaged per Year	7,020
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$9,101,963
Average Crop Damage per Year	$910,196

Source: USDA

According to the USDA Risk Management Agency, Pottawatomie County can expect on a yearly basis, relevant to drought occurrences:

- 10 insurance claims
- 7,020 acres impacted
- $910,196 in insurance claims

The following table summarizes drought event data for **Riley County**.

Table 4.29: Riley County Drought Agricultural Probability Summary

Data	Recorded Impact
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	143
Average Number of Claims per Year	14
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	53,749
Average Number of Acres Damaged per Year	5,375
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$4,715,859
Average Crop Damage per Year	$471,586

Source: USDA

According to the USDA Risk Management Agency, Riley County can expect on a yearly basis, relevant to drought occurrences:

- 14 insurance claims
- 5,375 acres impacted
- $471,568 in insurance claims

The following table summarizes drought event data for **Wabaunsee County**.

Table 4.30: Wabaunsee County Drought Agricultural Probability Summary

Data	Recorded Impact
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	93
Average Number of Claims per Year	9
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	81,708
Average Number of Acres Damaged per Year	8,171
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$13,343,231
Average Crop Damage per Year	$1,334,323

Source: USDA

According to the USDA Risk Management Agency, Wabaunsee County can expect on a yearly basis, relevant to drought occurrences:

- Nine insurance claims
- 8,171 acres impacted
- $1,334,323 in insurance claims

4.9.4 Vulnerability Analysis

In general, structures and populations are not directly vulnerable to losses as a result of drought. However, there is a small potential that bridges could be impacted by shrinking soil as a result of drought conditions that could cause foundational or support damages.

The USDA 2017 Census of Agriculture (the latest available data) provides data on the crop exposure value, the total dollar value of all crops, for each Kansas Region I County. USDA Risk Management Agency crop loss data (for the ten-year period from 2009 – 2018) allows us to quantify the monetary impact of drought conditions on the agricultural sector. The higher the percentage loss, the higher the potential vulnerability the county has to drought events.

Table 4.31: Drought Acres Impacted and Crop Insurance Paid per County from 2009-2018

Jurisdiction	Farm Acreage	Annualized Acres Impacted	Percentage of Total Acres Impacted Yearly	Market Value of Products Sold	Annualized Crop Insurance Paid	Percentage of Market Value Impacted Yearly
Chase	360,077	4,160	1.16%	$85,430,000	$644,762	0.75%
Geary	155,153	3,261	2.10%	$31,833,000	$545,295	1.71%
Lyon	522,934	13,776	2.63%	$134,440,000	$2,387,901	1.78%
Morris	409,269	14,244	3.48%	$138,615,000	$2,207,639	1.59%
Pottawatomie	406,031	7,020	1.73%	$101,363,000	$910,196	0.90%
Riley	214,311	5,375	2.51%	$51,171,000	$471,586	0.92%
Wabaunsee	378,759	8,171	2.16%	$63,146,000	$1,334,323	2.11%

Source: USDA

Additional predictions about drought vulnerability can be made by reviewing data with the National Weather Service (NWS) Climate Prediction Center at www.cpc.ncep.noaa.gov/products/expert_assessment/sdo_summary.php.

Drought can severely challenge a public water supplier through depletion of the raw water supply and greatly increased customer water demand. Even if the raw water supply remains adequate, problems due to limited treatment capacity or limited distribution system capacity may be encountered. In addition, the water for cropland and livestock can be greatly impacted. The following are the potential water supply limitations that may result from drought conditions:

- **Basic Source Limitation** - 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(s) because water quality problems were considered indicative of a basic source limitation.

- **Contractual Limitation** - The supplier's sole water source is purchased from another system that is drought vulnerable and there is a drought-cut-off clause in their water purchase contract. In such situations where there is not a drought cut-off clause, the purchaser is considered drought vulnerable under the same limitation category as the seller.
- **Distribution System Limitation** - The supplier has difficulty or is unable to meet drought-induced customer demand for water because of inadequate finished water storage capacity, inadequate finished water pumping capacity, inadequate transmission line sizes.
- **Minimum Desirable Streamflow** - The supplier reported imposing restrictions because of minimum desirable streamflow administration. Water rights junior to those granted for maintenance of established minimum desirable flows are subject to such administration.
- **Single Well Source** - The supplier relies upon a single well as its sole source for raw water. Suppliers with one active well and one emergency well were considered drought vulnerable because emergency wells are not a dependable long-term water source. Excessive hours of operation to meet drought-induced customer demand for water will result in the increased likelihood of mechanical breakdown with no alternative water supply source available.
- **Treatment Capacity Limitation** - The supplier has difficulty or is unable to meet drought-induced customer demand for water due to inadequate raw water treatment capacity.
- **Water Right Limitation** - The supplier reported imposing restrictions because the quantity of water they are authorized to divert under their water right(s) was insufficient to meet customer demands.

Water supply planning is the key to minimizing the effects of drought on the population and economy of the region. State of Kansas agencies have worked with public water suppliers to identify vulnerabilities and develop infrastructure, conservation plans, and partnerships to reduce the likelihood of running out of water during a drought. Information concerning these plans, and any current water supply limitations, may be found with the Kansas Water Office.

4.9.5 – Impact and Consequence Analysis

As per EMAP standards, the following table provides the consequence analysis for drought conditions.

Table 4.32: Drought Consequence Analysis

Subject	Impacts of Drought
Health and Safety of the Public	Drought impact tends to be agricultural however, because of the lack of precipitation water supply disruptions can occur which can affect people. Impact is expected to be minimal.
Health and Safety of Responders	Impact to responders is expected to be minimal.
Continuity of Operations	Minimal expectation for utilization of the COOP.
Property, Facilities, and Infrastructure	Impact to property, facilities, and infrastructure could be minimal to severe, depending on the length and intensity of the drought. Structural integrity of buildings and buckling of roads could occur.
Environment	The impact to the environment could be severe. Drought can severely affect farming, ranching, wildlife, and plants due to the lack of precipitation.

Table 4.32: Drought Consequence Analysis

Subject	Impacts of Drought
Economic Conditions	Impacts to the economy will be dependent on how extreme the drought is and how long it lasts. Communities that depend on an agricultural economic engine will likely be severely stressed.
Public Confidence in the Jurisdiction's Governance	Confidence could be an issue during periods of extreme drought if planning is not in place to address intake needs and loss of crops.

4.10 – Earthquake

An earthquake is the result of a sudden release of energy in the Earth's crust that creates seismic waves that are typically caused by the rupturing of geological faults.

4.10.1 – Location and Extent

Kansas Region I is in area of potential seismic activity. A series of faults called the Humboldt Fault Zone, also known as the Nemaha Uplift, runs through the center the region.

Humboldt Fault Zone

Source: Kansas Geological Survey, Earthquakes in Kansas

Two scales are used when referring to earthquake activity. Estimating the total force of an earthquake is the Richter scale, and the observed damage from an earthquake is the Modified Mercalli Intensity Scale. Additionally, both Acceleration (%g) and Velocity (cm/s) can be used to measure and quantify force and movement.

The following table equates the above referenced earthquake scales.

Table 4.33: Earthquake Magnitude Scale Comparison

Mercalli Scale Intensity	Verbal Description	Richter Scale Magnitude	Acceleration (%g)	Velocity (cm/s)	Witness Observations
I	Instrumental	1 to 2	0.17%	<0.1	None
II	Feeble	2 to 3	1.40%	1.1	Noticed only by sensitive people

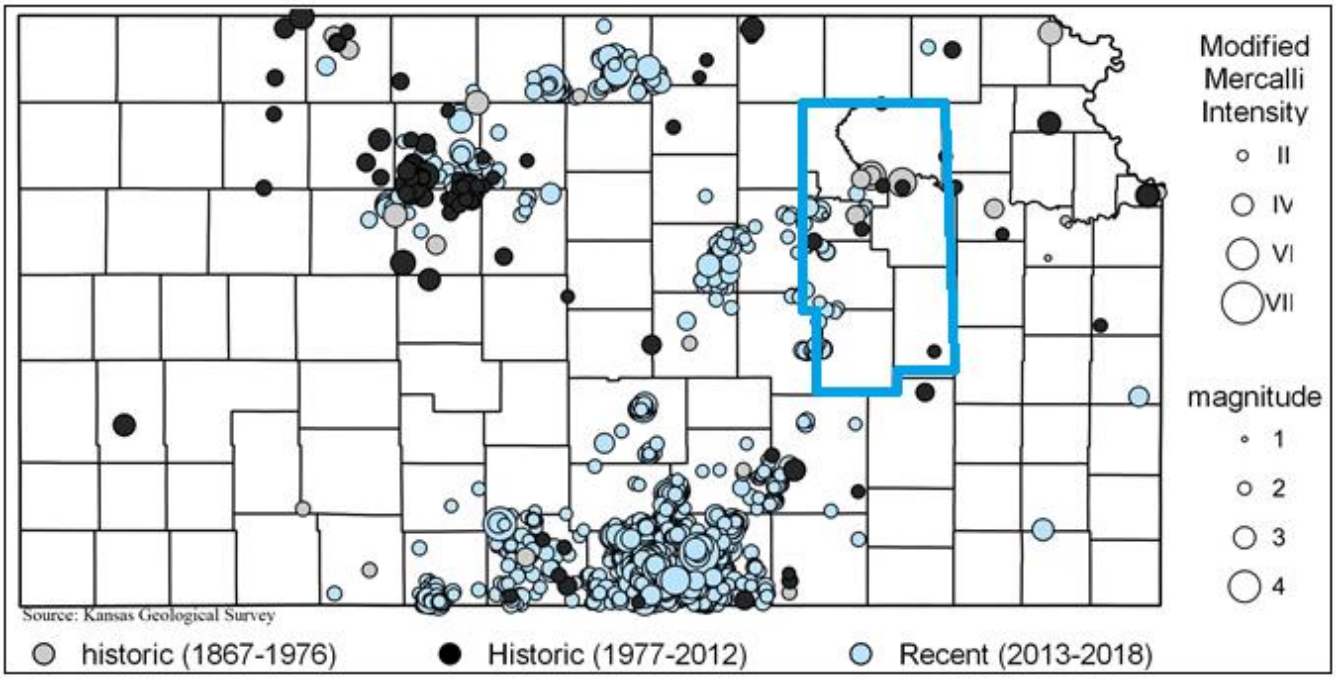
Table 4.33: Earthquake Magnitude Scale Comparison

Mercalli Scale Intensity	Verbal Description	Richter Scale Magnitude	Acceleration (%g)	Velocity (cm/s)	Witness Observations
III	Slight	3 to 4	1.40%	1.1	Resembles vibrations caused by heavy traffic
IV	Moderate	4	3.90%	3.4	Felt by people walking; rocking of free-standing objects
V	Rather Strong	4 to 5	9.20%	8.1	Sleepers awakened; bells ring
VI	Strong	5 to 6	18.00%	16	Trees sway, some damage from falling objects
VII	Very Strong	6	34.00%	31	General alarm, cracking of walls
VIII	Destructive	6 to 7	65.00%	60	Chimneys fall and some damage to building
IX	Ruinous	7	124.00%	116	Ground crack, houses begin to collapse, pipes break
X	Disastrous	7 to 8	>124.0%	>116	Ground badly cracked, many buildings destroyed. Some landslides
XI	Very Disastrous	8	>124.0%	>116	Few buildings remain standing, bridges destroyed.
XII	Catastrophic	8 or greater	>124.0%	>116	Total destruction; objects thrown in air, shaking and distortion of ground

4.10.2 – Previous Occurrences

The following map, from the KGS, shows all recorded earthquakes from 1867 through 2018.

KGS Historic Earthquake Map



The KGS Earthquake Catalog records earthquake events from 1979 through present. The following table details the Richter Scale Magnitude of any recorded events in the catalog.

Table 4.34: Region I Number of Earthquakes by Richter Scale Magnitude, 1979 - 2018

	0.1 -3.9	4.0 – 4.9	5.0 – 5.9	6.0 – 6.9	7.0- 7.9	8.0 +	Highest
Chase	4	0	0	0	0	0	2.8
Geary	9	0	0	0	0	0	3.0
Lyon	1	0	0	0	0	0	2.0
Morris	7	0	0	0	0	0	2.6
Pottawatomie	1	0	0	0	0	0	2.0
Riley	2	0	0	0	0	0	2.4
Wabaunsee	1	0	0	0	0	0	2.25

Source: KGS

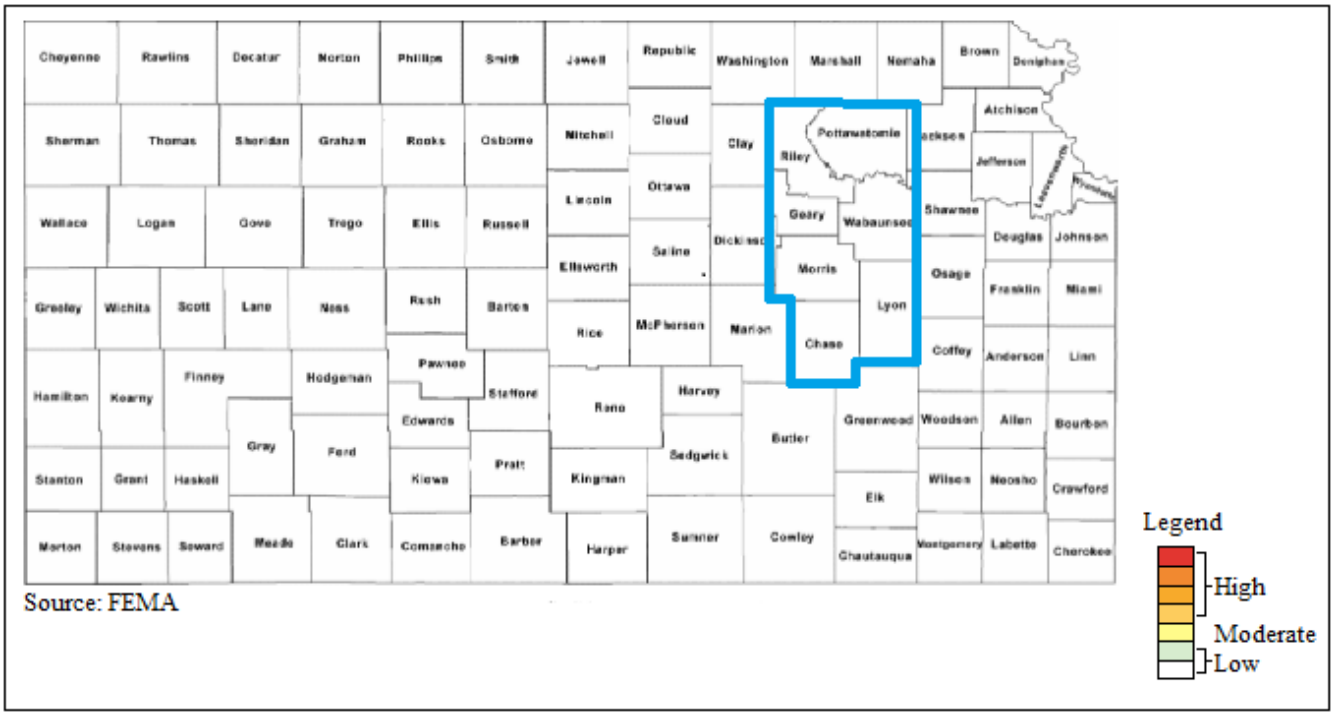
According to this archive, Kansas Region I has had one earthquake over magnitude 4.0 (recorded at a magnitude 4.2) earthquake since 1979.

Recently, concern about earthquakes caused by oil and gas exploration and production operations, has grown. Commonly, detected seismic activity associated with oil and gas operations, also known as induced seismicity, is thought to be triggered when wastewater is injected into disposal wells. According to the KGS, linking earthquakes to wastewater injection is difficult. Complex subsurface geology and limited data about that geology make it hard to pinpoint the cause seismic events. However, an established pattern of increased earthquake activity in an area over time may indicate a correlation between injection and seismic events.

4.10.3 – Hazard Probability Analysis

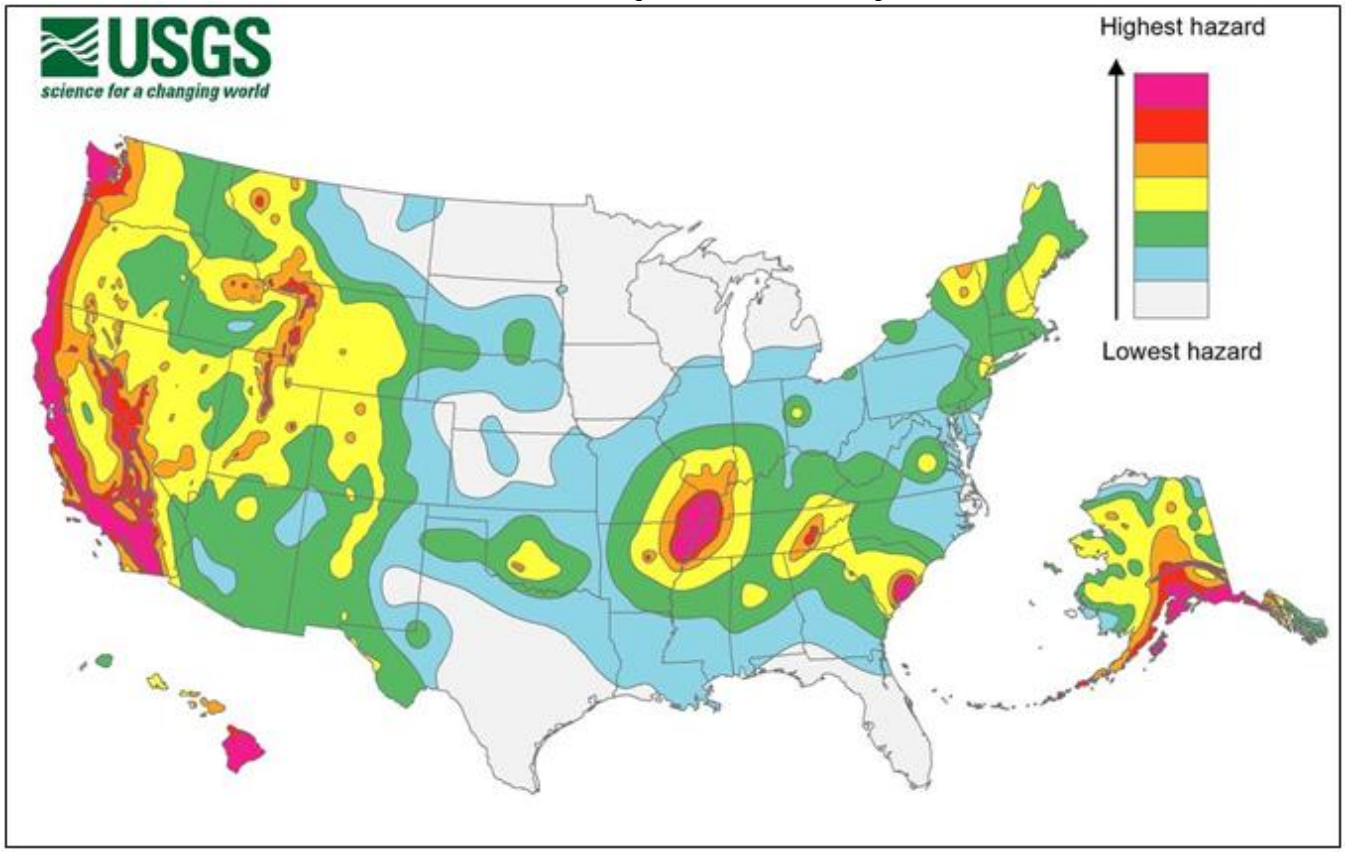
The following FEMA Seismic Risk Map for the United States indicates that all of the State of Kansas, including Kansas Region I, falls into the low hazard rankings.

FEMA Seismic Risk Map



The USGS also published a map that indicates hazard rankings based on acceleration (%g) for the United States, with the data correlating with the indicated FEMA risk. This map indicates the probability that ground shaking will exceed a certain level over a 50-year period. The low-hazard areas have a 2% chance of exceeding a designated low level of shaking and the high-hazard areas have a 2% chance of topping a much greater level.

USGS Earthquake Hazard Map



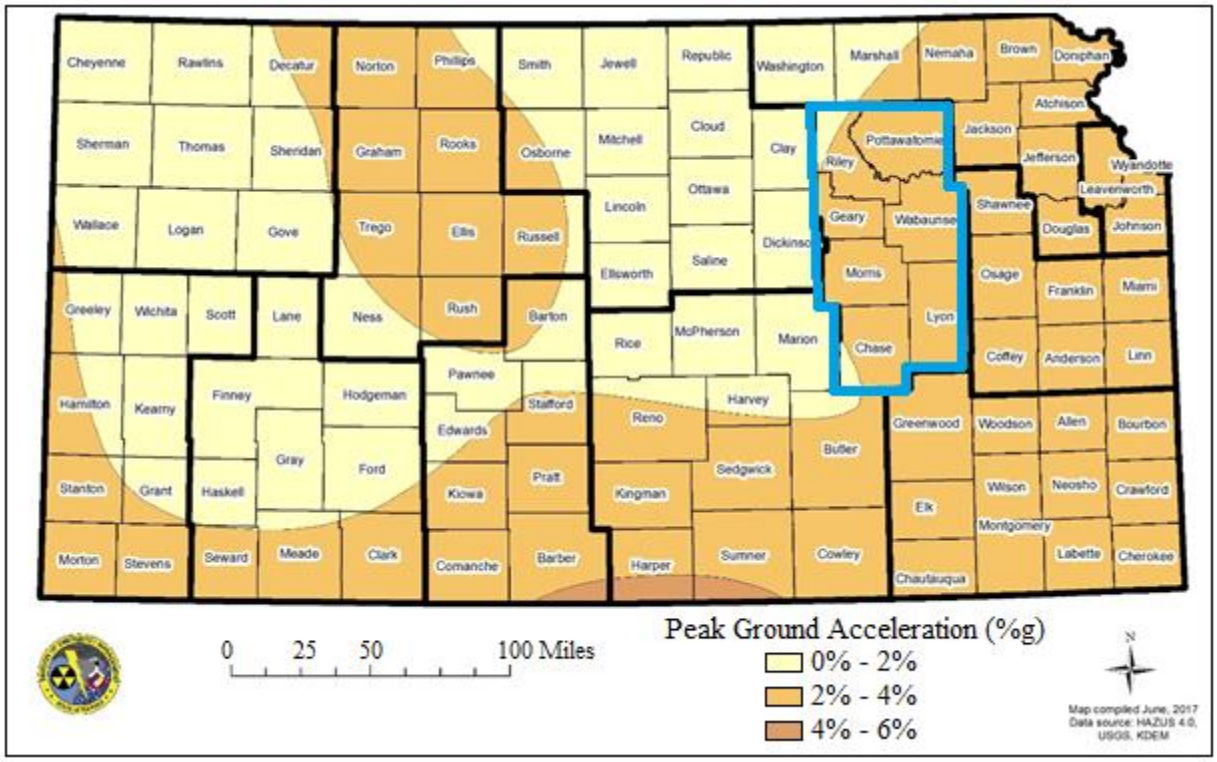
New research by Stanford University shows that oil and gas production injection limits enacted by the State Legislature has reduced he frequency of induced seismicity. Current modelling predicts that at current injection rates the number of widely felt earthquakes in Kansas will decrease to as few as 100 by 2020.

4.10.4 – Vulnerability Analysis

HAZUS, using the default inventory 2010 building valuations, was used to analyze vulnerability and estimate potential losses to earthquakes. A probabilistic, 2,500 Year 6.7 magnitude earthquake scenario was chosen to reveal areas of the region and state that are most vulnerable. These results are not meant to indicate annualized losses or damages as a result of a more typical low-magnitude event, but rather reveal vulnerabilities and losses for the worst-case scenario.

The following map, created using available HAZUS data, shows the ground shaking potential of a worst-case scenario 2,500-year 6.7 magnitude earthquake.

Regional Peak Ground Acceleration



Using available HAZUS data, the following potential losses from a worst-case scenario 2,500-year 6.7 Magnitude earthquake.

Table 4.35: Kansas Region I Probabilistic 6.7 Magnitude Earthquake Damages

County	Total Earthquake Losses	Displaced Households
Chase	$1,210,000	<1
Geary	$11,442,000	10
Lyon	$22,346,000	11
Morris	$3,384,000	1
Pottawatomie	$9,860,000	3
Wabaunsee	$28,516,000	28
Riley	$3,512,000	<1

Source: KDEM and HAZUS

Counties with a higher identified population are to be considered to have a potentially greater vulnerability to earthquake events. The following table indicates the total county population and the percentage change over the period 2000 to 2018.

Table 4.36: Kansas Region I Population Vulnerability Data for Earthquakes

County	2018 Population	Percent Population Change 2000 to 2018
Chase	2,600	-14.2%
Geary	32,777	17.3%
Lyon	33,300	-7.3%
Morris	5,521	-9.6%
Pottawatomie	24,209	33.0%
Riley	73,703	17.3%
Wabaunsee	6,912	0.4%

Source: US Census Bureau

Counties with a higher number of structures are to be considered to have a potentially greater vulnerability. The following table indicates the total number of housing units in each county (used as a representative figure for the total number of structures in each county, as housing numbers are closely tied to commercial structures) and the percentage change over the period 2000 to 2018.

Table 4.37: Kansas Region I Structure Vulnerability Data for Earthquakes

County	2018 Housing Units	Percent Change 2000 to 2018
Chase	1,492	-2.4%
Geary	15,385	28.6%
Lyon	15,387	4.3%
Morris	3,209	1.6%
Pottawatomie	9,488	29.8%
Riley	31,340	33.9%
Wabaunsee	3,297	8.7%

Source: US Census Bureau

Data concerning potential vulnerabilities for specific jurisdictions relating to population and housing, including growth or decline, may be found in Section 3.2, Regional Population Data and Section 3.4, Regional Housing Data.

4.10.5 – Consequence Analysis

As per EMAP requirements, the following table provides the Consequence Analysis

Table 4.38: Earthquake Consequence Analysis

Subject	Impacts of Earthquake
Health and Safety of the Public	Severity and location dependent. Impacts on persons near the epicenter are expected to be severe.
Health and Safety of Responders	Severity and location dependent. Impacts on persons near the epicenter are expected to be severe.
Continuity of Operations	Severity and location dependent. Event will likely require relocation, essential function prioritization based on capabilities and severe disruption of services.

Table 4.38: Earthquake Consequence Analysis

Subject	Impacts of Earthquake
Property, Facilities, and Infrastructure	Impact to property, facilities, and infrastructure could be minimal to severe, depending on the location of the facility and the severity of the event. Loss of structural integrity of buildings and infrastructure could occur.
Environment	The impact to the environment could be severe, including topological changes and severe destruction.
Economic Conditions	Impacts to the economy will be dependent severity of earthquake and proximity to the epicenter. Impacts will likely be long lasting and possibly permanent for most severely impacted businesses.
Public Confidence in the Jurisdiction's Governance	Confidence could be an issue if planning is not in place to address need of population, including mass sheltering and mass care.

4.11 – Expansive Soils

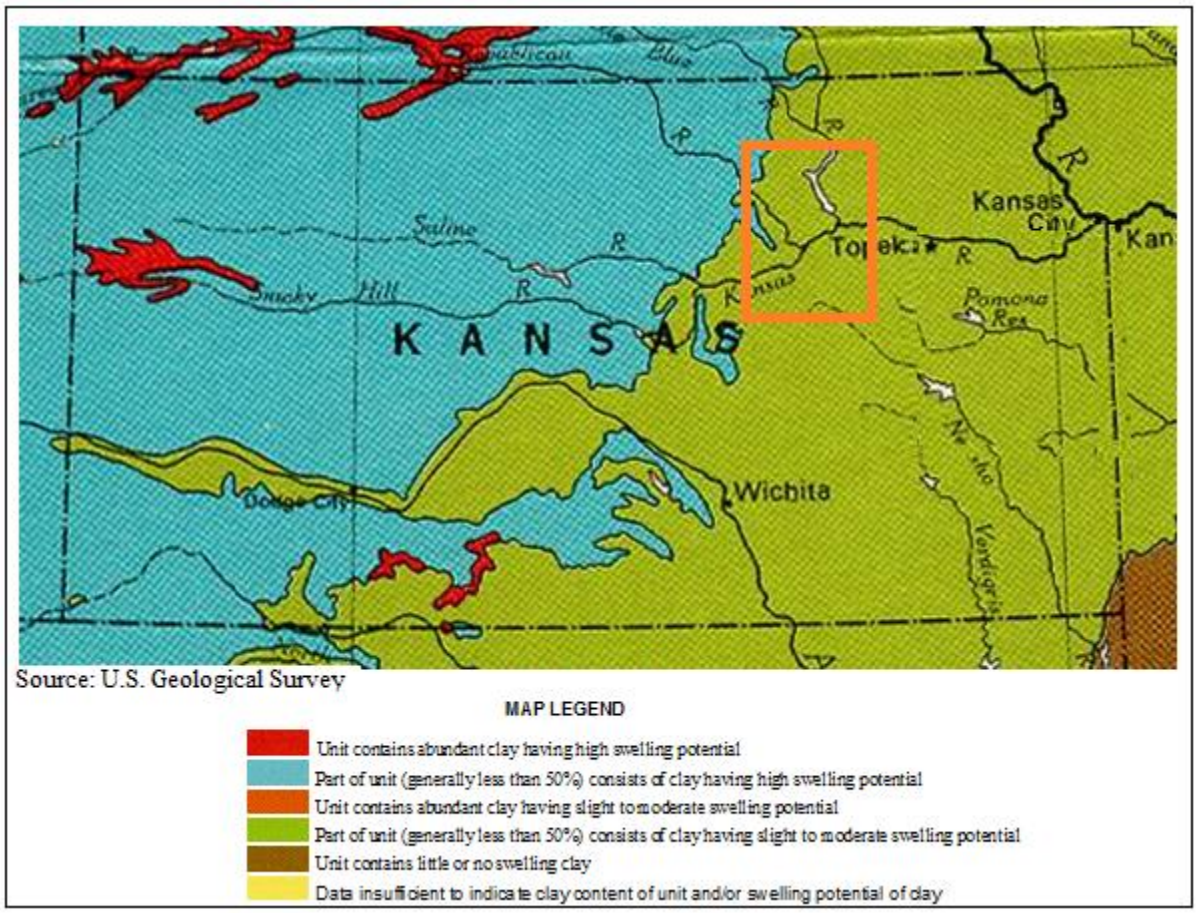
Expansive soils are slow to develop and do not usually pose a risk to public safety. The slow expansion and contraction of the clays and soils places pressure on structural foundations and subsurface dwellings. This pressure can become so great it damages foundations, cracks walls, and deforms structures.

4.11.1 – Location and Extent

Kansas Region I possesses a wide array of soils with a range of permeability from moderate to low. Generally, the permeability of the soils is related to the clay content. Clay soils tend to shrink when dry and swell when wet which has large implications on underground utility infrastructure and home foundations.

The map shows the swelling potential of soils in Kansas Region I.

USGS Soil Swelling Potential Map



Source: U.S. Geological Survey

4.11.2 – Previous Occurrences

No statewide database of expansive soils events is available.

Locally, there have been no reported expansive soil events within the past ten years.

4.11.3 – Hazard Probability Analysis

Currently there is limited available data on this hazard, but it is held that each year in the United States, expansive soils cause billions of dollars in damage to buildings, roads, pipelines, and other structures. But, as expansive soils cause damage over extended periods of time damages caused may be attributed to other factors such as extended drought or heavy periods of moisture, both of which may exacerbate the hazard.

Because there are soils with moderate clay content with a slight to moderate swell soils in the region the probability of shrink/swell occurrence is 100%. However, the probability of damage is so poorly documented that is presently not possible to quantify the potential occurrence of a major damaging expansive soils event.

4.11.4 – Vulnerability Analysis

Physical structures are potentially vulnerable to highly expansive soil. It is estimated by KDEM that approximately 10% of the homes built on expansive soils could experience significant damage. Based on this, and using current available building valuations, the following table estimates the potential damages assuming a 50% impact on the value of the structure.

Table 4.39: Kansas Region I Estimated Potential Structural Damages, Expansive Soil

County	Property Valuation	Property Valuation for 10% of Building Stock	Estimated 50% Damage
Chase	$328,770,000	$32,877,000	$16,438,500
Geary	$3,163,291,000	$316,329,100	$158,164,550
Lyon	$4,037,043,000	$403,704,300	$201,852,150
Morris	$805,916,000	$80,591,600	$40,295,800
Pottawatomie	$2,254,592,000	$225,459,200	$112,729,600
Riley	$6,656,737,000	$665,673,700	$332,836,850
Wabaunsee	$812,583,000	$81,258,300	$40,629,150

Source: US Census Bureau

Data concerning potential vulnerabilities for specific jurisdictions relating to housing, including growth or decline, may be found in Section 3.4, Regional Housing Data.

4.11.5 – Consequence Analysis

As per EMAP requirements, the following table provides the Consequence Analysis.

Table 4.40: Expansive Soils Consequence Analysis

Subject	Impacts of Expansive Soils
Health and Safety of the Public	Minimal impact.
Health and Safety of Responders	Minimal impact.
Continuity of Operations	Minimal expectation for utilization of COOP unless structures have extensive damage.
Property, Facilities, and Infrastructure	Localized impact could be moderate, including structural integrity to be lost, and roadways, railways to buckle.
Environment	Expansive soils could cause moderate damage to dams, levees, watersheds.
Economic Conditions	Economic impacts include rebuilding of the properties and infrastructure. Drought and extreme rain events could increase impact.
Public Confidence in the Jurisdiction's Governance	Confidence will be dependent on development trends and mitigation efforts at reducing the effect of expansive soils on new construction.

4.12 – Extreme Temperatures

Extreme temperature events occur when climate conditions produce temperatures well outside of the predicted norm. These extremes can have severe impacts on human health and mortality, natural ecosystems, agriculture, and other economic sectors.

4.12.1 – Location and Extent

The Midwest climate region is known for extremes in temperature. Specifically, Kansas lacks any mountain ranges that could act as a barrier to cold air masses from the north or hot, humid air masses from the south or any oceans or large bodies of water that could provide a moderating effect on the climate. The polar jet stream is often located over the region during the winter, bringing frequent storms and precipitation. Kansas summers are generally warm and humid due to the clockwise air rotation caused by Atlantic high-pressure systems bringing warm humid air up from the Gulf of Mexico.

All of Kansas Region I is vulnerable to both extreme heat and extreme cold, defined as follows.

Table 4.41: Extreme Temperature Definitions

Term	Definition
Extreme Heat	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. Humid or muggy conditions, which add to the discomfort of high temperatures, occur when an area of high atmospheric pressure traps moisture laden air near the ground.
Extreme Cold	Although no specific definition exists for extreme cold, an extreme cold event can generally be defined as temperatures at or below freezing for an extended period of time. Extreme cold events are usually part of Winter Storm events but can occur during anytime of the year and can have devastating effects on agricultural production.

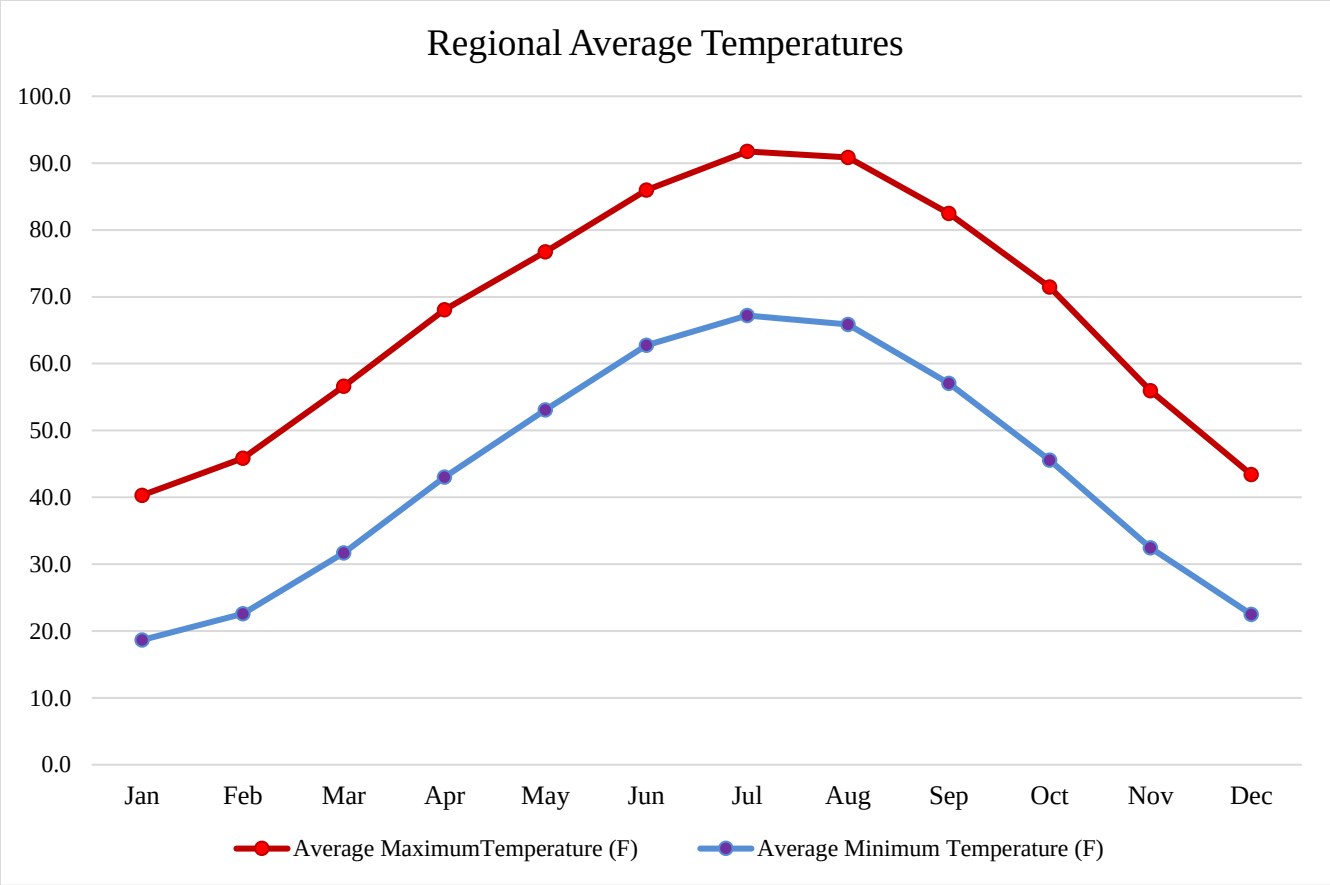
Data from the following High Plains Regional Climate Center weather stations from the first available date to present was obtained to illustrate regional temperature norms.

Table 4.42: Regional Average Temperatures

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Minimum Temperature (F)	18.7	22.6	31.7	43.0	53.1	62.8	67.2	65.9	57.0	45.5	32.4	22.5	43.5
Average Maximum Temperature (F)	40.3	45.9	56.6	68.0	76.7	86.0	91.7	90.8	82.5	71.5	55.9	43.4	67.4

Source: High Plains Regional Climate Center

The following graph illustrates the above data.



When discussing weather patterns climate change should be taken into account as it may markedly change future weather-related events. There is a scientific consensus that climate change is occurring, and recent climate modeling results indicate that extreme weather events may become more common. Rising average temperatures produce a more variable climate system which may result in an increase in the frequency and severity of some extreme weather events including longer and hotter heat waves (and by correlation, an increased risk of wildfires), higher wind speeds, greater rainfall intensity, and increased tornado activity.

4.12.2 – Previous Occurrences

Data from the High Plains Regional Climate Center indicates the following historic high and low temperatures.

Table 4.43: Kansas Region I Historic Temperatures

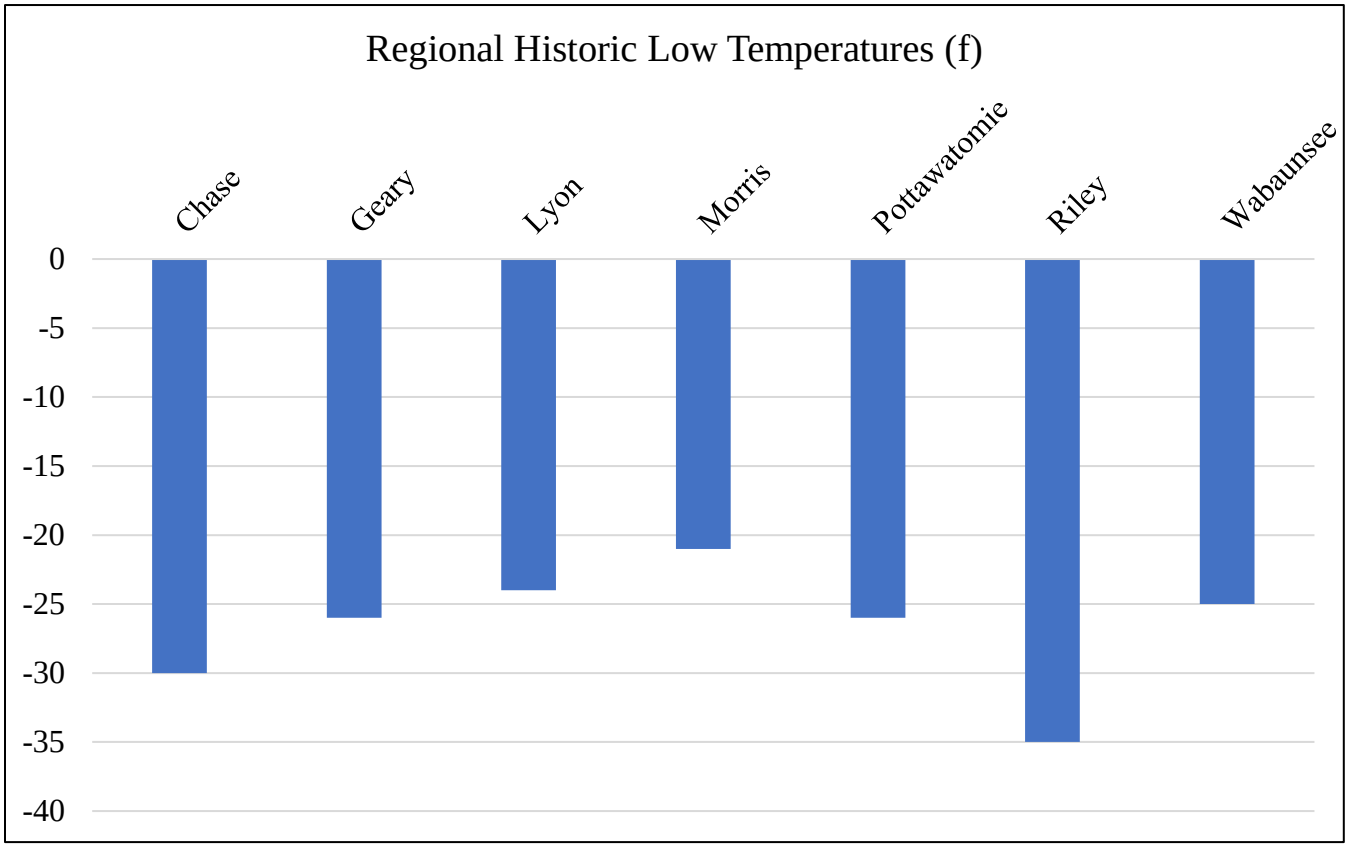
County	Historic Low Temperature (F)	Historic High Temperature (F)
Chase	-30 (1905)	118 (1936)
Geary	-26 (1947)	114 (1954)
Lyon	-24 (1947)	116 (1936)
Morris	-21 (1943)	115 (1936)
Pottawatomie	-26 (1947)	114 (1954)
Riley	-35 (1899)	116 (1936)

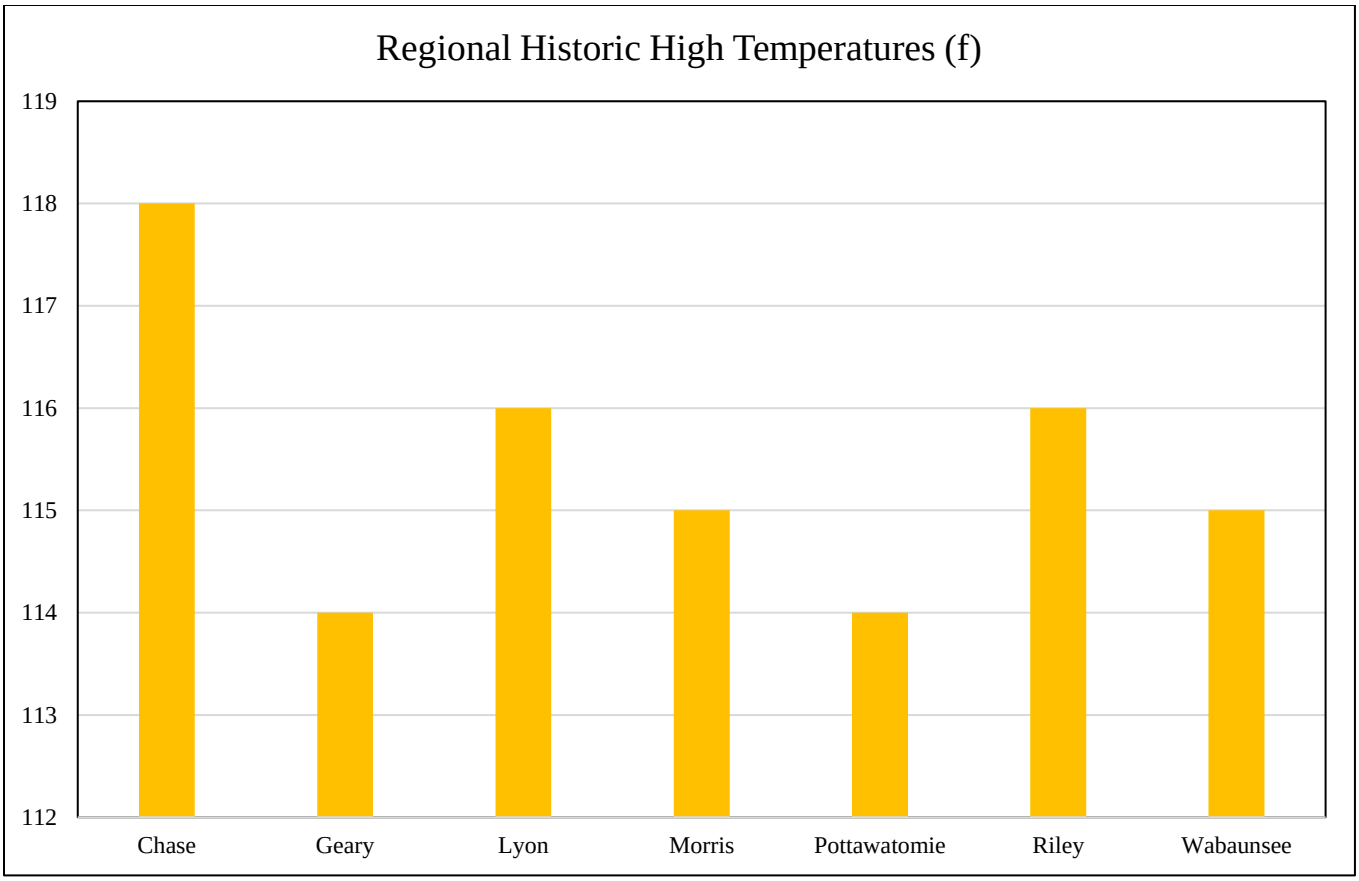
Table 4.43: Kansas Region I Historic Temperatures

County	Historic Low Temperature (F)	Historic High Temperature (F)
Wabaunsee	-25 (1989)	115 (1936)

Source: High Plains Regional Climate Center

The following graphs represent he above historic temperature data.





The following table presents National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI) identified extreme temperature events (Excessive Heat and Extreme Cold) in Kansas Region I for the 10-year period of 2010 – 2019 (2109 and 2019 are full data set years). It is worth noting that the NCEI data is regional, and sometimes statewide. As such reported damage is not specific to a regional county nor to any of the participating jurisdictions.

Table 4.44: Kansas Region I NCEI Extreme Temperature Events, 2010 - 2019

Event Type	Number of Days with Events	Property Damage	Deaths	Injuries
Excessive Heat	15	$0	0	0
Extreme Cold	1	$0	0	0

Source: NOAA NCEI

Crop loss data from the USDA Risk Management Agency detailing cause of loss was researched to determine the financial impacts of extreme temperatures on the region's agricultural base. Crop loss data for the ten-year period of 2009- 2018 (with 2009 and 2018 being full data years), for the region, indicates 295 claims on 106,441 acres for $16,014,371.

Table 4.45: USDA Risk Management Agency Cause of Loss Indemnities 2010-2019, Extreme Temperatures

County	Number of Reported Claims	Acres Lost	Total Amount of Loss
Chase	32	6,526	$1,211,024
Geary	29	4,882	$803,548

Table 4.45: USDA Risk Management Agency Cause of Loss Indemnities 2010-2019, Extreme Temperatures

County	Number of Reported Claims	Acres Lost	Total Amount of Loss
Lyon	56	51,115	$8,051,535
Morris	54	15,432	$2,757,425
Pottawatomie	46	9,576	$1,010,058
Riley	45	4,789	$468,852
Wabaunsee	33	14,120	$1,711,930

Source: USDA Farm Service Agency

4.12.3 – Hazard Probability Analysis

Although periods of extreme heat and cold occur on an annual basis, events that create a serious public health risk or threaten infrastructure capacity occur less often. An extreme heat event is more likely to occur in the months of June, July, August, and September, and an extreme cold event is more likely to occur in the months of November, December, January, February, and March. Also, the EPA has projected that with climate changes in the Great Plains, temperatures will continue to increase and impact all Kansas Region I communities.

As the reported extreme temperature events are regional, and not just county based, the following table summarizes extreme temperature event data for **Kansas Region I**.

Table 4.46: Kansas Region I Extreme Temperature Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	16
Average Events per Year	2
Number of Days with Event and Death or Injury (2010-2019)	0
Average Number of Days with Event and Death or Injury	0
Total Reported NCEI Property Damage (2010-2019)	$0
Average Property Damage per Year	$0

Source: NCEI

Data from the NCEI indicates that Kansas Region I can expect on a yearly basis, relevant to extreme temperature events:

- Two events
- No deaths or injuries
- $0 in property damages

Data was reviewed from the USDA Risk Management agency to determine vulnerability to extreme temperatures. The following table summarizes extreme temperature event data for **Chase County**

Table 4.47: Chase County Extreme Temperatures Agricultural Probability Summary

Data	Recorded Impact
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	32
Average Number of Claims per Year	3
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	6,526

Table 4.47: Chase County Extreme Temperatures Agricultural Probability Summary

Data	Recorded Impact
Average Number of Acres Damaged per Year	653
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$1,211,024
Average Crop Damage per Year	$121,102

Source: USDA

According to the USDA Risk Management Agency, Chase County can expect on a yearly basis, relevant to extreme temperatures occurrences:

- Three insurance claims
- 653 acres impacted
- $121,102 in insurance claims

The following table summarizes extreme temperatures event data for **Geary County**.

Table 4.48: Geary County Extreme Temperatures Agricultural Probability Summary

Data	Recorded Impact
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	29
Average Number of Claims per Year	3
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	4,882
Average Number of Acres Damaged per Year	488
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$803,548
Average Crop Damage per Year	$80,355

Source: USDA

According to the USDA Risk Management Agency, Geary County can expect on a yearly basis, relevant to extreme temperatures occurrences:

- Three insurance claims
- 488 acres impacted
- $80,355 in insurance claims

The following table summarizes extreme temperatures event data for **Lyon County**.

Table 4.49: Lyon County Extreme Temperatures Agricultural Probability Summary

Data	Recorded Impact
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	56
Average Number of Claims per Year	6
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	51,115
Average Number of Acres Damaged per Year	5,112
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$8,051,535
Average Crop Damage per Year	$805,153

Source: USDA

According to the USDA Risk Management Agency, Lyon County can expect on a yearly basis, relevant to extreme temperatures occurrences:

- Six insurance claims
- 5,112 acres impacted
- $805,153 in insurance claims

The following table summarizes extreme temperatures event data for **Morris County**.

Table 4.50: Morris County Extreme Temperatures Agricultural Probability Summary

Data	Recorded Impact
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	54
Average Number of Claims per Year	5
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	15,432
Average Number of Acres Damaged per Year	1,543
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$2,757,425
Average Crop Damage per Year	$275,743

Source: USDA

According to the USDA Risk Management Agency, Morris County can expect on a yearly basis, relevant to extreme temperatures occurrences:

- Five insurance claims
- 1,543 acres impacted
- $275,473 in insurance claims

The following table summarizes extreme temperatures event data for **Pottawatomie County**.

Table 4.51: Pottawatomie County Extreme Temperatures Agricultural Probability Summary

Data	Recorded Impact
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	46
Average Number of Claims per Year	5
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	9,576
Average Number of Acres Damaged per Year	958
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$1,010,058
Average Crop Damage per Year	$101,006

Source: USDA

According to the USDA Risk Management Agency, Pottawatomie County can expect on a yearly basis, relevant to extreme temperatures occurrences:

- Five insurance claims
- 958 acres impacted
- $101,006 in insurance claims

The following table summarizes extreme temperatures event data for **Riley County**.

Table 4.52: Riley County Extreme Temperatures Agricultural Probability Summary

Data	Recorded Impact
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	45
Average Number of Claims per Year	5
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	4,789
Average Number of Acres Damaged per Year	479
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$468,852
Average Crop Damage per Year	$46,885

Source: USDA

According to the USDA Risk Management Agency, Riley County can expect on a yearly basis, relevant to extreme temperatures occurrences:

- Five insurance claims
- 479 acres impacted
- $46,885 in insurance claims

The following table summarizes extreme temperatures event data for **Wabaunsee County**.

Table 4.53: Wabaunsee County Extreme Temperatures Agricultural Probability Summary

Data	Recorded Impact
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	33
Average Number of Claims per Year	3
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	14,120
Average Number of Acres Damaged per Year	1,412
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$1,711,930
Average Crop Damage per Year	$171,193

Source: USDA

According to the USDA Risk Management Agency, Wabaunsee County can expect on a yearly basis, relevant to extreme temperatures occurrences:

- Three insurance claims
- 1,412 acres impacted
- $171,193 in insurance claims

4.12.4 – Vulnerability Analysis

The primary concerns with this hazard are human health safety issues. Specific at-risk groups identified were outdoor workers, farmers, and senior citizens. 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 affect the planning area.

Exposure to direct sun can increase Heat Index values by as much as 15°F. The zone above 105°F corresponds to a Heat Index that may cause increasingly severe heat disorders with continued exposure and/or physical activity. The following table discusses potential impacts on human health related to excessive heat.

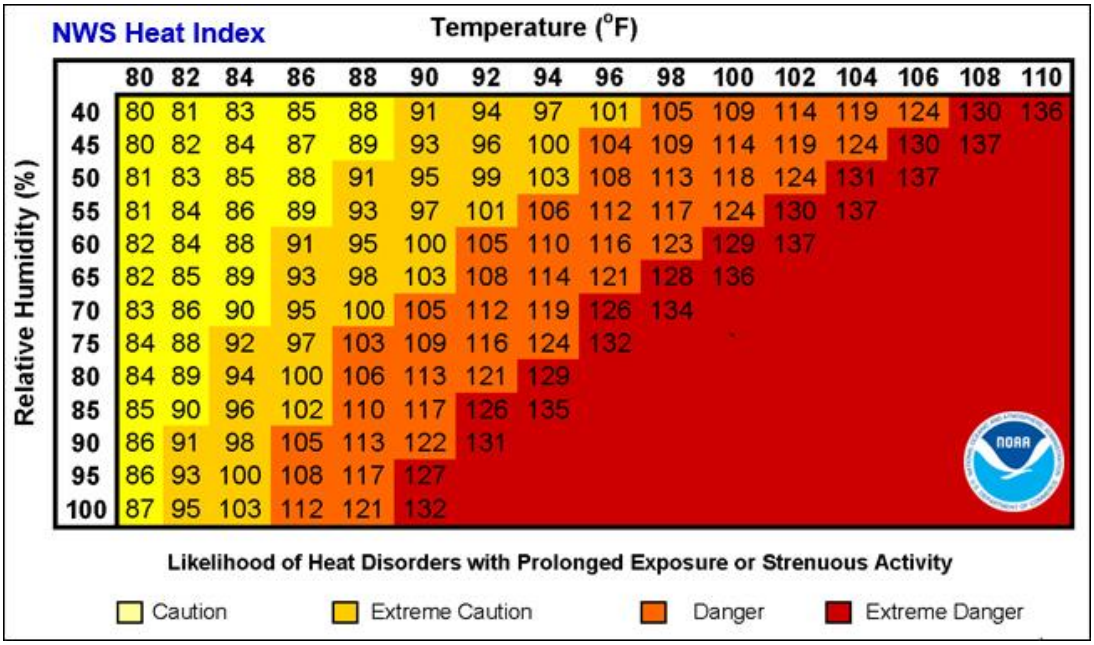
Table 4.54: Extreme Heat Impacts on Human Health

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

Source: National Weather Service Heat Index Program

The following graph, from the NWS, indicates Heat Index values.

Heat Index



Extreme cold can cause hypothermia, an extreme lowering of the body's temperature, frostbite and death. Infants and the elderly are particularly at risk, but anyone can be affected. Other impacts of extreme cold include asphyxiation from toxic fumes from emergency heaters, household fires, which can be caused by fireplaces and emergency heaters, and frozen/burst water pipes. There are no specific data sources recording cold related deaths in east-central Kansas.

The following graph, from the NWS, shows wind chill values.

Wind Chill Values

Wind (mph)	Temperature (°F)																	
Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes, 10 minutes, 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph) *Effective 11/01/01*

Counties with a higher identified population are to be considered to have a potentially greater vulnerability to extreme temperature events. The following table indicates the total county population and the percentage change over the period 2000 to 2018.

Table 4.55: Kansas Region I Population Vulnerability Data for Extreme Temperatures

County	2018 Population	Percent Population Change 2000 to 2018
Chase	2,600	-14.2%
Geary	32,777	17.3%
Lyon	33,300	-7.3%
Morris	5,521	-9.6%
Pottawatomie	24,209	33.0%
Riley	73,703	17.3%
Wabaunsee	6,912	0.4%

Source: US Census Bureau

Additionally, there is an increased likelihood of mortality for very young and very old populations due to extreme temperatures following table indicates the percentage of the total county population that may be considered especially vulnerable to extreme temperatures.

Table 4.56: Kansas Region I Vulnerable Population Vulnerability Data for Extreme Temperatures

County	Percentage of Population 5 and Under (2018)	Percentage of Population 65+ (2018)
Chase	6.1%	23.0%
Geary	6.3%	19.2%
Lyon	4.9%	25.6%
Morris	6.0%	21.3%

Table 4.56: Kansas Region I Vulnerable Population Vulnerability Data for Extreme Temperatures

County	Percentage of Population 5 and Under (2018)	Percentage of Population 65+ (2018)
Pottawatomie	6.7%	21.9%
Riley	6.4%	22.2%
Wabaunsee	7.0%	20.2%

Source: US Census Bureau

Data concerning potential vulnerabilities for specific jurisdictions relating to population, including growth or decline, may be found in Section 3.2, Regional Population Data.

In addition, extreme temperatures may exacerbate agricultural and economic losses. The USDA 2017 Census of Agriculture (the latest available data) provides data on the crop exposure value, the total dollar value of all crops, for each Kansas Region I County. USDA Risk Management Agency crop loss data for the five-year period 2009 - 2018 (data set includes full years for 2009 and 2018) allows us to quantify the monetary impact of extreme temperature conditions on the agricultural sector. The higher the percentage loss, the higher the potential vulnerability the county has to extreme temperature events.

Table 4.57: Extreme Temperature Acres Impacted and Crop Insurance Paid per County from 2009-2018

Jurisdiction	Farm Acreage	Annualized Acres Impacted	Percentage of Total Acres Impacted Yearly	Market Value of Products Sold	Annualized Crop Insurance Paid	Percentage of Market Value Impacted Yearly
Chase	360,077	653	0.18%	$85,430,000	$121,102	0.14%
Geary	155,153	488	0.31%	$31,833,000	$80,355	0.25%
Lyon	522,934	5,112	0.98%	$134,440,000	$805,153	0.60%
Morris	409,269	1,543	0.38%	$138,615,000	$275,743	0.20%
Pottawatomie	406,031	958	0.24%	$101,363,000	$101,006	0.10%
Riley	214,311	479	0.22%	$51,171,000	$46,885	0.09%
Wabaunsee	378,759	1,412	0.37%	$63,146,000	$171,193	0.27%

Source: USDA

4.12.5 – Consequence Analysis

As per EMAP requirements, the following table provides the Consequence Analysis.

Table 4.58: Extreme Temperature Consequence Analysis

Subject	Impacts of Extreme Temperatures
Health and Safety of the Public	Depending on the duration of the event, impact is expected to be severe for unprepared and unprotected persons. Impact will be minimal to moderate for prepared and protected persons.
Health and Safety of Responders	Impact could be severe if proper precautions are not taken, i.e. hydration in heat, clothing in extreme cold. With proper preparedness and protection, the impact would be minimal.
Continuity of Operations	Minimal expectation for utilization of the COOP.

Table 4.58: Extreme Temperature Consequence Analysis

Subject	Impacts of Extreme Temperatures
Property, Facilities, and Infrastructure	Impact to infrastructure could be minimal to severe depending on the temperature extremes.
Environment	The impact to the environment could be severe. Extreme heat and or cold could seriously damage wildlife and plants, trees and crops.
Economic Conditions	Impacts to the economy will be dependent on how extreme the temperatures get, but only in the sense of whether people will venture out to spend money. Utility bills could increase causing more financial hardship.
Public Confidence in the Jurisdiction's Governance	Confidence will be dependent on how well utilities hold up as they are stretched to provide heat and cool air, depending on the extreme. Planning and response could be challenged.

4.13 – Flood

Floods are most common in seasons of rain and thunderstorms. Floods that threaten Kansas Region I can be generally classified under two categories:

- **Flash Flood:** The product of heavy, localized precipitation in a short time period over a given location
- **Riverine Flood:** Occurs when precipitation over a given river basin for a long period of time causes the overflow of rivers, streams, lakes and drains

4.13.1 – Location and Extent

Flash Flooding

The NWS provides the following definitions of warnings for actual and potential flood conditions for Flash Floods:

- **Flash Flood Watch**: Issued to indicate current or developing hydrologic conditions that are favorable for flash flooding in and close to the watch area, but the occurrence is neither certain or imminent.
- **Flash Flood Warning**: Issued to inform the public, emergency management and other cooperating agencies that flash flooding is in progress, imminent, or highly likely.
- **Flash Flood Statement**: In hydrologic terms, a statement by the NWS which provides follow-up information on flash flood watches and warnings.

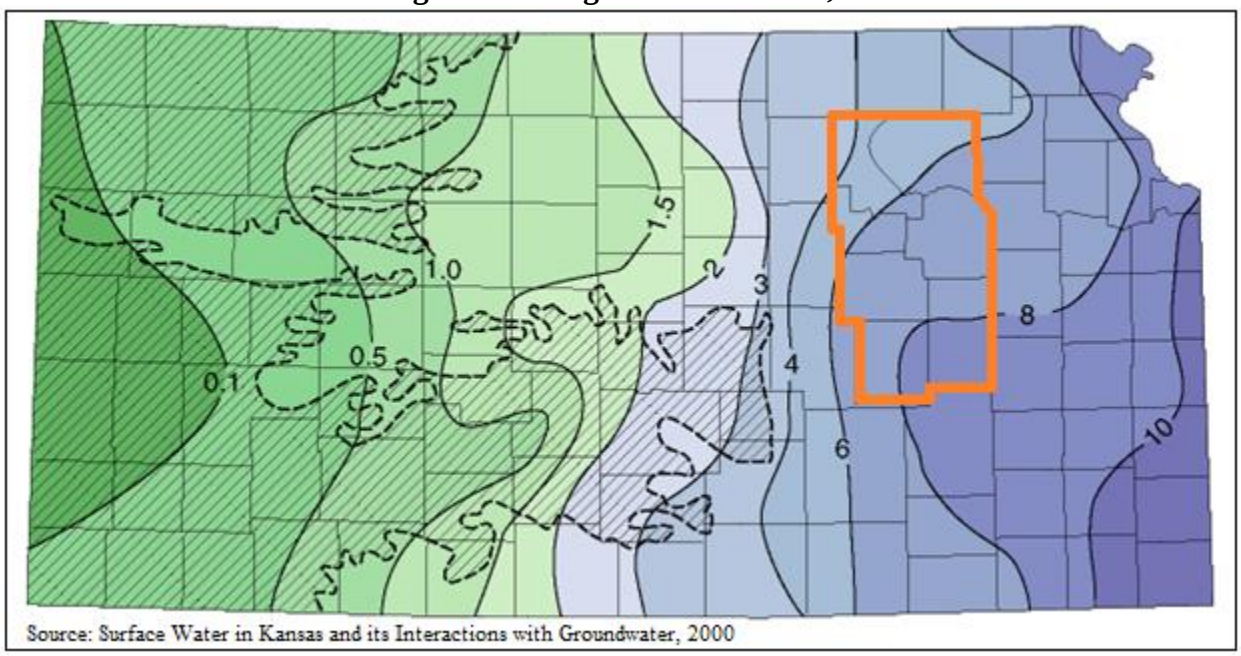
In general, flash flooding occurs in those locations in the planning area that are low-lying and/or do not have adequate drainage. Data from University of Kansas indicates that the average annual precipitation for Kansas Region I counties for 2014 - 2019 (the latest available data):

- Chase County: 30.4 inches
- Geary County: 33.6 inches
- Lyon County: 36.7 inches
- Morris County: 34.6 inches
- Pottawatomie County: 37.1 inches
- Riley County: 36.0 inches
- Wabaunsee County: 36.8 inches

This equates to a regional average of 35.0 inches of precipitation for the six-year period 2014 - 2019.

The following map illustrates the distribution of water runoff in Kansas. Surface runoff is water from rain or snowmelt that flows on the surface and does not percolate into the subsurface. In general, the higher the surface runoff, the higher the potential for flash flooding.

Kansas Region I Average Annual Runoff, In Inches



Source: Surface Water in Kansas and its Interactions with Groundwater, 2000

Riverine Flooding

In general, riverine flooding occurs from the overflow of rivers, streams, drains, and lakes due to excessive rainfall. The NWS provides the following definitions of warnings for actual and potential flood conditions for riverine flooding:

- **Flood Potential Outlook:** In hydrologic terms, a NWS outlook that is issued to alert the public of potentially heavy rainfall that could send rivers and streams into flood or aggravate an existing flood.
- **Flood Watch:** Issued to inform the public and cooperating agencies that current and developing hydro meteorological conditions are such that there is a threat of flooding, but the occurrence is neither certain nor imminent.
- **Flood Warning:** In hydrologic terms, a release by the NWS to inform the public of flooding along larger streams in which there is a serious threat to life or property. A flood warning will usually contain river stage (level) forecasts.
- **Flood Statement:** In hydrologic terms, a statement issued by the NWS to inform the public of flooding along major streams in which there is not a serious threat to life or property. It may also follow a flood warning to give later information.

All areas of Kansas Region I located near a stream or river are at risk of riverine flooding. While riverine floods can and do occur at various levels, the one percent annual chance flood has been chosen as the basis for this risk assessment. This level is the accepted standard for flood insurance and regulatory purposes.

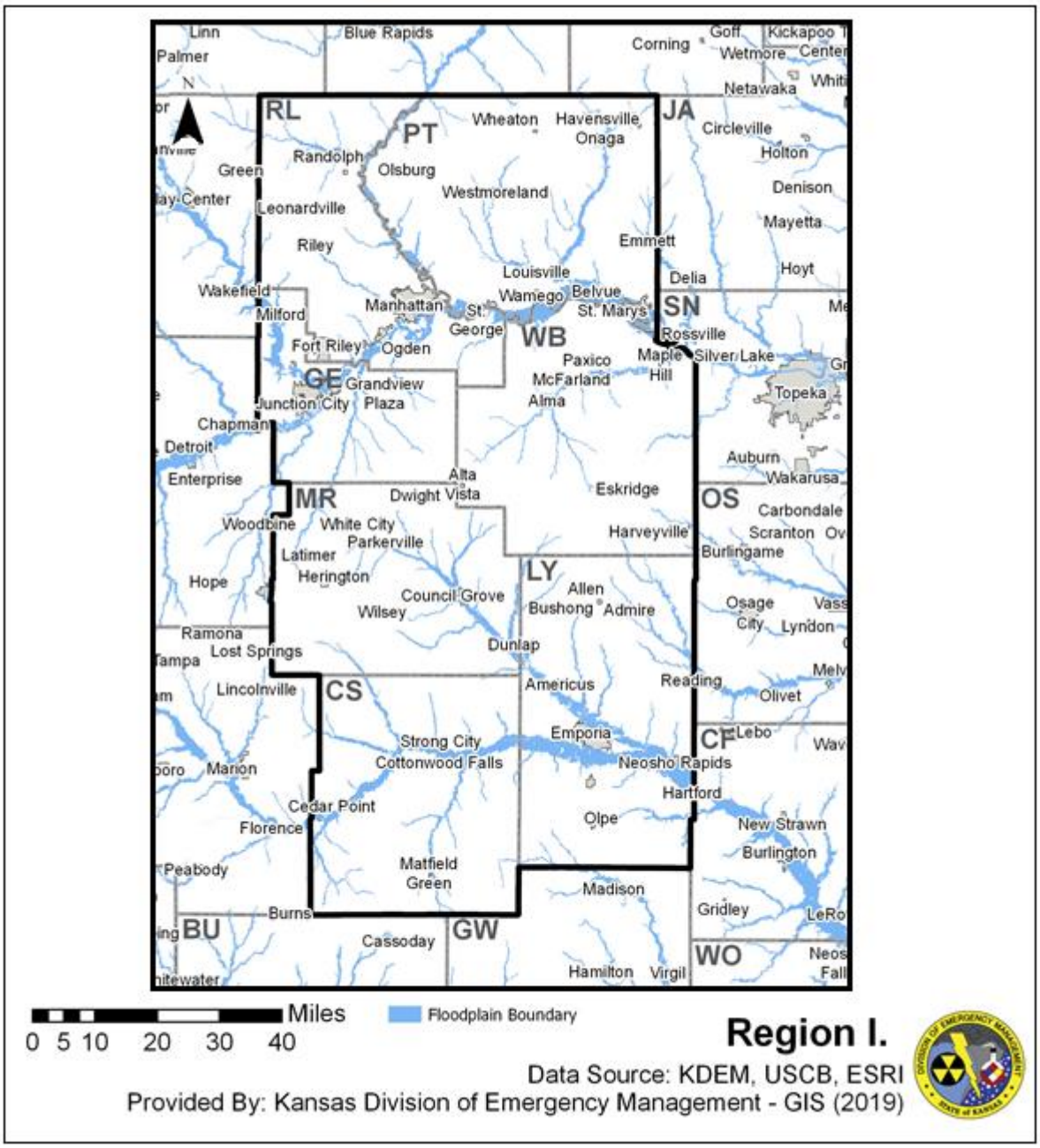
Flood probability can be expressed by recurrence interval, the average period of time for a flood that equals or exceeds a given magnitude, expressed as a period of years. The probability of occurrence of a given flood can also be expressed as the odds of recurrence of one or more similar or bigger floods in a certain number of years. Large, catastrophic floods have a very low frequency or probability of occurrence, whereas smaller floods occur more often. The larger the number of years in a recurrence interval, the smaller the chances of experiencing that flood in a year. However, the odds are never zero, even very large, uncommon floods always have a very small chance of recurring every year. When reviewing flood probability, it is important to note that once a flood occurs its chance of recurring the next year remains the same.

Table 4.59: Flood Recurrence Interval Probability

Recurrence Interval, in Years	Probability of Occurrence in Any Given Year	Percent Chance of Occurrence in Any Given Year
100	1 in 100	1
50	1 in 50	2
25	1 in 25	4
10	1 in 10	10
5	1 in 5	20
2	1 in 2	50

Source: FEMA

The following map, generated by KDEM using available data, depicts regional one percent annual flood areas.

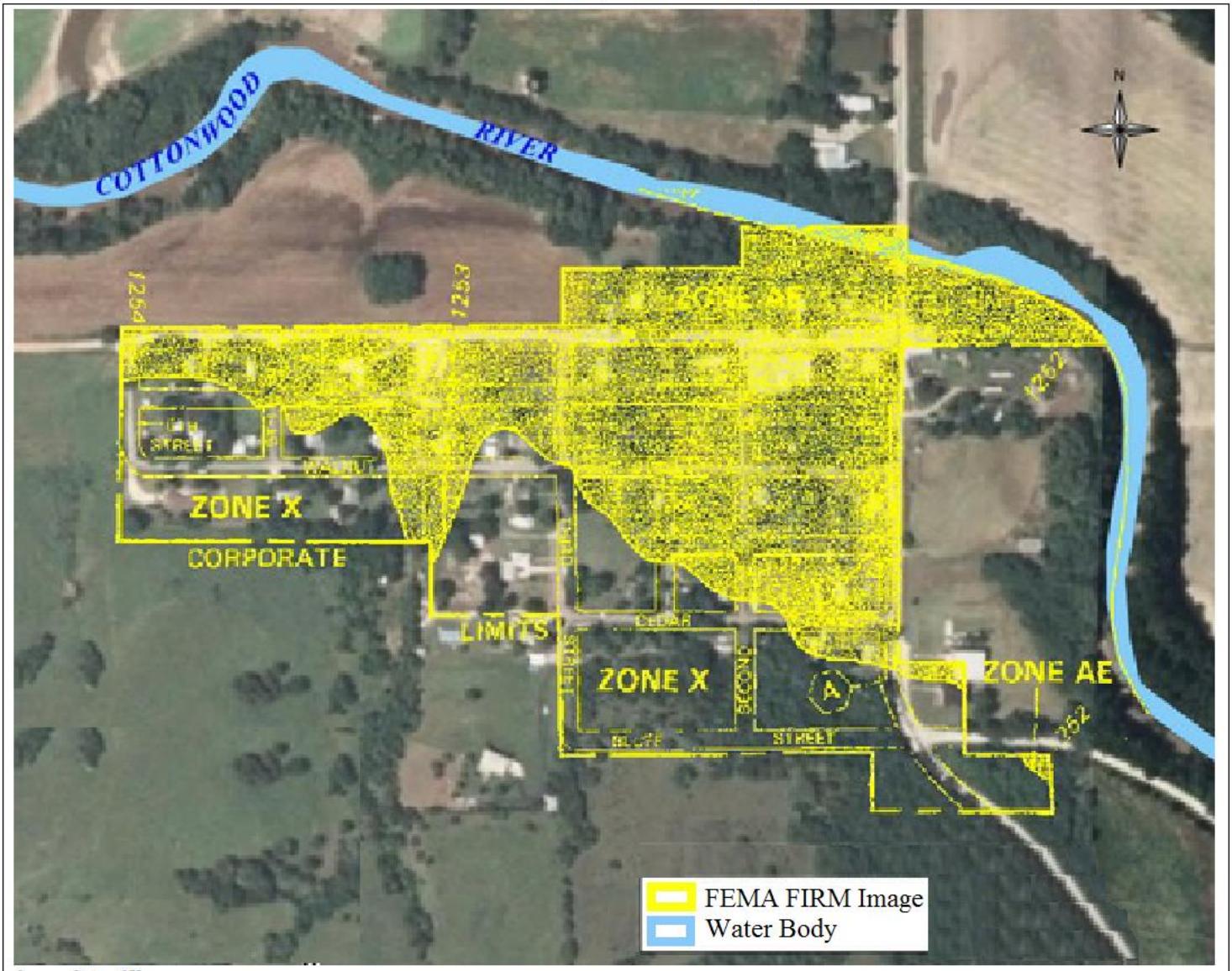


Relevant and available maps indicating potential flooding zones have are included below.

Chase County Flood Insurance Rate Map

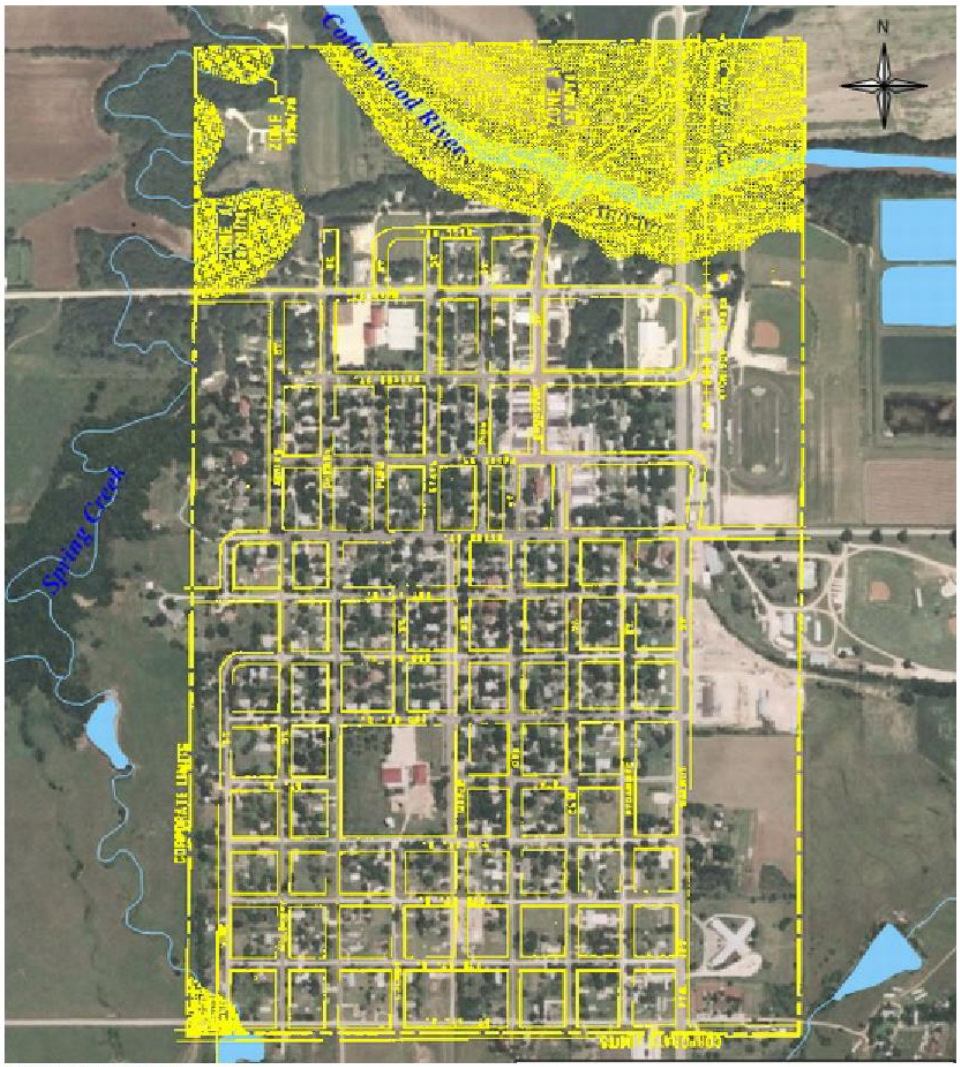
Source: FEMA FIRM, Map Date: 09/1977

Cedar Point, Chase County FIRM



Source: State of Kansas

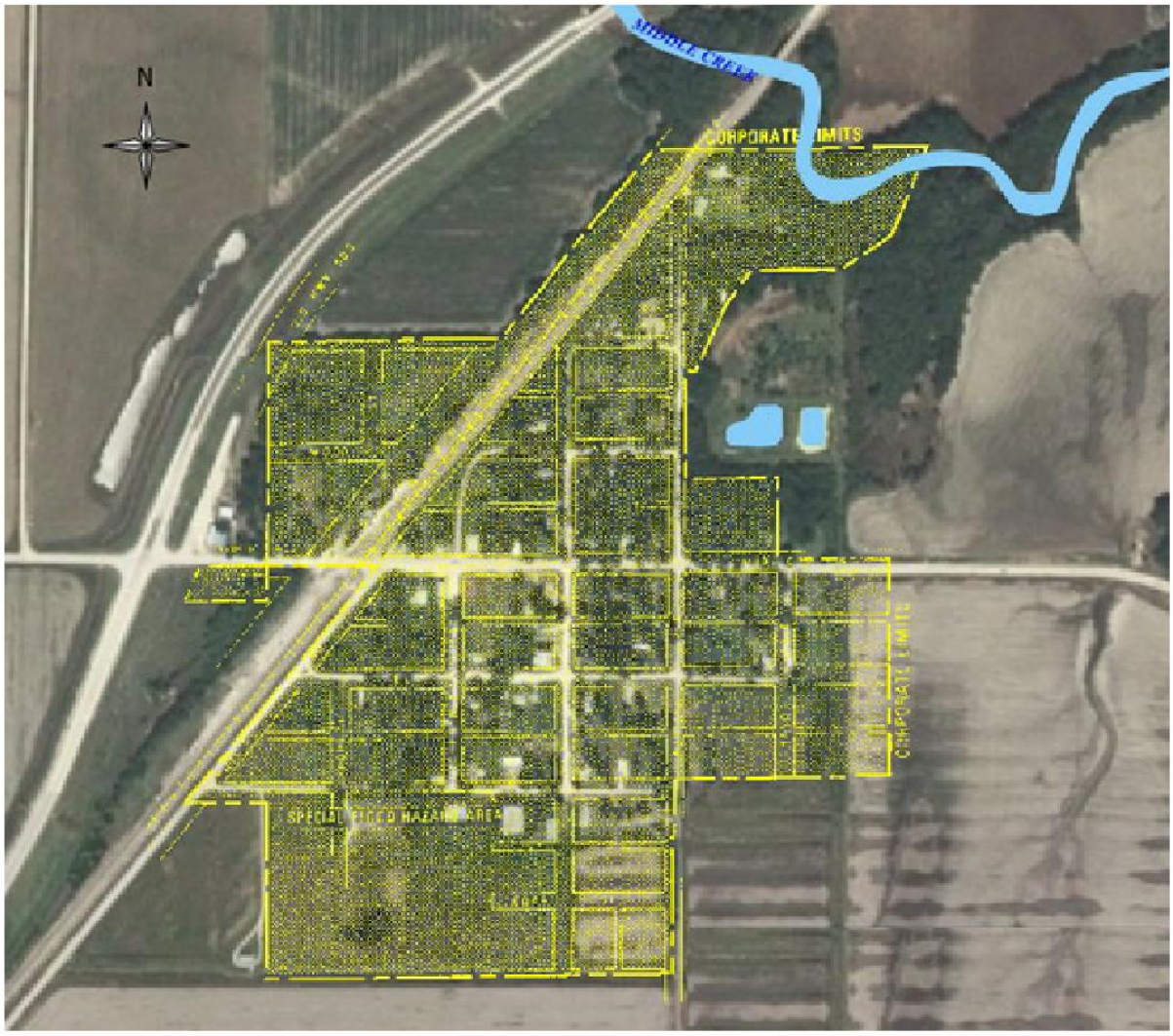
Cottonwood Falls, Chase County FIRM



Source: State of Kansas

FEMA FIRM Image
Water Body

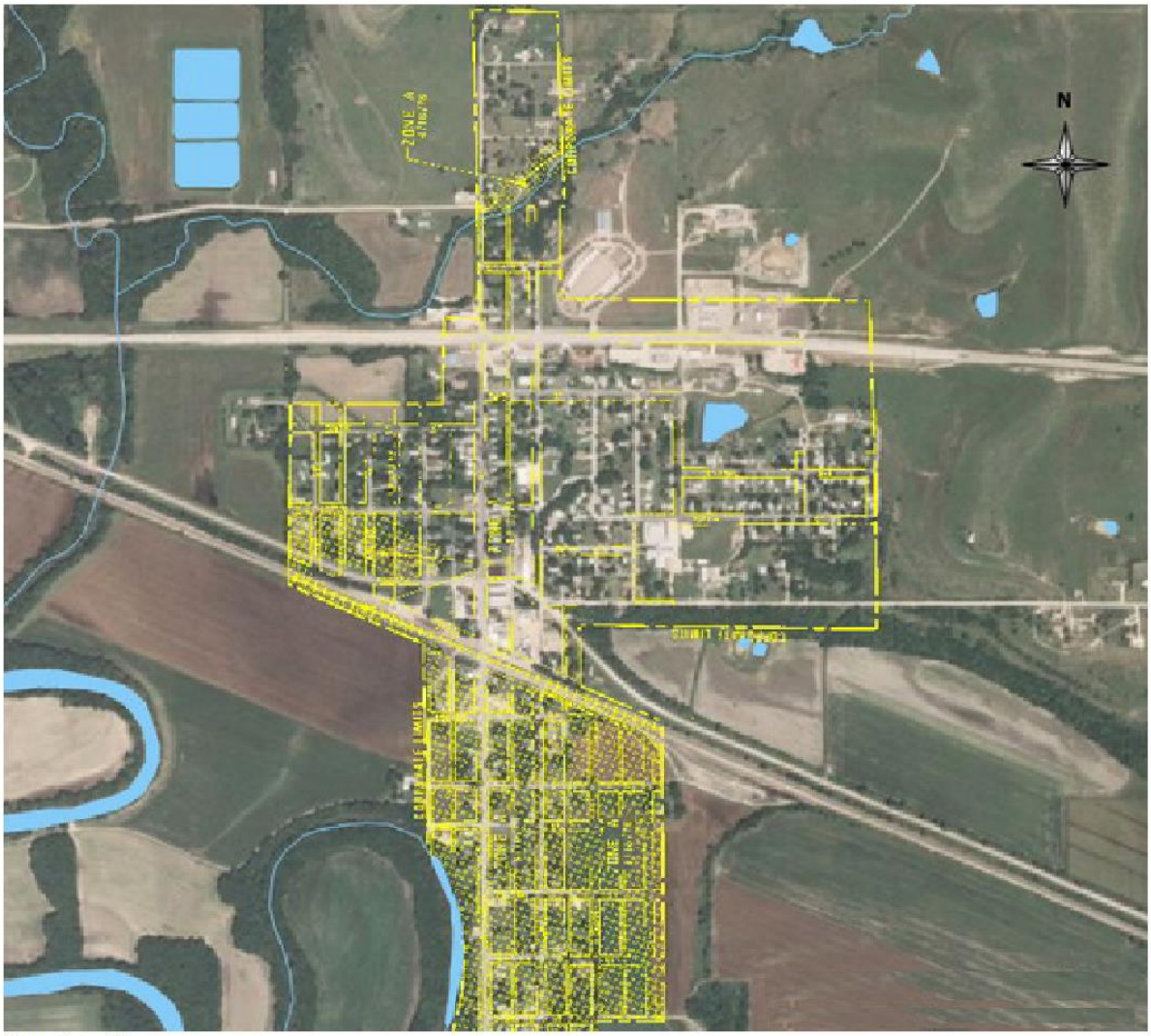
Elmdale, Chase County FIRM



Source: State of Kansas

FEMA FIRM Image
Water Body

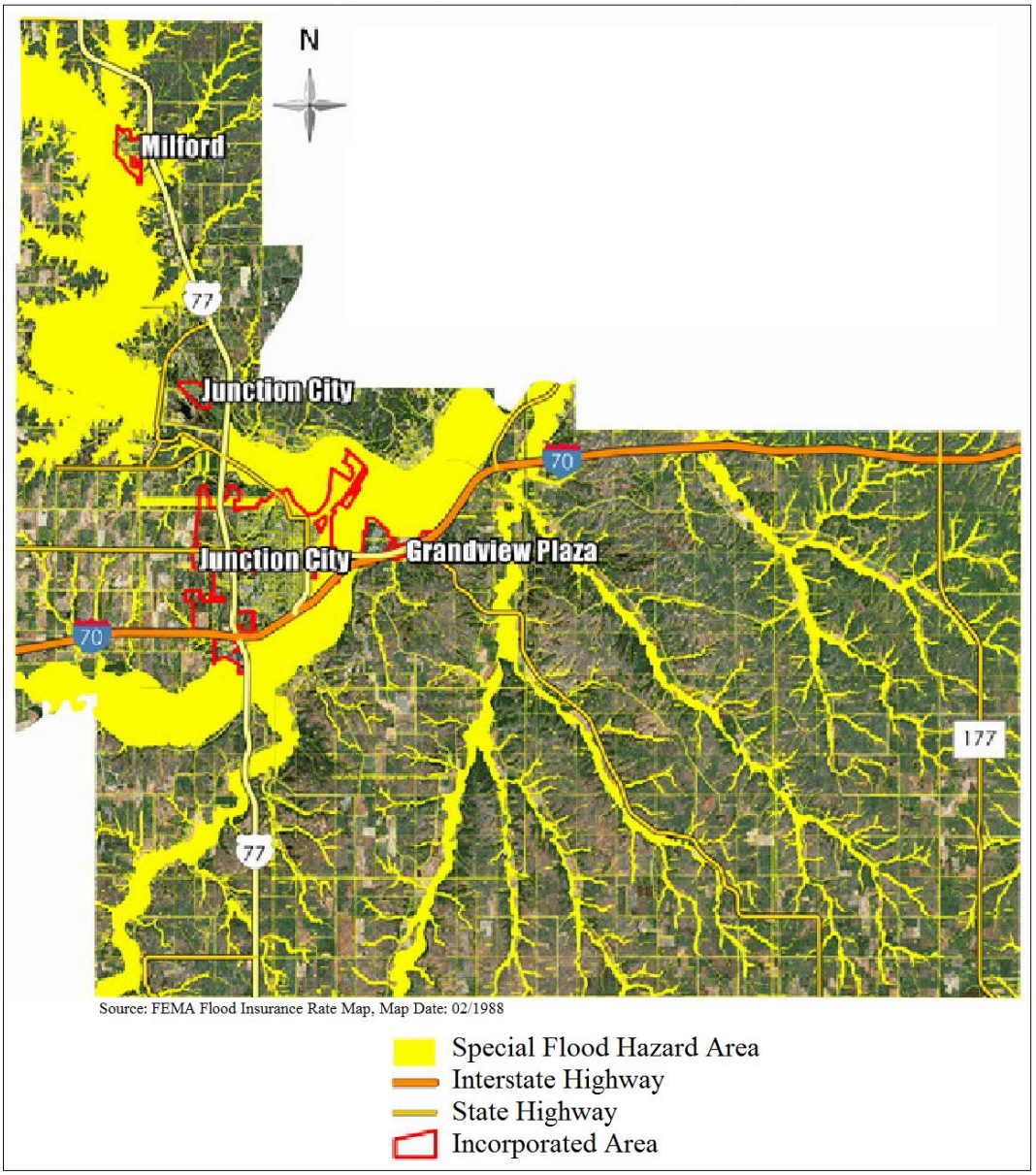
Strong City, Chase County FIRM



Source: State of Kansas

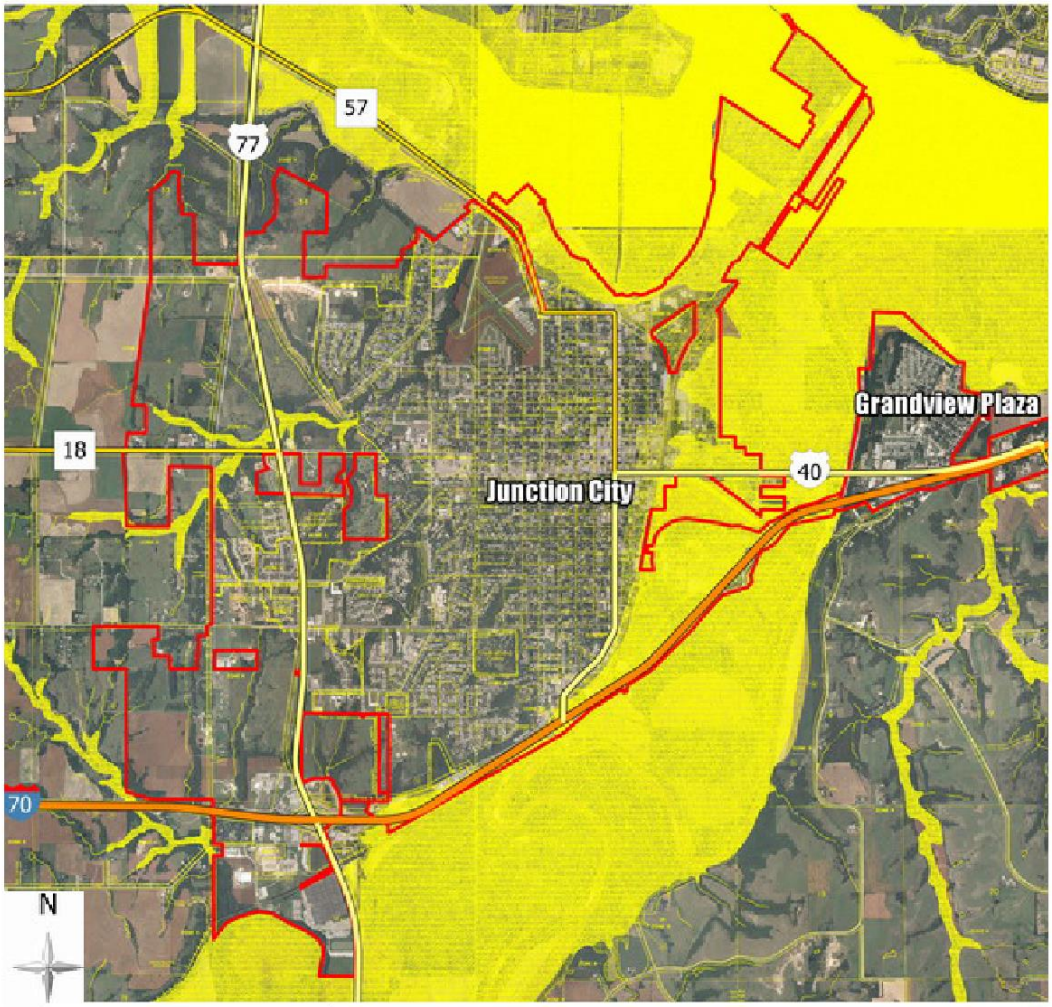
FEMA FIRM Image
Water Body

Geary County Flood Insurance Rate Map



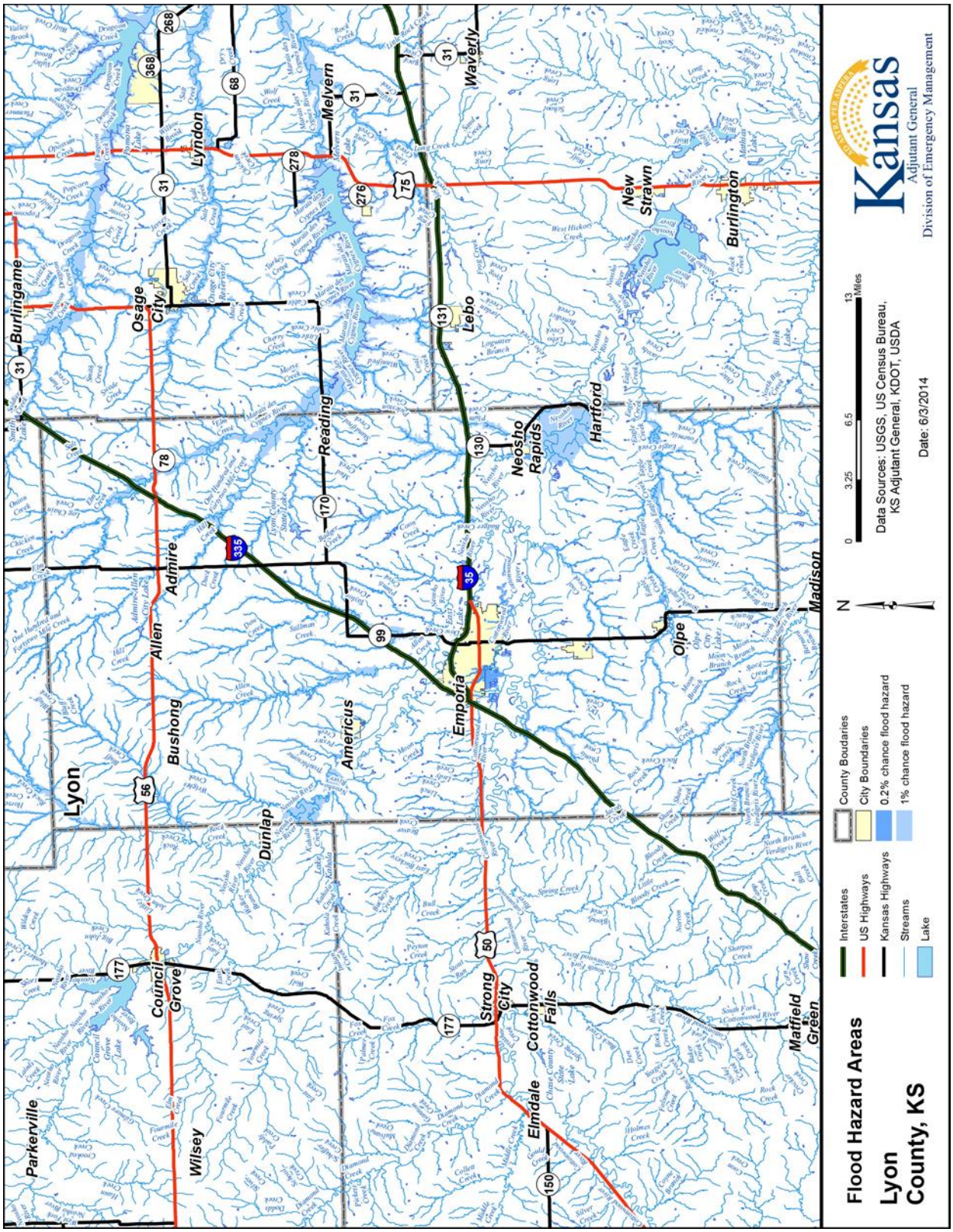
Source: FEMA Flood Insurance Rate Map, Map Date: 02/1988

Junction City, Geary County Flood Insurance Rate Map

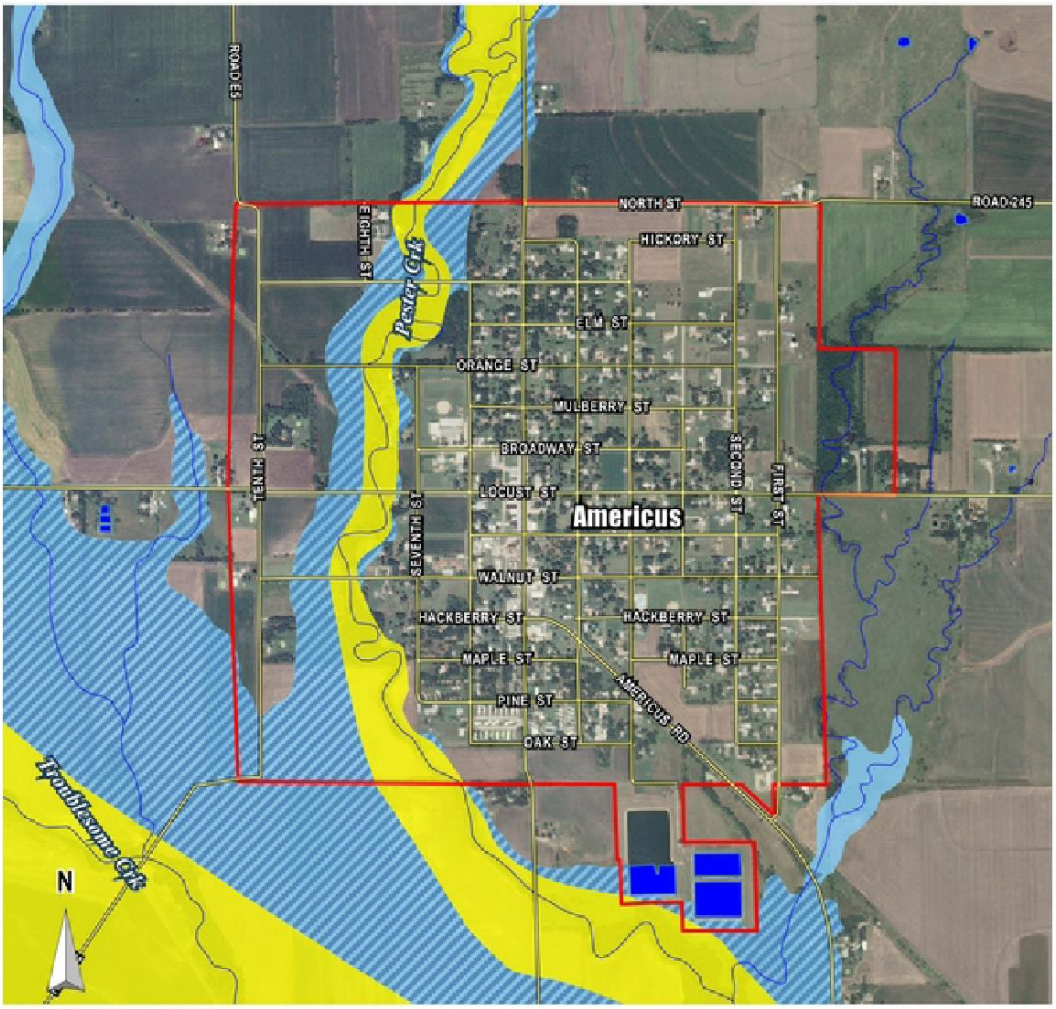


Source: FEMA FIRM, Map Date: 03/1987

Special Flood Hazard Area
Interstate Highway
State Highway
Incorporated Area


Flood Hazard Areas
Lyon County, KS
Interstates
US Highways
Kansas Highways
Streams
Lake
County Boudaries
City Boundaries
0.2% chance flood hazard
1% chance flood hazard
N
0
3.25
6.5
13
Miles
Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA
Date: 6/3/2014
Kansas
Adjutant General
Division of Emergency Management
Burlingame
Osage City
Lyndon
Melvern
Waverly
New Strawn
Burlington
Lebo
Reading
Neosho Rapids
Hartford
Admire
Allen
Bushong
Americus
Emporia
Olpe
Madison
Lyon
Dunlap
Council Grove
Strong City
Cottonwood Falls
Elmdale
Matfield Green
Parkerville
Wilsey

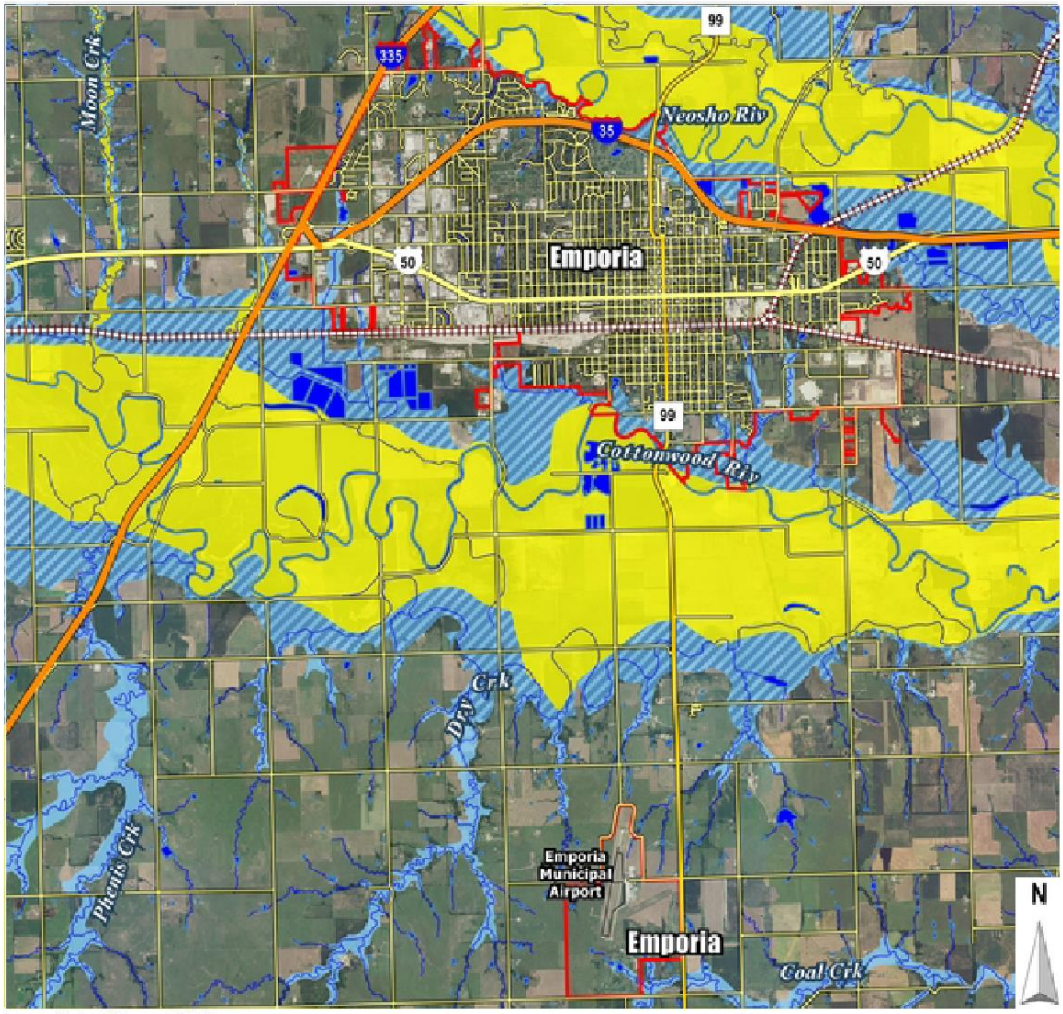
Americus, Lyon County Special Flood Hazard Area



Source: State of Kansas, FEMA

Highway
Incorporated Area
Water Body
Zone AE
Floodway in Zone AE
Zone A
Zone X Protected by Levee

Emporia, Lyon County Speical Flood Hazard Areas

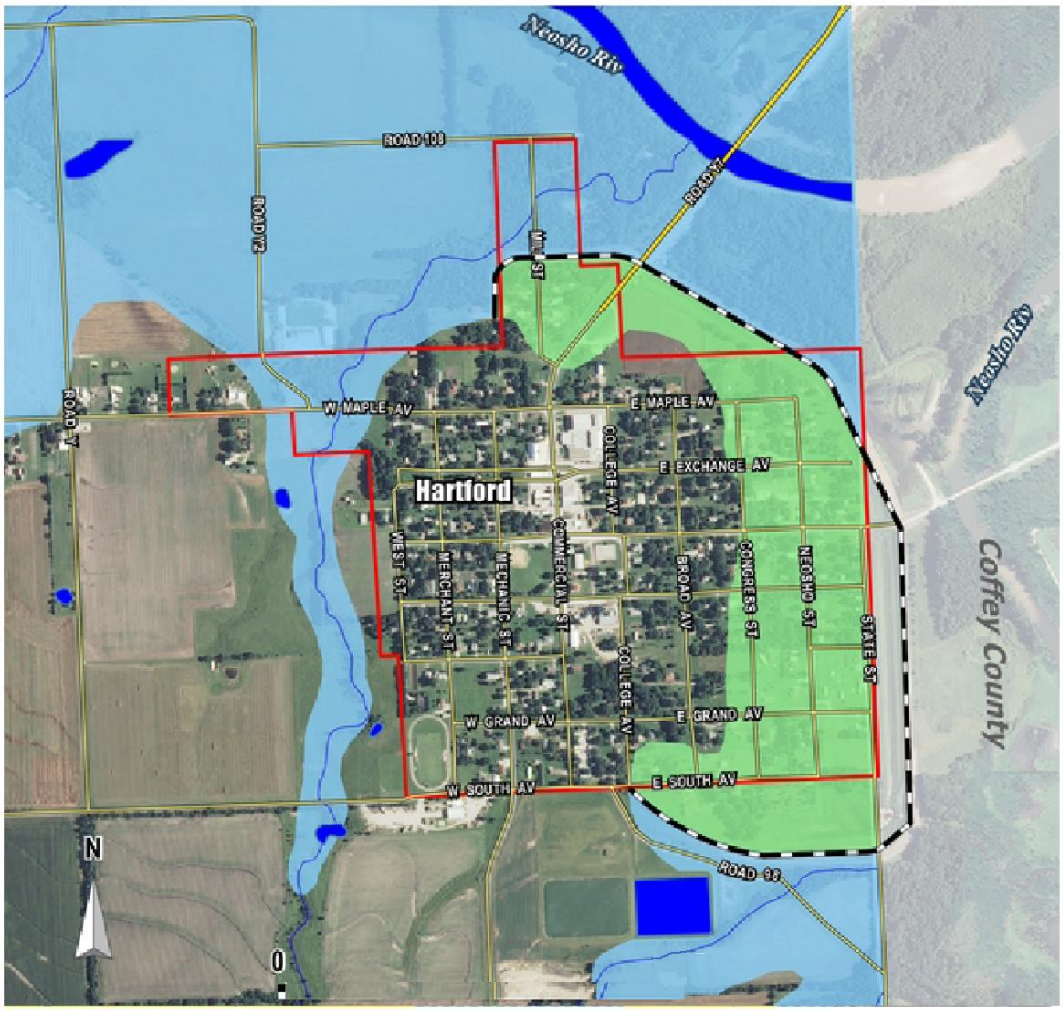


Source: State of Kansas, FEMA

Highway
Incorporated Area
Water Body

Zone AE
Floodway in Zone AE
Zone A
Zone X Protected by Levee

Hartford, Lyon County Special Flood Hazard Areas

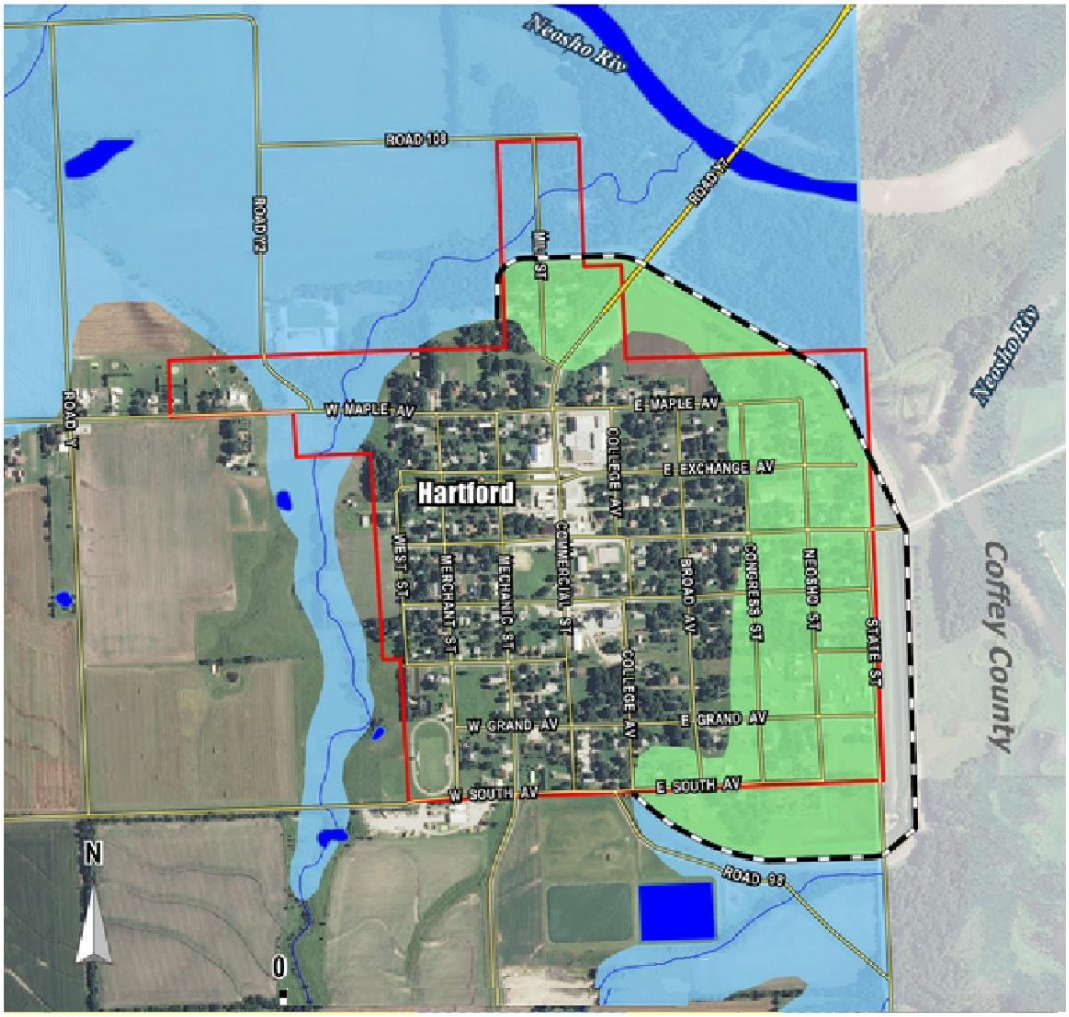


Source: State of Kansas, FEMA

Highway
Incorporated Area
Water Body

Zone AE
Floodway in Zone AE
Zone A
Zone X Protected by Levee

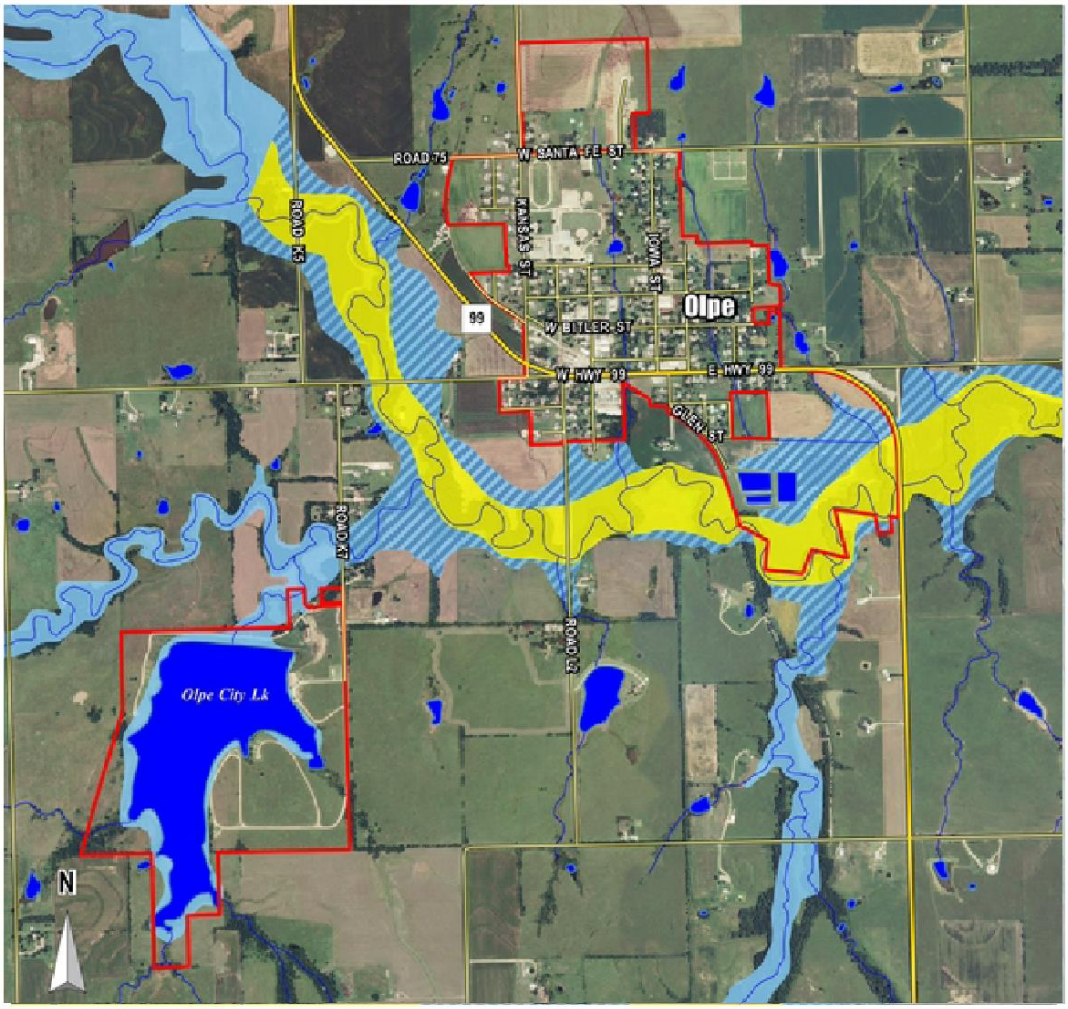
Hartford, Lyon County Special Flood Hazard Areas



Source: State of Kansas, FEMA

Railroad
Highway
Incorporated Area
Water Body
Zone AE
Floodway in Zone AE
Zone A
Zone X Protected by Levee

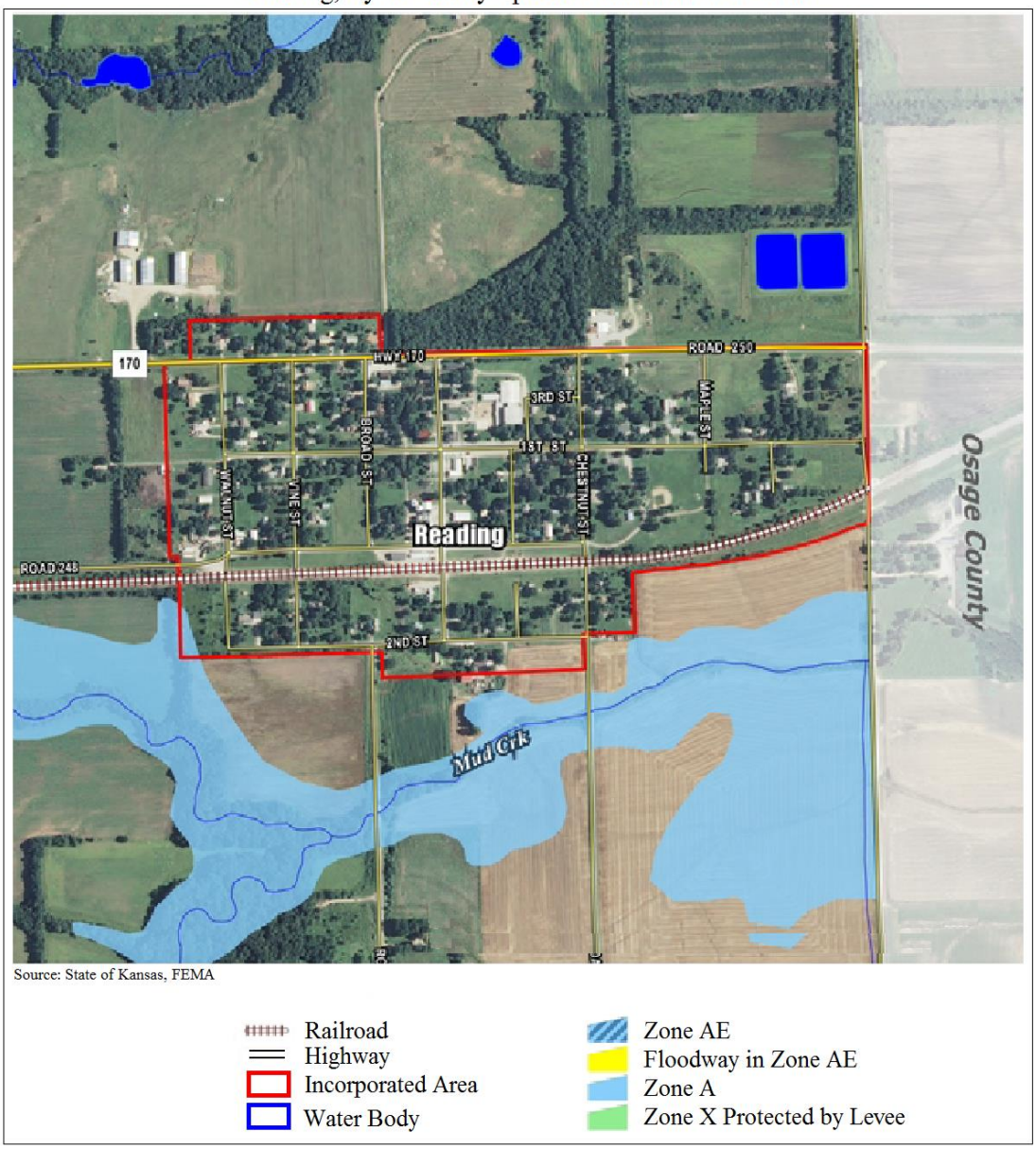
Olpe, Lyon County Special Flood Hazard Areas



Source: State of Kansas, FEMA

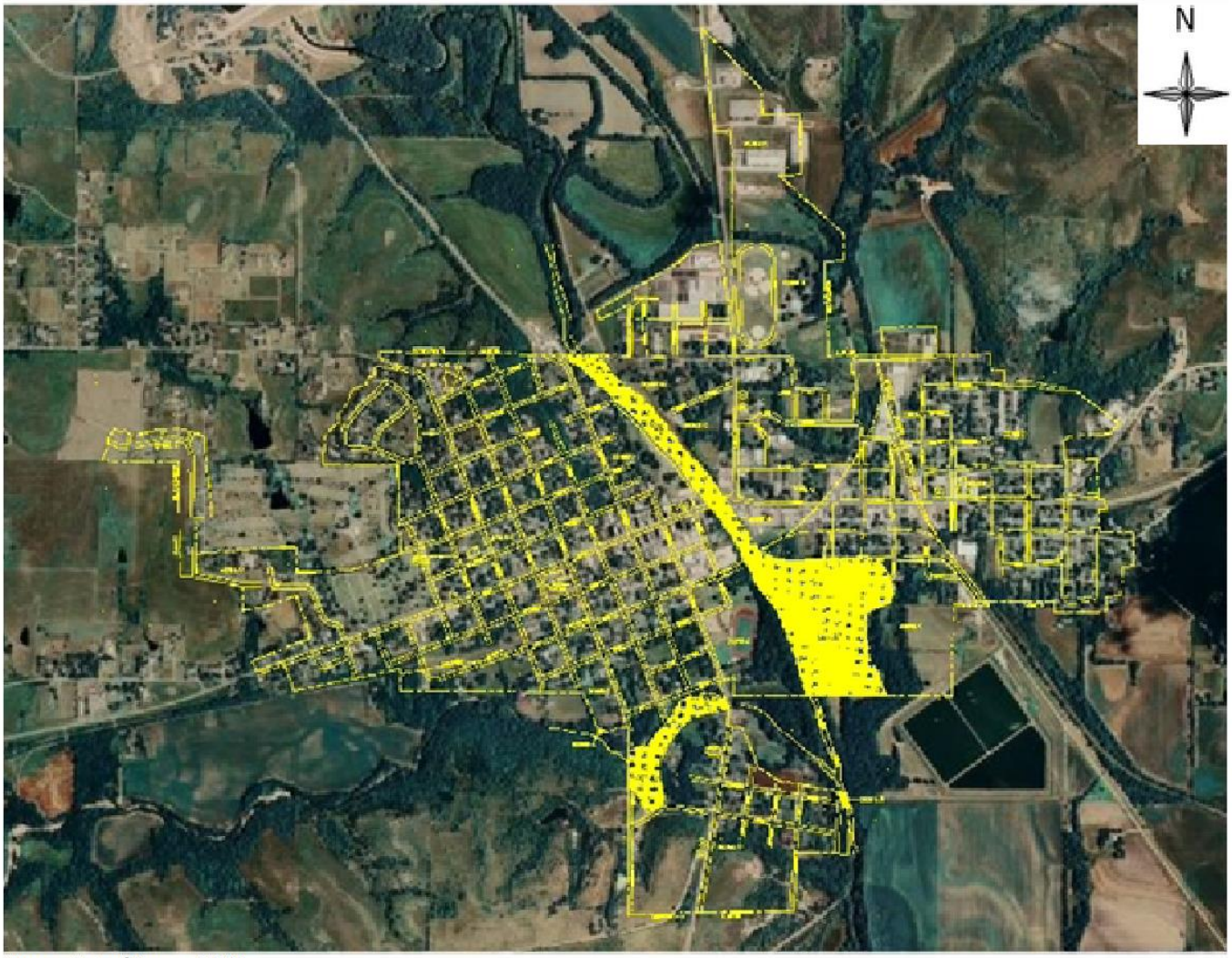
Railroad
Highway
Incorporated Area
Water Body
Zone AE
Floodway in Zone AE
Zone A
Zone X Protected by Levee

Reading, Lyon County Special Flood Hazard Areas



Source: State of Kansas, FEMA

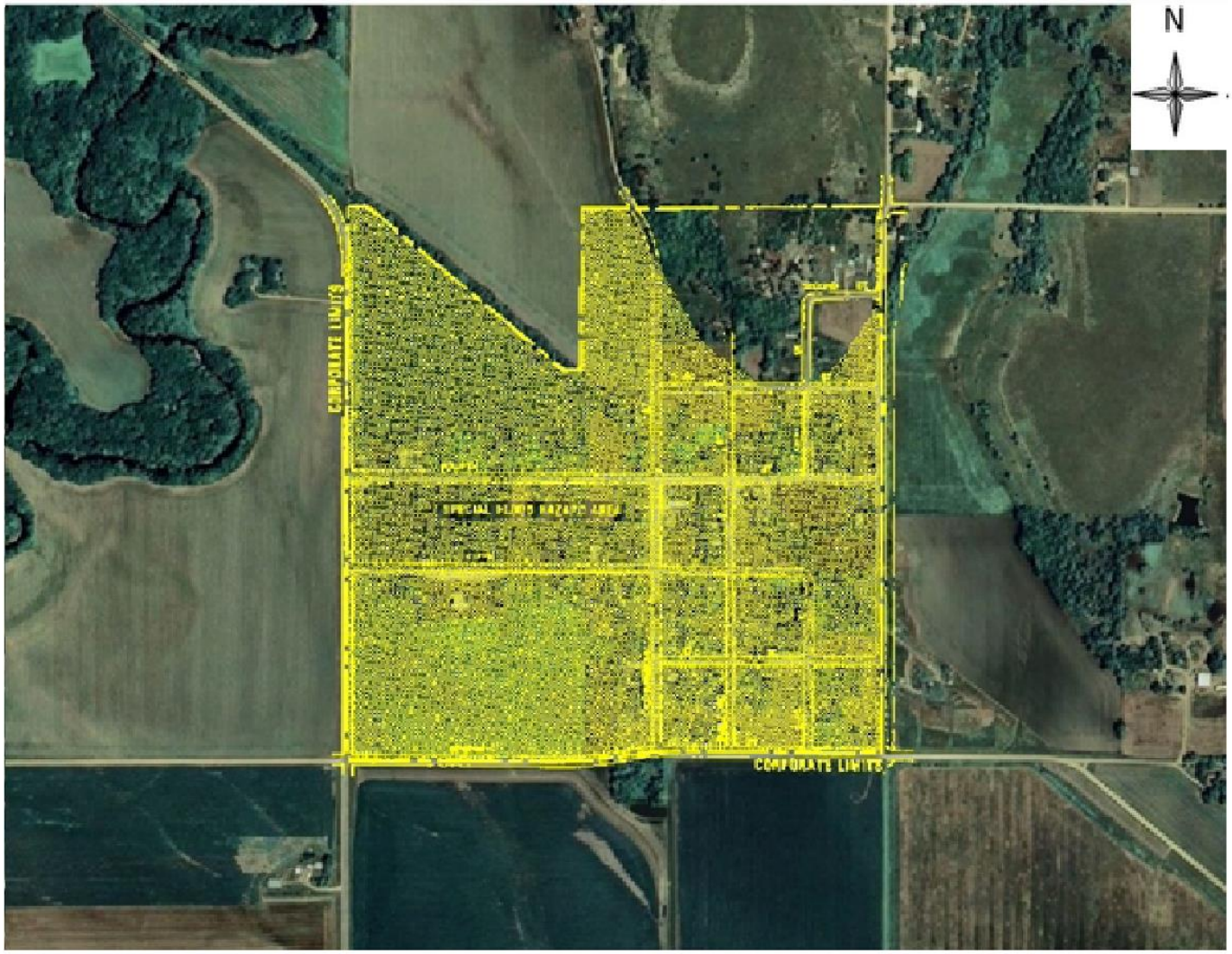
Council Grove, Morris County Flood Insurance Rate Map



Source: State of Kansas, FEMA

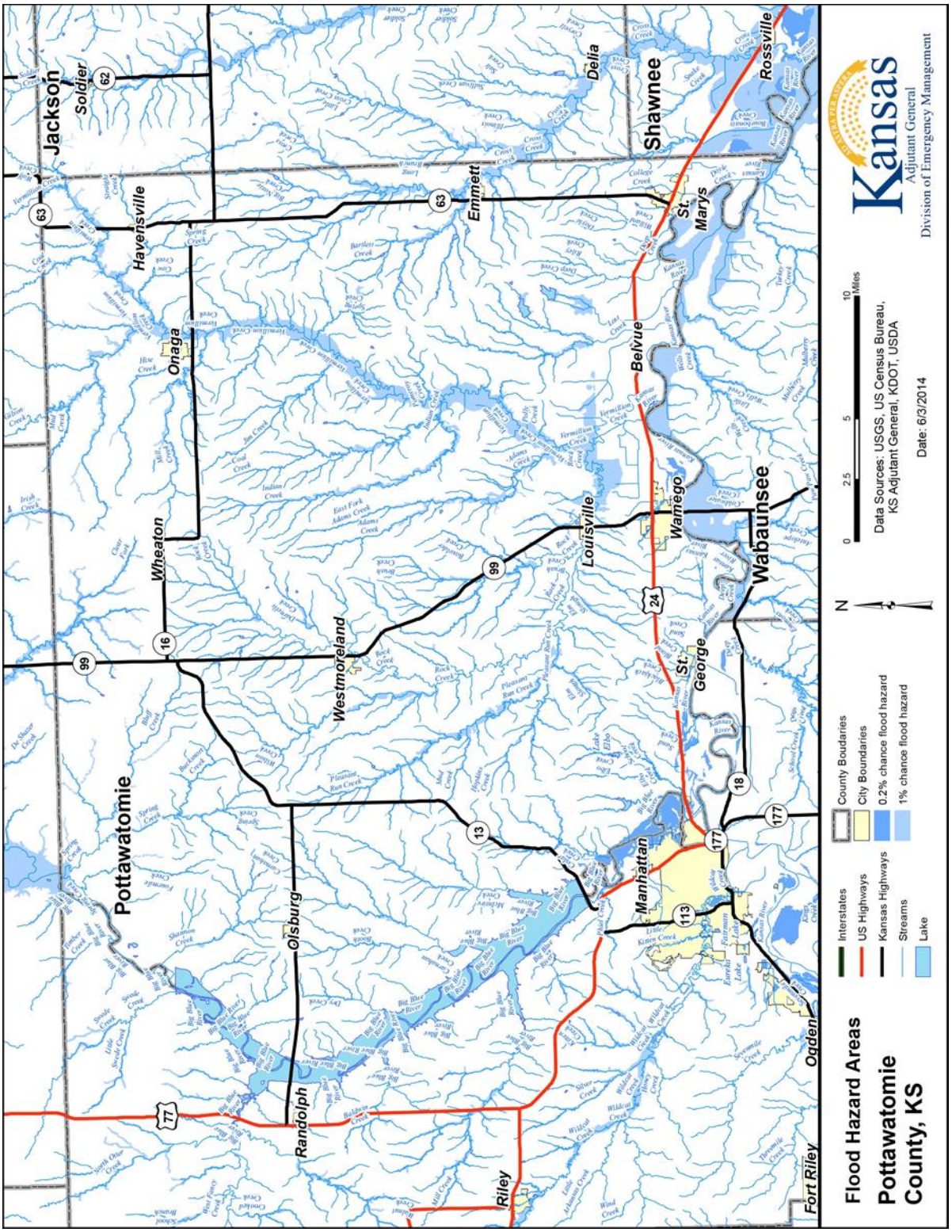
Special Flood Hazard Area

Dunlap, Morris County Flood Hazard Boundary Map

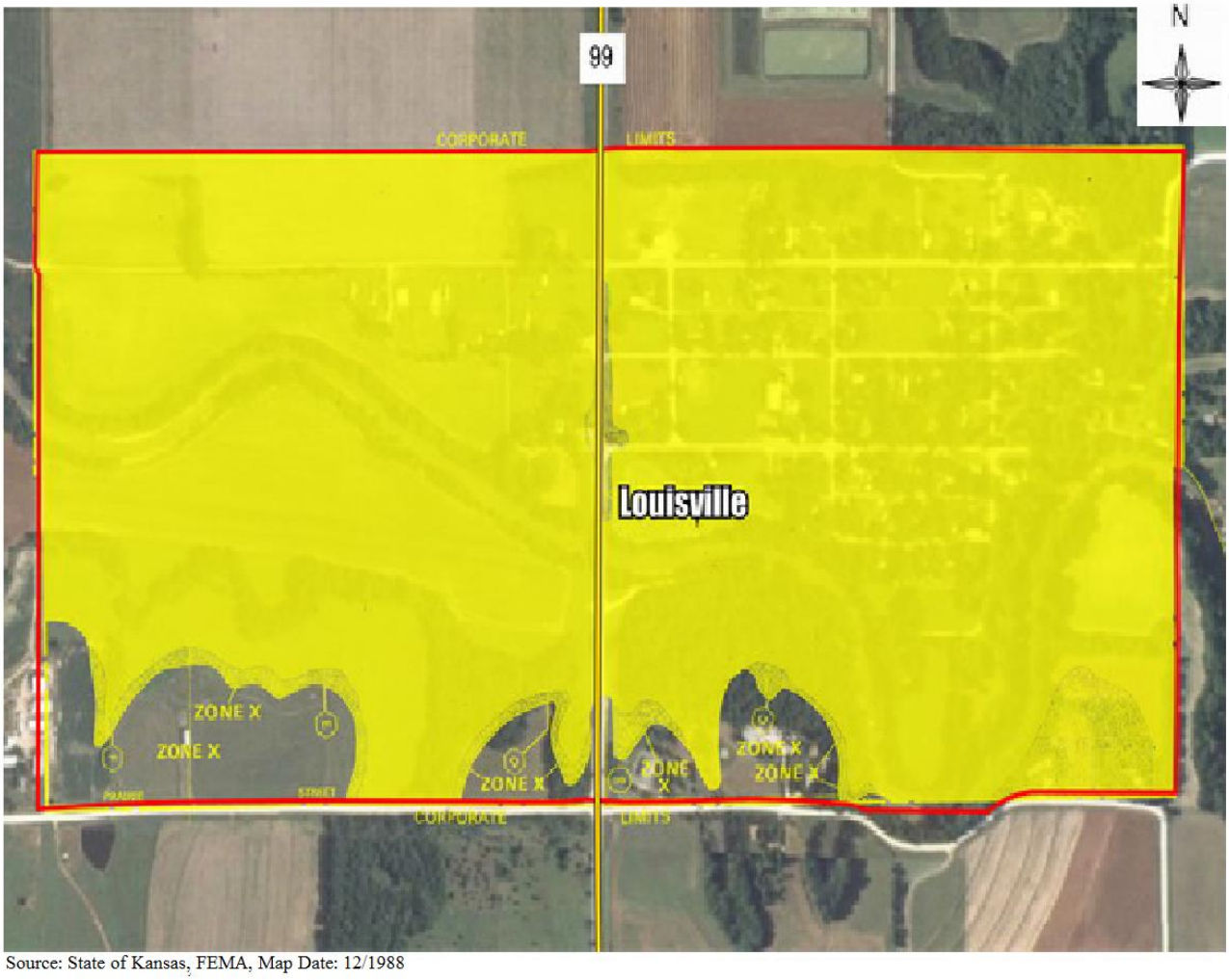


Source: State of Kansas, FEMA

Special Flood Hazard Area


Flood Hazard Areas
Pottawatomie County, KS
Interstates
US Highways
Kansas Highways
Streams
Lake
County Boudaries
City Boundaries
0.2% chance flood hazard
1% chance flood hazard
N
0 2.5 5 10 Miles
Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA
Date: 6/3/2014
Kansas
Adjutant General
Division of Emergency Management
Jackson
Soldier
Havensville
Onaga
Wheaton
Westmoreland
Olsburg
Randolph
Pottawatomie
Riley
Fort Riley
Ogden
Manhattan
Louisville
Emmett
Delia
Belvue
Wamego
St. George
St. Marys
Shawnee
Wabaunsee
Rossville

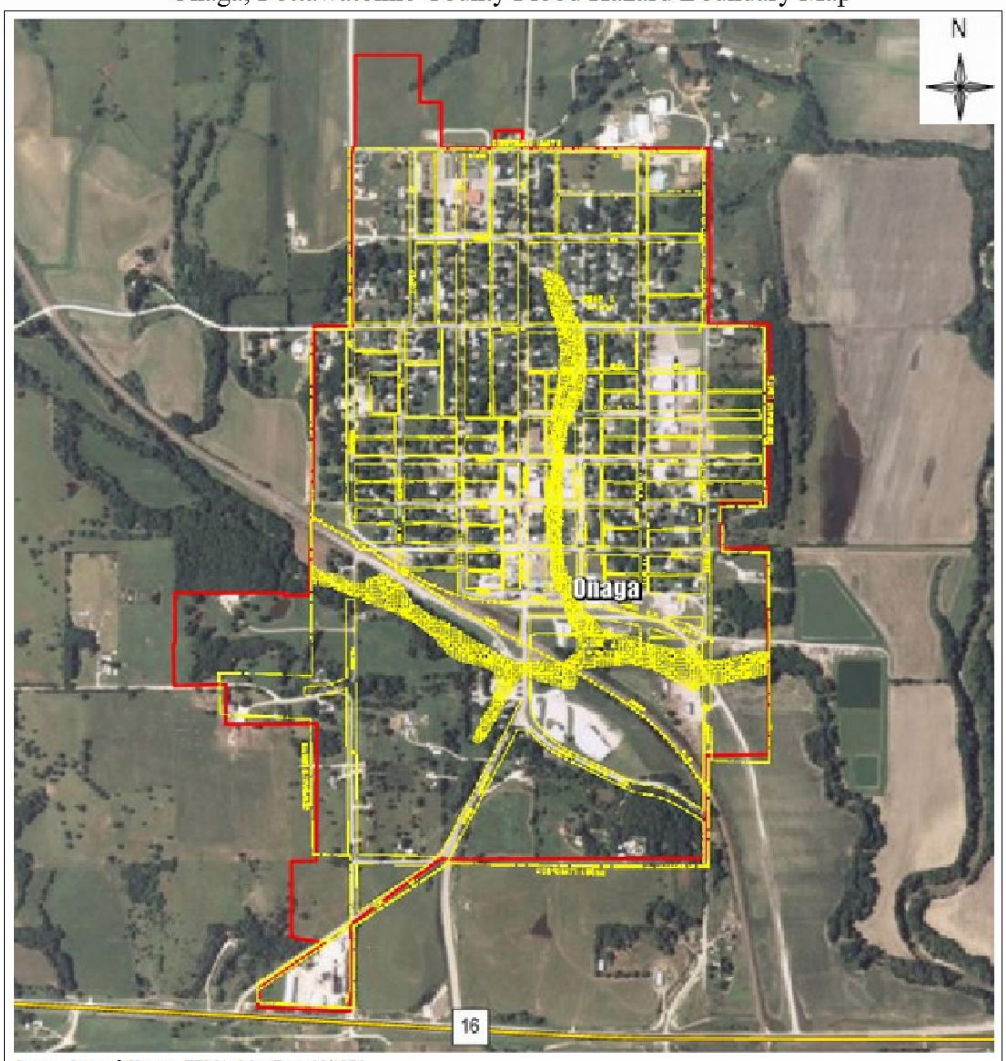
Louisville, Pottawatomie County Flood Insurance Rate Map



Source: State of Kansas, FEMA, Map Date: 12/1988

Special Flood Hazard Area
Highway
Incorporated Area

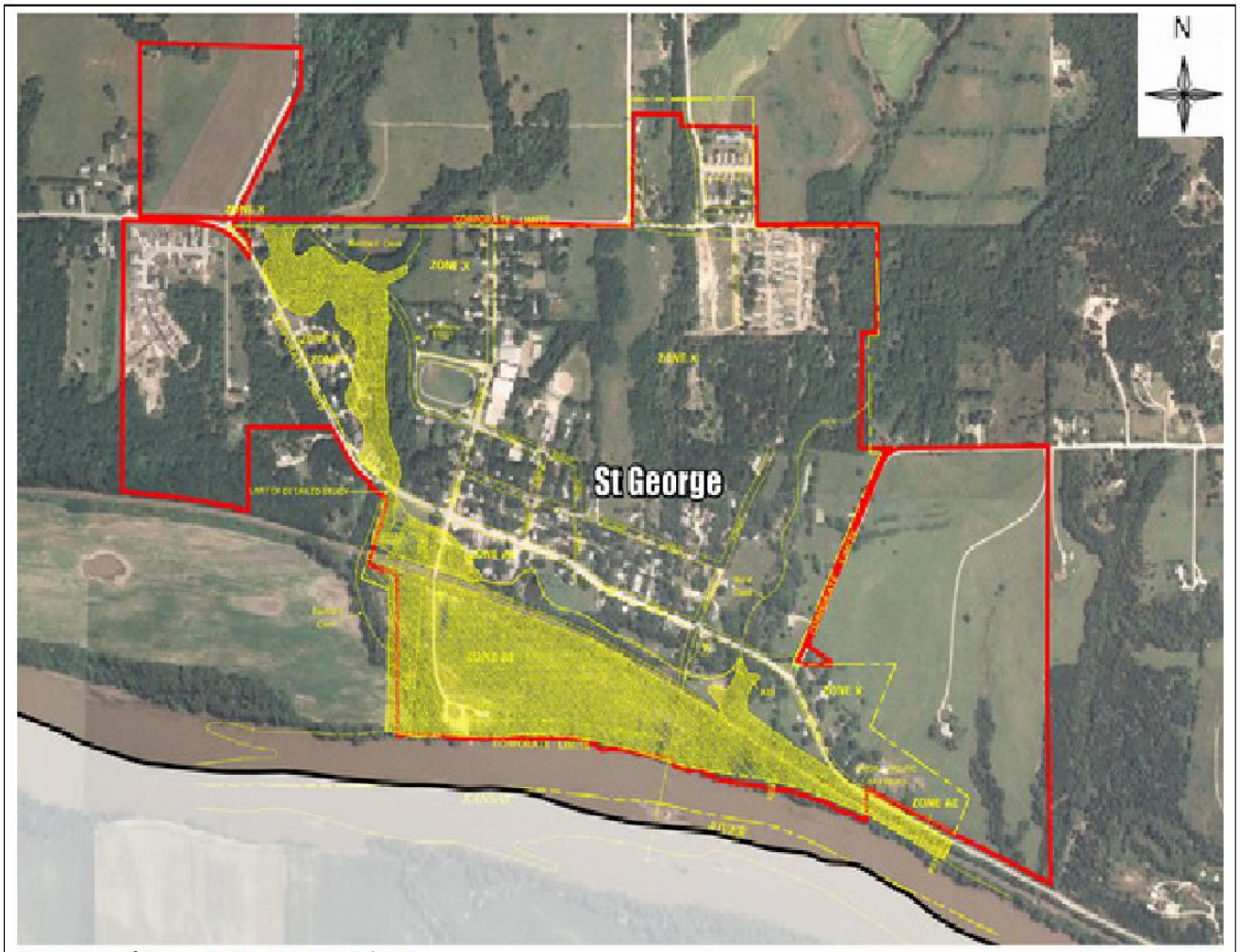
Onaga, Pottawatomie County Flood Hazard Boundary Map



Source: State of Kansas, FEMA, Map Date: 08/1976

Special Flood Hazard Area
Highway
Incorporated Area

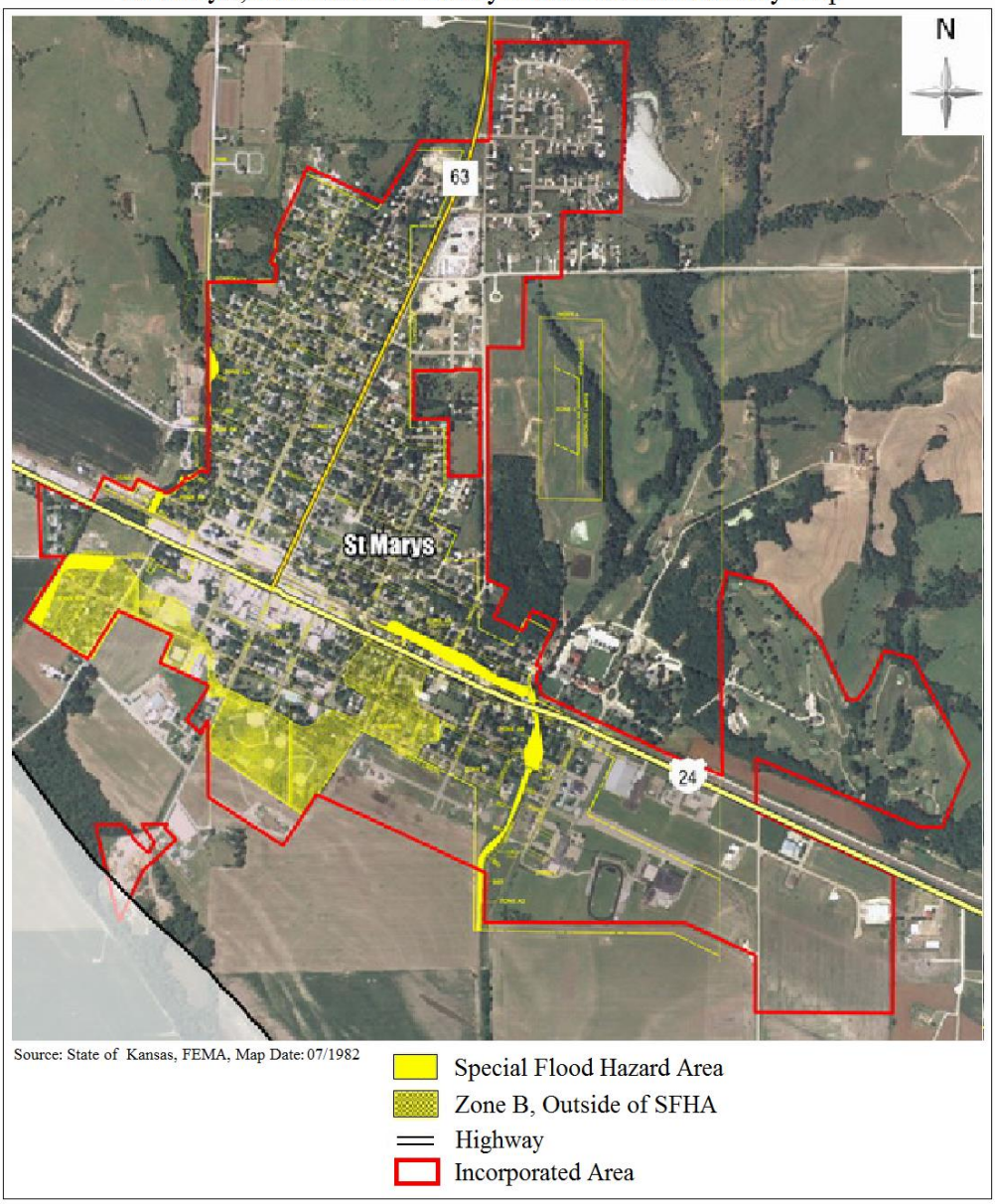
St. George , Pottawatomie County Flood Insurance Rate Map



Source: State of Kansas, FEMA, Map Date: 02/1988

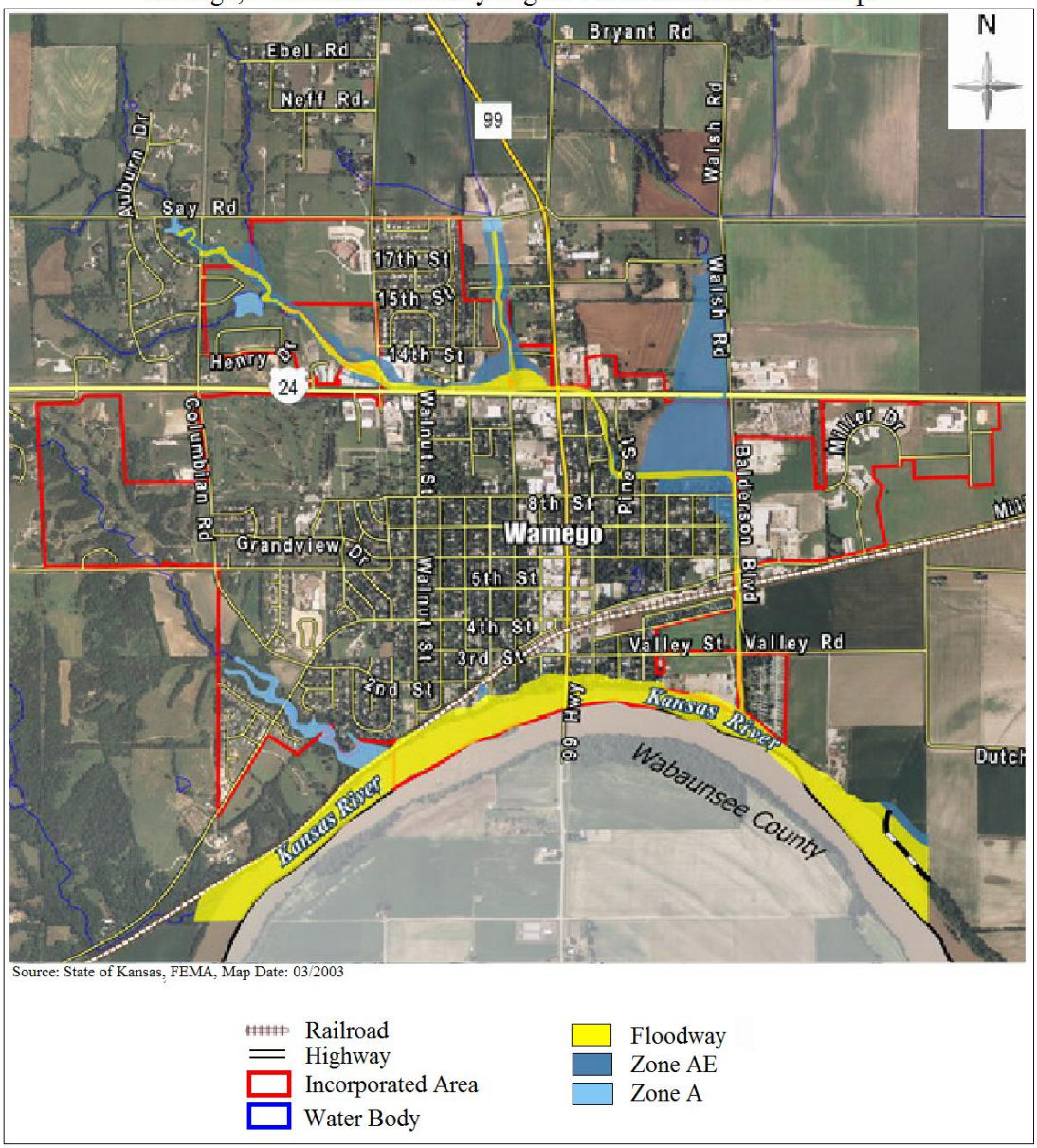
Special Flood Hazard Area
Highway
Incorporated Area

St. Mary's , Pottawatomie County Flood Hazard Boundary Map



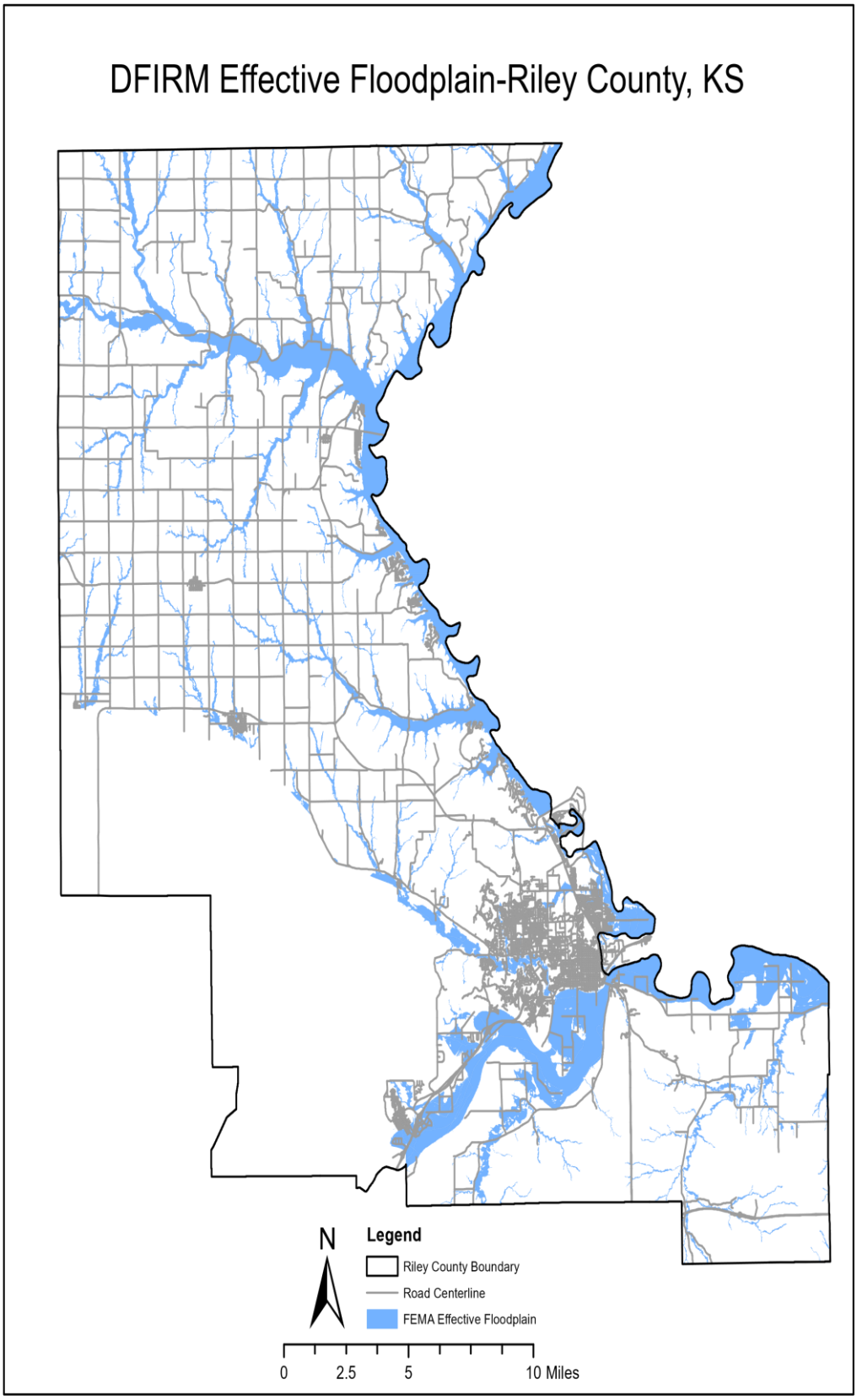
Source: State of Kansas, FEMA, Map Date: 07/1982

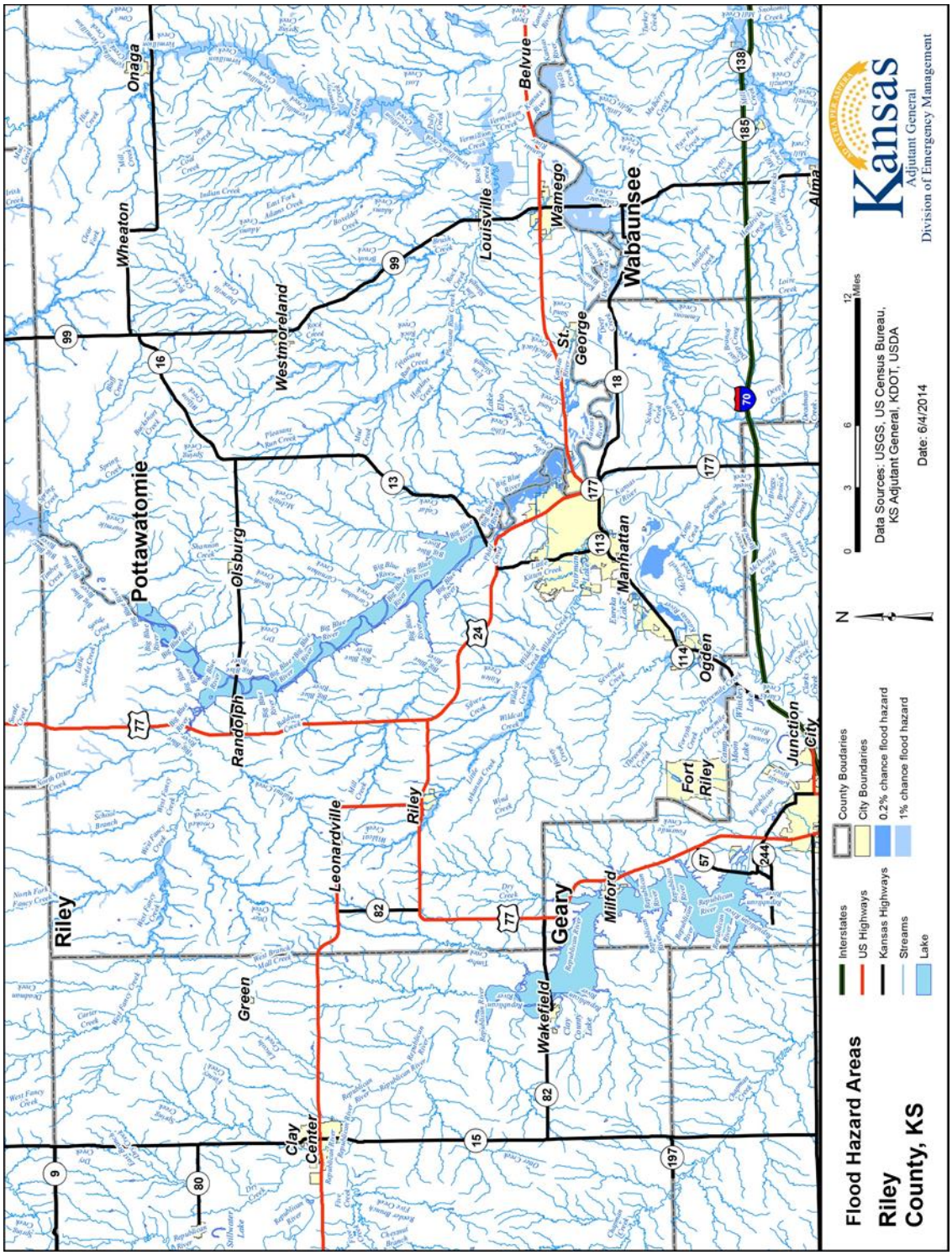
Wamego, Pottawatomie County Digital Flood Insurance Rate Map



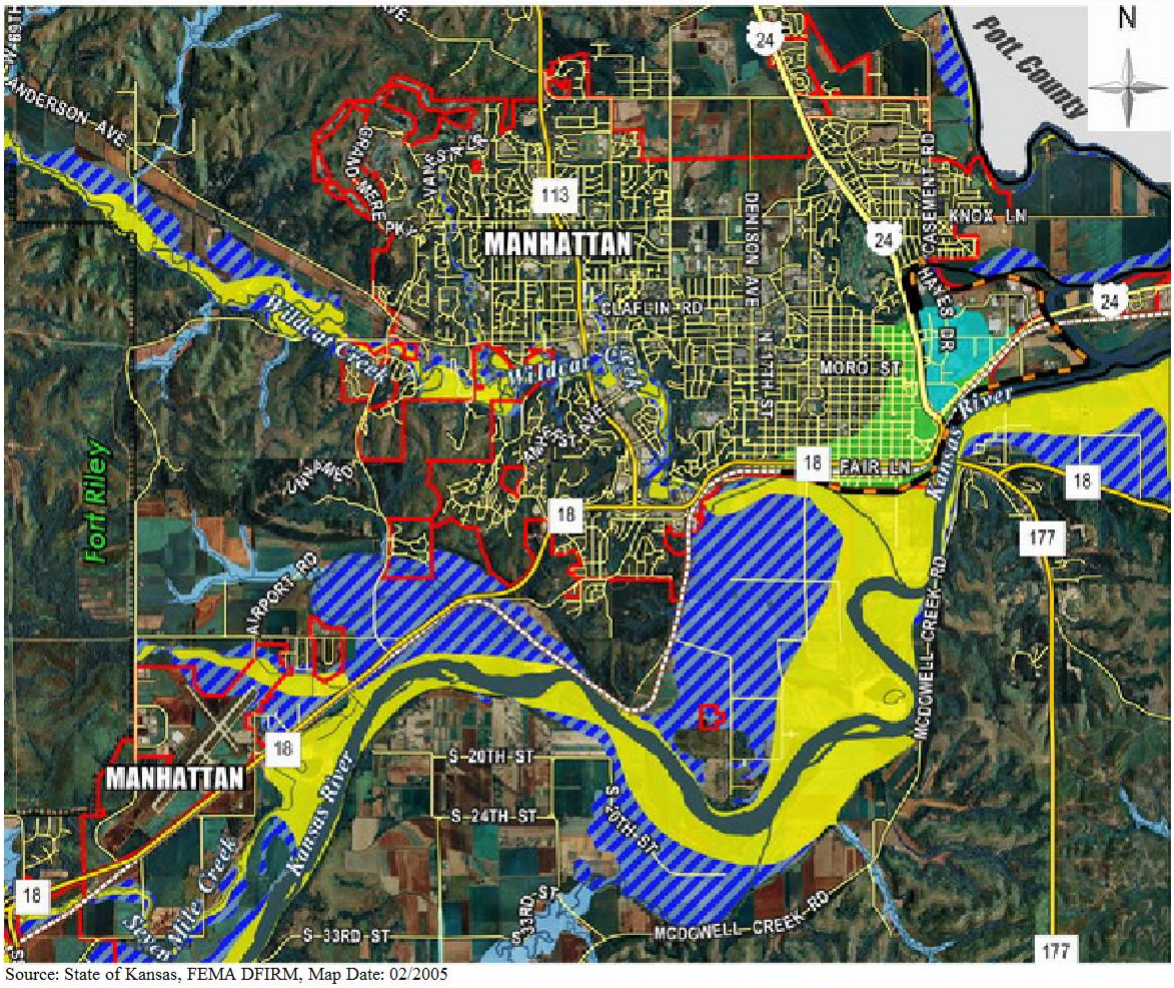
Source: State of Kansas, FEMA, Map Date: 03/2003

Railroad
Highway
Incorporated Area
Water Body
Floodway
Zone AE
Zone A


DFIRM Effective Floodplain-Riley County, KS
N
Legend
Riley County Boundary
Road Centerline
FEMA Effective Floodplain
0
2.5
5
10 Miles


Flood Hazard Areas
Riley County, KS
Interstates
US Highways
Kansas Highways
Streams
Lake
County Boudaries
City Boundaries
0.2% chance flood hazard
1% chance flood hazard
N
0 3 6 12 Miles
Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA
Date: 6/4/2014
Kansas
Adjutant General
Division of Emergency Management
Riley
Green
Clay Center
Wakefield
Geary
Milford
Leonardville
Riley
Randolph
Olsburg
Pottawatomie
Westmoreland
Wheaton
Onaga
Louisville
Belvue
Wamego
St. George
Wabaunsee
Manhattan
Ogden
Fort Riley
Junction City
Alma

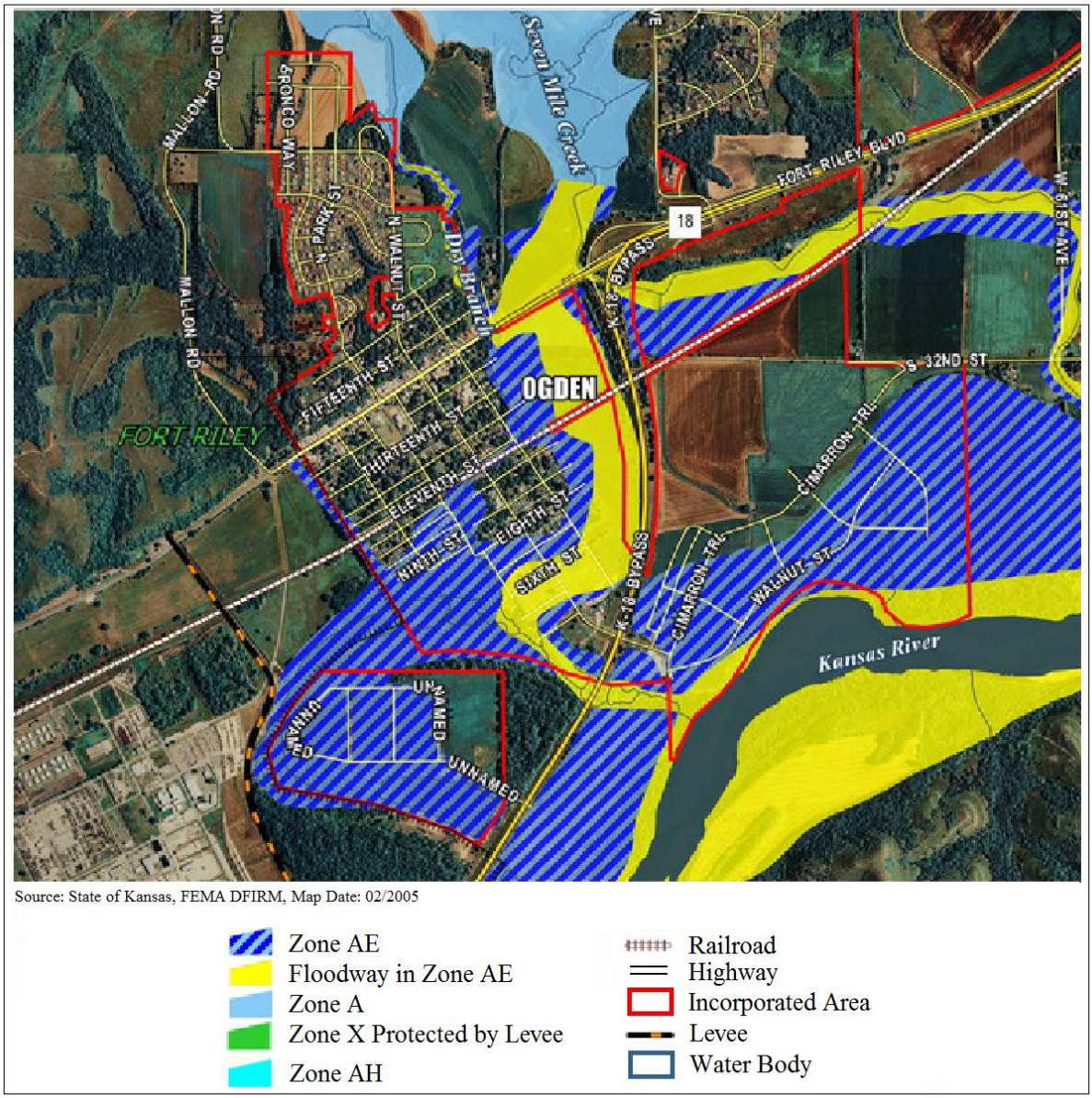
Manhattan, Riley County Digital Flood Insurance Rate Map



Source: State of Kansas, FEMA DFIRM, Map Date: 02/2005

- Zone AE
- Floodway in Zone AE
- Zone A
- Zone X Protected by Levee
- Zone AH
- Railroad
- Highway
- Incorporated Area
- Levee
- Water Body

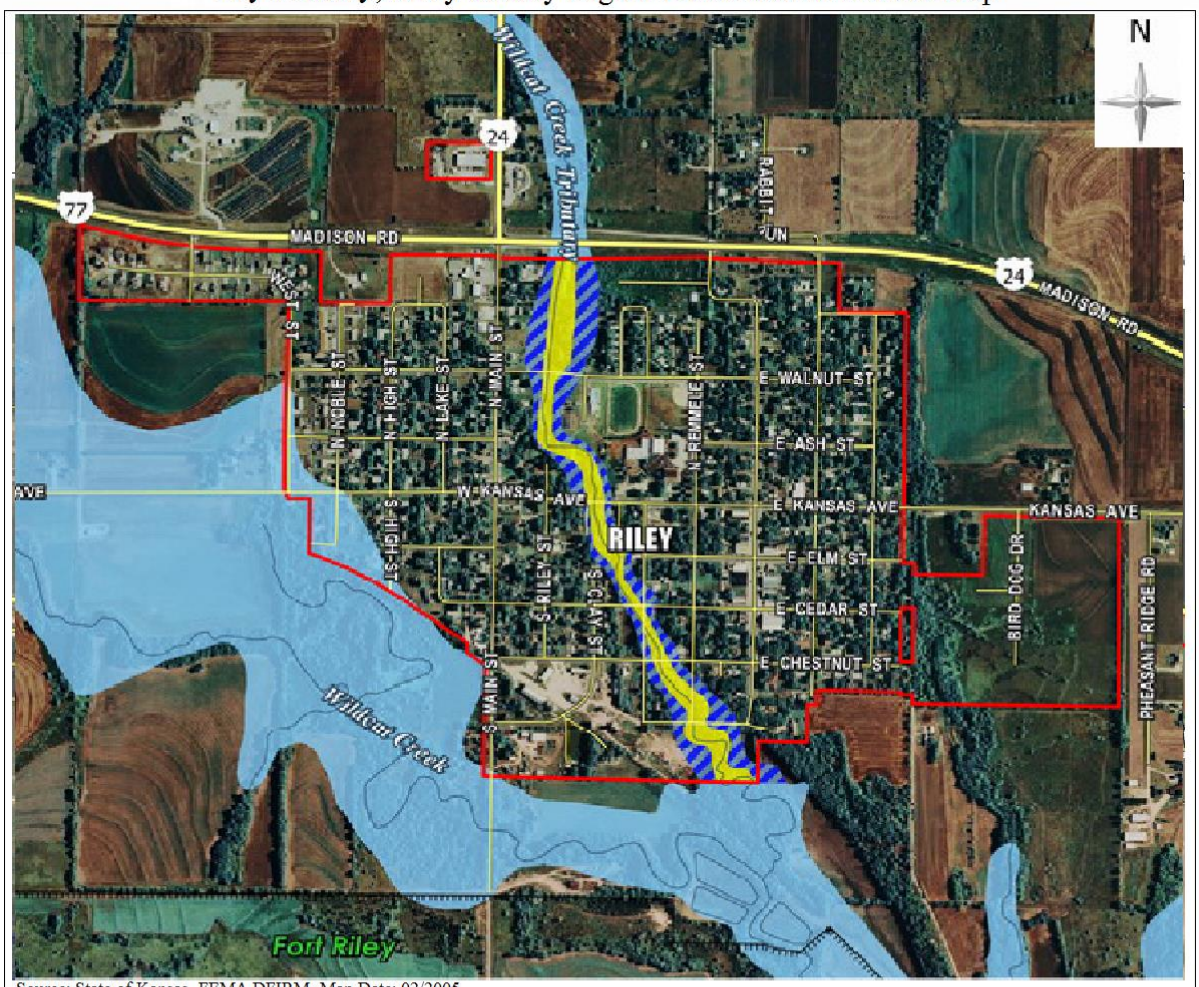
Ogden, Riley County Digital Flood Insurance Rate Map



Source: State of Kansas, FEMA DFIRM, Map Date: 02/2005

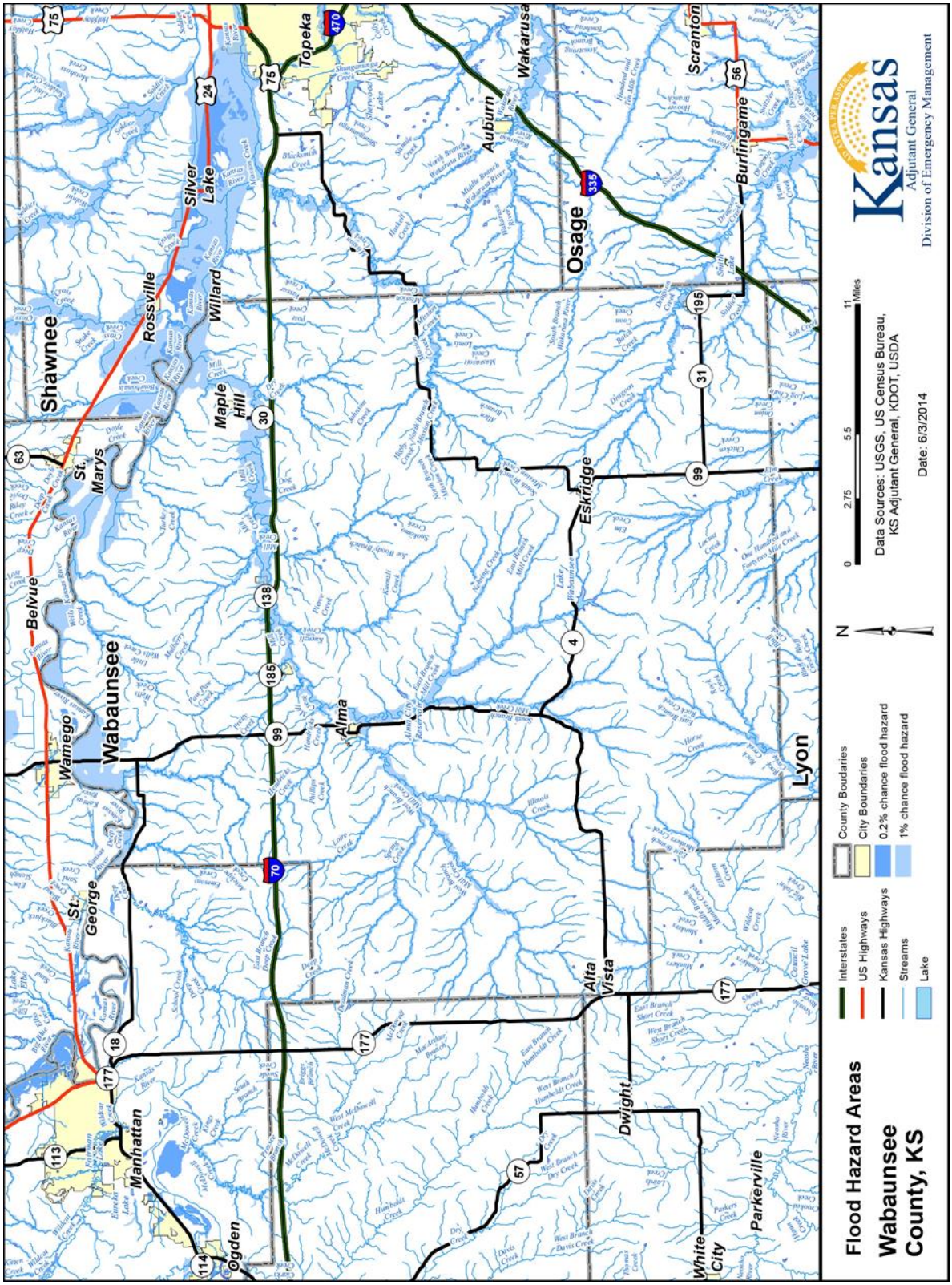
- Zone AE
- Floodway in Zone AE
- Zone A
- Zone X Protected by Levee
- Zone AH
- Railroad
- Highway
- Incorporated Area
- Levee
- Water Body

City of Riley, Riley County Digital Flood Insurance Rate Map



Source: State of Kansas, FEMA DFIRM, Map Date: 02/2005

- Zone AE
- Floodway in Zone AE
- Zone A
- Zone X Protected by Levee
- Zone AH
- Railroad
- Highway
- Incorporated Area
- Levee
- Water Body

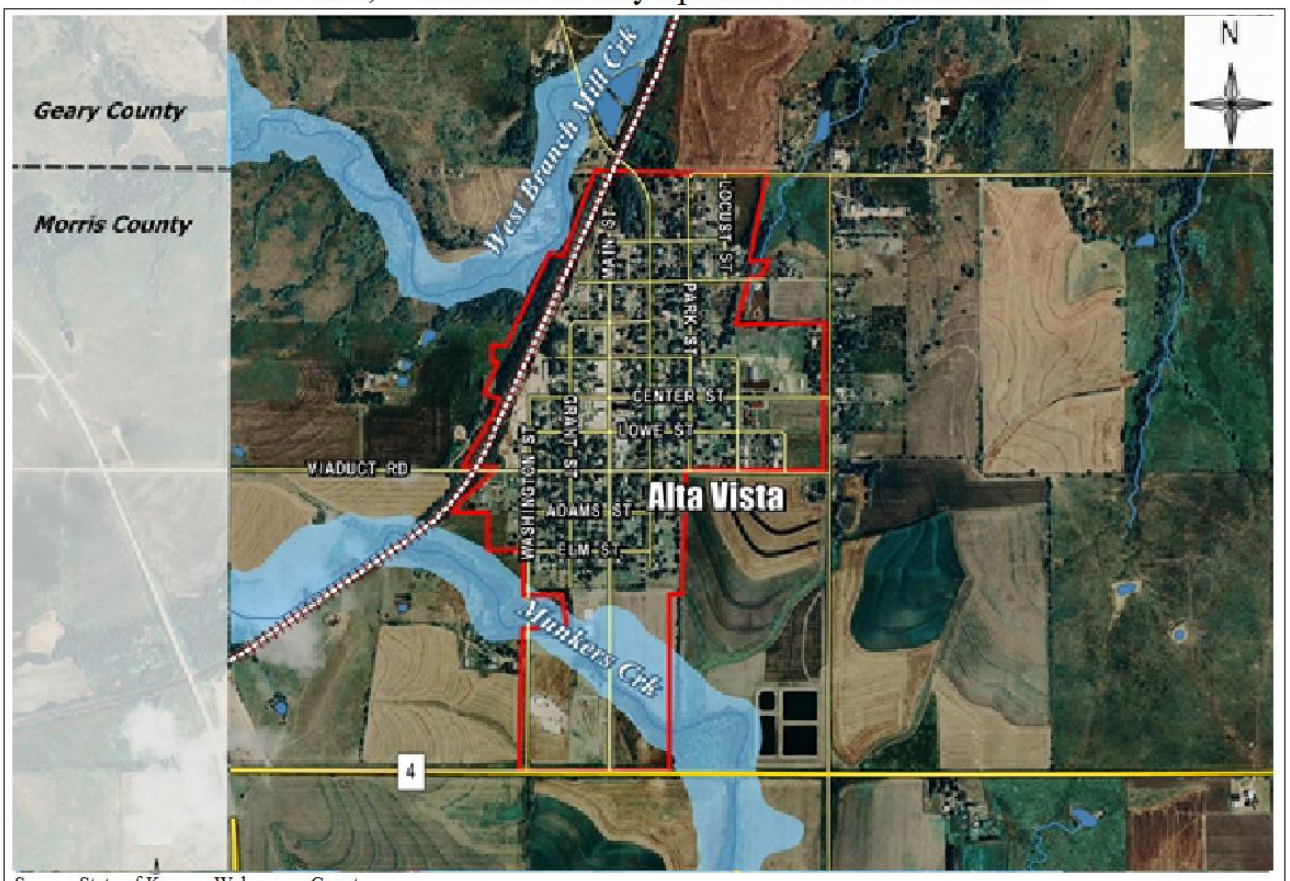

Flood Hazard Areas
Wabaunsee County, KS
Interstates
US Highways
Kansas Highways
Streams
Lake
County Boudaries
City Boundaries
0.2% chance flood hazard
1% chance flood hazard
N
0
2.75
5.5
11
Miles
Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA
Date: 6/3/2014
Kansas
Adjutant General
Division of Emergency Management
Topeka
Shawnee
Rossville
Silver Lake
Willard
Maple Hill
St. Marys
Belvue
Wamego
Wabaunsee
St. George
Manhattan
Ogden
Alma
Eskridge
Alta Vista
Dwight
White City
Parkerville
Lyon
Osage
Auburn
Wakarusa
Burlingame
Scranton

Alma, Wabaunsee County Special Flood Hazard Areas

Source: State of Kansas, Wabaunsee County

Railroad
Highway
Incorporated Area
Zone A
Water Body

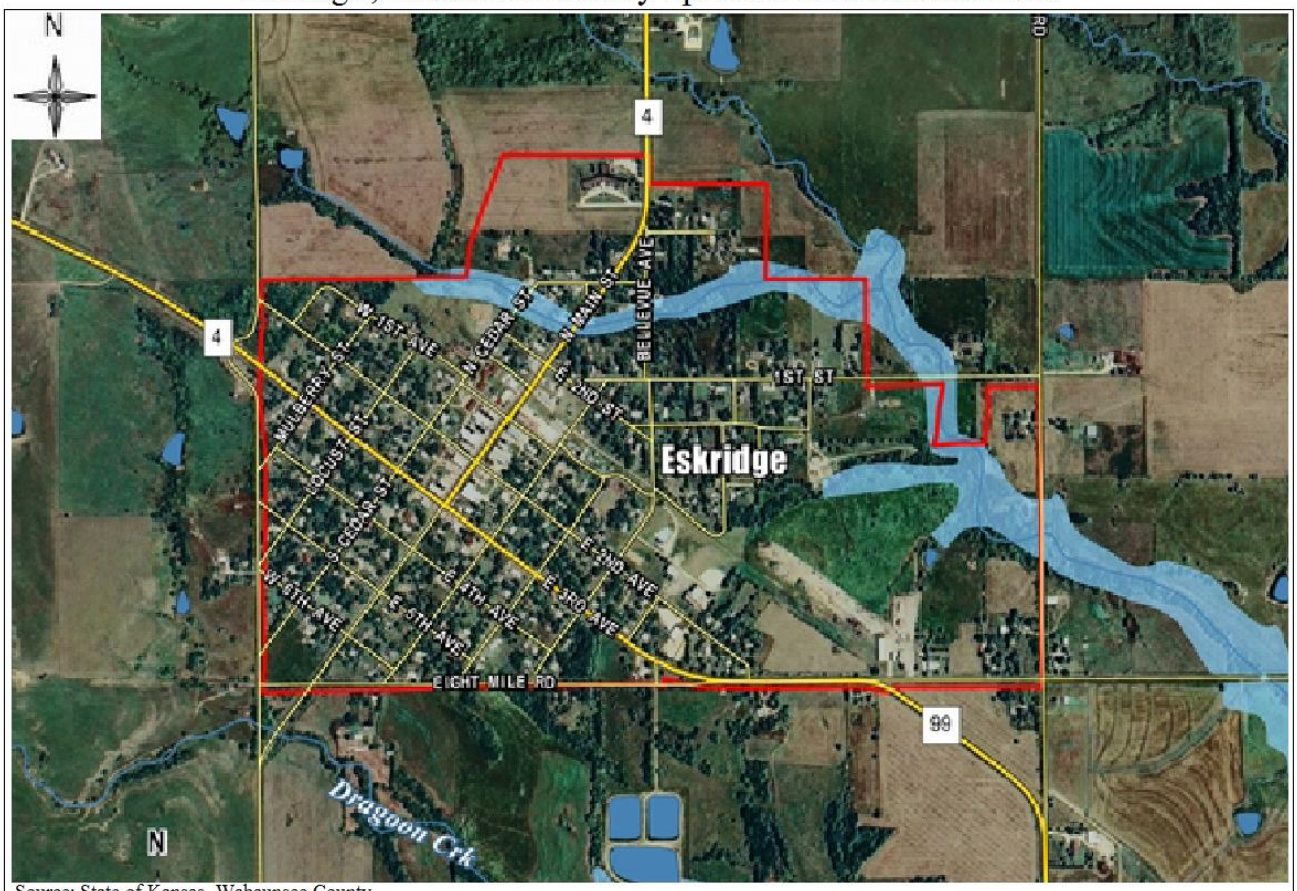
Alta Vista , Wabaunsee County Special Flood Hazard Areas



Source: State of Kansas, Wabaunsee County

Railroad
Highway
Incorporated Area
Zone A
Water Body

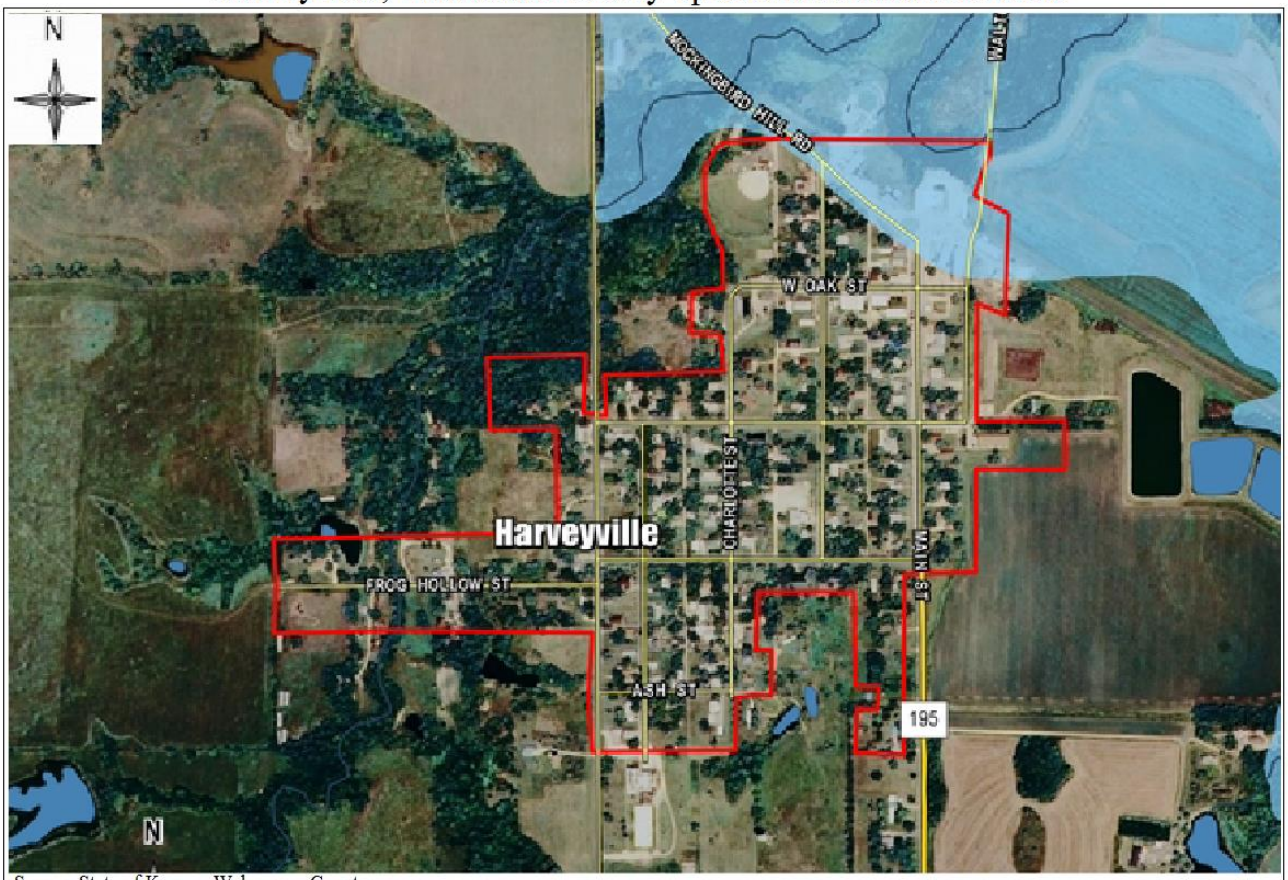
Eskridge , Wabaunsee County Special Flood Hazard Areas



Source: State of Kansas, Wabaunsee County

Railroad
Highway
Incorporated Area
Zone A
Water Body

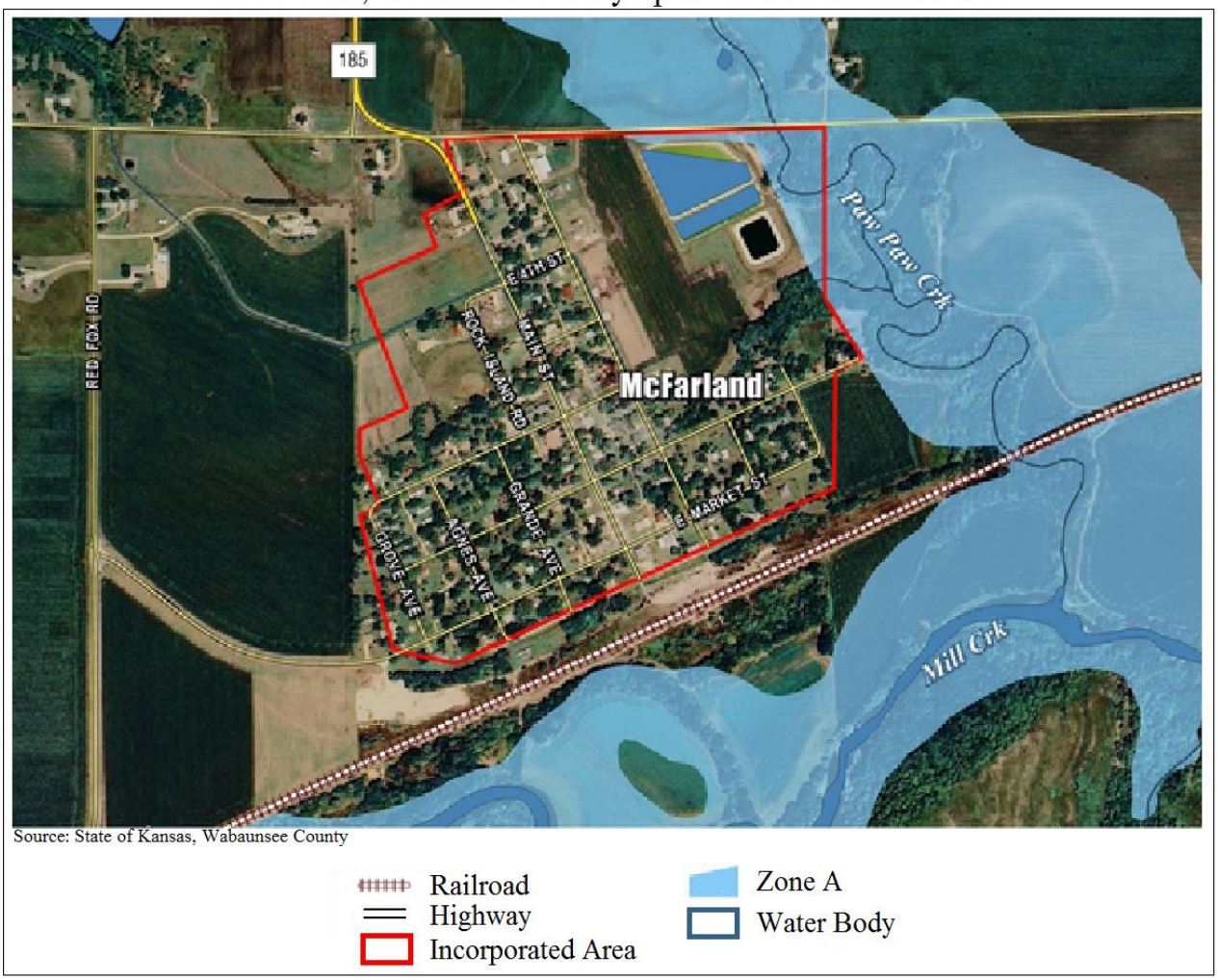
Harveyville, Wabaunsee County Special Flood Hazard Areas



Source: State of Kansas, Wabaunsee County

Railroad
Highway
Incorporated Area
Zone A
Water Body

McFarland, Wabaunsee County Special Flood Hazard Areas



Source: State of Kansas, Wabaunsee County

Railroad
Highway
Incorporated Area
Zone A
Water Body

Paxico, Wabaunsee County Special Flood Hazard Areas

Source: State of Kansas, Wabaunsee County

Railroad
Highway
Incorporated Area
Zone A
Water Body

Local Concerns

The following detail specific local concerns as related to flooding:

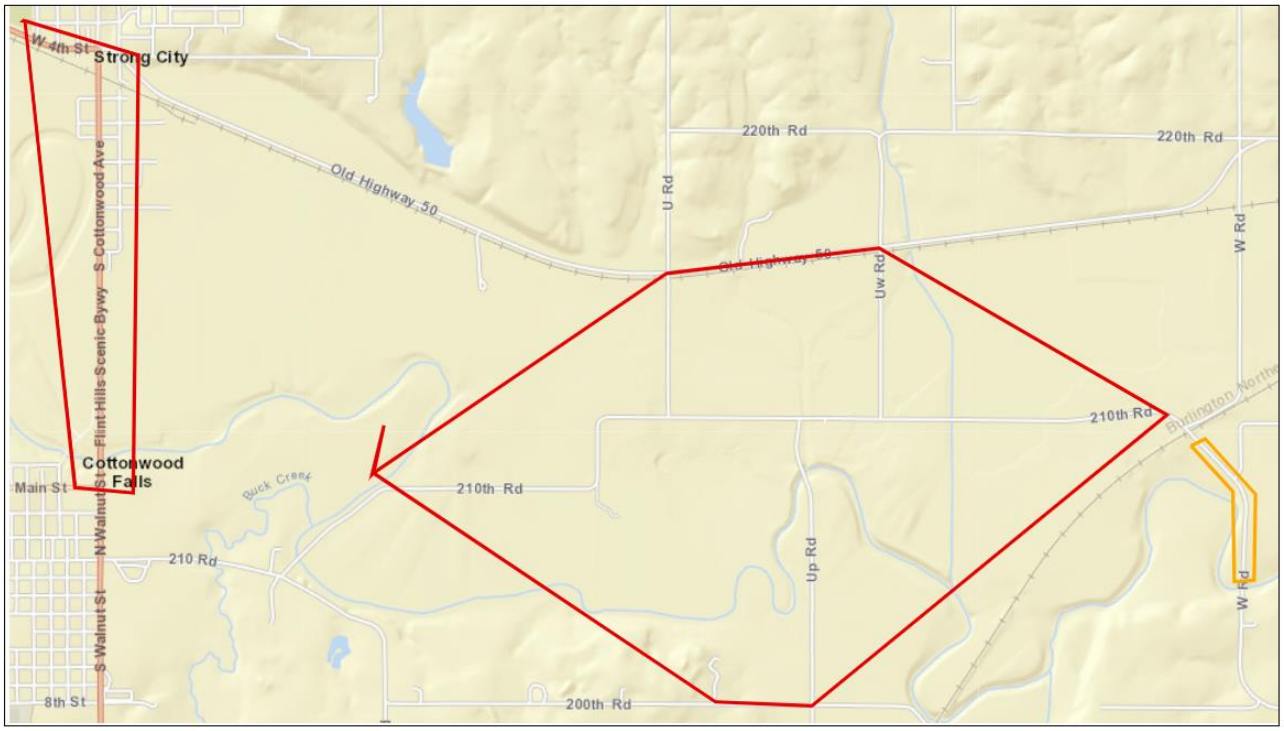
- In Chase County, the cities of Cottonwood Falls, Strong City, Cedar Point, and Elmdale are all located along the Cottonwood river, with each city having identified areas of inundation. The city of Elmdale is also located at the junction of the Middle Creek and Cottonwood river.
- In Geary County, the city of Grandview Plaza is located along the Republican and Smokey rivers and is at risk to flooding. Junction City is located along the Republican and Smoky Hill rivers and has identified flood hazard areas located on the north, northeast, and east sides of the city due to proximity to the two rivers. Many of the identified areas have little development.
- In Lyon County, the city of Americus has two Special Flood Hazard Areas (SFHAs) within the city that include some residential development and industrial lagoons. The city of Emporia is located between the Neosho River to the north and the Cottonwood River to the south. Multiple small SFHAs are created by these rivers, but the areas are largely undeveloped except for roads and intermittent residences. The city of Hartford has areas designated as both Zone A and Zone X Protected by Levee. The Hartford Levee creates a barrier around the eastern city limits of the city and provides protection (Zone X Protected by Levee) from the 100-year flood to developed areas along State Street, Neosho Street, and Congress Street. Other protected areas are in the north-central part of city along Main Street and in the southeastern section of Hartford between College Avenue and East South Avenue. In Neosho Rapids, two small SFHAs were identified. These areas appear to contain no development. The city of Olpe identified two SFHAs that appear to be largely undeveloped. In the city of Reading one undeveloped SFHA was noted.
- In Morris County, the city of Council Grove has SFHAs located along the area of the Neosho River, which trends north-south through the center of the city. An additional SFHA is indicated east of the river, south of Main Street, and includes developed areas along 3rd Street, 4th Street, 5th Street, Elm Street, and Walnut Street. Additional SFHAs are located west of the Neosho River, along Elm Creek, in the southern portion of Council Grove. The city of Dunlap has SFHAs located throughout much of the city
- In Pottawatomie County, the city of Louisville has one flood zone along Rock Creek that includes the majority the cities developed areas Rock Creek. The city of Onaga has one largely undeveloped primary flood zone that follows Hine Creek across the southern portion of the city. The city of St. George has two primary, largely undeveloped flood zones, one in the northwest portion of the city, west of Jackson Street and one south of the UP railroad tracks near Blackjack Creek and the Kansas River. The city of St. Mary's has three identified largely undeveloped flood zones, one located along the east boundary of the corporate limits along Willard Creek, one along the southwest corporate boundaries of the city from Willard Creek to College Creek, and one that in the southeast of the city that follows College Creek. The city of Wamego has three flood zones within developed areas, one along the Kansas River that runs along the south edge of the corporate limits of the city, one along the east edges of Wamego that follows Cat Creek (a tributary of the Kansas River), and one that follows East Unnamed Creek (a tributary of the Kansas River) from the west corporate limits to the north corporate limits.
- In Riley County, the city of Manhattan areas most susceptible to flooding occur along two floodways identified with Zones A, AE, AH, and Zone X. The first floodway is located along

Wildcat Creek which enters Manhattan on the west city boundary along Anderson Road and moves east-southeast until joining the Kansas River. There were no major population centers or improvements identified within the floodway up to the levee located along the southeast side of Manhattan that protects an area identified as Zone X. The levee protected area begins along Fair Lane at Denison Avenue, and trends north-northeast to Bertrand Street and Highway 24. Notable population areas were identified within this protected area. The second floodway is along city of Manhattan and the Kansas River boundary to the south and east. Large areas of floodplain appear to be within sparsely populated agricultural areas of the county as the river trends away from Manhattan to the east. The city of Ogden has one SFHA that includes some outlying city-owned property areas. In addition, the Dry Branch Creek flood area is located along the east side of the and includes some populated residential areas of the city the city of Riley identified two Zone AE flood hazard areas. Wildcat Creek is located along the west side of the city and touches a very small area of the city limits and includes a small portion of improved properties. Wildcat Creek Tributary enters the city from the north and runs south through the city where it joins Wildcat Creek outside the city limits. This narrow floodway does appear to include a small number of residential properties.

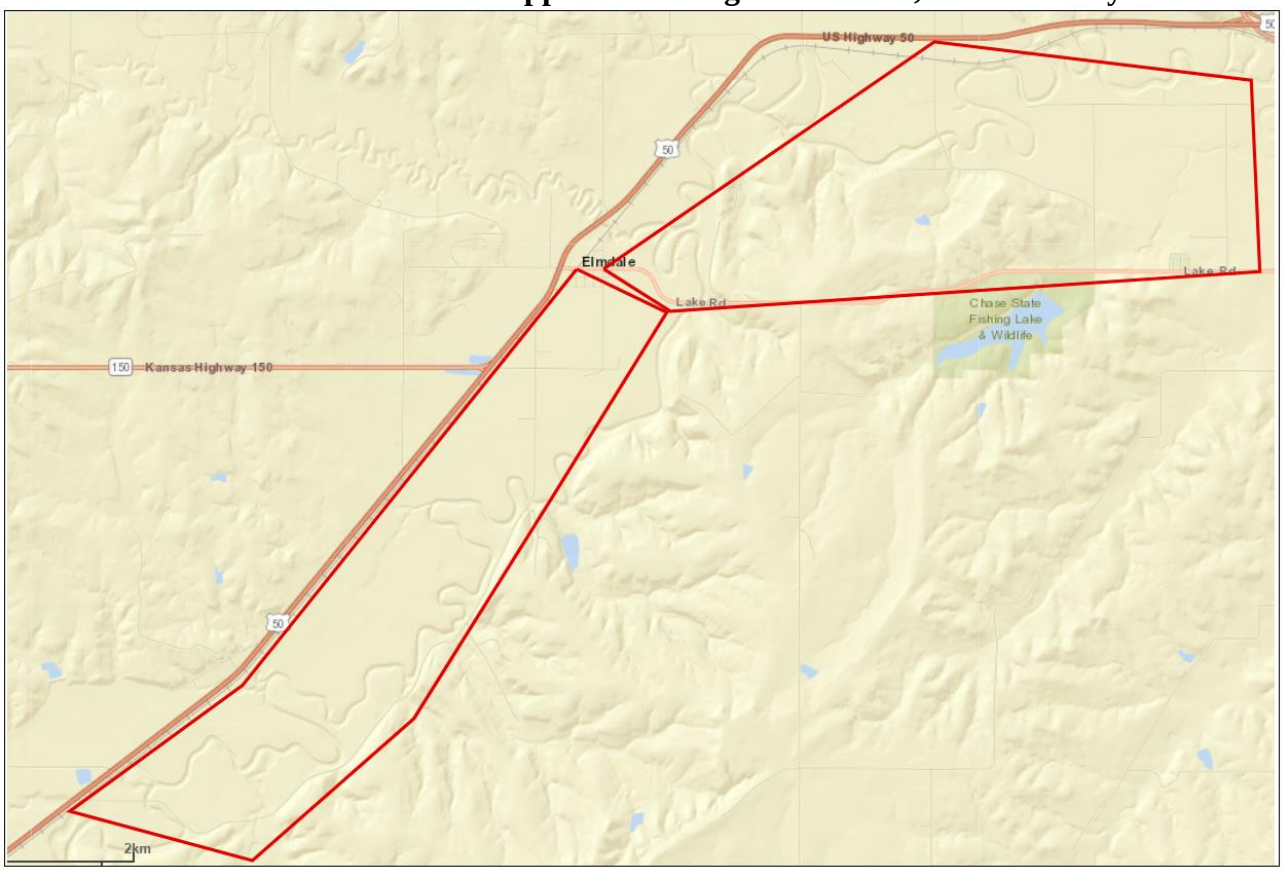
- In Wabaunsee County, a small, undeveloped portion of the southeast corner the city of Alma has a flood area that is designated as Zone A. The city of Alta Vista has one primary flood area, designated as Zone A, that is created by Munkers Creek. This wide strip of floodplain is located south of Elm Street and travels from east to west crossing over Main Street as the road intersects its path and is largely undeveloped. The city of Eskridge has a narrow floodplain, designated Zone A, that winds through the city and includes a limited number of residential properties. The city of Harveyville has one flood area, designated Zone A, in northeast corner of the city that includes several commercial properties. The city of McFarland has one flood area, designated as Zone A, created by Paw Paw Creek in the northeast corner of city. This floodplain area does not appear to impact improved areas in the city. The city of Paxico has one flood area, designated as Zone A, that covers most of the city located south of Elm Street. Areas identified within this floodplain appear to include both residential and commercial development.

Many local jurisdictions are subject to areas of repeat flooding. In an effort to identify these areas the KDA, in conjunction with the USACE Silver Jackets, has created a mapping system under the Recurring Flood Identification Project. This system allows for the local mapping of known flood areas within regional jurisdictions. Three classifications of flooding areas are used, minimal moderate and severe.

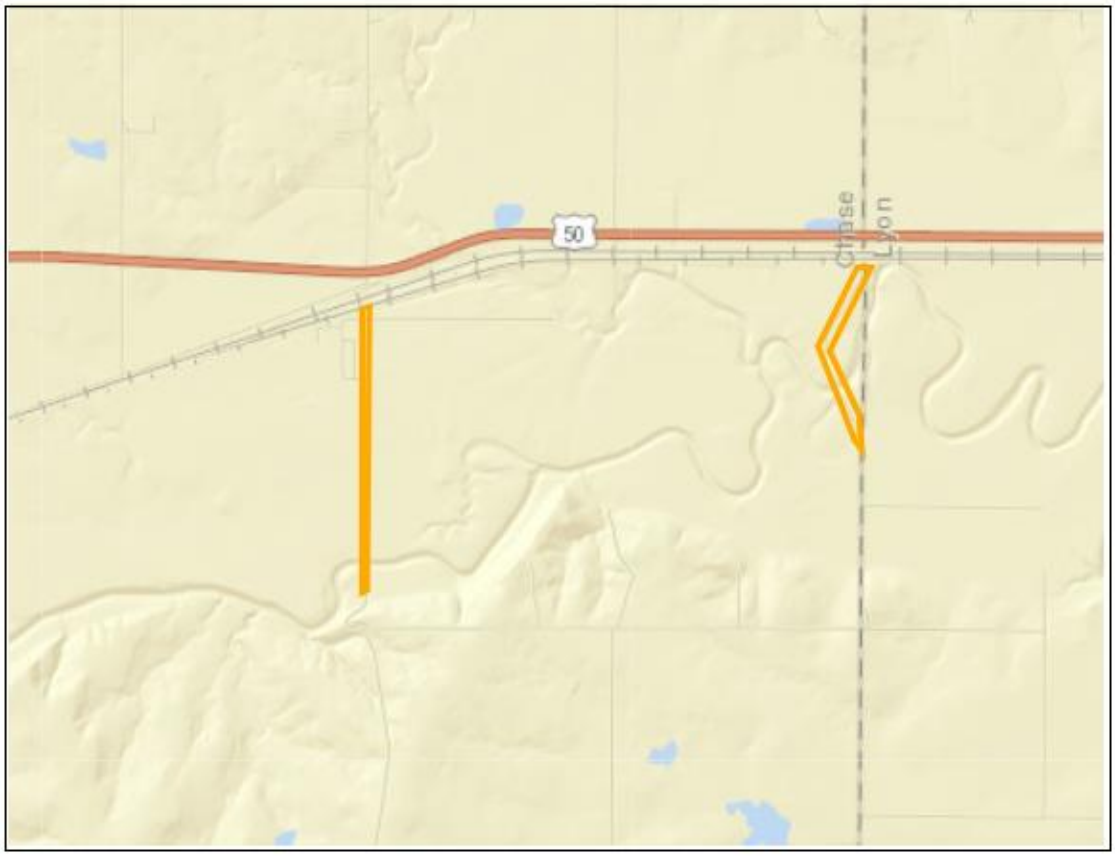
USACE Silver Jackets Mapped Recurring Flood Areas, Chase County



USACE Silver Jackets Mapped Recurring Flood Areas, Chase County



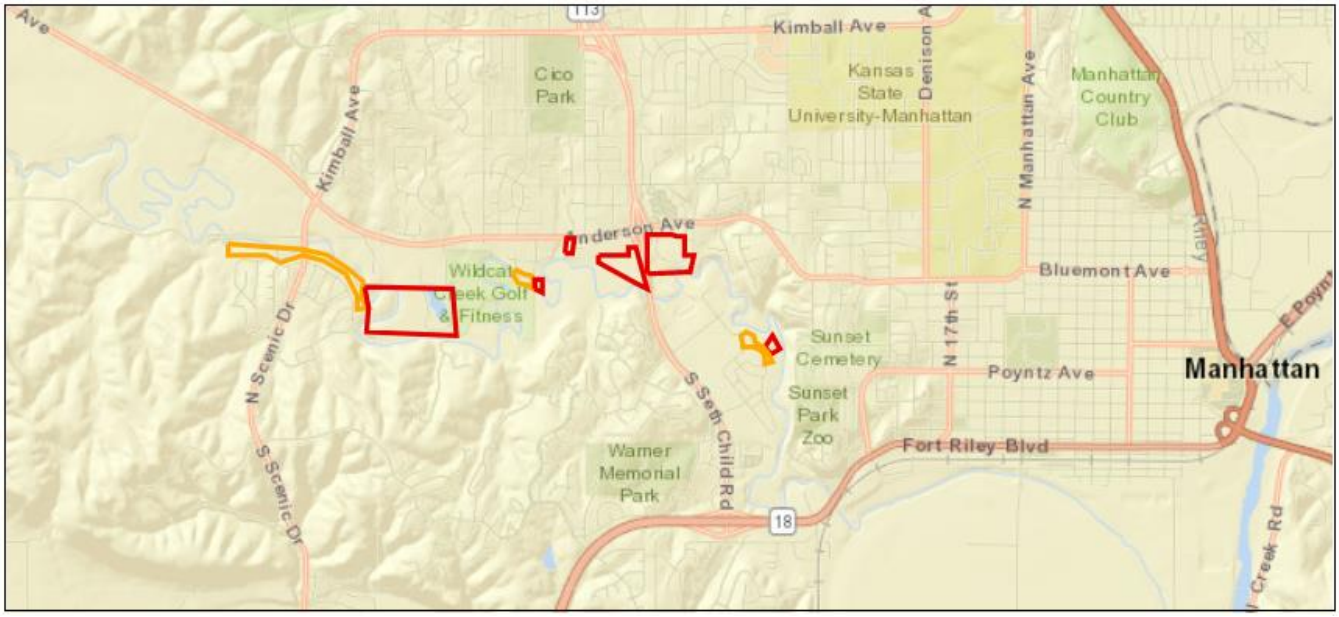
USACE Silver Jackets Mapped Recurring Flood Areas, Chase County



USACE Silver Jackets Mapped Recurring Flood Areas, Chase County

USACE Silver Jackets Mapped Recurring Flood Areas, Geary County

USACE Silver Jackets Mapped Recurring Flood Areas, Riley County



4.13.2 – Previous Occurrences

In the 20-year period from 2000 to present, there have been 13 Presidential Disaster Declarations for Kansas Region I for floods (along with other associates hazard events such as tornados or severe storms). The following 20-year information on past declared disasters is presented to provide a historical perspective on flood events that have impacted Kansas Region I. Declaration numbers in bold indication declared disaster that have occurred since the previous mitigation plan update in 2015.

Table 4.60: Kansas Region I FEMA Flood Disaster and Emergency Declarations, 2000 -2020

Declaration Number	Incident Period	Disaster Description	Regional Counties Involved	Dollars Obligated
4449	06/20/2019 (04/28-07/12/2019)	Severe Storms, Straight-line Winds, Tornados, **Flooding,** Landslides, and Mudslides	Chase, Geary, Lyon, Morris, Pottawatomie, Riley, Wabaunsee	$1,887,116
4403	10/19/2018 (09/01-09/08/2019)	Severe Storms, Straight-line Winds, and **Flooding**	Riley	$2,614,065
4230	07/20/2015 (05/04/2015 – 06/21/2015)	Severe Storms, Tornados, Straight-line Winds, and **Flooding**	Lyon, Morris, Pottawatomie and Wabaunsee, Chase, Lyon, Morris, Pottawatomie, and Wabaunsee	$13,848,325
4150	10/22/2013 (07/22/2013 – 08/15/2013)	Severe Storms, Straight-line Winds, Tornados, and **Flooding**	Chase, Geary, Lyon and Morris	$11,412,827
4063	05/24/2012 (4/14-4/15/2012)	Severe Storms, Tornados, Straight-line Winds, and **Flooding**	Lyon, Pottawatomie and Riley,	$6,923,919
4010	07/29/2011 (5/19-6/4/2011)	Severe Storms, Straight-line Winds, Tornados and **Flooding**	Chase, Lyon, Morris, Pottawatomie, Riley and Wabaunsee	$8,259,620
1932	08/10/2010 (6/7-7/21/2010)	Severe Storms, **Flooding,** and Tornados	Lyon, Morris, Pottawatomie and Wabaunsee, Chase, Lyon, Morris, Pottawatomie, and Wabaunsee	$9,279,257
1849	06/25/2009 (4/25-5/16/2009)	Severe Storms, **Flooding**, Straight-line Winds, and Tornados	Chase, Lyon, Morris and Wabaunsee	$15,013,488
1808	10/31/2008	Severe Storms, **Flooding**, and Tornados	Chase	$4,167,044
1776	07/09/2008	Severe Storms, **Flooding**, and Tornados	Riley	$70,629,544
1699	5/6/2007 (5/4/2007)	Severe Storms, Tornados, and **Flooding**	Chase, Lyon, Morris, Nemaha, Pottawatomie, Riley and Wabaunsee	$117,565,269
1579	2/8/2005 (1/4-6/2005)	Severe Winter Storm, Heavy Rains, and **Flooding**	Chase, Lyon, Morris and Wabaunsee	$106,873,672
1535	8/3/2004 (6/12-7/25/2004)	Severe Storms, **Flooding**, and Tornados	Geary, Lyon, Morris and Wabaunsee	$12,845,892

Source: FEMA
-: Data unavailable

The following provides details concerning Presidential Disaster Declarations DR 4449, DR 4403 and DR 4230 for Kansas Region I.

Kansas –Severe Storms, Straight-line Winds, Tornados, Flooding, Landslides, and Mudslides
FEMA-4449-DR
Declared June 20, 2019 On June 7, 2019

Governor Laura Kelly requested a major disaster declaration due to severe storms, straight-line winds, tornadoes, flooding, landslides, and mudslides beginning on April 28, 2019, and continuing. The Governor requested a declaration for Public Assistance for 63 counties and Hazard Mitigation statewide. Beginning on May 20, 2019, joint federal, state, and local government Preliminary Damage Assessments (PDAs) were conducted in the requested areas and are summarized below. PDAs estimate damages immediately after an event and are considered, along with several other factors, in determining whether a disaster is of such severity and magnitude that effective response is beyond the capabilities of the state and the affected local governments, and that Federal assistance is necessary.

On June 20, 2019, President Trump declared that a major disaster exists in the State of Kansas. This declaration made Public Assistance requested by the Governor available to state and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe storms, straight-line winds, tornadoes, flooding, landslides, and mudslides in Allen, Anderson, Atchison, Barber, Barton, Butler, Chase, Chautauqua, Cherokee, Clark, Clay, Cloud, Coffey, Cowley, Doniphan, Elk, Ellsworth, Franklin, Geary, Greenwood, Harper, Harvey, Hodgeman, Jefferson, Kingman, Leavenworth, Lincoln, Linn, Lyon, Marion, Marshall, McPherson, Meade, Montgomery, Morris, Nemaha, Neosho, Osage, Ottawa, Pawnee, Phillips, Pottawatomie, Pratt, Reno, Rice, Rush, Russell, Saline, Sumner, Wabaunsee, Washington, Wilson, and Woodson Counties. This declaration also made Hazard Mitigation Grant Program assistance requested by the Governor available for hazard mitigation measures statewide

Kansas – Severe Storms, Straight-line Winds, and Flooding
FEMA-4403-DR
Declared October 19, 2018

On September 25, 2018 Governor Jeff Colyer requested a major disaster declaration due to severe storms, straight-line winds, and flooding during the period of September 1-8, 2018. The Governor requested a declaration Public Assistance for nine counties and Hazard Mitigation statewide. During the period of September 24-28, 2018, joint federal, state, and local government Preliminary Damage Assessments (PDAs) were conducted in the requested areas and are summarized below. PDAs estimate damages immediately after an event and are considered, along with several other factors, in determining whether a disaster is of such severity and magnitude that effective response is beyond the capabilities of the state and the affected local governments, and that Federal assistance is necessary.

On October 19, 2018, President Trump declared that a major disaster exists in the State of Kansas. This declaration made Public Assistance requested by the Governor available to state and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe storms, straight-line winds, and flooding in Barber, Clay, Kingman, Kiowa, Marshall, Pratt, Rice, and Riley Counties. This declaration also made Hazard Mitigation Grant Program assistance requested by the Governor available for hazard mitigation measures statewide.

Kansas – Severe Storms, Tornados, Straight-Line Winds, and Flooding
FEMA-4230-DR
Declared July 20, 2015

On July 1, 2015, Governor Sam Brownback requested a major disaster declaration due to severe storms, tornados, straight-line winds, and flooding during the period of May 4 to June 21, 2015. The Governor requested a declaration for Public Assistance, including direct federal assistance for 42 counties and Hazard Mitigation statewide. During the period of May 4 to June 27, 2015, joint federal, state, and local government Preliminary Damage Assessments (PDAs) were conducted in the requested counties and are summarized below. PDAs estimate damages immediately after an event and are considered, along with several other factors, in determining whether a disaster is of such severity and magnitude that effective response is beyond the capabilities of the state and the affected local governments, and that Federal assistance is necessary.

On July 20, 2015, President Obama declared that a major disaster exists in the State of Kansas. This declaration made Public Assistance requested by the Governor available to state and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe storms, tornados, straight-line winds, and flooding in Atchison, Geary, Brown, Chase, Chase, Chautauqua, Cherokee, Cheyenne, Clay, Cloud, Geary, Geary, Doniphan, Morris, Elk, Ellsworth, Lyon, Gray, Greenwood, Lyon, Haskell, Hodgeman, Jackson, Jefferson, Jewell, Lyon, Wabaunsee, Marshall, Riley, Meade, Pottawatomie, Morris, Nemaha, Neosho, Riley, Pottawatomie, Republic, Rice, Stevens, Sumner, Wabaunsee, and Washington Counties. Direct Federal assistance was also authorized. Finally, this declaration made Hazard Mitigation Grant Program assistance requested by the Governor available for hazard mitigation measures statewide.

In addition to the above reported events, the following table presents NOAA NCEI identified flood events and the resulting damage totals in Kansas Region I from the period 2010 - 2019. This data is limited to reported events.

Table 4.61: Kansas Region I NCEI Flood and Flash Flood Events, 2009 - 2018

County	Event Type	Number of Days with Events	Property Damage	Deaths	Injuries
Chase	Flood	5	$200	0	0
	Flash Flood	2	$0	0	0
Geary	Flood	1	$0	0	0
	Flash Flood	8	$0	0	0
Lyon	Flood	3	$0	0	0

Table 4.61: Kansas Region I NCEI Flood and Flash Flood Events, 2009 - 2018

County	Event Type	Number of Days with Events	Property Damage	Deaths	Injuries
	Flash Flood	14	$0	1	0
Morris	Flood	3	$0	0	0
	Flash Flood	4	$0	0	0
Pottawatomie	Flood	1	$0	0	0
	Flash Flood	7	$0	0	0
Riley	Flood	0	$0	0	0
	Flash Flood	10	$17,200,000	0	3
Wabaunsee	Flood	2	$0	0	0
	Flash Flood	8	$0	0	0

Source: FEMA

The following provides local accounts of notable flood events:

- **September 3, 2018: Riley County**
  Residents in the city of Keats were being evacuated due to the rapidly rising water on Wildcat Creek. Damages were reported at $17,200,000

- **July 10, 2015: Lyon County**
  Flooding over the Kansas turnpike at mile marker 118. This shut down the northbound lanes. A 21-year-old male driver hydroplaned and lost control of his vehicle. The vehicle left the road and was then swept downstream by the flood waters. He was not able to survive.

Available crop loss data from the USDA Risk Management Agency detailing cause of loss was researched to determine the financial impacts of flooding on the Region's agricultural base. Crop loss data for the years 2009- 2018 (with 2009 and 2018 being full data years), for the region, indicate 141 flood related claims on 17,228 acres for $1,944,750.

Table 4.62: USDA Risk Management Agency Cause of Loss Indemnities 2010-2019, Flooding

County	Number of Reported Claims	Acres Lost	Total Amount of Loss
Chase	20	2,863	$212,569
Geary	1	7	$1,113
Lyon	39	10,072	$914,885
Morris	4	107	$16,213
Pottawatomie	31	1,857	$488,143
Riley	43	2,256	$304,384
Wabaunsee	3	65	$7,443

Source: USDA Farm Service Agency

4.13.3 – Hazard Probability Analysis

The following table summarizes riverine flood probability data for **Chase County**.

Table 4.63: Chase County Riverine Flood Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	2
Average Events per Year	<1
Number of Days with Event and Death or Injury (2010-2019)	0
Average Number of Days with Event and Death or Injury	0
Total Reported NCEI Property Damage (2010-2019)	$200
Average Property Damage per Year	$20

Source: NCEI

Data from the NCEI indicates that Chase County can expect on a yearly basis, relevant to riverine flood events:

- <1 event
- No deaths or injuries
- $20 in property damages

The following table summarizes flash flood probability data for **Chase County**.

Table 4.64: Chase County Flash Flood Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	2
Average Events per Year	<1
Number of Days with Event and Death or Injury (2010-2019)	0
Average Number of Days with Event and Death or Injury	0
Total Reported NCEI Property Damage (2010-2019)	$0
Average Property Damage per Year	$0

Source: NCEI

Data from the NCEI indicates that Chase County can expect on a yearly basis, relevant to flash flood events:

- <1 event
- No deaths or injuries
- $0 in property damages

Data was reviewed from the USDA Risk Management agency to determine vulnerability to flooding. The following table summarizes drought event data for **Chase County.**

Table 4.65: Chase County Flooding Agricultural Probability Summary

Data	Recorded Impact
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	20
Average Number of Claims per Year	2

Table 4.65: Chase County Flooding Agricultural Probability Summary

Data	Recorded Impact
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	2,863
Average Number of Acres Damaged per Year	286
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$212,569
Average Crop Damage per Year	$21,257

Source: USDA

According to the USDA Risk Management Agency, Chase County can expect on a yearly basis, relevant to flooding occurrences:

- Two insurance claims
- 286 acres impacted
- $21,257 in insurance claims

The following table summarizes riverine flood probability data for **Geary County**.

Table 4.66: Geary County Riverine Flood Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	1
Average Events per Year	<1
Number of Days with Event and Death or Injury (2010-2019)	0
Average Number of Days with Event and Death or Injury	0
Total Reported NCEI Property Damage (2010-2019)	$0
Average Property Damage per Year	$0

Source: NCEI

Data from the NCEI indicates that Geary County can expect on a yearly basis, relevant to riverine flood events:

- <1 event
- No deaths or injuries
- $0 in property damages

The following table summarizes flash flood probability data for **Geary County**.

Table 4.67: Geary County Flash Flood Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	8
Average Events per Year	1
Number of Days with Event and Death or Injury (2010-2019)	0
Average Number of Days with Event and Death or Injury	0
Total Reported NCEI Property Damage (2010-2019)	$0
Average Property Damage per Year	$0

Source: NCEI

Data from the NCEI indicates that Geary County can expect on a yearly basis, relevant to flash flood events:

- One event
- No deaths or injuries
- $0 in property damages

Data was reviewed from the USDA Risk Management agency to determine vulnerability to flooding. The following table summarizes drought event data for **Geary County.**

Table 4.68: Geary County Flooding Agricultural Probability Summary

Data	Recorded Impact
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	1
Average Number of Claims per Year	<1
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	7
Average Number of Acres Damaged per Year	1
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$1,113
Average Crop Damage per Year	$111

Source: USDA

According to the USDA Risk Management Agency, Geary County can expect on a yearly basis, relevant to flooding occurrences:

- <1 insurance claim
- One acre impacted
- $111 in insurance claims

The following table summarizes riverine flood probability data for **Lyon County**.

Table 4.69: Lyon County Riverine Flood Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	3
Average Events per Year	<1
Number of Days with Event and Death or Injury (2010-2019)	0
Average Number of Days with Event and Death or Injury	0
Total Reported NCEI Property Damage (2010-2019)	$0
Average Property Damage per Year	$0

Source: NCEI

Data from the NCEI indicates that County can expect on a yearly basis, relevant to riverine flood events:

- <1 event
- No deaths or injuries
- $0 in property damages

The following table summarizes flash flood probability data for **Lyon County**.

Table 4.70: Lyon County Flash Flood Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	14
Average Events per Year	1
Number of Days with Event and Death or Injury (2010-2019)	1
Average Number of Days with Event and Death or Injury	<1
Total Reported NCEI Property Damage (2010-2019)	$0
Average Property Damage per Year	$0

Source: NCEI

Data from the NCEI indicates that Lyon County can expect on a yearly basis, relevant to flash flood events:

- One event
- <1 death or injury
- $0 in property damages

Data was reviewed from the USDA Risk Management agency to determine vulnerability to flooding. The following table summarizes drought event data for **Lyon County.**

Table 4.71: Lyon County Flooding Agricultural Probability Summary

Data	Recorded Impact
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	39
Average Number of Claims per Year	4
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	10,072
Average Number of Acres Damaged per Year	1,007
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$914,885
Average Crop Damage per Year	$91,489

Source: USDA

According to the USDA Risk Management Agency, Lyon County can expect on a yearly basis, relevant to flooding occurrences:

- Four insurance claims
- 1,007 acres impacted
- $91,489 in insurance claims

The following table summarizes riverine flood probability data for **Morris County**.

Table 4.72: Morris County Riverine Flood Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	3
Average Events per Year	<1
Number of Days with Event and Death or Injury (2010-2019)	0
Average Number of Days with Event and Death or Injury	0
Total Reported NCEI Property Damage (2010-2019)	$0
Average Property Damage per Year	$0

Source: NCEI

Data from the NCEI indicates that County can expect on a yearly basis, relevant to riverine flood events:

- <1 event
- No deaths or injuries
- $0 in property damages

The following table summarizes flash flood probability data for **Morris County**.

Table 4.73: Morris County Flash Flood Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	4
Average Events per Year	<1
Number of Days with Event and Death or Injury (2010-2019)	0
Average Number of Days with Event and Death or Injury	0
Total Reported NCEI Property Damage (2010-2019)	$0
Average Property Damage per Year	$0

Source: NCEI

Data from the NCEI indicates that Morris County can expect on a yearly basis, relevant to flash flood events:

- <1 event
- No deaths or injuries
- $0 in property damages

Data was reviewed from the USDA Risk Management agency to determine vulnerability to flooding. The following table summarizes drought event data for **Morris County.**

Table 4.74: Morris County Flooding Agricultural Probability Summary

Data	Recorded Impact
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	4
Average Number of Claims per Year	<1
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	107
Average Number of Acres Damaged per Year	11
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$16,213
Average Crop Damage per Year	$1,621

Source: USDA

According to the USDA Risk Management Agency, Morris County can expect on a yearly basis, relevant to flooding occurrences:

- <1 insurance claim
- 11 acres impacted
- $1,621 in insurance claims

The following table summarizes riverine flood probability data for **Pottawatomie County**.

Table 4.75: Pottawatomie County Riverine Flood Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	1
Average Events per Year	<1
Number of Days with Event and Death or Injury (2010-2019)	0
Average Number of Days with Event and Death or Injury	0
Total Reported NCEI Property Damage (2010-2019)	$0
Average Property Damage per Year	$0

Source: NCEI

Data from the NCEI indicates that Pottawatomie County can expect on a yearly basis, relevant to riverine flood events:

- <1 event
- No deaths or injuries
- $0 in property damages

The following table summarizes flash flood probability data for **Pottawatomie County**.

Table 4.76: Pottawatomie County Flash Flood Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	7
Average Events per Year	1
Number of Days with Event and Death or Injury (2010-2019)	0
Average Number of Days with Event and Death or Injury	0
Total Reported NCEI Property Damage (2010-2019)	$0
Average Property Damage per Year	$0

Source: NCEI

Data from the NCEI indicates that Pottawatomie County can expect on a yearly basis, relevant to flash flood events:

- One event
- No deaths or injuries
- $0 in property damages

Data was reviewed from the USDA Risk Management agency to determine vulnerability to flooding. The following table summarizes drought event data for **Pottawatomie County.**

Table 4.77: Pottawatomie County Flooding Agricultural Probability Summary

Data	Recorded Impact
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	31
Average Number of Claims per Year	3
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	1,857
Average Number of Acres Damaged per Year	186
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$488,143
Average Crop Damage per Year	$48,814

Source: USDA

According to the USDA Risk Management Agency, Pottawatomie County can expect on a yearly basis, relevant to flooding occurrences:

- Three insurance claims
- 186 acres impacted
- $48,814 in insurance claims

The following table summarizes riverine flood probability data for **Riley County**.

Table 4.78: Riley County Riverine Flood Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	0
Average Events per Year	0
Number of Days with Event and Death or Injury (2010-2019)	0
Average Number of Days with Event and Death or Injury	0
Total Reported NCEI Property Damage (2010-2019)	$0
Average Property Damage per Year	$0

Source: NCEI

Data from the NCEI indicates that Riley County can expect on a yearly basis, relevant to riverine flood events:

- No events
- No deaths or injuries
- $0 in property damages

The following table summarizes flash flood probability data for **Riley County**.

Table 4.79: Riley County Flash Flood Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	10
Average Events per Year	1
Number of Days with Event and Death or Injury (2010-2019)	3
Average Number of Days with Event and Death or Injury	<1
Total Reported NCEI Property Damage (2010-2019)	$17,200,000
Average Property Damage per Year	$1,720,000

Source: NCEI

Data from the NCEI indicates that Riley County can expect on a yearly basis, relevant to flash flood events:

- One event
- <1 death or injury
- $1,720,000 in property damages

Data was reviewed from the USDA Risk Management agency to determine vulnerability to flooding. The following table summarizes flood event data for **Riley County.**

Table 4.80: Riley County Flooding Agricultural Probability Summary

Data	Recorded Impact
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	43
Average Number of Claims per Year	4
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	2,256
Average Number of Acres Damaged per Year	226
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$304,384
Average Crop Damage per Year	$30,438

Source: USDA

According to the USDA Risk Management Agency, Riley County can expect on a yearly basis, relevant to flooding occurrences:

- Four insurance claim
- 226 acres impacted
- $30,438 in insurance claims

The following table summarizes riverine flood probability data for **Wabaunsee County**.

Table 4.81: Wabaunsee County Riverine Flood Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	2
Average Events per Year	<1
Number of Days with Event and Death or Injury (2010-2019)	0
Average Number of Days with Event and Death or Injury	0
Total Reported NCEI Property Damage (2010-2019)	$0
Average Property Damage per Year	$0

Source: NCEI

Data from the NCEI indicates that Wabaunsee County can expect on a yearly basis, relevant to riverine flood events:

- <1 event
- No deaths or injuries
- $0 in property damages

The following table summarizes flash flood probability data for **Wabaunsee County**.

Table 4.82: Wabaunsee County Flash Flood Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	8
Average Events per Year	1
Number of Days with Event and Death or Injury (2010-2019)	0
Average Number of Days with Event and Death or Injury	0
Total Reported NCEI Property Damage (2010-2019)	$0
Average Property Damage per Year	$0

Source: NCEI

Data from the NCEI indicates that Wabaunsee County can expect on a yearly basis, relevant to flash flood events:

- One event
- No deaths or injuries
- $0 in property damages

Data was reviewed from the USDA Risk Management agency to determine vulnerability to flooding. The following table summarizes drought event data for **Wabaunsee County.**

Table 4.83: Wabaunsee County Flooding Agricultural Probability Summary

Data	Recorded Impact
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	3
Average Number of Claims per Year	<1
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	65
Average Number of Acres Damaged per Year	6
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$7,443
Average Crop Damage per Year	$745

Source: USDA

According to the USDA Risk Management Agency, Wabaunsee County can expect on a yearly basis, relevant to flooding occurrences:

- <1 insurance claim
- Six acres impacted
- $745 in insurance claims

In addition, Kansas Region I has had 13 Presidentially Declared Disasters relating to flooding (and other causes) in the last 20 years. This represents an average of one declared flood disaster per year.

4.13.4 – Vulnerability Analysis

The results of the HAZUS analysis were utilized to estimate potential losses for riverine flooding. The intent of this analysis was to enable Kansas Region I to estimate where flood losses could occur and the degree of severity using a consistent methodology. The HAZUS model helps quantify risk along known flood-hazard corridors as well as lesser streams and rivers that have a drainage area of 10 square miles or more.

HAZUS determines the displaced population based on the inundation area, not necessarily impacted buildings. As a result, there may be population vulnerable to displacement even if the structure is not vulnerable to damage. Individuals and households will be displaced from their homes even when the home has suffered little or no damage either because they were evacuated or there was no physical access to the property because of flooded roadways.

Flood sheltering needs are based on the displaced population, not the damage level of the structure. HAZUS determines the number of individuals likely to use government-provided short-term shelters

through determining the number of displaced households as a result of the flooding. To determine how many of those households and the corresponding number of individuals will seek shelter in government-provided shelters, the number is modified by factors accounting for income and age. Displaced people using shelters will most likely be individuals with lower incomes and those who do not have family or friends within the immediate area. Since the income and age factors are taken into account, the proportion of displaced population and those seeking shelter will vary from county to county.

Additionally, HAZUS considers flood depth when modeling damage (based on FEMA's depth-damage functions). Generated reports capture damage by occupancy class (in terms of square footage impacted) by damage percent classes. Occupancy classes include agriculture, commercial, education, government, industrial, religion, and residential. Damage percent classes are grouped by 10 percent increments up to 50%. Buildings that sustain more than 50% damage are considered to be substantially damaged.

The following table provides the HAZUS results for vulnerable populations and the population estimated to seek short term shelter as well as the numbers of damaged and substantially damaged buildings for each Kansas Region I county.

Table 4.84: Kansas Region I HAZUS Flood Scenario Displaced Population Building Damages

County	Population Vulnerable to Displacement	Population with Short Term Shelter Needs	Vulnerable Buildings	Damaged Buildings	Substantially Damaged Buildings
Chase	249	5	218	7	0
Geary	1,088	877	566	47	25
Lyon	660	74	503	8	0
Morris	433	80	441	27	0
Pottawatomie	521	96	737	29	0
Riley	845	552	1,435	103	8
Wabaunsee	351	42	240	27	0

Source: FEMA and HAZUS

The HAZUS analysis also provides an estimate the repair costs for impacted buildings as well as the associated loss of building contents and business inventory. Building damage can also cause additional losses to a community by restricting a building's ability to function properly. Income loss data accounts for losses such as 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 using a methodology based on the building damage estimates.

The damaged building counts generated by HAZUS are susceptible to rounding errors and are likely the weakest output of the model due to the use of census blocks for analysis. Generated reports include this disclaimer: "Unlike the earthquake and hurricane models, the flood model performs its analysis at the census block level. This means that the analysis starts with a small number of buildings within each census block and applies a series of distributions necessary for analyzing the potential damage. The application of these distributions and the small number of buildings make the flood model more sensitive to rounding errors that introduces uncertainty into the building count results." Additionally, losses are not calculated for individual buildings, but instead are based on the performances of entire classes of buildings obtained from the general building stock data. In the flood model, the number of grid cells (pixels) at each flood depth value is divided by the total number of grid cells in the census block. The result is used to weight

the flood depths applied to each specific occupancy type in the general building stock. First floor heights are then applied to determine the damage depths to analyze damages and losses. The following table provides the HAZUS results for building damages and lost income due to these damages.

Table 4.85: Kansas Region I HAZUS Flood Scenario Structural Damage and Income Loss

County	Structural Damage	Contents Damage	Inventory Loss	Total Direct Loss	Total Income Loss	Total Direct and Income Loss
Chase	$4,704,000	$3,266,000	$59,000	$8,029,000	$11,000	$8,040,000
Geary	$7,650,000	$9,027,000	$141,000	$16,818,000	$210,000	$17,028,000
Lyon	$11,022,000	$10,440,000	$296,000	$21,758,000	$149,000	$21,907,000
Morris	$10,171,000	$17,013,000	$625,000	$27,809,000	$197,000	$28,006,000
Pottawatomie	$9,393,000	$7,065,000	$216,000	$16,674,000	$20,000	$16,694,000
Riley	$16,800,000	$15,895,000	$923,000	$33,618,000	$87,000	$33,705,000
Wabaunsee	$9,149,000	$9,643,000	$340,000	$19,132,000	$228,000	$19,360,000

Source: FEMA and HAZUS

The USDA 2017 Census of Agriculture (the latest available data) provides data on the crop exposure value, the total dollar value of all crops, for each Kansas Region I County. USDA Risk Management Agency Crop loss data for the ten-year period of 2009- 2018 (with 2009 and 2018 being full data years) allows us to quantify the monetary impact of flood conditions on the agricultural sector. The higher the percentage loss, the higher the potential vulnerability the county has to flood events.

Table 4.86: Flood Acres Impacted and Crop Insurance Paid per County from 2009-2018

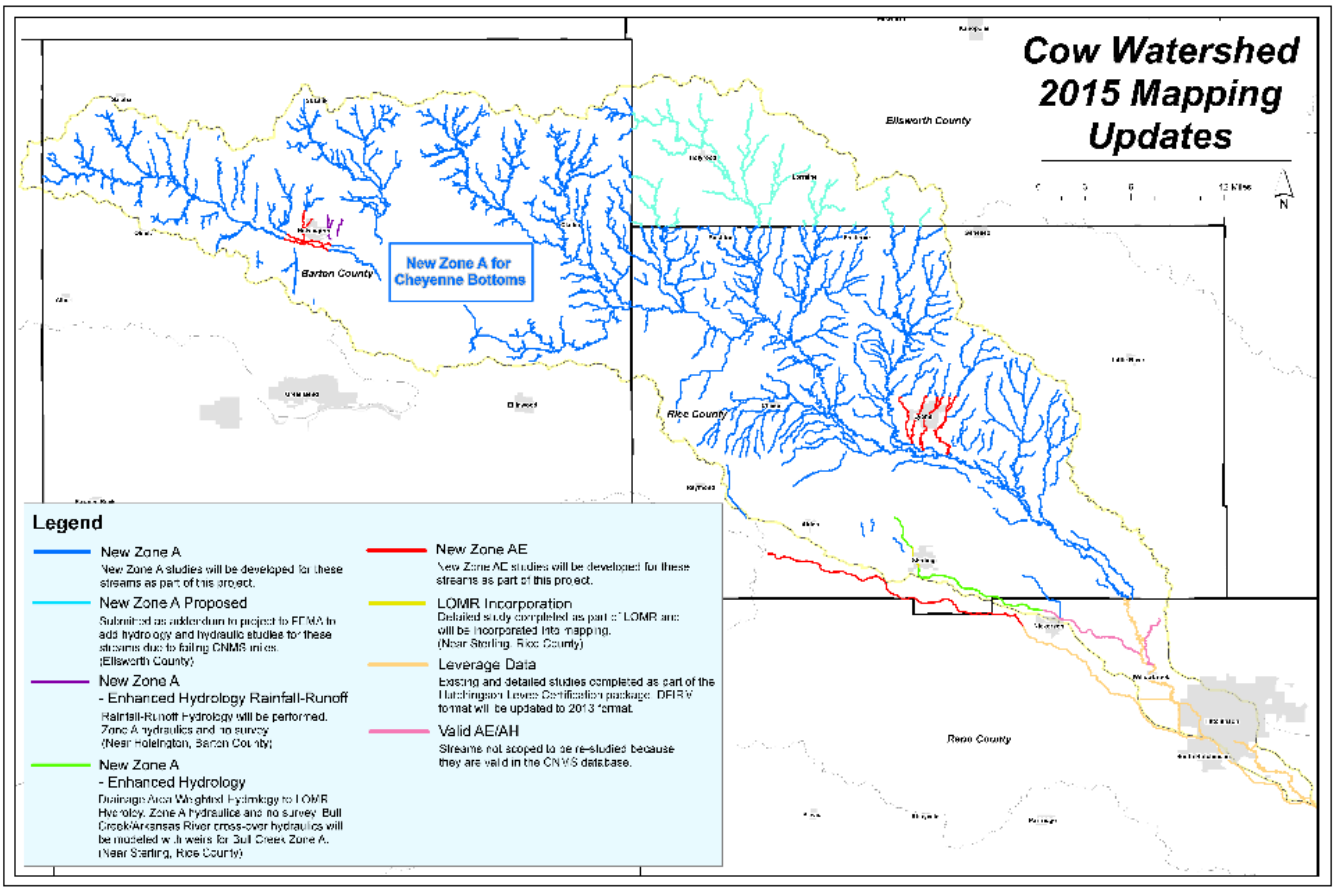
Jurisdiction	Farm Acreage	Annualized Acres Impacted	Percentage of Total Acres Impacted Yearly	Market Value of Products Sold	Annualized Crop Insurance Paid	Percentage of Market Value Impacted Yearly
Chase	360,077	286	0.08%	$85,430,000	$21,257	0.02%
Geary	155,153	1	0.00%	$31,833,000	$111	0.00%
Lyon	522,934	1,007	0.19%	$134,440,000	$91,489	0.07%
Morris	409,269	11	0.00%	$138,615,000	$1,621	0.00%
Pottawatomie	406,031	186	0.05%	$101,363,000	$48,814	0.05%
Riley	214,311	226	0.11%	$51,171,000	$30,438	0.06%
Wabaunsee	378,759	6	0.00%	$63,146,000	$744	0.00%

Source: USDA

Flood risk can also change over time because of new building and development, weather patterns and other factors. Although the frequency or severity of impacts cannot be changed, FEMA is working with federal, state, tribal and local partners across the nation to identify flood risk and promote informed planning and development practices to help reduce that risk through the Risk Mapping, Assessment and Planning (Risk MAP) program. Risk MAP uses the watershed boundaries to conduct studies. This watershed approach allows communities to come together to develop partnerships, combine resources, share flood risk information with FEMA, and identify broader opportunities for mitigation action.

The Flood Risk Products and datasets present information that can enhance hazard mitigation planning activities, especially the risk and vulnerability assessment portion of a hazard mitigation plan, and the development of risk-based mitigation strategies. Risk MAP can also help guide land use and development decisions and help you take mitigation action by highlighting areas of highest risk, areas in need of mitigation, and areas of floodplain change. Currently Kansas Region I has no current Risk Map projects.

In 2015, a mapping project was completed on the Cow Watershed (HUC8 11030011), which lies within the Kansas Counties of Geary, Ellsworth, Reno, and Rice. This project consists of new detailed hydrologic and hydraulic studies using current watershed characteristics and new detailed topography for 51 stream miles of streams that will be modeled by detailed methods resulting in Zone AE floodplains with a floodway, and 912 stream miles of streams that will be studied by approximate methods resulting in updated Zone A floodplains. It was requested to perform enhanced hydrology on approximately 7.0 stream miles of Zone A streams based on a rainfall-runoff model, and to distribute enhanced hydrology on approximately 15.6 stream miles of Bull Creek, a Zone A stream, based on the extrapolation of flows from an effective Letter of Map Revision. In addition, statistical gage analysis was performed for approximately 66.4 stream miles of Cow Creek, which is a Zone A stream. For streams not included in a detailed hydrologic study, approximate Zone A hydrology was performed using localized regression equations, generated from the results of the detailed rainfall-runoff models that were developed for this watershed. The mapping results of this project are presented below.



Mold

Mold is plant-like organism that obtains nourishment it directly from surrounding organic materials. Mold can grow on a variety of materials and thrives in damp environments. As such, a recently flooded home or business provides an ideal environment for mold growth, especially on materials such as drywall and carpeting. The young, old and ill may be specifically susceptible to the effects of mold, with symptoms including:

- congestion
- cough
- breathing difficulties
- sore throat
- membrane irritation
- upper respiratory infections

As such, any instance of flood related mold should be remediated as soon as possible.

4.13.5 – National Flood Insurance Program Communities

The National Flood Insurance Program (NFIP) is a federal program, managed by FEMA, that exists to provide flood insurance for property owners in participating communities, to improve floodplain management practices, and to develop maps of flood hazard areas. The following table presents the number of NFIP participating communities in each county.

Table 4.87: Kansas Region I NFIP Communities

Community	Initial Flood Hazard Boundary Map Identified	Initial Flood Insurance Rate Map Identified	Current Effective Map Date
Chase County			
Chase County	09/13/77	05/01/90	05/01/90(L)
Cedar Point	12/17/1976	12/17/1976	02/19/87
Cottonwood Falls	03/26/76	06/01/09	06/01/09(L)
Elmdale	01/10/75	09/01/90	09/01/90(L)
Strong City	08/16/74	09/01/90	09/01/90(L)
Geary County			
Geary County	10/18/1977	02/04/88	02/04/88
Grandview Plaza	08/09/1974	04/05/2016	04/05/2016
Junction City	02/01/74	09/29/78	03/18/87
Lyon County			
Lyon County	06/28/77	11/17/1982	12/17/2010
Admire	-	02/20/08	NSFHA
Allen	-	02/20/08	NSFHA
Americus	02/01/74	04/15/82	02/20/08
Emporia	02/01/74	10/2/1979	02/20/08
Hartford	09/26/75	02/20/08	12/17/10(M)

Table 4.87: Kansas Region I NFIP Communities

Community	Initial Flood Hazard Boundary Map Identified	Initial Flood Insurance Rate Map Identified	Current Effective Map Date
Neosho Rapids	01/03/75	02/20/08	12/17/2010
Morris County			
Council Grove	12/21/1973	04/03/87	04/03/87(M)
Dwight	09/19/75	-	NSFHA
Wilsey	-	-	-
Pottawatomie County			
Pottawatomie County	12/20/1977	02/17/88	12/4/2012
Belvue	11/29/1974	-	NSFHA
Havensville	-	12/4/2012	12/4/2012
Louisville	12/6/1974	12/2/1988	12/4/2012
Onaga	08/13/76	09/01/11	12/04/12(M)
St. George	01/03/75	02/03/93	12/4/2012
St. Mary's	12/7/1973	02/01/80	07/06/82
Wamego	12/7/1973	02/18/81	12/4/2012
Riley County			
Riley County	02/15/74	04/01/82	07/06/10
Manhattan	03/08/74	04/01/82	07/06/10
Ogden	06/07/74	10/15/1981	02/04/05
City of Riley	02/15/74	11/1/1979	11/19/2003
Wabaunsee County			
Wabaunsee County	-	03/19/07	03/19/07
Alma	03/08/74	03/19/07	03/19/07
Eskridge	08/22/75	12/1/1989	03/19/07
Harveyville	11/8/1974	03/19/07	03/19/07
Maple Hill	11/5/1976	03/19/07	03/19/07
McFarland	11/22/1974	03/19/07	03/19/07
Paxico	12/20/1974	01/04/85	03/19/07

Notes: NSFHA: No Special Flood Hazard Area - All Zone C
(L): Original FIRM by letter - All Zone A, C and X
(M): No elevation determined - All Zone A, C and X

Additionally, the NFIP's Community Rating System (CRS) incentive rewards communities for the work they do managing their floodplains. Eligible communities that qualify for this voluntary program go above the minimum NFIP requirements and can offer their citizens discounted flood insurance in both Special Flood Hazard Areas (SFHAs) areas or non-SFHA areas. Additionally, work already being done by the state of Kansas (e.g., dam safety program and state freeboard requirements) gives communities additional discounts. The following Region I community is currently a CRS participant:

Table 4.88: Kansas Region I CRS Participating Jurisdictions

Jurisdiction	County	CRS Entry Date	CRS Class	% Discount for SFHA	% Discount for Non-SFHA	Status
Geary County	Geary County	10/01/2017	8	10%	5%	Current
Lyon County	Lyon County	10/01/2007	8	10%	5%	Current
Riley County	Riley County	05/01/2015	9	5%	5%	Current
Riley, City of	Riley County	10/01/2018	9	5%	5%	Current
Wamego	Pottawatomie County	10/01/2012	9	5%	5%	Current

Source: FEMA and KDEM

4.13.6 – FEMA Flood Policy and Loss Data

Kansas Region I flood-loss information was pulled from FEMA's "Policy and Loss Data by Community with County and State Data." There are several limitations to this data, including:

- Only losses to participating NFIP communities are represented
- Communities joined the NFIP at various times since 1978
- The number of flood insurance policies in effect may not include all structures at risk to flooding
- Some of the historical loss areas have been mitigated with property buyouts

Some properties are under-insured. The flood insurance purchase requirement is for flood insurance in the amount of federally backed mortgages, not the entire value of the structure. Additionally, contents coverage is not required.
The following table shows the details of NFIP policy and loss statistics for each county in Kansas Region I. Loss statistics include losses through December 31, 2018.

Table 4.89: Kansas Region I NFIP Policy and Loss Statistics, As of December 31, 2018

Jurisdiction	Number of Policies in Force	Insurance in Force	Number of Closed Losses	Total Payments
Chase County				
Chase County	9	$871,300	4	$26,643.93
Cedar Point	1	$15,000	5	$52,643.72
Cottonwood Falls	0	$0	4	$62,338.05
Elmdale	2	$76,300	9	$113,217.11
Strong City	7	$324,200	4	$26,643.93
Geary County				
Geary County	15	$4,901,600	12	$78,572.49
Grandview Plaza	0	$0	0	$0
Junction City	51	$11,767,800	13	$197,103.00
Lyon County				
Lyon County	27	$4,504,400	28	$ 474,953.98
Admire	0	$0	0	$0
Allen	0	$0	0	$0
Americus	3	$625,000	3	$11,472.50
Emporia	35	$6,079,300	15	$389,763.94

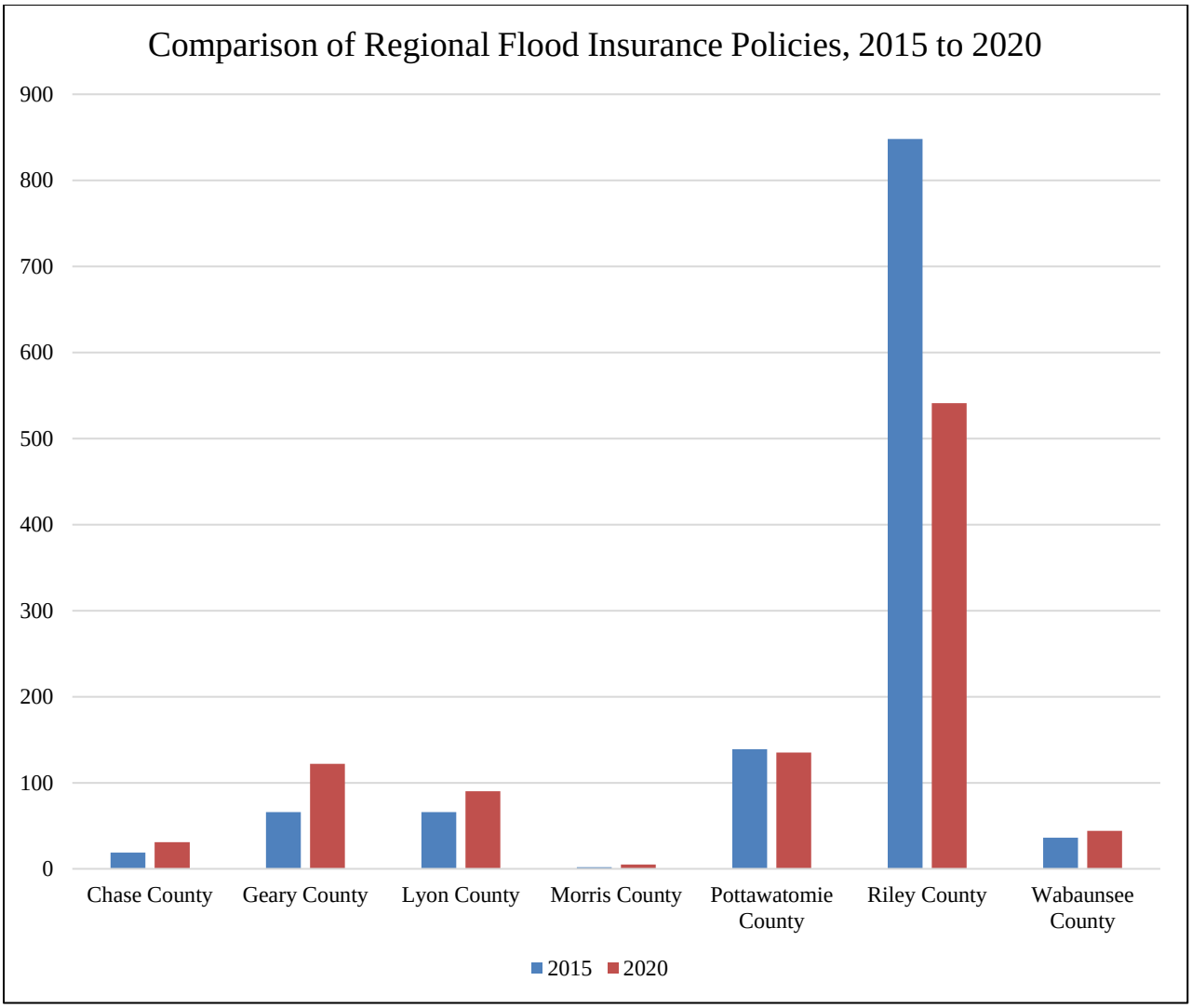
Table 4.89: Kansas Region I NFIP Policy and Loss Statistics, As of December 31, 2018

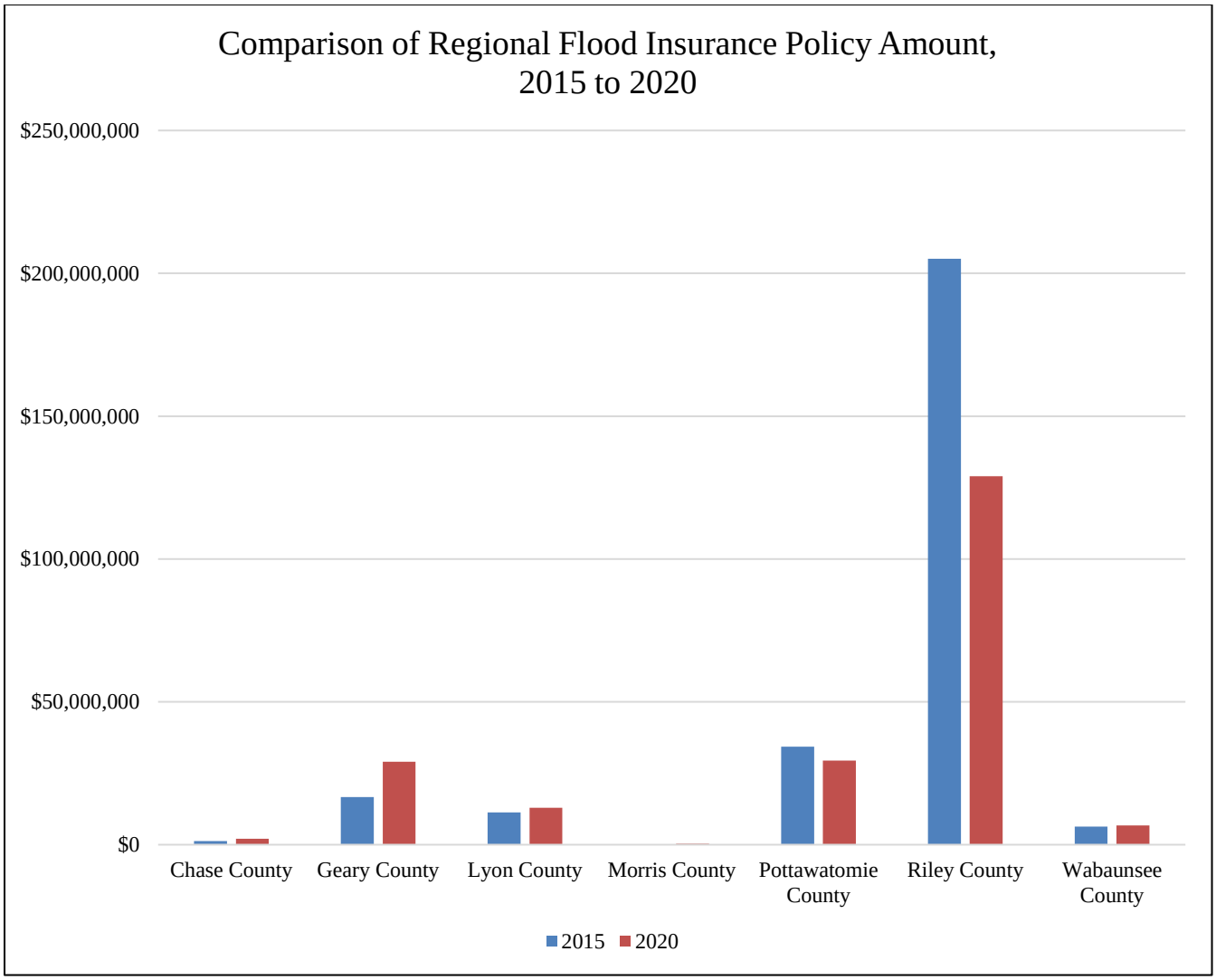
Jurisdiction	Number of Policies in Force	Insurance in Force	Number of Closed Losses	Total Payments
Hartford	0	$0	0	$0
Neosho Rapids	1	$70,000	0	$0
Morris County				
Council Grove	2	$141,500	0	$0
Dwight	0	$0	0	$0
Wilsey	0	$0	0	$0
Pottawatomie County				
Pottawatomie County	120	$30,620,400	26	$231,939.99
Belvue	0	$0	0	$0
Havensville	0	$0	0	$0
Louisville	0	$0	0	$0
Onaga	1	$300,000	0	$0
St. George	5	$423,900	0	$0
St. Mary's	12	$2,778,900	22	$11,899.08
Wamego	1	$150,000	3	$38,599.03
Riley County				
Riley County	115	$23,921,800	59	$939,943.48
Manhattan	721	$179,020,600	172	$3,577,911.61
Ogden	8	$1,227,500	15	$84,724.32
City of Riley	4	$908,200	0	$0
Wabaunsee County				
Wabaunsee County	19	$4,479,700	1	$2,229.07
Alma	0	$0	0	$0
Eskridge	1	$175,000	0	$0
Harveyville	0	$0	0	$0
Maple Hill	2	$525,000	1	$5,831.11
McFarland	0	$0	0	$0
Paxico	14	$1,138,400	0	$0

Source: FEMA, "Policy and Loss Data by Community with County and State Data"

The following graphs summarize data from the above table for Kansas Region I in comparison to 201 data. Of note:

- Regionally the number of flood policies has decreased from 2015 to 2020, from 1,176 to 968
- Regionally the amount of flood insurance in-force decreased from 2015 to 2020, from $275,045,800 to $209,457,700


Comparison of Regional Flood Insurance Policies, 2015 to 2020
900
800
700
600
500
400
300
200
100
0
Chase County
Geary County
Lyon County
Morris County
Pottawatomie County
Riley County
Wabaunsee County
2015
2020



4.13.7 – Repetitive Loss Properties

A high priority to Kansas Region I is the reduction of losses to Repetitive Loss (RL) and Severe Repetitive Loss (SRL) structures. The NFIP defines a RL property as:

- Any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling 10-year period, since 1978

At least two of the claims must be more than 10 days apart.

The definition of severe repetitive loss as applied to this program was established in section 1361A of the National Flood Insurance Act, as amended, 42 U.S.C. 4102a. An SRL property is defined as a residential property that is covered under an NFIP flood insurance policy and:

- That has at least four NFIP claim payments (including building and contents) over $5,000 each, and the cumulative amount of such claims payments exceeds $20,000; or

- For which at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building.

For both of the above, at least two of the referenced claims must have occurred within any ten-year period and must be greater than ten days apart.

The following table details non-mitigated RL and SRL properties in Kansas Region I.

Table 4.90: Kansas Region I Repetitive Loss Properties, As of December 2018

County Name	Community Name	Mitigated	Insured	Occupancy	Total Building Payment	Total Contents Payment	Losses	Total Paid
Geary	Ellinwood	No	Yes	Single Family	$27,762	$0	2	$27,762
Lyon	Lyon County	No	No	Single Family	$6,607	$0	2	$6,607
Lyon	Lyon County	No	Yes	Single Family	$39,267	$5,600	2	$44,867
Lyom	Lyon County	No	Yes	Single Family	$29,978	$13,900	3	$43,879
Pottawatomie/Riley	Manhattan	No	Yes	Single Family	$296,516	$101,766	2	$398,282
Pottawatomie/Riley	Manhattan	No	Yes	Single Family	$435,456	$156,448	3	$591,905
Pottawatomie/Riley	Manhattan	No	No	Single Family	$14,078	$0	4	$14,078
Pottawatomie/Riley	Manhattan	No	Yes	2-4 Family	$289,960	$0	3	$289,960
Pottawatomie/Riley	Manhattan	No	Yes	2-4 Family	$289,531	$0	3	$289,531
Pottawatomie/Riley	Manhattan	No	Yes	2-4 Family	$286,455	$5,000	3	$291,455
Pottawatomie/Riley	Manhattan	No	No	Single Family	$3,622	$0	2	$3,622
Pottawatomie/Riley	Manhattan	No	No	Single Family	$25,182	$0	2	$25,182
Pottawatomie/Riley	Manhattan	No	No	Single Family	$64,626	$0	2	$64,626
Pottawatomie/Riley	Manhattan	No	Yes	Other-Non-Residential	$60,650	$5,355	5	$66,004
Pottawatomie	Pottawatomie County	No	Yes	Single Family	$56,512	$13,834	2	$70,346
Riley	Riley County	No	No	Single Family	$21,774	$0	2	$21,774
Riley	Riley County	No	No	ASSMD Condo	$41,256	$156,742	6	$197,998

4.13.8 – Consequence Analysis

As per EMAP requirements, the following table provides the Consequence Analysis.

Table 4.91: Flood Consequence Analysis

Subject	Impacts of Flood
Health and Safety of the Public	Impact dependent on the level of flood waters. Individuals further away from the incident area are at a lower risk. Casualties are dependent on warning time.
Health and Safety of Responders	Impact to responders is expected to be minimal unless responders live within the affected area.
Continuity of Operations	Temporary relocation may be necessary if inundation affects government facilities.
Property, Facilities, and Infrastructure	Localized impact could be severe in the inundation area of the incident to facilities and infrastructure. The further away from the incident area the damage lessens.
Environment	Impact will be severe for impacted area. Impact will lessen with distance.
Economic Conditions	Impacts to the economy depend on the area flooded, depth of water, and the amount of time it takes for the water to recede.
Public Confidence in the Jurisdiction's Governance	Perception of whether the flood could have been prevented, warning time, and response and recovery time will greatly impact the public's confidence.

4.14 – Hailstorms

According to NOAA, hail is precipitation that is formed when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere causing them to freeze. The raindrops form into small frozen droplets and then continue to grow as they come into contact with super-cooled water which will freeze on contact with the frozen rain droplet. This frozen rain droplet can continue to grow and form hail.

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4.14.1 – Location and Extent

Hailstorms occur over broad geographic regions. The entire planning area, including all participating jurisdictions, is at risk to hailstorms.

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

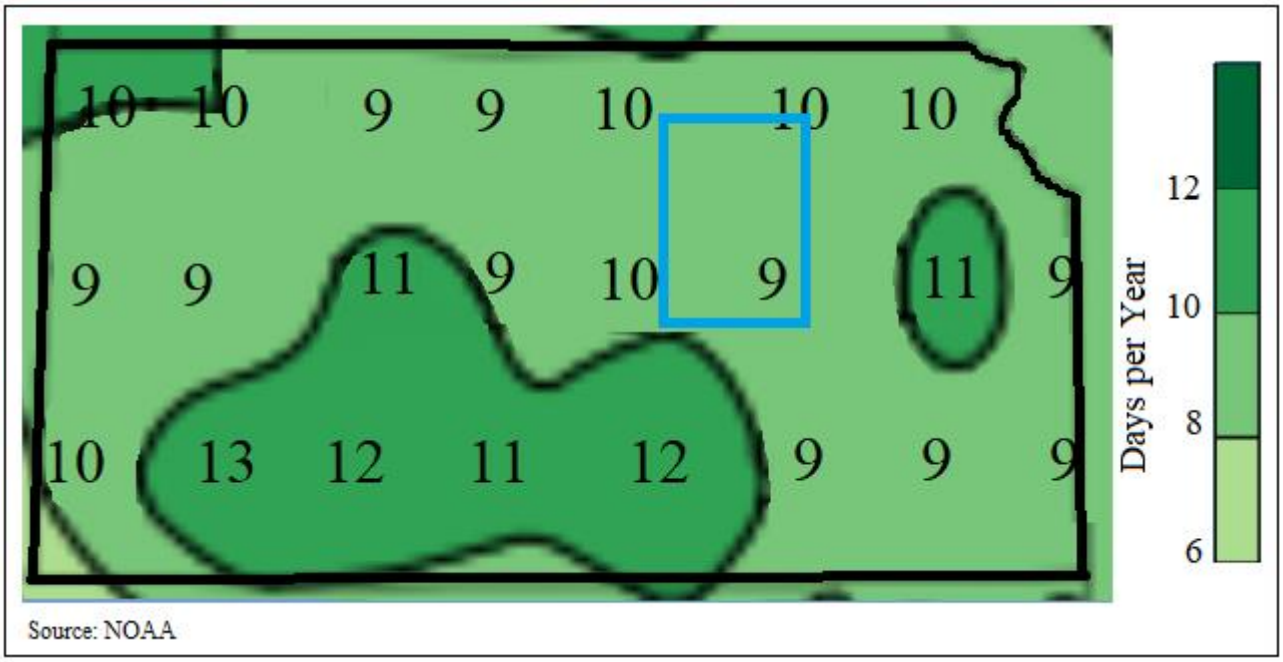
Table 4.92: Hailstorm Intensity Scale

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

The following map, generated by data compiled by NOAA, indicates the average number of severe hail event days for Kansas Region I (9).

Kansas Region I Severe Hail Days per Year from 2003 to 2012 Reports



4.14.2 – Previous Occurrences

In the 20-year period from 2000 to present, there have been 11 Presidential Disaster Declarations for Kansas Region I for severe storms (along with other associates hazard event), of which hail may be a component. The following 20-year information (with 2000 and 2019 being full data years) on past declared disasters is presented to provide a historical perspective on hail events that have impacted Kansas Region I. Declaration numbers in bold indication declared disaster that have occurred since the previous mitigation plan update in 2015.

Table 4.93: Kansas Region I FEMA Severe Storm Disaster and Emergency Declarations, 2000-2020

Declaration Number	Incident Period	Disaster Description	Regional Counties Involved	Dollars Obligated
4449	06/20/2019 (04/28/2019 – 07/12/2019)	**Severe Storms**, Straight-line Winds, Tornados, Flooding, Landslides, and Mudslides	Chase, Geary, Lyon, Morris, Pottawatomie, Riley, Wabaunsee	$1,887,116
4403	10/19/2018 (09/01-09/08/2019)	**Severe Storms**, Straight-line Winds, And Flooding	Riley	$2,614,065
4230	07/20/2015 (05/04/2015 – 06/21/2015)	**Severe Storms**, Tornados, Straight-line Winds, and Flooding	Lyon, Morris, Pottawatomie and Wabaunsee, Chase, Lyon, Morris, Pottawatomie, and Wabaunsee	$13,848,325
4150	10/22/2013 (07/22/2013 – 08/15/2013)	**Severe Storms**, Straight-line Winds, Tornados, and Flooding	Chase, Geary, Lyon and Morris	$11,412,827

Table 4.93: Kansas Region I FEMA Severe Storm Disaster and Emergency Declarations, 2000-2020

Declaration Number	Incident Period	Disaster Description	Regional Counties Involved	Dollars Obligated
4010	07/29/2011 (5/19-6/4/2011)	**Severe Storms**, Straight-line Winds, Tornados and Flooding	Lyon, Pottawatomie and Riley,	$8,259,620
1932	08/10/2010 (6/7-7/21/2010)	**Severe Storms**, Flooding and Tornados	Chase, Lyon, Morris, Pottawatomie, Riley and Wabaunsee	$9,279,257
1849	06/25/2009 (4/25-5/16/2009)	**Severe Storms**, Flooding, Straight-line Winds, and Tornados	Chase, Lyon, Morris and Wabaunsee	$15,013,488
1808	10/31/2008	Severe Storms, Flooding, and Tornadoes	Chase	$4,167,044
1776	07/09/2008	**Severe Storms**, Flooding, and Tornados	Riley	$70,629,544
1699	5/6/2007 (5/4/2007)	**Severe Storms**, Tornados, and Flooding	Chase, Lyon, Morris, Nemaha, Pottawatomie, Riley and Wabaunsee	$117,565,269
1535	8/3/2004 (6/12-7/25/2004)	**Severe Storms**, Flooding, and Tornados	Geary, Lyon, Morris and Wabaunsee	$12,845,892

Source: FEMA
-: Data unavailable

The following provides details concerning Presidential Disaster Declarations DR 4449, DR 4403 and DR 4230 for Kansas Region I.

Kansas –Severe Storms, Straight-line Winds, Tornados, Flooding, Landslides, and Mudslides
FEMA-4449-DR
Declared June 20, 2019 On June 7, 2019

Governor Laura Kelly requested a major disaster declaration due to severe storms, straight-line winds, tornadoes, flooding, landslides, and mudslides beginning on April 28, 2019, and continuing. The Governor requested a declaration for Public Assistance for 63 counties and Hazard Mitigation statewide. Beginning on May 20, 2019, joint federal, state, and local government Preliminary Damage Assessments (PDAs) were conducted in the requested areas and are summarized below. PDAs estimate damages immediately after an event and are considered, along with several other factors, in determining whether a disaster is of such severity and magnitude that effective response is beyond the capabilities of the state and the affected local governments, and that Federal assistance is necessary.

On June 20, 2019, President Trump declared that a major disaster exists in the State of Kansas. This declaration made Public Assistance requested by the Governor available to state and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe storms, straight-line winds, tornadoes, flooding, landslides, and mudslides in Allen, Anderson, Atchison, Barber, Barton, Butler, Chase, Chautauqua, Cherokee, Clark, Clay, Cloud, Coffey, Cowley, Doniphan, Elk, Ellsworth, Franklin, Geary, Greenwood, Harper, Harvey, Hodgeman, Jefferson, Kingman, Leavenworth, Lincoln, Linn, Lyon, Marion, Marshall, McPherson, Meade, Montgomery, Morris,

Nemaha, Neosho, Osage, Ottawa, Pawnee, Phillips, Pottawatomie, Pratt, Reno, Rice, Rush, Russell, Saline, Sumner, Wabaunsee, Washington, Wilson, and Woodson Counties. This declaration also made Hazard Mitigation Grant Program assistance requested by the Governor available for hazard mitigation measures statewide

Kansas – Severe Storms, Straight-line Winds, and Flooding
FEMA-4403-DR
Declared October 19, 2018

On September 25, 2018 Governor Jeff Colyer requested a major disaster declaration due to severe storms, straight-line winds, and flooding during the period of September 1-8, 2018. The Governor requested a declaration Public Assistance for nine counties and Hazard Mitigation statewide. During the period of September 24-28, 2018, joint federal, state, and local government Preliminary Damage Assessments (PDAs) were conducted in the requested areas and are summarized below. PDAs estimate damages immediately after an event and are considered, along with several other factors, in determining whether a disaster is of such severity and magnitude that effective response is beyond the capabilities of the state and the affected local governments, and that Federal assistance is necessary.

On October 19, 2018, President Trump declared that a major disaster exists in the State of Kansas. This declaration made Public Assistance requested by the Governor available to state and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe storms, straight-line winds, and flooding in Barber, Clay, Kingman, Kiowa, Marshall, Pratt, Rice, and Riley Counties. This declaration also made Hazard Mitigation Grant Program assistance requested by the Governor available for hazard mitigation measures statewide.

Kansas – Severe Storms, Tornados, Straight-Line Winds, and Flooding
FEMA-4230-DR
Declared July 20, 2015

On July 1, 2015, Governor Sam Brownback requested a major disaster declaration due to severe storms, tornados, straight-line winds, and flooding during the period of May 4 to June 21, 2015. The Governor requested a declaration for Public Assistance, including direct federal assistance for 42 counties and Hazard Mitigation statewide. During the period of May 4 to June 27, 2015, joint federal, state, and local government Preliminary Damage Assessments (PDAs) were conducted in the requested counties and are summarized below. PDAs estimate damages immediately after an event and are considered, along with several other factors, in determining whether a disaster is of such severity and magnitude that effective response is beyond the capabilities of the state and the affected local governments, and that Federal assistance is necessary.

On July 20, 2015, President Obama declared that a major disaster exists in the State of Kansas. This declaration made Public Assistance requested by the Governor available to state and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe storms, tornados, straight-line winds, and flooding in Atchison, Geary, Brown, Chase, Chase, Chautauqua,

Cherokee, Cheyenne, Clay, Cloud, Geary, Geary, Doniphan, Morris, Elk, Ellsworth, Lyon, Gray, Greenwood, Lyon, Haskell, Hodgeman, Jackson, Jefferson, Jewell, Lyon, Wabaunsee, Marshall, Riley, Meade, Pottawatomie, Morris, Nemaha, Neosho, Riley, Pottawatomie, Republic, Rice, Stevens, Sumner, Wabaunsee, and Washington Counties. Direct Federal assistance was also authorized. Finally, this declaration made Hazard Mitigation Grant Program assistance requested by the Governor available for hazard mitigation measures statewide.

In addition to the above reported events, the following table presents NOAA NCEI identified hailstorm events and the resulting damage totals in Kansas Region I for the period 2009 - 2018 (with 2009 and 2018 being full data set years).

Table 4.94: Kansas Region I NCEI Hailstorm Events, 2009 - 2018

County	Number of Days with Events	Property Damage	Deaths	Injuries
Chase	18	$0	0	0
Geary	24	$0	0	0
Lyon	40	$0	0	0
Morris	36	$0	0	0
Pottawatomie	39	$0	0	0
Riley	43	$0	0	0
Wabaunsee	35	$0	0	0

Source: NOAA NCEI

Available crop loss data from the USDA Risk Management Agency detailing cause of loss was researched to determine the financial impacts of hail on the region's agricultural base. Crop loss data for the ten-year period of 2009- 2018 (with 2009 and 2018 being full data years), for the region, indicates 114 hail related claims on 1,826 acres for $1,261,778.

Table 4.95: USDA Risk Management Agency Cause of Loss Indemnities 2010-2019, Hail

County	Number of Reported Claims	Acres Lost	Total Amount of Loss
Chase	5	570	$27,570
Geary	3	173	$6,446
Lyon	31	9,354	$644,576
Morris	26	2,079	$144,228
Pottawatomie	17	1,838	$151,602
Riley	16	1,368	$109,799
Wabaunsee	16	1,826	$177,558

Source: USDA Farm Service Agency

4.12.3 – Hazard Probability Analysis

The following table summarizes hailstorm probability data for **Chase County**.

Table 4.96: Chase County Hailstorm Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	18
Average Events per Year	2
Number of Days with Event and Death or Injury (2010-2019)	0

Table 4.96: Chase County Hailstorm Probability Summary

Data	Recorded Impact
Average Number of Days with Event and Death or Injury	0
Total Reported NCEI Property Damage (2010-2019)	$0
Average Property Damage per Year	$0
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	5
Average Number of Claims per Year	1
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	570
Average Number of Acres Damaged per Year	57
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$27,570
Average Crop Damage per Year	$2,757

Source: NCEI and USDA

Data from the NCEI indicates that Chase County can expect on a yearly basis, relevant to hail events:

- Two events
- No deaths or injuries
- $0 in property damages

According to the USDA Risk Management Agency, Chase County can expect on a yearly basis, relevant to hail occurrences:

- One insurance claim
- 57 acres impacted
- $2,757 in insurance claims

The following table summarizes hailstorm probability data for **Geary County**.

Table 4.97: Geary County Hailstorm Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	24
Average Events per Year	2
Number of Days with Event and Death or Injury (2010-2019)	0
Average Number of Days with Event and Death or Injury	0
Total Reported NCEI Property Damage (2010-2019)	$0
Average Property Damage per Year	$0
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	3
Average Number of Claims per Year	<1
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	173
Average Number of Acres Damaged per Year	17
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$6,446
Average Crop Damage per Year	$645

Source: NCEI and USDA

Data from the NCEI indicates that Geary County can expect on a yearly basis, relevant to hail events:

- Two events

- No deaths or injuries
- $0 in property damages

According to the USDA Risk Management Agency, Geary County can expect on a yearly basis, relevant to hail occurrences:

- <1 insurance claim
- 17 acres impacted
- $645 in insurance claims

The following table summarizes hailstorm probability data for **Lyon County**.

Table 4.98: Lyon County Hailstorm Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	40
Average Events per Year	4
Number of Days with Event and Death or Injury (2010-2019)	0
Average Number of Days with Event and Death or Injury	0
Total Reported NCEI Property Damage (2010-2019)	$0
Average Property Damage per Year	$0
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	31
Average Number of Claims per Year	3
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	9,354
Average Number of Acres Damaged per Year	935
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$644,576
Average Crop Damage per Year	$64,458

Source: NCEI and USDA

Data from the NCEI indicates that Lyon County can expect on a yearly basis, relevant to hail events:

- Four events
- No deaths or injuries
- $0 in property damages

According to the USDA Risk Management Agency, Lyon County can expect on a yearly basis, relevant to hail occurrences:

- Three insurance claims
- 935 acres impacted
- $64,458 in insurance claims

The following table summarizes hailstorm probability data for **Morris County**.

Table 4.99: Morris County Hailstorm Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	36

Table 4.99: Morris County Hailstorm Probability Summary

Data	Recorded Impact
Average Events per Year	4
Number of Days with Event and Death or Injury (2010-2019)	0
Average Number of Days with Event and Death or Injury	0
Total Reported NCEI Property Damage (2010-2019)	$0
Average Property Damage per Year	$0
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	26
Average Number of Claims per Year	3
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	2,079
Average Number of Acres Damaged per Year	208
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$144,228
Average Crop Damage per Year	$14,423

Source: NCEI and USDA

Data from the NCEI indicates that Morris County can expect on a yearly basis, relevant to hail events:

- Four events
- No deaths or injuries
- $0 in property damages

According to the USDA Risk Management Agency, Morris County can expect on a yearly basis, relevant to hail occurrences:

- Three insurance claims
- 208 acres impacted
- $14,423 in insurance claims

The following table summarizes hailstorm probability data for **Pottawatomie County**.

Table 4.100: Pottawatomie County Hailstorm Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	39
Average Events per Year	4
Number of Days with Event and Death or Injury (2010-2019)	0
Average Number of Days with Event and Death or Injury	0
Total Reported NCEI Property Damage (2010-2019)	$0
Average Property Damage per Year	$0
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	69
Average Number of Claims per Year	17
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	2
Average Number of Acres Damaged per Year	1,838
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	184
Average Crop Damage per Year	$151,602

Source: NCEI and USDA

Data from the NCEI indicates that Pottawatomie County can expect on a yearly basis, relevant to hail events:

- Four events
- No deaths or injuries
- $0 in property damages

According to the USDA Risk Management Agency, Pottawatomie County can expect on a yearly basis, relevant to hail occurrences:

- Two insurance claims
- 184 acres impacted
- $15,160 in insurance claims

The following table summarizes hailstorm probability data for **Riley County**.

Table 4.101: Riley County Hailstorm Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	43
Average Events per Year	4
Number of Days with Event and Death or Injury (2010-2019)	0
Average Number of Days with Event and Death or Injury	0
Total Reported NCEI Property Damage (2010-2019)	$0
Average Property Damage per Year	$0
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	16
Average Number of Claims per Year	2
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	1,368
Average Number of Acres Damaged per Year	137
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$109,799
Average Crop Damage per Year	$10,980

Source: NCEI and USDA

Data from the NCEI indicates that Riley County can expect on a yearly basis, relevant to hail events:

- Four events
- No deaths or injuries
- $0 in property damages

According to the USDA Risk Management Agency, Riley County can expect on a yearly basis, relevant to hail occurrences:

- Two insurance claims
- 137 acres impacted
- $10,980 in insurance claims

The following table summarizes hailstorm probability data for **Wabaunsee County**.

Table 4.102: Wabaunsee County Hailstorm Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	35
Average Events per Year	4
Number of Days with Event and Death or Injury (2010-2019)	0
Average Number of Days with Event and Death or Injury	0
Total Reported NCEI Property Damage (2010-2019)	$0
Average Property Damage per Year	$0
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	16
Average Number of Claims per Year	2
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	1,826
Average Number of Acres Damaged per Year	183
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$177,558
Average Crop Damage per Year	$17,756

Source: NCEI and USDA

Data from the NCEI indicates that Wabaunsee County can expect on a yearly basis, relevant to hail events:

- Four events
- No deaths or injuries
- $0 in property damages

According to the USDA Risk Management Agency, Wabaunsee County can expect on a yearly basis, relevant to hail occurrences:

- Two insurance claims
- 183 acres impacted
- $17,756 in insurance claims

In addition, Kansas Region I has had 11 Presidentially Declared Disasters relating to severe storms (of which hail is a potential component) in the last 20 years. This represents an average of one declared severe storm disaster per year.

4.14.4 – Vulnerability Analysis

For purposes of this assessment, all counties within the region were determined to be at equal risk to hailstorm events. Counties with a higher or increasing structural inventory, or having a high structural valuation are to be considered to have a potentially greater vulnerability. Additionally, population vulnerabilities to hail events are expected to be minimal.

The following table presents data from the NOAA NCEI and HAZUS concerning the value of structures and the percentage of structures for each Kansas Region I county incurring damage over the period 2009 to 2018 from hailstorm events. The greater the percentage of structures damaged the greater overall vulnerability going forward.

Table 4.103: Kansas Region I Structural Vulnerability Data for Hailstorms, 2010-2019

County	HAZUS Building Valuation	NCEI Structure Damage	Percentage of Building Valuation Damaged
Chase	$328,770,000	$0	0.0%
Geary	$3,163,291,000	$0	0.0%
Lyon	$4,037,043,000	$0	0.0%
Morris	$805,916,000	$0	0.0%
Pottawatomie	$2,254,592,000	$0	0.0%
Riley	$6,656,737,000	$0	0.0%
Wabaunsee	$812,583,000	$0	0.0%

Source: NCEI and HAZUS

Data concerning potential vulnerabilities for specific jurisdictions relating to housing, including growth or decline, may be found in Section 3.4, Regional Housing Data.

The USDA 2017 Census of Agriculture (the latest available data) provides data on the crop exposure value, the total dollar value of all crops, for each Kansas Region I County. The USDA Risk Management Agency provides information on insured crop losses related to identified hazard, with data from the ten-year period of 2009 to 2018 (with 2009 and 2018 being full data set years) used for analysis. The higher the percentage loss, the higher the potential vulnerability the county has to hailstorm events.

Table 4.104: Hailstorm Acres Impacted and Crop Insurance Paid per County from 2009-2018

Jurisdiction	Farm Acreage	Annualized Acres Impacted	Percentage of Total Acres Impacted Yearly	Market Value of Products Sold	Annualized Crop Insurance Paid	Percentage of Market Value Impacted Yearly
Chase	360,077	57	0.02%	$85,430,000	$2,757	0.00%
Geary	155,153	17	0.01%	$31,833,000	$645	0.00%
Lyon	522,934	935	0.18%	$134,440,000	$64,458	0.05%
Morris	409,269	208	0.05%	$138,615,000	$14,423	0.01%
Pottawatomie	406,031	184	0.05%	$101,363,000	$15,160	0.01%
Riley	214,311	137	0.06%	$51,171,000	$10,980	0.02%
Wabaunsee	378,759	183	0.05%	$63,146,000	$17,756	0.03%

Source: USDA

4.14.5 – Impact and Consequence Analysis

As per EMAP requirements, the following table provides the Consequence Analysis.

Table 4.105: Hailstorm Consequence Analysis

Subject	Impacts of Hailstorm
Health and Safety of the Public	Severity and location dependent. Impacts on persons in the areas of hail are expected to be severe if caught without proper shelter.
Health and Safety of Responders	Impacts will be predicated on the severity of the event. Damaged infrastructure will likely result in hazards such as downed utility lines, main breakages and debris on roadways. .
Continuity of Operations	Temporary relocation may be necessary if government facilities experience damage. Services may be limited to essential tasks if utilities are impacted.

Table 4.105: Hailstorm Consequence Analysis

Subject	Impacts of Hailstorm
Property, Facilities, and Infrastructure	Impact to property, facilities, and infrastructure could be minimal to severe, depending on the location and structural capacity of the facility. Loss of structural integrity of buildings and infrastructure could occur. Utility lines, roads, residential and business properties will be affected.
Environment	Impact could be severe for the immediate impacted area, depending on the size of the event. Impact will lessen as distance increases from the immediate incident area
Economic Conditions	Impacts to the economy will be dependent severity of the event and the impact on structures and infrastructure. Impacts could be severe if roads/utilities are affected.
Public Confidence in the Jurisdiction's Governance	Response and recovery will be in question if not timely and effective. Warning systems in place and the timeliness of those warnings could be questioned.

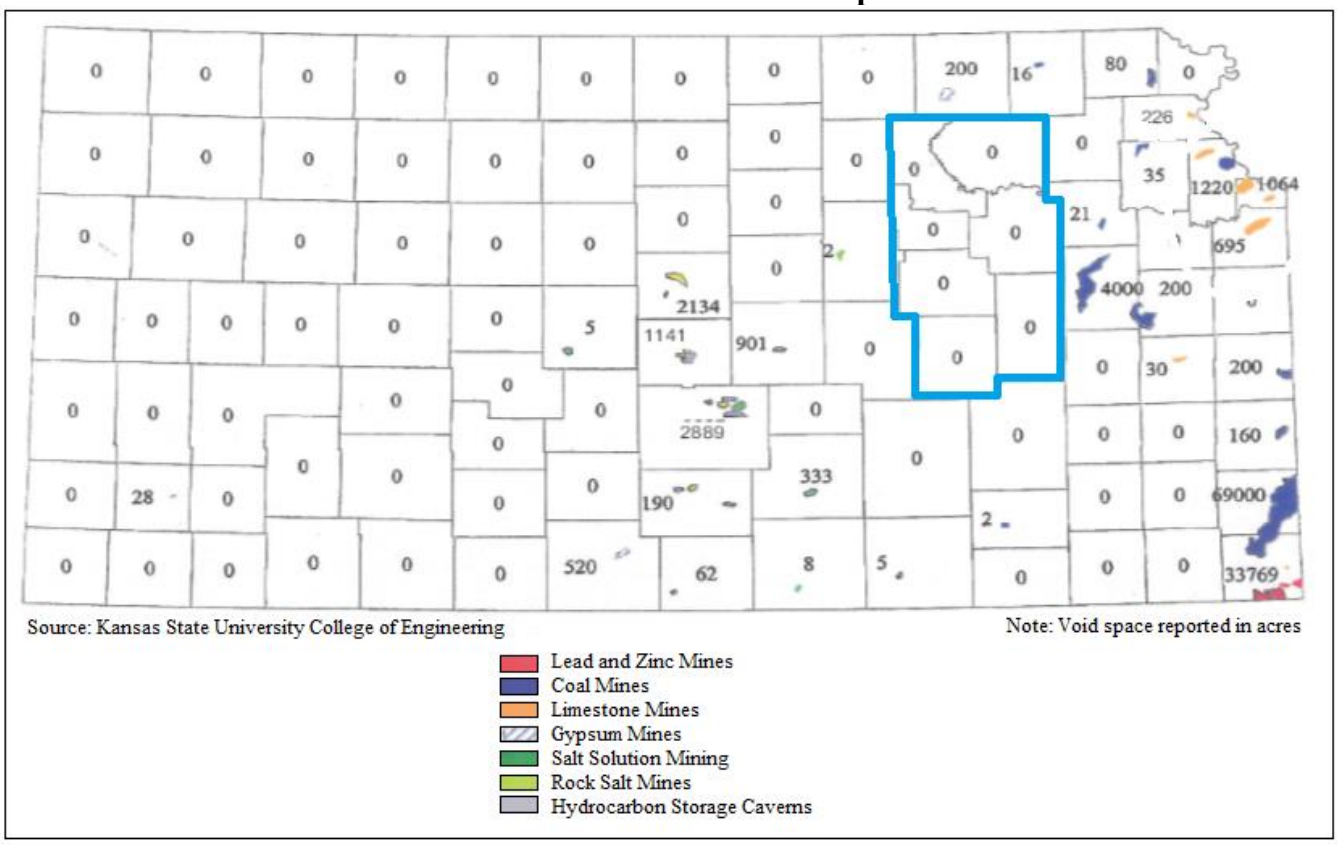
4.15 – Land Subsidence

Land subsidence is caused when the ground above manmade or natural voids collapses. Subsidence can be related to mine collapse, water and oil withdrawal, or natural causes such as shrinking of expansive soils, salt dissolution (which may also be related to mining activities), and cave collapses. The surface depression is known as a sinkhole. If sinkholes appear beneath developed areas, damage or destruction of buildings, roads and rails, or other infrastructure can result. The rate of subsidence, which ranges from gradual to catastrophic, correlates to its risk to public safety and property damage.

4.15.1 – Location and Extent

The Kansas Department of Health and Environment (KDHE) prepared a report on "Subsurface Void Space and Sinkhole/Subsidence Area Inventory for the State of Kansas." The report inventoried subsurface void space from oil and gas exploration and production, natural sources, shaft mining, and solution mining. The following map details the distribution of total acres and major cause of void spaces for all Kansas Region I counties.

KDHE Total Subsurface Void Space



The following table details the total amount of subsurface void space as calculated using data from the KDHE map.

Table 4.106: Kansas Region I Sub-Surface Void Space

County	Total Sub-Surface Void Space (acres)
Chase	0
Geary	5
Lyon	0
Morris	0
Pottawatomie	0
Riley	0
Wabaunsee	0

Source: KDHE

Of additional concern to Kansas Region I is Karst topography. Mapping from the United States Geologic Survey (USGS) indicates areas of Karst topography in the region. The green areas on the map show fissures, tubes, and caves generally less than 1,000 feet long with 50 feet or less vertical extent in gently dipping to flat-lying carbonate rock. There are limited documented problems associated with natural limestone subsidence and sinkholes in Kansas Region I.

USGS Karst Topography

4.15.2 – Previous Occurrences

There have been no reported land subsidence events in Kansas Region I during the ten-year period from 2010 to 2019.

4.15.3 – Hazard Probability Analysis

Land subsidence events with the potential to affect Kansas Region I are incredibly difficult to quantify and forecast. Compounding the difficulty, land subsidence events occur on their own or occur as a secondary hazard with incidents of heavy rain, melting snow, and earthquakes as a primary cause. Hence, their future occurrences are highly dependent on the likelihood of the mentioned hazards.

Based on limited available data, indicating that there have been no reported events in the past ten years, and bearing in mind that many events may be unreported as they have no impact on human activities, the probability of a reported land subsidence occurrence in any given year is very low.

4.15.4 Vulnerability Analysis

Counties with a higher or increasing population, high, or increasing, or having a high structural valuation are to be considered to have a potentially greater vulnerability. Additionally, population vulnerabilities to land subsidence events are expected to be minimal.

Vulnerability to land subsidence in Kansas Region I was analyzed using the KDHE "Subsurface Void Space and Sinkhole/Subsidence Area Inventory for the State of Kansas" report. All documented acres of subsurface void space were classified according to these risk categories for each of the following causes of void space:

- Lead and Zinc Mines
- Coal Mines
- Limestone Mines
- Gypsum Mines
- Salt Solution Mining
- Rock Salt Mines
- Hydrocarbon Storage Caverns

Based on these classifications, a risk category was assigned to each of the subsurface void acres:

- Category I: High Risk
- Category II: Medium Risk
- Category III: Low Risk

The following table shows the classification of the void space in each of Kansas Region I counties. Please note that not all classifications with identified acreage are shown.

Table 4.107: Kansas Region I Sub-Surface Void Space Risk Classification in Acres

County	All Categories
Chase	0
Geary	0
Lyon	0
Morris	0
Pottawatomie	0
Riley	0
Wabaunsee	0

Source: KDHE, "Subsurface Void Space and Sinkhole/Subsidence Area Inventory for the State of Kansas" 2006.

Based on this data, the area for each county underlain by sub-surface void acreage was determined. The higher percentage of acreage underlain by void area the higher the potential vulnerability.

Table 4.108: Kansas Region I Percentage of Land Underlain by Sub-Surface Void Space

County	Total County Acreage	Sub-Surface Void Space Acreage	Percentage of County Acreage Underlain by Void Space
Chase	497,920	0	0.0%
Geary	258,560	5	0.0%
Lyon	547,200	0	0.0%
Morris	449,920	0	0.0%
Pottawatomie	551,680	0	0.0%
Riley	398,080	0	0.0%
Wabaunsee	512,000	0	0.0%

Source: KDHE

The following table presents data from the NOAA NCEI and HAZUS concerning the value of structures and the percentage of structures for each Kansas Region I county incurring damage over the period 2010 to 2019 from land subsidence events. The greater the percentage of structures damaged the greater overall vulnerability going forward.

Table 4.109: Kansas Region I Structural Vulnerability Data for Land Subsidence, 2010-2019

County	HAZUS Building Valuation	NCEI Structure Damage	Percentage of Building Valuation Damaged
Chase	$328,770,000	$0	0.0%
Geary	$3,163,291,000	$0	0.0%
Lyon	$4,037,043,000	$0	0.0%
Morris	$805,916,000	$0	0.0%
Pottawatomie	$2,254,592,000	$0	0.0%
Riley	$6,656,737,000	$0	0.0%
Wabaunsee	$812,583,000	$0	0.0%

Source: NCEI and HAZUS

Data concerning potential vulnerabilities for specific jurisdictions relating to housing, including growth or decline, may be found in Section 3.4, Regional Housing Data.

4.15.5 – Impact and Consequence Analysis

As per EMAP requirements, the following table provides the Consequence Analysis.

Table 4.110: Land Subsidence Consequence Analysis

Subject	Impacts of Land Subsidence
Health and Safety of the Public	Local impact expected to be moderate to severe for the incident area, depending on the scale of the area.
Health and Safety of Responders	Impact to responders would be minimal.
Continuity of Operations	Minimal expectation of execution of the COOP, unless a facility is impacted.
Property, Facilities, and Infrastructure	Localized impact to facilities and infrastructure in the incident area has the potential to do severe damage.
Environment	Impact to the area would be minimal.
Economic Conditions	Impacts to the economy will depend on the severity of the damage.
Public Confidence in the Jurisdiction's Governance	Local development policies will be questioned

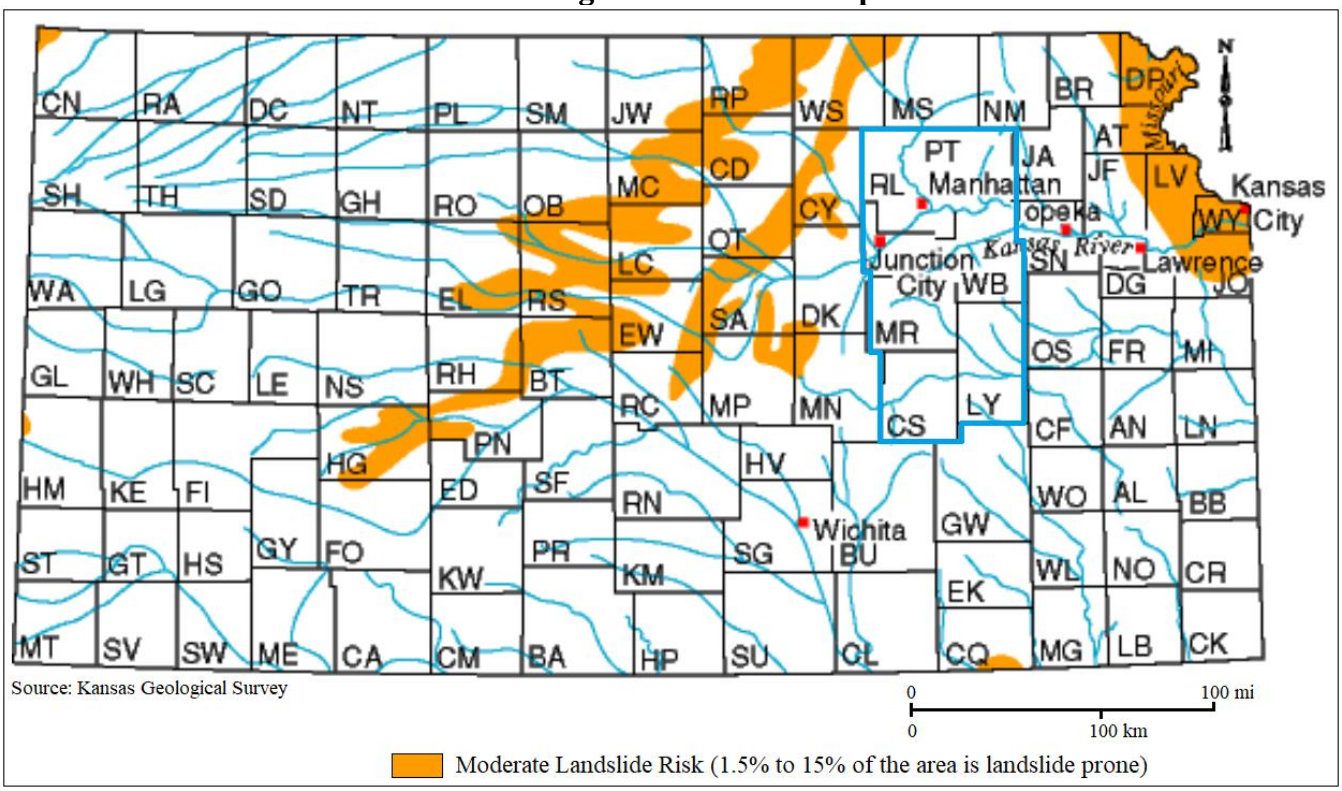
4.16 – Landslides

Landslides are the downward and outward movement of slopes. Landslides include a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows. Although gravity acting on and over steepened slopes is the primary reason for a landslide, landslides are often prompted by the occurrence of other disasters. Other contributing factors include erosion, steep slopes, rain and snow, and earthquakes.

4.16.1 – Location and Extent

Landslides are classified based mostly on their character of movement and degree of internal disruption. These landslide classes are rock fall, flow, slide, and creep. Although these are clear divisions, in the real world a landslide may have components of more than one type. Areas prone to landslides can cover broad geographic regions, but occurrences are generally localized. Landslides require an earth or rock covered slope, and so flatter areas have a much-decreased risk of occurrence. The following map, produced by the Kansas Geological Survey (KGS), shows areas of the region with a moderate susceptibility of landslides, equating to 1.5% to 15% of the area being landslide prone.

KGS Regional Landslide Map



4.16.2 – Previous Occurrences

At present there is no centralized and complete database containing historical records for landslides in Kansas.

In the 20-year period from 1999 to present, there has been one Presidential Disaster Declaration for Kansas Region I for landslides and mudslides (along with other associates hazard event). The following provides details concerning Presidential Disaster Declarations DR 4449.

> **Kansas –Severe Storms, Straight-line Winds, Tornados, Flooding, Landslides, and Mudslides**
> **FEMA-4449-DR**
> Declared June 20, 2019 On June 7, 2019
>
> Governor Laura Kelly requested a major disaster declaration due to severe storms, straight-line winds, tornadoes, flooding, landslides, and mudslides beginning on April 28, 2019, and continuing. The Governor requested a declaration for Public Assistance for 63 counties and Hazard Mitigation statewide. Beginning on May 20, 2019, joint federal, state, and local government Preliminary Damage Assessments (PDAs) were conducted in the requested areas and are summarized below. PDAs estimate damages immediately after an event and are considered, along with several other factors, in determining whether a disaster is of such severity and magnitude that effective response is beyond the capabilities of the state and the affected local governments, and that Federal assistance is necessary.
>
> On June 20, 2019, President Trump declared that a major disaster exists in the State of Kansas. This declaration made Public Assistance requested by the Governor available to state and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe storms, straight-line winds, tornadoes, flooding, landslides, and mudslides in Allen, Anderson, Atchison, Barber, Barton, Butler, Chase, Chautauqua, Cherokee, Clark, Clay, Cloud, Coffey, Cowley, Doniphan, Elk, Ellsworth, Franklin, Geary, Greenwood, Harper, Harvey, Hodgeman, Jefferson, Kingman, Leavenworth, Lincoln, Linn, Lyon, Marion, Marshall, McPherson, Meade, Montgomery, Morris, Nemaha, Neosho, Osage, Ottawa, Pawnee, Phillips, Pottawatomie, Pratt, Reno, Rice, Rush, Russell, Saline, Sumner, Wabaunsee, Washington, Wilson, and Woodson Counties. This declaration also made Hazard Mitigation Grant Program assistance requested by the Governor available for hazard mitigation measures statewide

Information solicited from MPC members indicate that no damaging landslides or mudslides were recorded within the region for this event. For Kansas Region I there have been no other reported or recorded landslides impacting either participating jurisdictions or the region in the past 10 years.

4.16.3 – Hazard Probability Analysis

Landslides with the potential to affect Kansas Region I are incredibly difficult to quantify and forecast. Compounding the difficulty, landslides occur on their own or occur as a secondary hazard with incidents

of heavy rain, melting snow, earthquakes, and land subsidence are their primary cause. Hence, their future occurrences are highly dependent on the likelihood of the mentioned hazards.

As indicated in the map above, no areas of Kansas Region I have been identified as having a moderate susceptibility to landslides. Additionally, the limited available past occurrence data indicate that there is a very low rate of occurrence. Based on limited available data, and bearing in mind that many landslides may be unreported as they have no impact on human activities, it is not likely that a major landslide will impact the region based on zero reported occurrences in 10 years.

4.16.4 Vulnerability Analysis

Based on landslide mapping by the KGS, the area for each county with a moderate landslide risk was estimated. The higher percentage of acreage in a moderate landslide risk area the higher the potential vulnerability. However, landslides require an earth or rock covered slope, and so flatter areas have a much-decreased risk of occurrence.

Table 4.111: Kansas Region I Percentage of Land in Moderate Landslide Risk Area

County	Total County Acreage	Estimated Acreage with Moderate Landslide Potential	Percentage of County Acreage Identified in Potential Slide Area
Chase	497,920	0	0.0%
Geary	258,560	0	0.0%
Lyon	547,200	0	0.0%
Morris	449,920	0	0.0%
Pottawatomie	551,680	0	0.0%
Riley	398,080	0	0.0%
Wabaunsee	512,000	0	0.0%

Source: KDEM and HAZUS

The following table presents data from the NOAA NCEI and HAZUS concerning the value of structures and the percentage of structures for each Kansas Region I county incurring damage over the period 2009 to 2018 from landslide events. The greater the percentage of structures damaged the greater overall vulnerability going forward.

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Table 4.112: Kansas Region I Structural Vulnerability Data for Landslides, 2010-2019

County	HAZUS Building Valuation	NCEI Structure Damage	Percentage of Building Valuation Damaged
Chase	$328,770,000	$0	0.0%
Geary	$3,163,291,000	$0	0.0%
Lyon	$4,037,043,000	$0	0.0%
Morris	$805,916,000	$0	0.0%
Pottawatomie	$2,254,592,000	$0	0.0%
Riley	$6,656,737,000	$0	0.0%
Wabaunsee	$812,583,000	$0	0.0%

Source: NCEI and HAZUS

Population vulnerabilities to landslide events are expected to be minimal.

Data concerning potential vulnerabilities for specific jurisdictions relating housing, including growth or decline, may be found in Section 3.4, Regional Housing Data.

4.16.5 – Impact and Consequence Analysis

As per EMAP requirements, the following table provides the Consequence Analysis.

Table 4.113: Landslide Consequence Analysis

Subject	Impacts of Landslide
Health and Safety of the Public	Severity and location dependent. Impacts on persons in the path of the slide are expected to be severe.
Health and Safety of Responders	Impacts are expected to be minimal.
Continuity of Operations	Minimal expectation of execution of the COOP, unless a facility is impacted.
Property, Facilities, and Infrastructure	Impact to property, facilities, and infrastructure could be minimal to severe, depending on the location of the facility in relation to the slide. Loss of structural integrity of buildings and infrastructure could occur.
Environment	Impact to the area would be minimal other than the immediate area.
Economic Conditions	Impacts to the economy will be dependent severity of landslide and the impact on structures and infrastructure. Impacts could be severe if roads/utilities are affected. Otherwise impact would be non-existent to minimal.
Public Confidence in the Jurisdiction's Governance	Confidence could be an issue if local development policies are questioned.

4.17 – Lightning

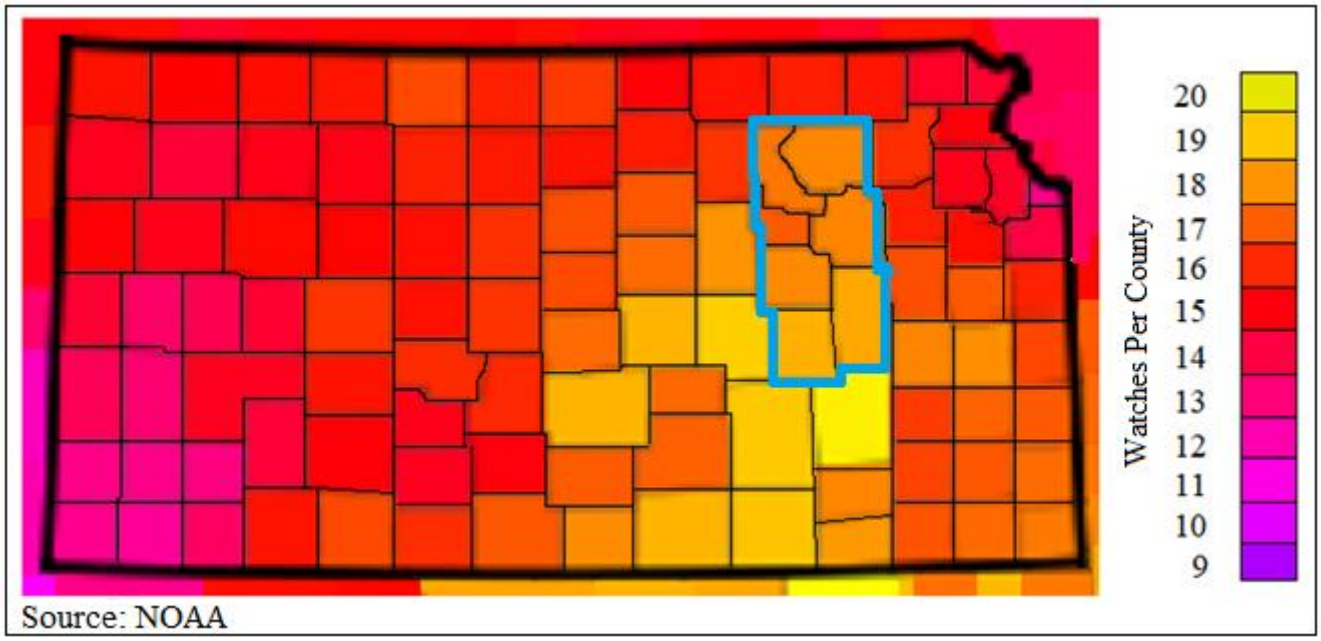
Lightning is a discharge of atmospheric electricity that is triggered by a buildup of differing charges within a cloud. According to the NWS, lightning is one of the most underrated severe weather hazards and is the second deadliest weather killer in the United States.

4.17.1 – Location and Extent

Lightning occurs over broad geographic regions. The entire Kansas Region I planning area, including all participating jurisdictions, is at risk to lightning.

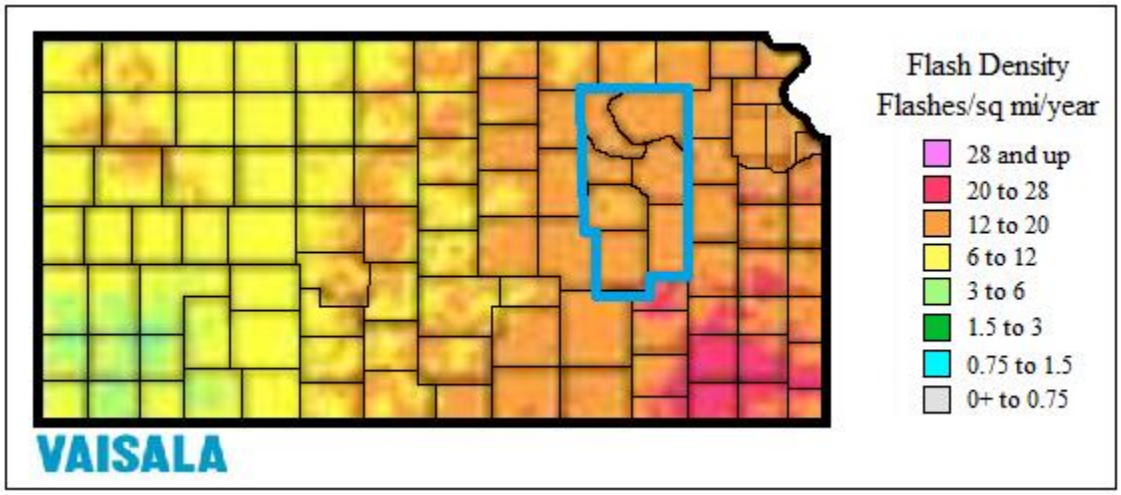
Thunderstorms are often the generator of lightning. The following map, generated by NOAA, indicates the average number severe thunderstorm watches per year for Kansas Region I.

Annual Average Thunderstorm Watches per Year (20-Year Average, 1993-2012)



The following map, generated by Vaisala, indicates the average number of lightning flashes per square mile per year for Kansas Region I. In general, the more recorded flashes the greater the potential for lightning strikes.

Vaisala Lightning Flash Density, 2008-2017



4.17.2 – Previous Occurrences

In the 20-year period from 2000 to present, there have been 11 Presidential Disaster Declarations for Kansas Region I for severe storms (along with other associates hazard event), of which lightning may be a component. The following 20-year information (with 2000 and 2019 being full data years) on past declared disasters is presented to provide a historical perspective on lightning events that have impacted Kansas Region I. Declaration numbers in bold indication declared disaster that have occurred since the previous mitigation plan update in 2015.

Table 4.114: Kansas Region I FEMA Severe Storm Disaster and Emergency Declarations, 2000-2020

Declaration Number	Incident Period	Disaster Description	Regional Counties Involved	Dollars Obligated
4449	06/20/2019 (04/28/2019 – 07/12/2019)	**Severe Storms**, Straight-line Winds, Tornados, Flooding, Landslides, and Mudslides	Chase, Geary, Lyon, Morris, Pottawatomie, Riley, Wabaunsee	$1,887,116
4403	10/19/2018 (09/01-09/08/2019)	**Severe Storms**, Straight-line Winds, And Flooding	Riley	$2,614,065
4230	07/20/2015 (05/04/2015 – 06/21/2015)	**Severe Storms**, Tornados, Straight-line Winds, and Flooding	Lyon, Morris, Pottawatomie and Wabaunsee, Chase, Lyon, Morris, Pottawatomie, and Wabaunsee	$13,848,325
4150	10/22/2013 (07/22/2013 – 08/15/2013)	**Severe Storms**, Straight-line Winds, Tornados, and Flooding	Chase, Geary, Lyon and Morris	$11,412,827
4010	07/29/2011 (5/19-6/4/2011)	**Severe Storms**, Straight-line Winds, Tornados and Flooding	Lyon, Pottawatomie and Riley,	$8,259,620
1932	08/10/2010 (6/7-7/21/2010)	**Severe Storm**s, Flooding and Tornados	Chase, Lyon, Morris, Pottawatomie, Riley and Wabaunsee	$9,279,257
1849	06/25/2009 (4/25-5/16/2009)	**Severe Storms**, Flooding, Straight-line Winds, and Tornados	Chase, Lyon, Morris and Wabaunsee	$15,013,488

Table 4.114: Kansas Region I FEMA Severe Storm Disaster and Emergency Declarations, 2000-2020

Declaration Number	Incident Period	Disaster Description	Regional Counties Involved	Dollars Obligated
1808	10/31/2008	Severe Storms, Flooding, and Tornadoes	Chase	$4,167,044
1776	07/09/2008	**Severe Storms**, Flooding, and Tornados	Riley	$70,629,544
1699	5/6/2007 (5/4/2007)	**Severe Storms**, Tornados, and Flooding	Chase, Lyon, Morris, Nemaha, Pottawatomie, Riley and Wabaunsee	$117,565,269
1535	8/3/2004 (6/12-7/25/2004)	**Severe Storms**, Flooding, and Tornados	Geary, Lyon, Morris and Wabaunsee	$12,845,892

Source: FEMA
-: Data unavailable

The following provides details concerning Presidential Disaster Declarations DR 4449, DR 4403 and DR 4230 for Kansas Region I.

Kansas –Severe Storms, Straight-line Winds, Tornados, Flooding, Landslides, and Mudslides
FEMA-4449-DR
Declared June 20, 2019 On June 7, 2019

Governor Laura Kelly requested a major disaster declaration due to severe storms, straight-line winds, tornadoes, flooding, landslides, and mudslides beginning on April 28, 2019, and continuing. The Governor requested a declaration for Public Assistance for 63 counties and Hazard Mitigation statewide. Beginning on May 20, 2019, joint federal, state, and local government Preliminary Damage Assessments (PDAs) were conducted in the requested areas and are summarized below. PDAs estimate damages immediately after an event and are considered, along with several other factors, in determining whether a disaster is of such severity and magnitude that effective response is beyond the capabilities of the state and the affected local governments, and that Federal assistance is necessary.

On June 20, 2019, President Trump declared that a major disaster exists in the State of Kansas. This declaration made Public Assistance requested by the Governor available to state and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe storms, straight-line winds, tornadoes, flooding, landslides, and mudslides in Allen, Anderson, Atchison, Barber, Barton, Butler, Chase, Chautauqua, Cherokee, Clark, Clay, Cloud, Coffey, Cowley, Doniphan, Elk, Ellsworth, Franklin, Geary, Greenwood, Harper, Harvey, Hodgeman, Jefferson, Kingman, Leavenworth, Lincoln, Linn, Lyon, Marion, Marshall, McPherson, Meade, Montgomery, Morris, Nemaha, Neosho, Osage, Ottawa, Pawnee, Phillips, Pottawatomie, Pratt, Reno, Rice, Rush, Russell, Saline, Sumner, Wabaunsee, Washington, Wilson, and Woodson Counties. This declaration also made Hazard Mitigation Grant Program assistance requested by the Governor available for hazard mitigation measures statewide

Kansas – Severe Storms, Straight-line Winds, and Flooding
FEMA-4403-DR
Declared October 19, 2018

On September 25, 2018 Governor Jeff Colyer requested a major disaster declaration due to severe storms, straight-line winds, and flooding during the period of September 1-8, 2018. The Governor requested a declaration Public Assistance for nine counties and Hazard Mitigation statewide. During the period of September 24-28, 2018, joint federal, state, and local government Preliminary Damage Assessments (PDAs) were conducted in the requested areas and are summarized below. PDAs estimate damages immediately after an event and are considered, along with several other factors, in determining whether a disaster is of such severity and magnitude that effective response is beyond the capabilities of the state and the affected local governments, and that Federal assistance is necessary.

On October 19, 2018, President Trump declared that a major disaster exists in the State of Kansas. This declaration made Public Assistance requested by the Governor available to state and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe storms, straight-line winds, and flooding in Barber, Clay, Kingman, Kiowa, Marshall, Pratt, Rice, and Riley Counties. This declaration also made Hazard Mitigation Grant Program assistance requested by the Governor available for hazard mitigation measures statewide.

Kansas – Severe Storms, Tornados, Straight-Line Winds, and Flooding
FEMA-4230-DR
Declared July 20, 2015

On July 1, 2015, Governor Sam Brownback requested a major disaster declaration due to severe storms, tornados, straight-line winds, and flooding during the period of May 4 to June 21, 2015. The Governor requested a declaration for Public Assistance, including direct federal assistance for 42 counties and Hazard Mitigation statewide. During the period of May 4 to June 27, 2015, joint federal, state, and local government Preliminary Damage Assessments (PDAs) were conducted in the requested counties and are summarized below. PDAs estimate damages immediately after an event and are considered, along with several other factors, in determining whether a disaster is of such severity and magnitude that effective response is beyond the capabilities of the state and the affected local governments, and that Federal assistance is necessary.

On July 20, 2015, President Obama declared that a major disaster exists in the State of Kansas. This declaration made Public Assistance requested by the Governor available to state and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe storms, tornados, straight-line winds, and flooding in Atchison, Geary, Brown, Chase, Chase, Chautauqua, Cherokee, Cheyenne, Clay, Cloud, Geary, Geary, Doniphan, Morris, Elk, Ellsworth, Lyon, Gray, Greenwood, Lyon, Haskell, Hodgeman, Jackson, Jefferson, Jewell, Lyon, Wabaunsee, Marshall, Riley, Meade, Pottawatomie, Morris, Nemaha, Neosho, Riley, Pottawatomie, Republic, Rice, Stevens, Sumner, Wabaunsee, and Washington Counties. Direct Federal assistance was also

authorized. Finally, this declaration made Hazard Mitigation Grant Program assistance requested by the Governor available for hazard mitigation measures statewide.

In addition to the above reported events, the following table presents NOAA NCEI identified lightning events and the resulting damage totals in Kansas Region I from the period 2009 - 2018.

Table 4.115: Kansas Region I NCEI Lightning Events, 2009 - 2018

County	Number of Events	Property Damage	Deaths	Injuries
Chase	2	$15,000	0	3
Geary	0	$0	0	0
Lyon	0	$0	0	0
Morris	0	$0	0	0
Pottawatomie	0	$0	0	0
Riley	0	$0	0	0
Wabaunsee	0	$0	0	0
0	0	$0	0	0

Source: NOAA NCEI

The following local events were reported.

- **July 27, 2009**: **Chase County**
  Three state transportation workers were injured while working along the Kansas Turnpike when their vehicle was struck by lightning. One worker was inside the vehicle, while two others were nearby. All three of the employees were taken to the hospital, two were treated and released, while the other was hospitalized in fair condition. Property damages were reported at $15,000.

Available crop loss data from the USDA Risk Management Agency detailing cause of loss was researched to determine the financial impacts of lightning on the region's agricultural base. Crop loss data for the ten-year period of 2009- 2018 (with 2009 and 2018 being full data years), for the region, indicates no related claims.

Table 4.116: USDA Risk Management Agency Cause of Loss Indemnities 2010-2019, Lightning

County	USDA Crop Loss	Acres Impacted	Number of Claims
Chase	$0	0	0
Geary	$0	0	0
Lyon	$0	0	0
Morris	$0	0	0
Pottawatomie	$0	0	0
Riley	$0	0	0
Wabaunsee	$0	0	0

Source: USDA

4.17.3 – Hazard Probability Analysis

Data from the NCEI indicates that Region I counties can expect on a yearly basis, relevant to lightning events:

- No deaths
- <1 injury
- $1,500 in reported property damages

According to the USDA Risk Management Agency, Region I counties can expect on a yearly basis, relevant to lightning occurrences:

- No claims
- No impacted acres
- $0 in damages

In addition, Kansas Region I has had 11 Presidentially Declared Disasters relating to severe storms (of which lightning is a potential component) in the last 20 years. This represents an average of one declared severe storm disaster per year.

4.17.4 – Vulnerability Analysis

The following table presents data from the NOAA NCEI and HAZUS concerning the value of structures and the percentage of structures for each Kansas Region I county incurring damage over the period 2009 to 2018 from lightning events. The greater the percentage of structures damaged the greater overall vulnerability going forward.

Table 4.117: Kansas Region I Structural Vulnerability Data for Lightning, 2009 -2018

County	HAZUS Building Valuation	NCEI Structure Damage	Percentage of Building Valuation Damaged
Chase	$328,770,000	$0	0.0%
Geary	$3,163,291,000	$0	0.0%
Lyon	$4,037,043,000	$0	0.0%
Morris	$805,916,000	$0	0.0%
Pottawatomie	$2,254,592,000	$0	0.0%
Riley	$6,656,737,000	$0	0.0%
Wabaunsee	$812,583,000	$0	0.0%

Source: NCEI and HAZUS

Counties with a higher identified population are to be considered to have a potentially greater vulnerability to lightning events. The following table indicates the total county population and the percentage change over the period 2000 to 2018.

Table 4.118: Kansas Region I Population Vulnerability Data for Lightning

County	2018 Population	Percent Population Change 2000 to 2018
Chase	2,600	-14.2%
Geary	32,777	17.3%
Lyon	33,300	-7.3%
Morris	5,521	-9.6%
Pottawatomie	24,209	33.0%
Riley	73,703	17.3%
Wabaunsee	6,912	0.4%

Source: US Census Bureau

Data concerning potential vulnerabilities for specific jurisdictions relating to population and housing, including growth or decline, may be found in Section 3.2, Regional Population Data and Section 3.4, Regional Housing Data.

In addition, lightning may exacerbate agricultural and economic losses. The USDA 2017 Census of Agriculture (the latest available data) provides data on the crop exposure value, the total dollar value of all crops, for each Kansas Region I County. The USDA Risk Management Agency provides information on insured crop losses related to identified hazard, with data from the ten-year period of 2009 to 2018 (with 2009 and 2018 being full data set years) used for analysis. The higher the percentage loss, the higher the potential vulnerability the county has to lightning events.

Table 4.119: Lightning Acres Impacted and Crop Insurance Paid per County from 2009-2018

Jurisdiction	Farm Acreage	Annualized Acres Impacted	Percentage of Total Acres Impacted Yearly	Market Value of Products Sold	Annualized Crop Insurance Paid	Percentage of Market Value Impacted Yearly
Chase	360,077	0	0.0%	$85,430,000	0	0.0%
Geary	155,153	0	0.0%	$31,833,000	0	0.0%
Lyon	522,934	0	0.0%	$134,440,000	0	0.0%
Morris	409,269	0	0.0%	$138,615,000	0	0.0%
Pottawatomie	406,031	0	0.0%	$101,363,000	0	0.0%
Riley	214,311	0	0.0%	$51,171,000	0	0.0%
Wabaunsee	378,759	0	0.0%	$63,146,000	0	0.0%

Source: USDA

4.17.5 – Impact and Consequence Analysis

As per EMAP requirements, the following table provides the Consequence Analysis.

Table 4.120: Lightning Consequence Analysis

Subject	Impacts of Lightning
Health and Safety of the Public	Severity and location dependent. Impacts on persons in the areas of lightning are expected to be severe if caught without proper shelter.
Health and Safety of Responders	Impacts will be predicated on the severity of the event. Damaged infrastructure will likely result in hazards such as downed utility lines, main breakages and debris on roadways.

Table 4.120: Lightning Consequence Analysis

Subject	Impacts of Lightning
Continuity of Operations	Temporary relocation may be necessary if government facilities experience damage. Services may be limited to essential tasks if utilities are impacted.
Property, Facilities, and Infrastructure	Impact to property, facilities, and infrastructure could be minimal to severe, depending on the location and structural capacity of the facility. Loss of utility infrastructure could occur. Utility lines, residential and business properties will be affected.
Environment	Impact could be severe for the immediate impacted area, depending on the size of the event. Impact will lessen as distance increases from the immediate incident area
Economic Conditions	Impacts to the economy will be dependent severity of the event and the impact on structures and infrastructure. Impacts could be severe if utilities are affected.
Public Confidence in the Jurisdiction's Governance	Response and recovery will be in question if not timely and effective. Warning systems in place and the timeliness of those warnings could be questioned.

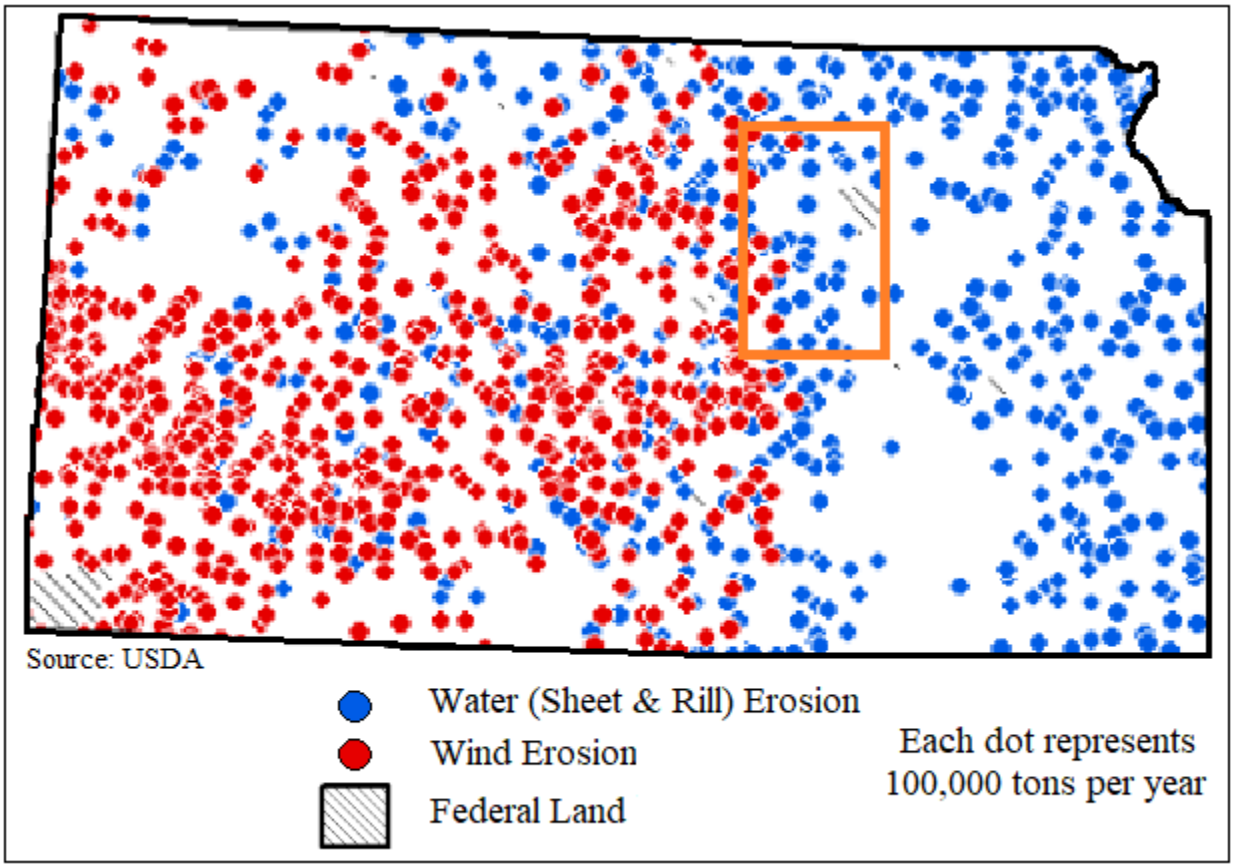
4.18 – Soil Erosion and Dust

Soil erosion, in general, is a process that removes topsoil through the application of water, wind, or farming activities. Soil erosion can be a slow, unobserved process or can happen quickly due to extreme environmental factors. The United States is losing soil 10 times faster than the natural replenishment rate, and related production losses cost the country about $44,000,000,000 each year. On average, wind erosion is responsible for about 40% of this loss and can increase markedly in drought years.

4.18.1 – Location and Extent

Soil erosion and dust occurs over broad geographic regions. The entire Kansas Region I planning area, including all participating jurisdictions, is at risk to soil erosion and dust.

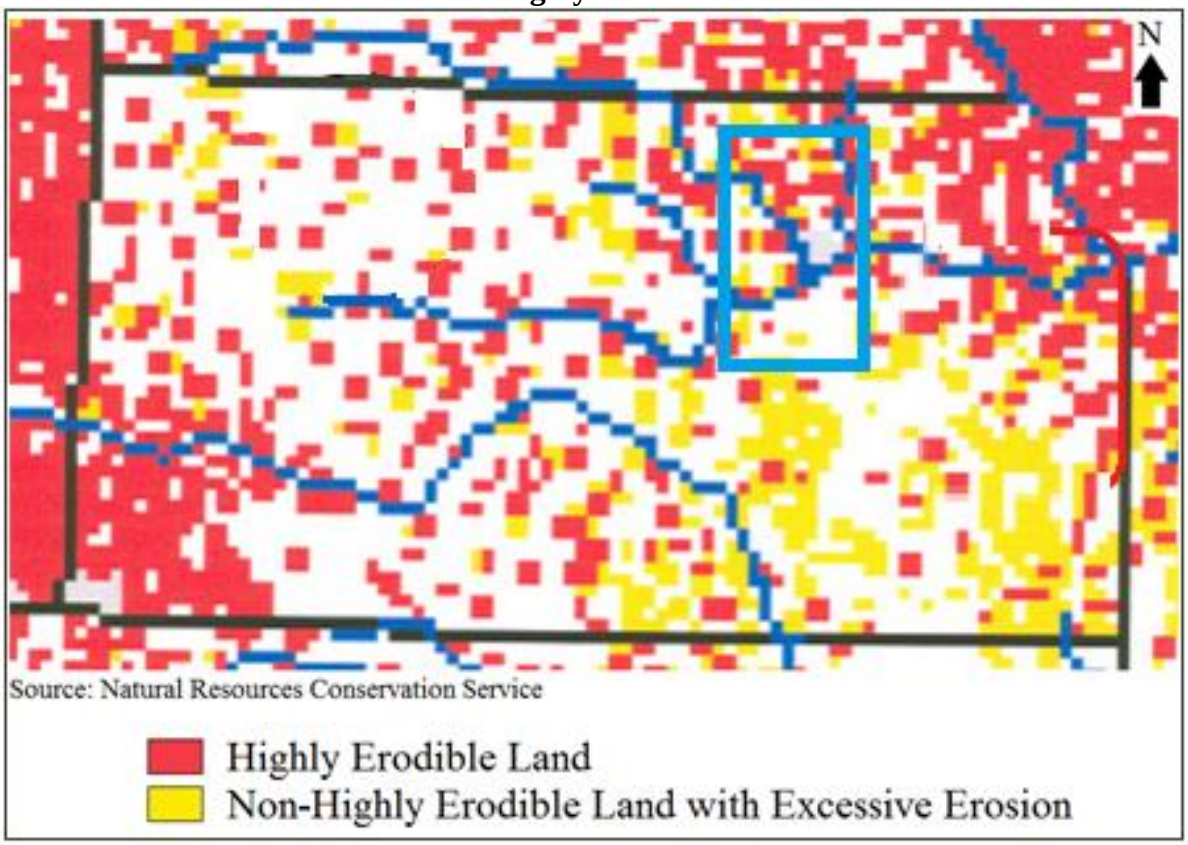
Wind and Water Erosion on Cropland 2012



The following figure, from the Natural Resources Conservation Service (NRCS) shows areas of excessive erosion of farmland in Kansas. 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.

NRCS Highly Erodible Land



4.18.2 – Previous Occurrences

At present there is no centralized and complete database containing historical records for soil erosion in Kansas. For Kansas Region I there have been no reported or recorded soil erosion or dust events impacting either participating jurisdictions or the region in the past 10 years.

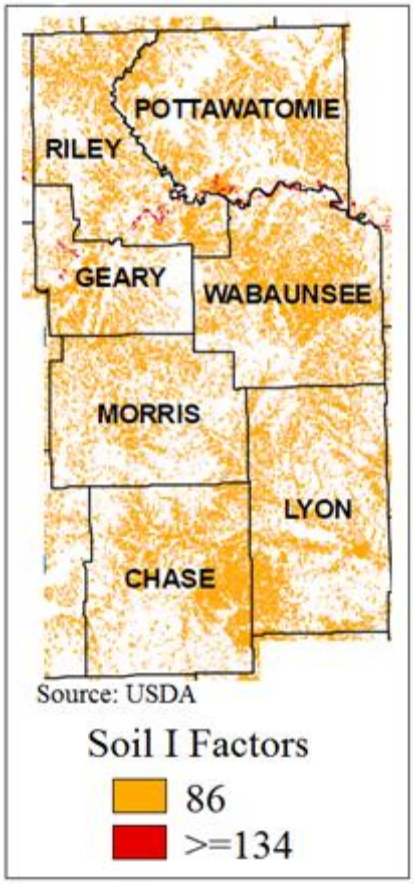
Available crop loss data from the USDA Risk Management Agency detailing cause of loss was researched to determine the financial impacts of soil erosion and dust on the Region's agricultural base. Crop loss data for the years 2009- 2018 (with 2009 and 2018 being full data years), for the region, indicates no related claims

4.18.3 – Hazard Probability Analysis

Predicting future erosion amounts is problematic as much relies on farm management practices, available moisture and crop type. Due to the on-going nature of this hazard, and the small agricultural base for the region, it is expected that future events causing minimally measurable impact to the regions crops and farmers will continue occur. Again, the rate of occurrence and potential future occurrence will be predicated on farm management practices and drought and water conditions.

The map below indicates all Kansas Region I soils that have an "I" value, or wind erodibility index, of 86 or greater. The higher the I value, the more susceptible it is to wind erosion.

Region Soil I Values



4.18.4 – Vulnerability Analysis

For purposes of this assessment, all counties within the region were determined to be at equal risk to soil erosion and dust events. Additionally, as this hazard disproportionately impacts the agricultural sector, only data on that sector was reviewed for potential vulnerability. Available crop loss data from the USDA Risk Management Agency detailing cause of loss was researched to determine the financial impacts of soil erosion on the region's agricultural base. Crop loss data for the ten-year period of 2009- 2018 (with 2009 and 2018 being full data years), for the region, indicates no soil erosion related claims.

Table 4.121: Soil Erosion and Dust Acres Impacted and Crop Insurance Paid per County from 2009-2018

Jurisdiction	Farm Acreage	Annualized Acres Impacted	Percentage of Total Acres Impacted Yearly	Market Value of Products Sold	Annualized Crop Insurance Paid	Percentage of Market Value Impacted Yearly
Chase	360,077	0	0.0%	$85,430,000	0	0.0%
Geary	155,153	0	0.0%	$31,833,000	0	0.0%
Lyon	522,934	0	0.0%	$134,440,000	0	0.0%

Table 4.121: Soil Erosion and Dust Acres Impacted and Crop Insurance Paid per County from 2009-2018

Jurisdiction	Farm Acreage	Annualized Acres Impacted	Percentage of Total Acres Impacted Yearly	Market Value of Products Sold	Annualized Crop Insurance Paid	Percentage of Market Value Impacted Yearly
Morris	409,269	0	0.0%	$138,615,000	0	0.0%
Pottawatomie	406,031	0	0.0%	$101,363,000	0	0.0%
Riley	214,311	0	0.0%	$51,171,000	0	0.0%
Wabaunsee	378,759	0	0.0%	$63,146,000	0	0.0%

Source: USDA

4.18.5 – Impact and Consequence Analysis

As per EMAP requirements, the following table provides the Consequence Analysis.

Table 4.122: Soil Erosion and Dust Consequence Analysis

Subject	Impacts of Soil Erosion and Dust
Health and Safety of the Public	Impact tends to be agricultural; however, dust can be a danger to susceptible individuals in the form of air pollutants.
Health and Safety of Responders	With proper preparedness and protection, impact to the responders is expected to be minimal.
Continuity of Operations	Minimal expectation for utilization of the COOP.
Property, Facilities, and Infrastructure	Impact to property, facilities, and infrastructure could be severe, depending on the site of the soil erosion. This could adversely affect utility poles/lines, and facilities. Dust can also adversely affect machinery, air conditioners, etc.
Environment	The impact to the environment could be severe. Soil erosion and dust can severely affect farming, ranching, wildlife and plants due to production losses and habitat changes.
Economic Conditions	Impacts to the economy will be dependent on how extreme the soil erosion and dust are. Potentially it could severely affect crop yield and productivity. Seedling survival and growth is stressed by erosion and dust, as is the top soil which agriculture is dependent on.
Public Confidence in the Jurisdiction's Governance	Planning, response, and recovery may be questioned if not timely and effective.

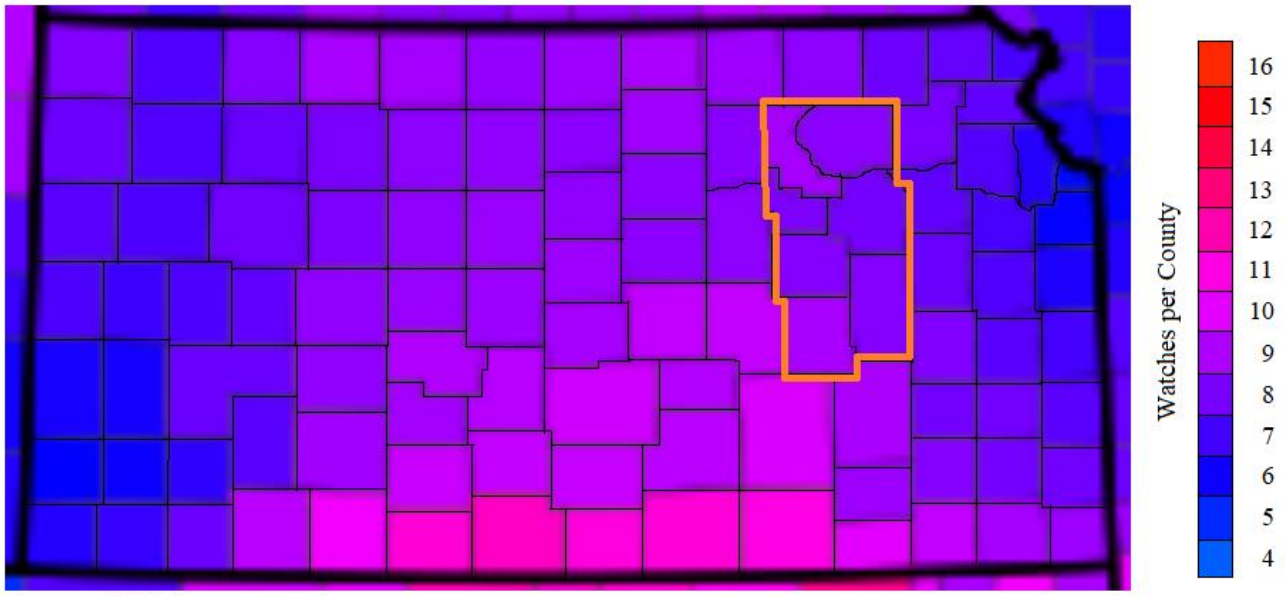
4.19 – Tornado

A tornado is a violently rotating column of air in contact with the ground. Often referred to as a twister or a cyclone, they can strike anywhere and with little warning. Tornados come in many shapes and sizes but are typically in the form of a visible condensation funnel, whose narrow end touches the earth and is often encircled by a cloud of debris and dust.

4.19.1 – Location and Extent

Tornados can strike anywhere in Kansas Region I, placing the entire planning area at risk. The following map, generated by NOAA, shows the average annual tornado watches per year for Kansas Region I.

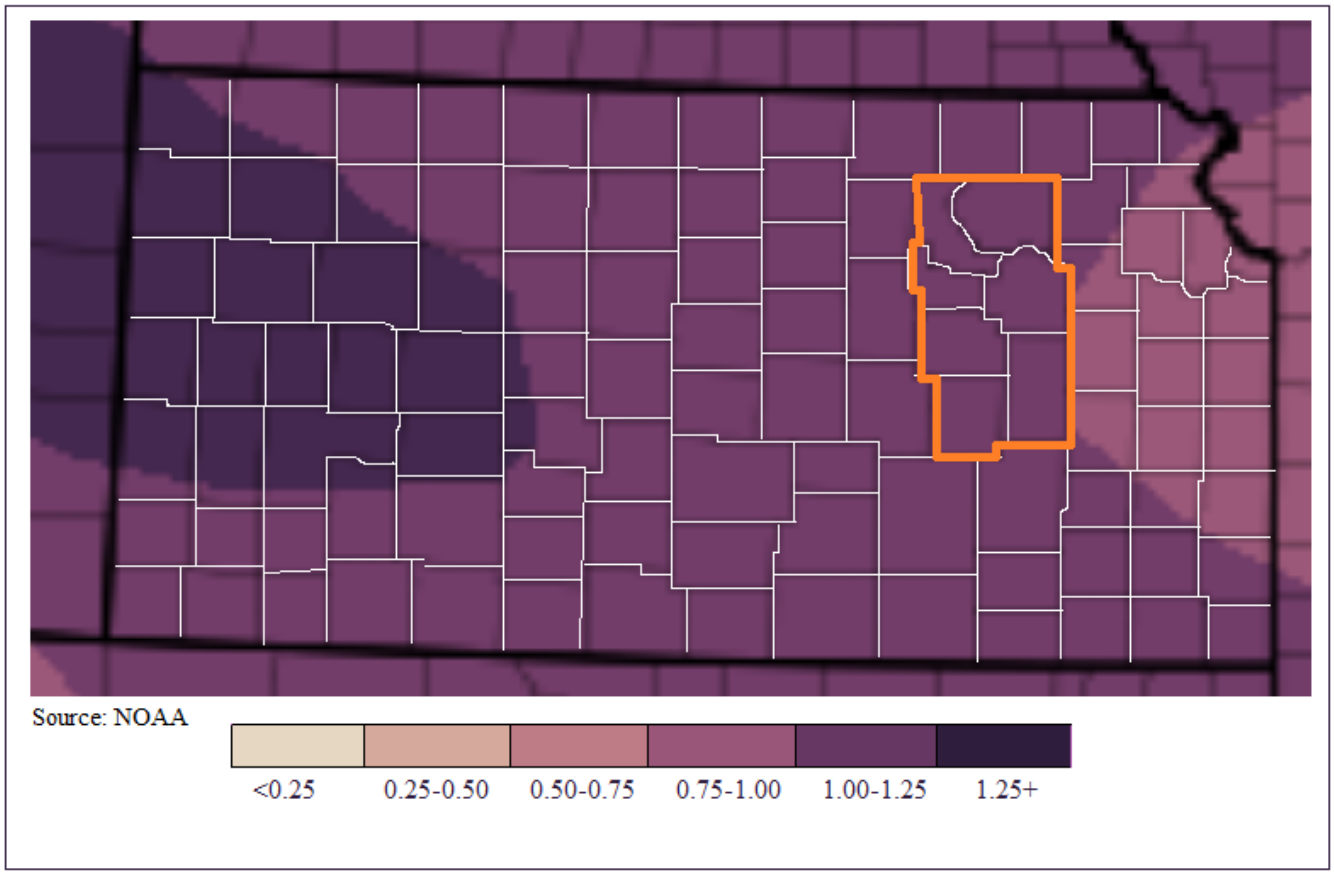
Annual Average Tornado Watches Year Average per Year (1933-2012)



Source: NOAA

Additionally, NOAA generated the following map indicating the mean number of tornado days per year, using data compiled from the years 1986 to 2015.

Mean Number of Tornado Days per Year Within 25 Miles of a Point (1986-2015)



Many tornados only exist for a few seconds in the form of a touchdown. The most extreme tornados can attain wind speeds of more than 200 miles per hour, stretch more than two miles across, and travel dozens of miles.

A tornado may arrive with a squall line or cold front and touch down quickly. Smaller tornados can strike without warning. Other times tornado watches and sirens will alert communities of high potential tornado producing weather or an already formed tornado and its likely path.

Since 2007, the United States uses the Enhanced Fujita Scale to categorize tornados. The scale correlates wind speed values per F level and provides a rubric for estimating damage.

Table 4.123: Enhanced Fujita Scale

Scale	Wind Speed (mph)	Relative Frequency	Potential Damage
EF0	65-85	53.5%	Light. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornados with no reported damage (i.e. those that remain in open fields) are always rated EF0.
EF1	86-110	31.6%	Moderate. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.

Table 4.123: Enhanced Fujita Scale

Scale	Wind Speed (mph)	Relative Frequency	Potential Damage
EF2	111-135	10.7%	Considerable. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes complete destroyed; large trees snapped or uprooted; light object missiles generated; cars lifted off ground.
EF3	136-165	3.4%	Severe. Entire stores of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	166-200	0.7%	Devastating. Well-constructed houses and whole frame houses completely leveled; cars thrown, and small missiles generated.
EF5	>200	<0.1%	Explosive. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 300 ft.; steel reinforced concrete structure badly damaged; high rise buildings have significant structural deformation; incredible phenomena will occur.

Source: NOAA Storm Prediction Center

4.19.2 – Previous Occurrences

In the 20-year period from 2000 to present, there have been ten Presidential Disaster Declarations for Kansas Region I for tornados (along with other associates hazard event). The following 20-year information (with 2000 and 2019 being full data years) on past declared disasters is presented to provide a historical perspective on tornado events that have impacted Kansas Region I. Declaration numbers in bold indication declared disaster that have occurred since the previous mitigation plan update in 2015.

Table 4.124: Kansas Region I FEMA Tornado Disaster and Emergency Declarations, 2000-2020

Declaration Number	Incident Period	Disaster Description	Regional Counties Involved	Dollars Obligated
4449	06/20/2019 (04/28/2019 – 07/12/2019)	Severe Storms, Straight-line Winds, **Tornados**, Flooding, Landslides, and Mudslides	Chase, Geary, Lyon, Morris, Pottawatomie, Riley, Wabaunsee	$1,887,116
4230	07/20/2015 (05/04/2015 – 06/21/2015)	Severe Storms, **Tornados**, Straight-line Winds, and Flooding	Lyon, Morris, Pottawatomie and Wabaunsee, Chase, Lyon, Morris, Pottawatomie, and Wabaunsee	$13,848,325
4150	10/22/2013 (07/22/2013 – 08/15/2013)	Severe Storms, Straight-line Winds, **Tornados**, and Flooding	Chase, Geary, Lyon and Morris	$11,412,827
4010	07/29/2011 (5/19-6/4/2011)	Severe Storms, Straight-line Winds, **Tornados** and Flooding	Lyon, Pottawatomie and Riley,	$8,259,620
1932	08/10/2010 (6/7-7/21/2010)	Severe Storms, Flooding and **Tornados**	Chase, Lyon, Morris, Pottawatomie, Riley and Wabaunsee	$9,279,257
1849	06/25/2009 (4/25-5/16/2009)	Severe Storms, Flooding, Straight-line Winds, and **Tornados**	Chase, Lyon, Morris and Wabaunsee	$15,013,488

Table 4.124: Kansas Region I FEMA Tornado Disaster and Emergency Declarations, 2000-2020

Declaration Number	Incident Period	Disaster Description	Regional Counties Involved	Dollars Obligated
1808	10/31/2008	Severe Storms, Flooding, and **Tornados**	Chase	$4,167,044
1776	07/09/2008	Severe Storms, Flooding, and **Tornados**	Riley	$70,629,544
1699	5/6/2007 (5/4/2007)	Severe Storms, **Tornados**, and Flooding	Chase, Lyon, Morris, Nemaha, Pottawatomie, Riley and Wabaunsee	$117,565,269
1535	8/3/2004 (6/12-7/25/2004)	Severe Storms, Flooding, and **Tornados**	Geary, Lyon, Morris and Wabaunsee	$12,845,892

Source: FEMA
-: Data unavailable

The following provides details concerning Presidential Disaster Declarations DR 4449 and DR 4230 for Kansas Region I.

Kansas –Severe Storms, Straight-line Winds, Tornados, Flooding, Landslides, and Mudslides
FEMA-4449-DR
Declared June 20, 2019 On June 7, 2019

Governor Laura Kelly requested a major disaster declaration due to severe storms, straight-line winds, tornadoes, flooding, landslides, and mudslides beginning on April 28, 2019, and continuing. The Governor requested a declaration for Public Assistance for 63 counties and Hazard Mitigation statewide. Beginning on May 20, 2019, joint federal, state, and local government Preliminary Damage Assessments (PDAs) were conducted in the requested areas and are summarized below. PDAs estimate damages immediately after an event and are considered, along with several other factors, in determining whether a disaster is of such severity and magnitude that effective response is beyond the capabilities of the state and the affected local governments, and that Federal assistance is necessary.

On June 20, 2019, President Trump declared that a major disaster exists in the State of Kansas. This declaration made Public Assistance requested by the Governor available to state and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe storms, straight-line winds, tornadoes, flooding, landslides, and mudslides in Allen, Anderson, Atchison, Barber, Barton, Butler, Chase, Chautauqua, Cherokee, Clark, Clay, Cloud, Coffey, Cowley, Doniphan, Elk, Ellsworth, Franklin, Geary, Greenwood, Harper, Harvey, Hodgeman, Jefferson, Kingman, Leavenworth, Lincoln, Linn, Lyon, Marion, Marshall, McPherson, Meade, Montgomery, Morris, Nemaha, Neosho, Osage, Ottawa, Pawnee, Phillips, Pottawatomie, Pratt, Reno, Rice, Rush, Russell, Saline, Sumner, Wabaunsee, Washington, Wilson, and Woodson Counties. This declaration also made Hazard Mitigation Grant Program assistance requested by the Governor available for hazard mitigation measures statewide

Kansas – Severe Storms, Tornados, Straight-Line Winds, and Flooding
FEMA-4230-DR
Declared July 20, 2015

On July 1, 2015, Governor Sam Brownback requested a major disaster declaration due to severe storms, tornados, straight-line winds, and flooding during the period of May 4 to June 21, 2015. The Governor requested a declaration for Public Assistance, including direct federal assistance for 42 counties and Hazard Mitigation statewide. During the period of May 4 to June 27, 2015, joint federal, state, and local government Preliminary Damage Assessments (PDAs) were conducted in the requested counties and are summarized below. PDAs estimate damages immediately after an event and are considered, along with several other factors, in determining whether a disaster is of such severity and magnitude that effective response is beyond the capabilities of the state and the affected local governments, and that Federal assistance is necessary.

On July 20, 2015, President Obama declared that a major disaster exists in the State of Kansas. This declaration made Public Assistance requested by the Governor available to state and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe storms, tornados, straight-line winds, and flooding in Atchison, Geary, Brown, Chase, Chase, Chautauqua, Cherokee, Cheyenne, Clay, Cloud, Geary, Geary, Doniphan, Morris, Elk, Ellsworth, Lyon, Gray, Greenwood, Lyon, Haskell, Hodgeman, Jackson, Jefferson, Jewell, Lyon, Wabaunsee, Marshall, Riley, Meade, Pottawatomie, Morris, Nemaha, Neosho, Riley, Pottawatomie, Republic, Rice, Stevens, Sumner, Wabaunsee, and Washington Counties. Direct Federal assistance was also authorized. Finally, this declaration made Hazard Mitigation Grant Program assistance requested by the Governor available for hazard mitigation measures statewide.

In addition to the above reported events, the following table presents NOAA NCEI identified tornado events and the resulting damage totals in Kansas Region I for the period 20010- 2019 (with 2010 and 2019 being full data set years).

Table 4.125: Kansas Region I NCEI Tornado Events, 2010 - 2019

County	Number of Days with Event	Property Damage	Deaths	Injuries	Highest Rated Tornado
Chase	2	$0	0	0	EF1
Geary	10	$0	0	0	EF0
Lyon	7	$2,280,000	1	5	EF3
Morris	6	$0	0	0	EF1
Pottawatomie	3	$0	0	0	EF1
Riley	3	$0	0	0	EF0
Wabaunsee	6	$0	1	12	EF2

Source: NOAA NCEI

The following provides both **local accounts** and NOAA NCEI descriptions of notable recorded events:

- **February 28, 2012: Harveyville (Wabaunsee County)**
  As the line of thunderstorms moved eastward across northeast Kansas on of the strongest storms spawned a brief, but strong tornado, which impacted the town of Harveyville, Kansas. The tornado was short-lived but was able to destroy a large portion of the town. Several houses were destroyed, as was a church in the center of town. A National Weather Service survey team determined that the tornado rated an EF-2 on the Enhanced Fujita Scale. At least a dozen injuries occurred with this storm, one of which became fatal after a day in the hospital. Damages were unreported.

- **May 21, 2011: Reading (Lyon County)**
  A tornado developed three miles southwest of Reading. This tornado proceeded to hit the town of Reading producing EF3 damage in the city. A single-story home in Reading was swept off its foundation. There were several two-story homes with significant damage to the second story or completely removed. A well anchored mobile home was lofted and thrown 50 yards into a tree. Vehicles were rolled and large chemical tank was thrown 100 yards. Winds estimated at 140 mph. One death and five injuries were reported. Property losses were estimated at $2,280,000.

Available crop loss data from the USDA Risk Management Agency detailing cause of loss was researched to determine the financial impacts of tornados on the region's agricultural base. Crop loss data for the ten-year period of 2009- 2018 (with 2009 and 2018 being full data years), for the region, indicates no tornado related claims on 0 acres causing $0 in loss.

Table 4.126: USDA Risk Management Agency Cause of Loss Indemnities 2010-2019, Tornados

County	Number of Reported Claims	Acres Lost	Total Amount of Loss
Chase	0	0	$0
Geary	0	0	$0
Lyon	0	0	$0
Morris	0	0	$0
Pottawatomie	0	0	$0
Riley	0	0	$0
Wabaunsee	0	0	$0

Source: USDA

4.19.3 – Hazard Probability Analysis

The following table summarizes tornado probability data for **Chase County**.

Table 4.127: Chase County Tornado Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	2
Average Events per Year	<1
Number of Deaths or Injuries (2010-2019)	0
Average Number of Deaths or Injuries	0
Total Reported NCEI Property Damage (2010-2019)	$0
Average Property Damage per Year	$0
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	0
Average Number of Claims per Year	0
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	0

Table 4.127: Chase County Tornado Probability Summary

Data	Recorded Impact
Average Number of Acres Damaged per Year	0
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$0
Average Crop Damage per Year	$0

Source: NCEI and USDA

Data from the NCEI indicates that Chase County can expect on a yearly basis, relevant to tornado events:

- <1 event
- No deaths or injuries
- $0 in property damages

According to the USDA Risk Management Agency, Chase County can expect on a yearly basis, relevant to tornado occurrences:

- No insurance claims
- No acres impacted
- $0 in insurance claims

The following table summarizes tornado probability data for **Geary County**.

Table 4.128: Geary County Tornado Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	10
Average Events per Year	1
Number of Deaths or Injuries (2010-2019)	0
Average Number of Deaths or Injuries	0
Total Reported NCEI Property Damage (2010-2019)	$0
Average Property Damage per Year	$0
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	0
Average Number of Claims per Year	0
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	0
Average Number of Acres Damaged per Year	0
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$0
Average Crop Damage per Year	$0

Source: NCEI and USDA

Data from the NCEI indicates that Geary County can expect on a yearly basis, relevant to tornado events:

- One event
- No deaths or injuries
- $0 in property damages

According to the USDA Risk Management Agency, Geary County can expect on a yearly basis, relevant to tornado occurrences:

- No insurance claims
- No acres impacted
- $0 in insurance claims

The following table summarizes Tornado probability data for **Lyon County**.

Table 4.129: Lyon County Tornado Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	7
Average Events per Year	1
Number of Deaths or Injuries (2010-2019)	6
Average Number of Deaths or Injuries	1
Total Reported NCEI Property Damage (2010-2019)	$2,280,000
Average Property Damage per Year	$228,000
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	0
Average Number of Claims per Year	0
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	0
Average Number of Acres Damaged per Year	0
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$0
Average Crop Damage per Year	$0

Source: NCEI and USDA

Data from the NCEI indicates that Lyon County can expect on a yearly basis, relevant to tornado events:

- One event
- One death or injury
- $228,000 in property damages

According to the USDA Risk Management Agency, Lyon County can expect on a yearly basis, relevant to tornado occurrences:

- No insurance claims
- No acres impacted
- $0 in insurance claims

The following table summarizes tornado probability data for **Morris County**.

Table 4.130: Morris County Tornado Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	6
Average Events per Year	1
Number of Deaths or Injuries (2010-2019)	0
Average Number of Deaths or Injuries	0
Total Reported NCEI Property Damage (2010-2019)	$0
Average Property Damage per Year	$0
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	0

Table 4.130: Morris County Tornado Probability Summary

Data	Recorded Impact
Average Number of Claims per Year	0
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	0
Average Number of Acres Damaged per Year	0
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$0
Average Crop Damage per Year	$0

Source: NCEI and USDA

Data from the NCEI indicates that Morris County can expect on a yearly basis, relevant to tornado events:

- One event
- No deaths or injuries
- $0 in property damages

According to the USDA Risk Management Agency, Morris County can expect on a yearly basis, relevant to tornado occurrences:

- No insurance claims
- No acres impacted
- $0 in insurance claims

The following table summarizes tornado probability data for **Pottawatomie County**.

Table 4.131: Pottawatomie County Tornado Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	3
Average Events per Year	<1
Number of Deaths or Injuries (2010-2019)	0
Average Number of Deaths or Injuries	0
Total Reported NCEI Property Damage (2010-2019)	$0
Average Property Damage per Year	$0
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	0
Average Number of Claims per Year	0
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	0
Average Number of Acres Damaged per Year	0
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$0
Average Crop Damage per Year	$0

Source: NCEI and USDA

Data from the NCEI indicates that Pottawatomie County can expect on a yearly basis, relevant to tornado events:

- <1 event
- No deaths or injuries
- $0 in property damages

According to the USDA Risk Management Agency, Pottawatomie County can expect on a yearly basis, relevant to tornado occurrences:

- No insurance claims
- No acres impacted
- $0 in insurance claims

The following table summarizes tornado probability data for **Riley County**.

Table 4.132: Riley County Tornado Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	3
Average Events per Year	<1
Number of Deaths or Injuries (2010-2019)	0
Average Number of Deaths or Injuries	0
Total Reported NCEI Property Damage (2010-2019)	$0
Average Property Damage per Year	$0
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	0
Average Number of Claims per Year	0
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	0
Average Number of Acres Damaged per Year	0
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$0
Average Crop Damage per Year	$0

Source: NCEI and USDA

Data from the NCEI indicates that Riley County can expect on a yearly basis, relevant to tornado events:

- One event
- No deaths or injuries
- $33,500 in property damages

According to the USDA Risk Management Agency, Riley County can expect on a yearly basis, relevant to tornado occurrences:

- No insurance claims
- No acres impacted
- $0 in insurance claims

The following table summarizes Tornado probability data for **Wabaunsee County**.

Table 4.133: Wabaunsee County Tornado Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	6
Average Events per Year	1
Number of Deaths or Injuries (2010-2019)	13
Average Number of Deaths or Injuries	1

Table 4.133: Wabaunsee County Tornado Probability Summary

Data	Recorded Impact
Total Reported NCEI Property Damage (2010-2019)	$0
Average Property Damage per Year	$0
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	0
Average Number of Claims per Year	0
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	0
Average Number of Acres Damaged per Year	0
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$0
Average Crop Damage per Year	$0

Source: NCEI and USDA

Data from the NCEI indicates that Wabaunsee County can expect on a yearly basis, relevant to tornado events:

- One event
- One death or injury
- $0 in property damages

According to the USDA Risk Management Agency, Wabaunsee County can expect on a yearly basis, relevant to tornado occurrences:

- No insurance claims
- No acres impacted
- $0 in insurance claims.

Based on the number of NCEI reported events we derive the following probability for event occurrence in Kanas Region I:

- **Tornado Probability:** Approximately four events per year

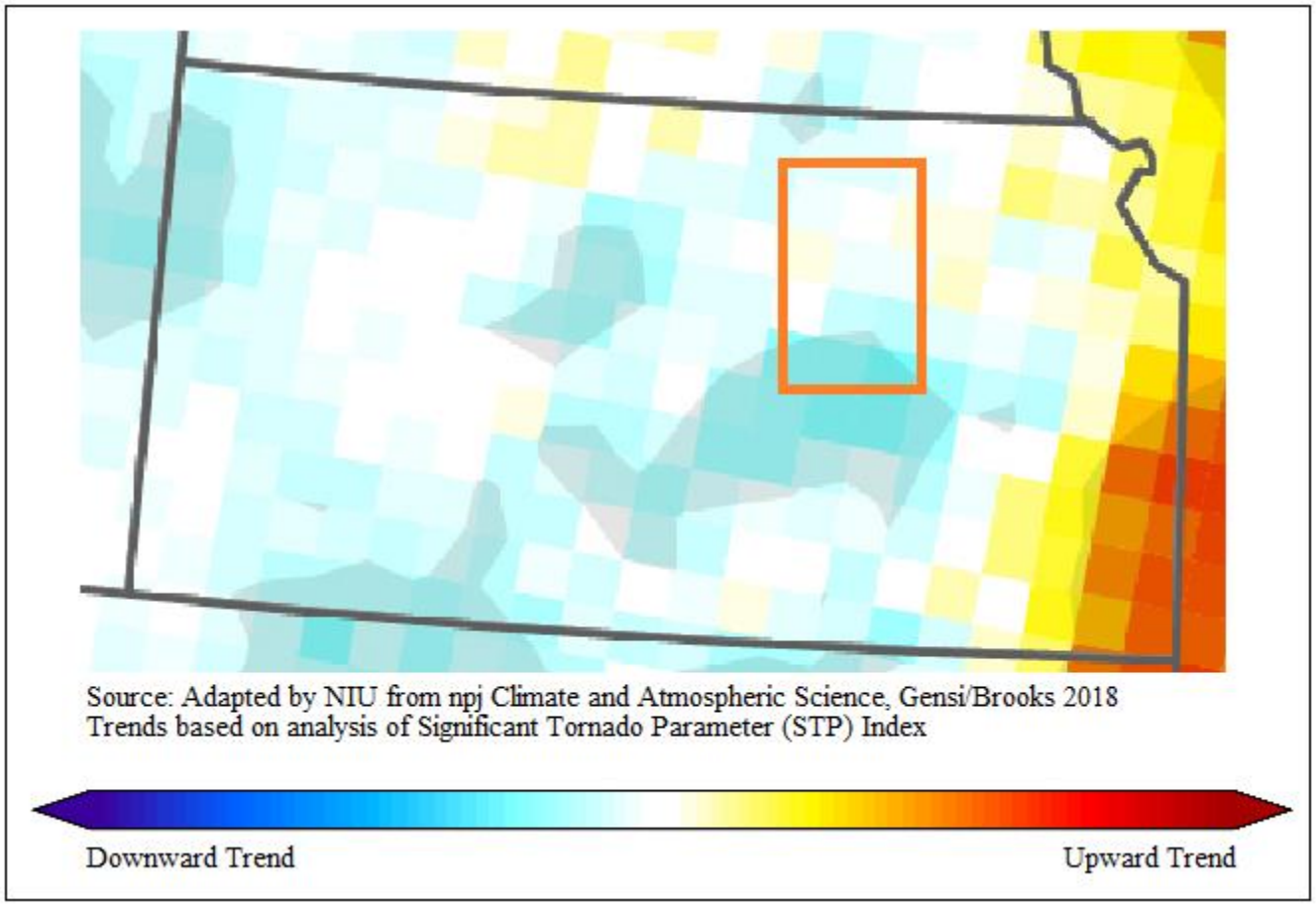
However, if events are normalized for tornados rated above an EF2, we derive the following probability for event occurrence:

- **Probability of an EF2 or greater tornado:** <1 event per year

In addition, Kansas Region I has had ten Presidentially Declared Disasters relating to tornados (and other concurrent events such as flooding) in the last 20 years. This represents an average of one declared tornado disaster per year.

Research conducted by the National Severe Storms Lab looked at Significant Tornado Parameter (STP) to help determine future tornado probability. STP is a measurement of the major parameters of tornado conditions, including wind speed and direction, wind at differing altitudes, unstable air patterns, and humidity. The following map, generated by Northern Illinois University and compiled from STP data, indicates that Kansas Region I may see decreasing future number of tornados.

Tornado Environmental Frequency Trends



4.19.4 – Vulnerability Analysis

For purposes of this assessment, all counties within the region were determined to be at equal risk to tornado events. Counties with a higher or increasing population, high, or increasing, or having a high structural valuation are to be considered to have a potentially greater vulnerability.

The following table presents data from the NOAA NCEI and HAZUS concerning the value of structures and the percentage of structures for each Kansas Region I county incurring damage over the period 2009 to 2018 from tornado events. The greater the percentage of structures damaged the greater overall vulnerability going forward.

Table 4.134: Kansas Region I Structural Vulnerability Data for Tornados, 2010-2019

County	HAZUS Building Valuation	NCEI Structure Damage	Percentage of Building Valuation Damaged
Chase	$328,770,000	$0	0.0%
Geary	$3,163,291,000	$0	0.0%
Lyon	$4,037,043,000	$2,280,000	0.06%
Morris	$805,916,000	$0	0.0%
Pottawatomie	$2,254,592,000	$0	0.0%
Riley	$6,656,737,000	$0	0.0%

Table 4.134: Kansas Region I Structural Vulnerability Data for Tornados, 2010-2019

County	HAZUS Building Valuation	NCEI Structure Damage	Percentage of Building Valuation Damaged
Wabaunsee	$812,583,000	$0	0.0%

Source: NCEI and HAZUS

Counties with a higher identified population are to be considered to have a potentially greater vulnerability to tornado events. The following table indicates the total county population and the percentage change over the period 2000 to 2018.

Table 4.135: Kansas Region I Population Vulnerability Data for Tornados

County	2018 Population	Percent Population Change 2000 to 2018
Chase	2,600	-14.2%
Geary	32,777	17.3%
Lyon	33,300	-7.3%
Morris	5,521	-9.6%
Pottawatomie	24,209	33.0%
Riley	73,703	17.3%
Wabaunsee	6,912	0.4%

Source: US Census Bureau

Data concerning potential vulnerabilities for specific jurisdictions relating to population and housing, including growth or decline, may be found in Section 3.2, Regional Population Data and Section 3.4, Regional Housing Data.

The USDA 2017 Census of Agriculture (the latest available data) provides data on the crop exposure value, the total dollar value of all crops, for each Kansas Region I County. The USDA Risk Management Agency provides information on insured crop losses related to identified hazard, with data from the ten-year period of 2009 to 2018 (with 2009 and 2018 being full data set years) used for analysis. The higher the percentage loss, the higher the potential vulnerability the county has to tornado events.

Table 4.136: Tornado Acres Impacted and Crop Insurance Paid per County from 2009-2018

Jurisdiction	Farm Acreage	Annualized Acres Impacted	Percentage of Total Acres Impacted Yearly	Market Value of Products Sold	Annualized Crop Insurance Paid	Percentage of Market Value Impacted Yearly
Chase	360,077	0	0.0%	$85,430,000	$0	0.0%
Geary	155,153	0	0.0%	$31,833,000	$0	0.0%
Lyon	522,934	0	0.0%	$134,440,000	$0	0.0%
Morris	409,269	0	0.0%	$138,615,000	$0	0.0%
Pottawatomie	406,031	0	0.0%	$101,363,000	$0	0.0%
Riley	214,311	0	0.0%	$51,171,000	$0	0.0%
Wabaunsee	378,759	0	0.0%	$63,146,000	$0	0.0%

Source: USDA

Between 2001 and 2010 51% of those killed by tornados were living in mobile homes, according to the NOAA. A 2012 "Kansas Severe Weather Awareness Week" report indicates that people living in mobile

homes are killed by tornados at a rate 20 times higher than people living in permanent homes. Additionally, a new study from Michigan State University reported that the two biggest factors related to tornado fatalities were housing quality (measured by mobile homes as a proportion of housing units) and income level. When a tornado strikes, a county with double the number of mobile homes as a proportion of all homes will experience 62% more fatalities than a county with fewer mobile homes, according to the study data.

The following participating jurisdictions may have increased vulnerability to tornado events due to having greater than 20% of housing stock as mobile homes:

- **Elmdale** (Chase County)
- **Grandview Plaza** (Geary County)
- **Milford** (Geary County)
- **Admire** (Lyon County)
- **Hartford** (Lyon County)
- **Neosho Rapids** (Lyon County)
- **Dunlap** (Morris County)
- **Parkerville** (Morris County)
- **Belvue** (Pottawatomie County)
- **Emmet** (Pottawatomie County)
- **Lousiville** (Pottawatomie County)
- **Wheaton** (Pottawatomie County)
- **Ogden** (Riley County)

4.19.5 – Impact and Consequence Analysis

As per EMAP requirements, the following table provides the Consequence Analysis.

Table 4.137: Tornado Consequence Analysis

Subject	Impacts of Tornado
Health and Safety of the Public	Impact of the immediate area could be severe depending on whether individuals were able to seek shelter and get out of the trajectory of the tornado. Casualties are dependent on warning systems and warning times.
Health and Safety of Responders	Impact to responders is expected to be minimal unless responders live within the affected area.
Continuity of Operations	Temporary to permanent relocation may be necessary if government facilities experience damage.
Property, Facilities, and Infrastructure	Localized impact could be severe in the trajectory path. Roads, buildings, and communications could be adversely affected. Damage could be severe.
Environment	Impact will be severe for the immediate impacted area. Impact will lessen as distance increases from the immediate incident area.
Economic Conditions	Impacts to the economy will greatly depend on the trajectory of the tornado. If a jurisdiction takes a direct hit then the economic conditions will be severe. With an indirect hit the impact could be low to severe.
Public Confidence in the Jurisdiction's Governance	Response and recovery will be in question if not timely and effective. Warning systems and warning time will also be questioned.

4.20 – Wildfire

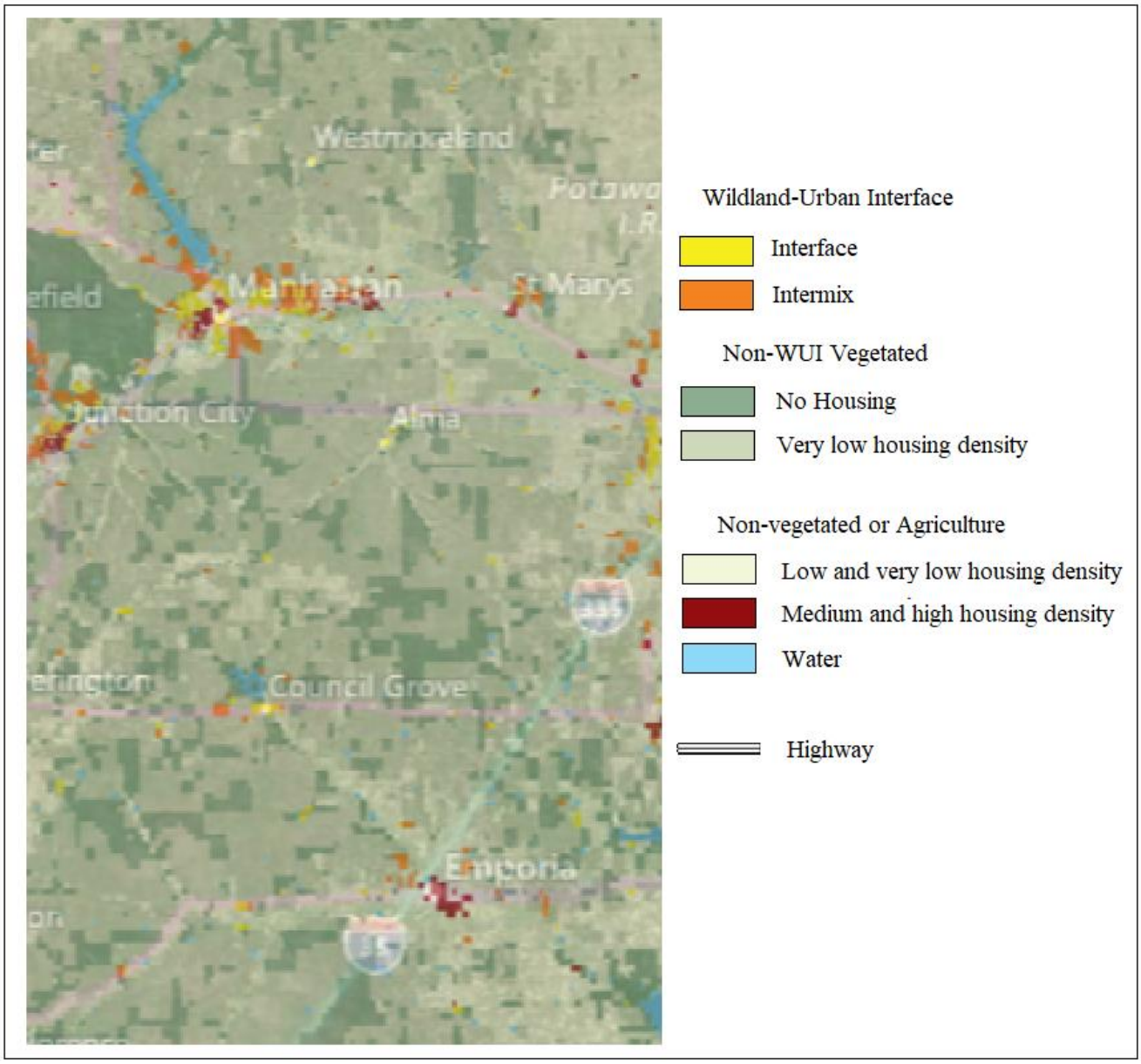
The NWS defines a wildfire as any free burning uncontainable wildland fire not prescribed for the area which consumes the natural fuels and spreads in response to its environment. They can occur naturally, by human accident, and on rare occasions by human action. Population de-concentration in the U.S. has resulted in rapid development in the outlying fringe of metropolitan areas and in rural areas with attractive recreational and aesthetic amenities, especially forests. This expansion has increased the likelihood that wildfires will threaten life and property.

4.20.1 – Location and Extent

Wildfires in Kansas Region I typically originate in pasture or prairie areas following the ignition of dry grasses (by natural or human sources). According to the 2011 Kansas Forest Action Plan, with the exception of Eastern Redcedar, most forest types in Kansas do not pose significant fire management issues. However, grasslands, which make up a majority of the open areas in Kansas Region I, do pose fire management issues due to the expansion of the Wildland Urban Interface (WUI) in recent decades.

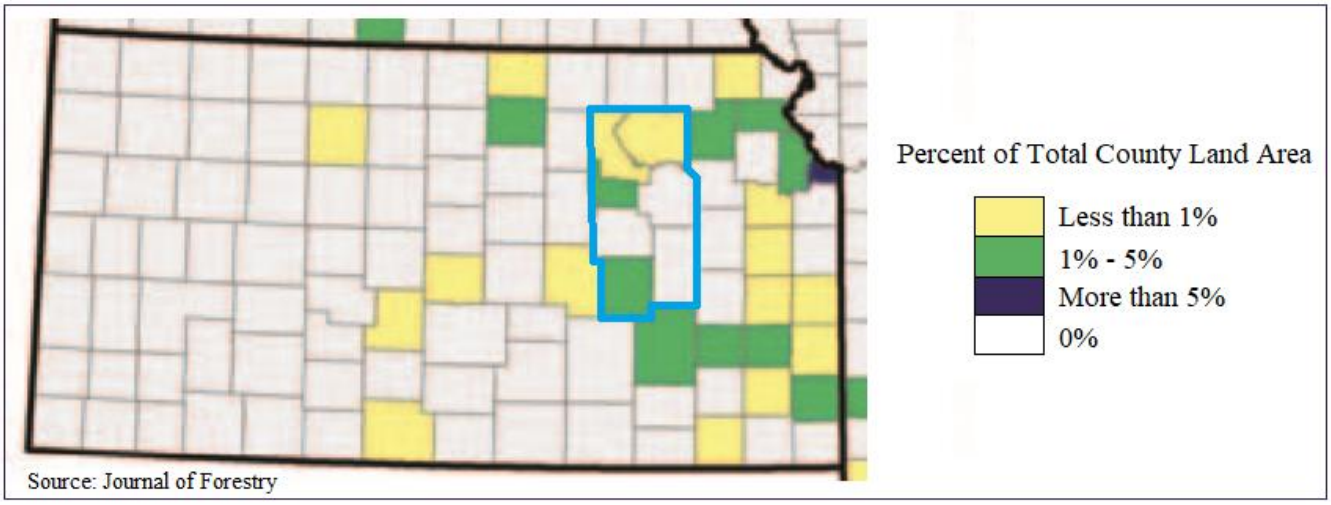
The WUI creates an environment in which fire can move readily between structural and vegetation fuels. Two types of WUI are mapped: intermixed and interface. Intermix WUI are areas where housing and vegetation intermingle; interface WUI are areas with housing in the vicinity of dense, contiguous wildland vegetation. The following maps detail WUI areas and information for Kansas Region I.

SILVIS Labs Regional WUI Map



The Eastern Redcedar is of concern to Kansas Region I. This invasive evergreen species can take over fence rows and un-planted fields, adding to wildfire fuel and risk. The following 2012 map, from the Journal of Forestry, indicates the percent of the total regional acreage impacted by Eastern Redcedar.

Percent of Total Regional Land Area of Eastern Redcedar



4.20.2 – Previous Occurrences

In the 20-year period from 200 to present, there have been no Presidential Disaster Declarations for Kansas Region I for wildfires. In the 20-year period from 200 to present, there has been one Fire Management Assistance Declaration for the region, as follows:

- FM5121: Declared on April 5, 2016 – This wildfire burned roughly 600 acres in Wabaunsee County. Total cost was estimated at $119,530.

The Office of the State of Kansas Fire Marshall's Office (KSFM) was contacted concerning the size and origin of reported wildfires for the region. The following table lists all recorded wildfires, by county, for the six-year period 2013-2018 (currently available data, with 2013 and 2018 being full data set years).

Table 4.138: Kansas Region I State Fire Marshall Recorded Wildfire Events, 2013-2018

County	Number of Reported Fires	Deaths	Injuries	Buildings Burned	Burned Acres
Chase	44	0	0	1	30,553
Geary	97	0	3	2	12,223
Lyon	184	0	0	9	26,542
Morris	99	0	0	9	8,118
Pottawatomie	98	0	0	0	6,250
Riley	156	0	1	12	12,187
Wabaunsee	178	0	2	1	16,955

Source: KSFM

Available crop loss data from the USDA Risk Management Agency detailing cause of loss was researched to determine the financial impacts of wildfires on the region's agricultural base. Crop loss data for the ten-year period of 2009- 2018 (with 2009 and 2018 being full data years), for the region, indicates no wildfire related claims on 0 acres for $0.

Table 4.139: USDA Risk Management Agency Cause of Loss Indemnities 2010-2019, Wildfires

County	Number of Reported Claims	Acres Lost	Total Amount of Loss
Chase	0	0	$0
Geary	0	0	$0
Lyon	0	0	$0
Morris	0	0	$0
Pottawatomie	0	0	$0
Riley	0	0	$0
Wabaunsee	0	0	$0

Source: USDA

4.20.3 – Hazard Probability Analysis

The following table summarizes wildfire probability data for **Chase County**.

Table 4.140: Chase County Wildfire Probability Summary

Data	Recorded Impact
Number of KSFM Reported Events (2013-2018)	44
Average Events per Year	7
Number Deaths or Injuries (2013-2018)	0
Average Number of Yearly Deaths and Injuries	0
Total Reported Burned Buildings (2013-2018)	1
Average Burned Buildings per Year	<1
Total Reported Burned Acres (2013-2018)	30,553
Average Burned Acres per Year	5,092
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	0
Average Number of Claims per Year	0
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	0
Average Number of Acres Damaged per Year	0
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$0
Average Crop Damage per Year	$0

Source: KSFM and NOAA

Data from the KSFM indicates that Chase County can expect on a yearly basis, relevant to wildfire events:

- Seven events
- No deaths or injuries
- <1 building burned
- 5,092 acres burned

According to the USDA Risk Management Agency, Chase County can expect on a yearly basis, relevant to wildfire occurrences:

- No insurance claims
- No acres impacted
- $0 in insurance claims

The following table summarizes wildfire probability data for **Geary County**.

Table 4.141: Geary County Wildfire Probability Summary

Data	Recorded Impact
Number of KSFM Reported Events (2013-2018)	97
Average Events per Year	16
Number Deaths or Injuries (2013-2018)	3
Average Number of Yearly Deaths and Injuries	<1
Total Reported Burned Buildings (2013-2018)	2
Average Burned Buildings per Year	<1
Total Reported Burned Acres (2013-2018)	12,223
Average Burned Acres per Year	2,037
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	0
Average Number of Claims per Year	0
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	0
Average Number of Acres Damaged per Year	0
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$0
Average Crop Damage per Year	$0

Source: KSFM and NOAA

Data from the KSFM indicates that Geary County can expect on a yearly basis, relevant to wildfire events:

- 16 events
- <1 death or injury
- <1 building burned
- 2,037 acres burned

According to the USDA Risk Management Agency, Geary County can expect on a yearly basis, relevant to wildfire occurrences:

- No insurance claims
- No acres impacted
- $0 in insurance claims

The following table summarizes wildfire probability data for **Lyon County**.

Table 4.142: Lyon County Wildfire Probability Summary

Data	Recorded Impact
Number of KSFM Reported Events (2013-2018)	184
Average Events per Year	31
Number Deaths or Injuries (2013-2018)	0
Average Number of Yearly Deaths and Injuries	0
Total Reported Burned Buildings (2013-2018)	9
Average Burned Buildings per Year	2
Total Reported Burned Acres (2013-2018)	26,542
Average Burned Acres per Year	4,424
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	0

Table 4.142: Lyon County Wildfire Probability Summary

Data	Recorded Impact
Average Number of Claims per Year	0
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	0
Average Number of Acres Damaged per Year	0
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	0
Average Crop Damage per Year	0

Source: KSFM and NOAA

Data from the KSFM indicates that Lyon County can expect on a yearly basis, relevant to wildfire events:

- 31 events
- No deaths or injuries
- Two buildings burned
- 4,424 acres burned

According to the USDA Risk Management Agency, Lyon County can expect on a yearly basis, relevant to wildfire occurrences:

- No insurance claims
- No acres impacted
- $0 in insurance claims

The following table summarizes wildfire probability data for **Morris County**.

Table 4.143: Morris County Wildfire Probability Summary

Data	Recorded Impact
Number of KSFM Reported Events (2013-2018)	99
Average Events per Year	17
Number Deaths or Injuries (2013-2018)	0
Average Number of Yearly Deaths and Injuries	0
Total Reported Burned Buildings (2013-2018)	9
Average Burned Buildings per Year	2
Total Reported Burned Acres (2013-2018)	8,118
Average Burned Acres per Year	1,353
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	0
Average Number of Claims per Year	0
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	0
Average Number of Acres Damaged per Year	0
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$0
Average Crop Damage per Year	$0

Source: KSFM and NOAA

Data from the KSFM indicates that Morris County can expect on a yearly basis, relevant to wildfire events:

- 17 events
- No deaths or injuries

- Two buildings burned
- 1,353 acres burned

According to the USDA Risk Management Agency, Morris County can expect on a yearly basis, relevant to wildfire occurrences:

- No insurance claims
- No acres impacted
- $0 in insurance claims

The following table summarizes wildfire probability data for **Pottawatomie County**.

Table 4.144: Pottawatomie County Wildfire Probability Summary

Data	Recorded Impact
Number of KSFM Reported Events (2013-2018)	98
Average Events per Year	16
Number Deaths or Injuries (2013-2018)	0
Average Number of Yearly Deaths and Injuries	0
Total Reported Burned Buildings (2013-2018)	0
Average Burned Buildings per Year	0
Total Reported Burned Acres (2013-2018)	6,250
Average Burned Acres per Year	1,042
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	0
Average Number of Claims per Year	0
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	0
Average Number of Acres Damaged per Year	0
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$0
Average Crop Damage per Year	$0

Source: KSFM and NOAA

Data from the KSFM indicates that Pottawatomie County can expect on a yearly basis, relevant to wildfire events:

- 16 events
- No deaths or injuries
- No buildings burned
- 1,042 acres burned

According to the USDA Risk Management Agency, Pottawatomie County can expect on a yearly basis, relevant to wildfire occurrences:

- No insurance claims
- No acres impacted
- $0 in insurance claims

The following table summarizes wildfire probability data for **Riley County**.

Table 4.145: Riley County Wildfire Probability Summary

Data	Recorded Impact
Number of KSFM Reported Events (2013-2018)	156
Average Events per Year	26
Number Deaths or Injuries (2013-2018)	1
Average Number of Yearly Deaths and Injuries	<1
Total Reported Burned Buildings (2013-2018)	12
Average Burned Buildings per Year	2
Total Reported Burned Acres (2013-2018)	12,187
Average Burned Acres per Year	2,031
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	0
Average Number of Claims per Year	0
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	0
Average Number of Acres Damaged per Year	0
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$0
Average Crop Damage per Year	$0

Source: KSFM and NOAA

Data from the KSFM indicates that Riley County can expect on a yearly basis, relevant to wildfire events:

- 26 events
- <1 death or injury
- Two buildings burned
- 2,031 acres burned

According to the USDA Risk Management Agency, Riley County can expect on a yearly basis, relevant to wildfire occurrences:

- No insurance claims
- No acres impacted
- $0 in insurance claims

The following table summarizes wildfire probability data for **Wabaunsee County**.

Table 4.146: Wabaunsee County Wildfire Probability Summary

Data	Recorded Impact
Number of KSFM Reported Events (2013-2018)	178
Average Events per Year	30
Number Deaths or Injuries (2013-2018)	2
Average Number of Yearly Deaths and Injuries	<1
Total Reported Burned Buildings (2013-2018)	1
Average Burned Buildings per Year	<1
Total Reported Burned Acres (2013-2018)	16,955
Average Burned Acres per Year	2,826
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	0
Average Number of Claims per Year	0
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	0

Table 4.146: Wabaunsee County Wildfire Probability Summary

Data	Recorded Impact
Average Number of Acres Damaged per Year	0
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$0
Average Crop Damage per Year	$0

Source: KSFM and NOAA

Data from the KSFM indicates that Wabaunsee County can expect on a yearly basis, relevant to wildfire events:

- 30 events
- <1 death or injury
- <1 building burned
- 2,826 acres burned

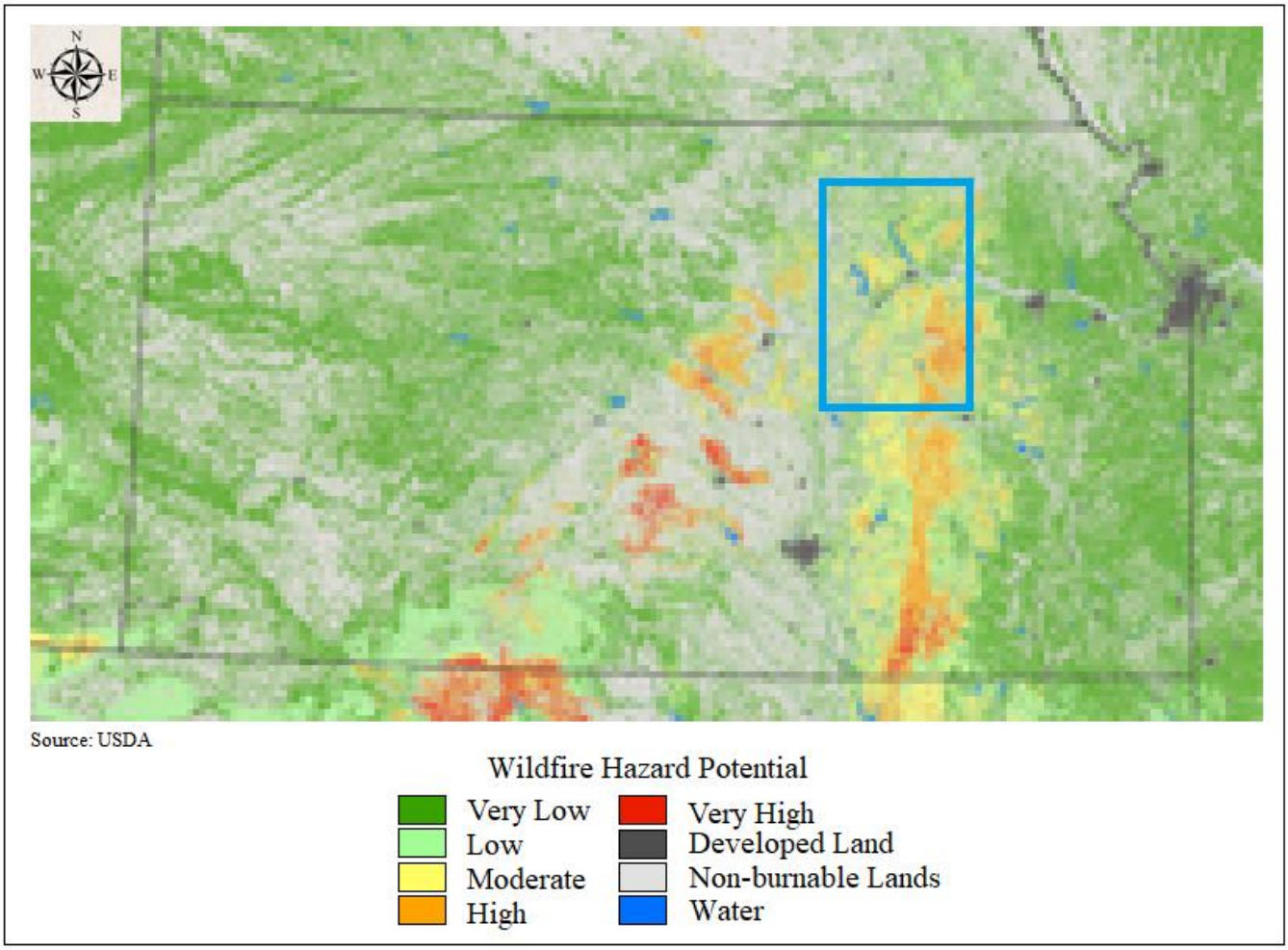
According to the USDA Risk Management Agency, Wabaunsee County can expect on a yearly basis, relevant to wildfire occurrences:

- No insurance claims
- No acres impacted
- $0 in insurance claims

In addition, in the 20-year period from 200 to present there has been one Fire Management Assistance Declaration for the region. This represents an average of less than one declared Fire Management Assistance event per year.

Mapping created by the USDA in 2018 indicates the Wildfire Hazard Potential for the United States. The map indicates that the majority of Kansas Region I is in the low to very low potential class, however areas in the very high potential class are noted.

USDA Wildfire Potential Map



4.20.4 – Vulnerability Analysis

For purposes of this assessment, all counties within the region were determined to be at equal risk to wildfire events. Counties with a higher or increasing population, high, or increasing, or having a high structural valuation are to be considered to have a potentially greater vulnerability.

The following table presents data from HAZUS and KSFM concerning the structures and the percentage of structures for each Kansas Region I county incurring damage over the six-year period of 2013 to 2018 (current available data) from wildfire events. As KSFM did not assign a value to the structures burned, an estimate of $32,000 per structure (value determined using a commercial cost calculator for an 800 square foot general purpose barn at $40 per square foot) was used as reports indicate the majority of structures burned were farm out-buildings. The greater the percentage of structures damaged the greater overall vulnerability going forward.

Table 4.147: Kansas Region I Structural Vulnerability Data for Wildfires, 2010-2019

County	HAZUS Building Valuation	KSFM Reported Structure Damage	Percentage of Building Valuation Damaged
Chase	$328,770,000	$32,000	0.01%
Geary	$3,163,291,000	$64,000	0.00%
Lyon	$4,037,043,000	$288,000	0.01%
Morris	$805,916,000	$288,000	0.04%
Pottawatomie	$2,254,592,000	$0	0.00%
Riley	$6,656,737,000	$384,000	0.01%
Wabaunsee	$812,583,000	$32,000	0.00%

Source: NCEI and HAZUS

Counties with a higher identified population are to be considered to have a potentially greater vulnerability to wildfire events. The following table indicates the total county population and the percentage change over the period 2000 to 2018.

Table 4.148: Kansas Region I Population Vulnerability Data for Wildfires

County	2018 Population	Percent Population Change 2000 to 2018
Chase	2,600	-14.2%
Geary	32,777	17.3%
Lyon	33,300	-7.3%
Morris	5,521	-9.6%
Pottawatomie	24,209	33.0%
Riley	73,703	17.3%
Wabaunsee	6,912	0.4%

Source: US Census Bureau

Data concerning potential vulnerabilities for specific jurisdictions relating to population and housing, including growth or decline, may be found in Section 3.2, Regional Population Data and Section 3.4, Regional Housing Data.

The USDA 2017 Census of Agriculture (the latest available data) provides data on the crop exposure value, the total dollar value of all crops, for each Kansas Region I County. The USDA Risk Management Agency provides information on insured crop losses related to identified hazard, with data from the ten-year period of 2009 to 2018 (with 2009 and 2018 being full data set years) used for analysis. The higher the percentage loss, the higher the potential vulnerability the county has to wildfire events.

Table 4.149: Wildfire Acres Impacted and Crop Insurance Paid per County from 2009-2018

Jurisdiction	Farm Acreage	Annualized Acres Impacted	Percentage of Total Acres Impacted Yearly	Market Value of Products Sold	Annualized Crop Insurance Paid	Percentage of Market Value Impacted Yearly
Chase	360,077	0	0.00%	$85,430,000	$0	0.00%
Geary	155,153	0	0.00%	$31,833,000	$0	0.00%
Lyon	522,934	0	0.00%	$134,440,000	$0	0.00%
Morris	409,269	0	0.00%	$138,615,000	$0	0.00%

Table 4.149: Wildfire Acres Impacted and Crop Insurance Paid per County from 2009-2018

Jurisdiction	Farm Acreage	Annualized Acres Impacted	Percentage of Total Acres Impacted Yearly	Market Value of Products Sold	Annualized Crop Insurance Paid	Percentage of Market Value Impacted Yearly
Pottawatomie	406,031	0	0.00%	$101,363,000	$0	0.00%
Riley	214,311	0	0.00%	$51,171,000	$0	0.00%
Wabaunsee	378,759	0	0.00%	$63,146,000	$0	0.00%

Source: USDA

Potentially lessening future vulnerability to wildfires are Community Wildfire Protection Plans (CWPPs). A CWPP is the most effective way to take advantage of various Federal programs to include the Healthy Forests Restoration Act. By having a CWPP, communities are given priority for funding of Healthy Forests Restoration Act hazardous fuels reduction projects. The three main components of a CWPP are:

- Collaboration between all affected or potentially affected jurisdictions,
- Assessment of the wildfire hazards in an area that leads to recommendation for prioritized fuel reduction, and
- A section on recommendations towards reducing structural ignitability.

Currently the following Kansas Region I counties have approved CWPPs.

- Riley County

4.20.5 – Impact and Consequence Analysis

As per EMAP requirements, the following table provides the Consequence Analysis.

Table 4.150: Wildfire Consequence Analysis

Subject	Impacts of Wildfire
Health and Safety of the Public	Impact could be severe for people living and working in the immediate area. Surrounding communities may also be impacted by evacuees.
Health and Safety of Responders	Impact to responders could be severe depending on the size and scope of the fire, especially for firefighters. Impact will be low to moderate for support responders with the main threat as smoke inhalation.
Continuity of Operations	Temporary relocation may be necessary if government facilities experience damage.
Property, Facilities, and Infrastructure	Delivery of services could be affected if there is any disruption to the roads and/or utilities due to damages sustained.
Environment	Impact will be severe for the immediate area with regards to trees, bushes, animals, and crops. Impact will lessen as distance increases.
Economic Conditions	Impacts to the economy could be moderate in the immediate area.
Public Confidence in the Jurisdiction's Governance	Response and recovery will be in question if not timely and effective. Evacuation orders and shelter availability could be called in to question.

4.21 – Windstorm

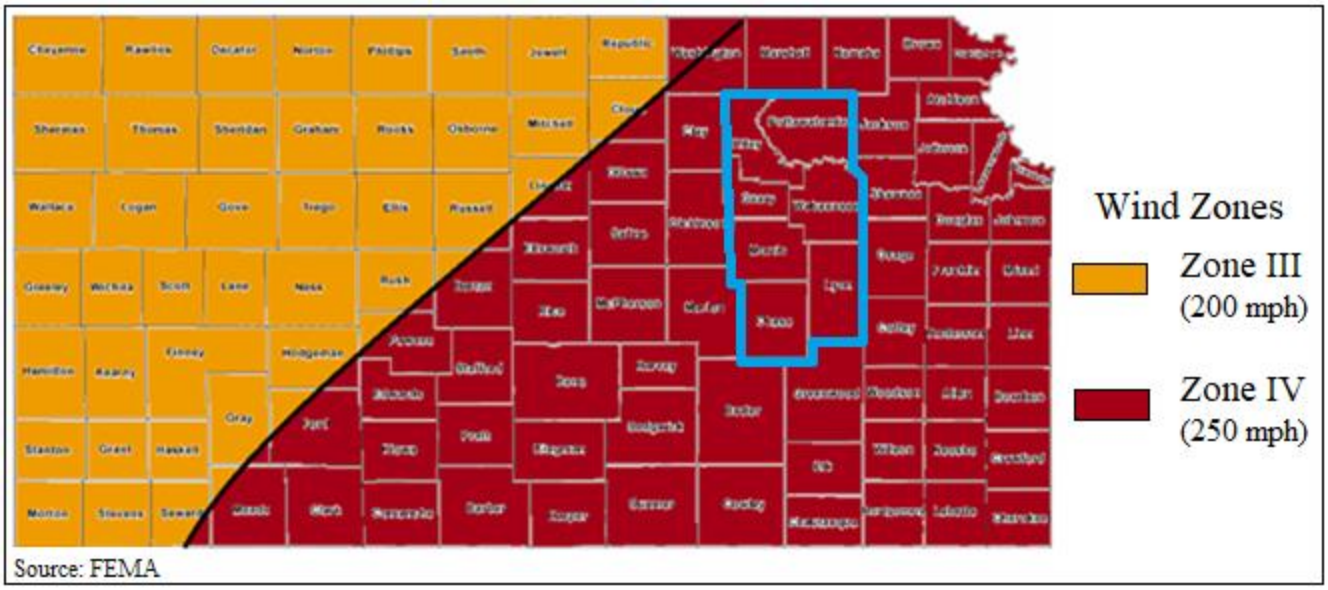
Straight-line winds are generally any thunderstorm wind that is not associated with rotation. It is these winds, which can exceed 100 mph that represent the most common type of severe weather and are responsible for most wind da mage related to thunderstorms. Since thunderstorms do not have narrow tracks like tornados, the associated wind damage can be extensive and affect entire counties or regions. 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.

4.21.1 – Location and Extent

High winds occur over broad geographic regions. The entire Kansas Region I planning area, including all participating jurisdictions, is at risk to high wind events.

The following figure shows the wind zones of the United States based on maximum wind speeds. Kansas Region I is located within wind zone IV, the highest inland category.

Regional Wind Zones



Source: FEMA

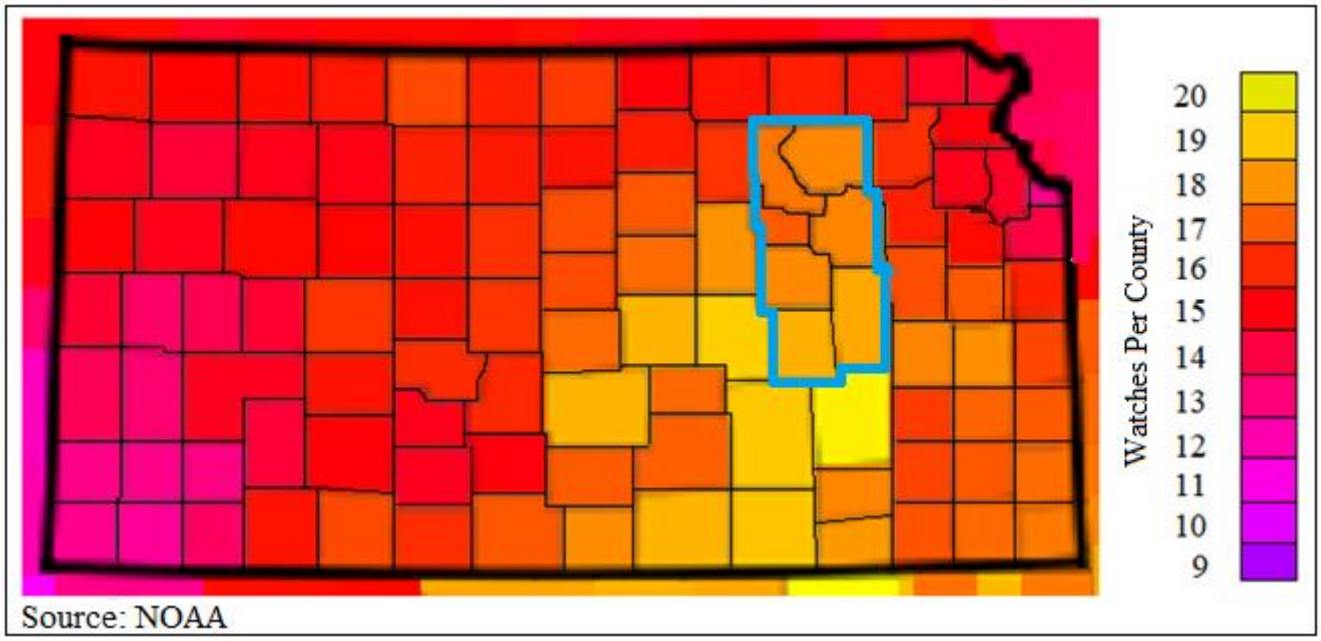
Severe thunderstorms strike Kansas Region I regularly, with accompanying high wind that can cause injury, death, and property damage. The widespread and frequent nature of thunderstorms makes high wind a relatively common occurrence. The NWS classifies thunderstorms, often the generator of high winds, using the following categories.

- **Marginal:** Isolated severe thunderstorms, limited in duration and/or coverage and/or intensity
- **Slight:** Scattered severe storms possible, Short-lived and/or not widespread, isolated intense storms possible

- **Enhanced:** Numerous severe storms possible, more persistent and/or widespread, a few intense
- **Moderate:** Widespread severe storms likely, long-lived, widespread and intense
- **High:** Widespread severe storms expected, long-lived, very widespread and particularly intense

The following map, generated by NOAA, indicates the average number severe thunderstorm watches per year for Kansas Region I.

Annual Average Thunderstorm Watches per Year (20-Year Average 1993-2012)



To measure wind speed and its correlating potential for damage, experts use the Beaufort scale as shown below.

Table 4.151: Beaufort Scale

Beaufort Number	Wind Speed (mph)	Effects on Land
0	Under 1	Calm, smoke rises vertically
1	1-3	Smoke drift indicates wind direction, vanes do not move
2	4-7	Wind felt on face, leaves rustle, vanes begin to move
3	8-12	Leaves, small twigs in constant motion. Light flags extended.
4	13-18	Dust, leaves and loose paper raised up, small branches move
5	19-24	Small trees begin to sway
6	25-31	Large branches of trees in motion, whistling heard in wires
7	32-38	While trees in motion, resistance felt in walking against the wind
8	39-46	Twigs and small branches broken off trees
9	47-54	Slight structural damage occurs, slate blown from roofs
10	55-63	Seldom experienced on land, trees broken, structural damage occurs
11	64-72	Very rarely experienced on land, usually with widespread damage
12	73 or higher	Violence and destruction

4.21.2 – Previous Occurrences

In the 20-year period from 2000 to present, there have been six Presidential Disaster Declarations for Kansas Region I for Straight-Line Winds (along with other associates hazard events). The following 20-year information (with 2000 and 2019 being full data years) on past declared disasters is presented to provide a historical perspective on high wind events that have impacted Kansas Region I. Declaration numbers in bold indication declared disaster that have occurred since the previous mitigation plan update in 2015.

Table 4.152: Kansas Region I FEMA Straight-Line Winds Disaster and Emergency Declarations, 2000-2020

Declaration Number	Incident Period	Disaster Description	Regional Counties Involved	Dollars Obligated
4449	06/20/2019 (04/28/2019 – 07/12/2019)	Severe Storms, **Straight-line Winds**, Tornados, Flooding, Landslides, and Mudslides	Chase, Geary, Lyon, Morris, Pottawatomie, Riley, Wabaunsee	$590,356
4403	10/19/2018 (09/01-09/08/2019)	Severe Storms, **Straight-line Winds**, And Flooding	Riley	$1,343,151
4230	07/20/2015 (05/04/2015 – 06/21/2015)	Severe Storms, Tornados, **Straight-line Winds**, and Flooding	Lyon, Morris, Pottawatomie and Wabaunsee, Chase, Lyon, Morris, Pottawatomie, and Wabaunsee	$13,848,325
4150	10/22/2013 (07/22/2013 – 08/15/2013)	Severe Storms, **Straight-line Winds**, Tornados, and Flooding	Chase, Geary, Lyon and Morris	$11,412,827
4010	07/29/2011 (5/19-6/4/2011)	Severe Storms, **Straight-line Winds**, Tornados and Flooding	Lyon, Pottawatomie, and Riley	$8,259,620
1849	06/25/2009 (4/25-5/16/2009)	Severe Storms, Flooding, **Straight-line Winds**, and Tornados	Chase, Lyon, Morris and Wabaunsee	$15,013,488

Source: FEMA

The following provides details concerning Presidential Disaster Declarations DR 4449, DR 4403 and DR 4230 for Kansas Region I.

Kansas –Severe Storms, Straight-line Winds, Tornados, Flooding, Landslides, and Mudslides
FEMA-4449-DR
Declared June 20, 2019 On June 7, 2019

Governor Laura Kelly requested a major disaster declaration due to severe storms, straight-line winds, tornadoes, flooding, landslides, and mudslides beginning on April 28, 2019, and continuing. The Governor requested a declaration for Public Assistance for 63 counties and Hazard Mitigation statewide. Beginning on May 20, 2019, joint federal, state, and local government Preliminary Damage Assessments (PDAs) were conducted in the requested areas and are summarized below. PDAs estimate damages immediately after an event and are considered, along with several other factors, in determining whether a disaster is of such severity and magnitude that effective response

is beyond the capabilities of the state and the affected local governments, and that Federal assistance is necessary.

On June 20, 2019, President Trump declared that a major disaster exists in the State of Kansas. This declaration made Public Assistance requested by the Governor available to state and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe storms, straight-line winds, tornadoes, flooding, landslides, and mudslides in Allen, Anderson, Atchison, Barber, Barton, Butler, Chase, Chautauqua, Cherokee, Clark, Clay, Cloud, Coffey, Cowley, Doniphan, Elk, Ellsworth, Franklin, Geary, Greenwood, Harper, Harvey, Hodgeman, Jefferson, Kingman, Leavenworth, Lincoln, Linn, Lyon, Marion, Marshall, McPherson, Meade, Montgomery, Morris, Nemaha, Neosho, Osage, Ottawa, Pawnee, Phillips, Pottawatomie, Pratt, Reno, Rice, Rush, Russell, Saline, Sumner, Wabaunsee, Washington, Wilson, and Woodson Counties. This declaration also made Hazard Mitigation Grant Program assistance requested by the Governor available for hazard mitigation measures statewide

Kansas – Severe Storms, Straight-line Winds, and Flooding
FEMA-4403-DR
Declared October 19, 2018

On September 25, 2018 Governor Jeff Colyer requested a major disaster declaration due to severe storms, straight-line winds, and flooding during the period of September 1-8, 2018. The Governor requested a declaration Public Assistance for nine counties and Hazard Mitigation statewide. During the period of September 24-28, 2018, joint federal, state, and local government Preliminary Damage Assessments (PDAs) were conducted in the requested areas and are summarized below. PDAs estimate damages immediately after an event and are considered, along with several other factors, in determining whether a disaster is of such severity and magnitude that effective response is beyond the capabilities of the state and the affected local governments, and that Federal assistance is necessary.

On October 19, 2018, President Trump declared that a major disaster exists in the State of Kansas. This declaration made Public Assistance requested by the Governor available to state and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe storms, straight-line winds, and flooding in Barber, Clay, Kingman, Kiowa, Marshall, Pratt, Rice, and Riley Counties. This declaration also made Hazard Mitigation Grant Program assistance requested by the Governor available for hazard mitigation measures statewide.

Kansas – Severe Storms, Tornados, Straight-Line Winds, and Flooding
FEMA-4230-DR
Declared July 20, 2015

On July 1, 2015, Governor Sam Brownback requested a major disaster declaration due to severe storms, tornados, straight-line winds, and flooding during the period of May 4 to June 21, 2015. The Governor requested a declaration for Public Assistance, including direct federal assistance for 42 counties and Hazard Mitigation statewide. During the period of May 4 to June 27, 2015, joint

federal, state, and local government Preliminary Damage Assessments (PDAs) were conducted in the requested counties and are summarized below. PDAs estimate damages immediately after an event and are considered, along with several other factors, in determining whether a disaster is of such severity and magnitude that effective response is beyond the capabilities of the state and the affected local governments, and that Federal assistance is necessary.

On July 20, 2015, President Obama declared that a major disaster exists in the State of Kansas. This declaration made Public Assistance requested by the Governor available to state and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe storms, tornados, straight-line winds, and flooding in Atchison, Geary, Brown, Chase, Chase, Chautauqua, Cherokee, Cheyenne, Clay, Cloud, Geary, Geary, Doniphan, Morris, Elk, Ellsworth, Lyon, Gray, Greenwood, Lyon, Haskell, Hodgeman, Jackson, Jefferson, Jewell, Lyon, Wabaunsee, Marshall, Riley, Meade, Pottawatomie, Morris, Nemaha, Neosho, Riley, Pottawatomie, Republic, Rice, Stevens, Sumner, Wabaunsee, and Washington Counties. Direct Federal assistance was also authorized. Finally, this declaration made Hazard Mitigation Grant Program assistance requested by the Governor available for hazard mitigation measures statewide.

In addition to the above reported events, the following table presents NOAA NCEI identified high wind events (High Wind and Thunderstorm Wind) and the resulting damage totals in Kansas Region I for the period 2009 - 2018 (with 2009 and 2018 being full data set years).

Table 4.153: Kansas Region I NCEI High Wind Events, 2009 - 2018

County	Number of Days with Events	Property Damage	Deaths	Injuries	Highest Recorded Wind Speed
Chase	20	$851,000	0	0	61 Knots
Geary	46	$6,000	0	7	78 Knots
Lyon	44	$19,000	0	0	81 Knots
Morris	17	$25,000	0	0	87 Knots
Pottawatomie	45	$18,000	0	0	70 Knots
Riley	40	$414,000	0	0	81 Knots
Wabaunsee	32	$24,000	0	0	70 Knots

Source: NOAA NCEI

The following provides both **local accounts** and NOAA NCEI descriptions of notable recorded events:

- **July 2019: Strong City (Chase County)**
  The Symphony in the Flint Hills concert and festival was canceled for the first time in 14 years due to high winds and storm damages. The economic impact was unrecorded, but lost sales and lodging impacted the community.

- **May 18, 2013: Milford (Geary County)**
  One camper flipped over with 2 minor injuries and another camper flipped. Most of the area without power. Two people were reported as injured

- **August 13, 2010: Ogden (Riley County)**

A wind measuring instrument mounted to the roof of the Air Traffic Control tower at Manhattan Regional Airport measured a 93-mph wind gust. The ASOS station at Manhattan Regional Airport also reported a strong wind gust of 68 mph. In the town of Ogden the windows of a residence were cracked by the force of the wind. No estimation of the wind speed was given by this resident. Kansas State University also sustained some significant damage, as wind damage to Anderson Hall's roof resulted in over a quarter million dollars in repairs. In and around Manhattan, numerous outbuildings were damaged and destroyed. Widespread power line and tree damage was also noted across the city, resulting in many damaged roofs and widespread power outages. Property damage was recorded at $400,000.

- **June 19, 2010: Junction City (Geary County)**
  Trained spotters, law enforcement officers, and emergency management reported 60 to 70 mph wind gusts near Milford Lake in Geary County. In Junction City power lines and transformers were damaged. Five people were reported injured.

Available crop loss data from the USDA Risk Management Agency detailing cause of loss was researched to determine the financial impacts of high on the region's agricultural base. Crop loss data for the ten-year period of 2009- 2018 (with 2009 and 2018 being full data years), for the region, indicates 35 high wind related claims on 2,016 acres for $156,422.

Table 4.154: USDA Risk Management Agency Cause of Loss Indemnities 2010-2019, High Winds

County	Number of Reported Claims	Acres Lost	Total Amount of Loss
Chase	4	118	$0
Geary	5	287	$18,139
Lyon	7	456	$34,759
Morris	1	260	$13,832
Pottawatomie	8	453	$39,515
Riley	4	60	$1,122
Wabaunsee	6	383	$49,422

Source: USDA

4.21.3 – Hazard Probability Analysis

The following table summarizes high wind probability data for **Chase County**.

Table 4.155: Chase County High Wind Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	20
Average Events per Year	2
Number of Days with Event and Death or Injury (2010-2019)	0
Average Number of Days with Death or Injury	0
Total Reported NCEI Property Damage (2010-2019)	$851,000
Average Property Damage per Year	$85,100
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	4
Average Number of Claims per Year	<1
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	118

Table 4.155: Chase County High Wind Probability Summary

Data	Recorded Impact
Average Number of Acres Damaged per Year	12
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$0
Average Crop Damage per Year	$0

Source: NCEI and USDA

Data from the NCEI indicates that Chase County can expect on a yearly basis, relevant to high wind events:

- Two events
- <1 death or injury
- $85,100 in property damages

According to the USDA Risk Management Agency, Chase County can expect on a yearly basis, relevant to high wind occurrences:

- <1 insurance claim
- 12 acres impacted
- $0 in insurance claims

The following table summarizes high wind probability data for **Geary County**.

Table 4.156: Geary County High Wind Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	46
Average Events per Year	5
Number of Days with Event and Death or Injury (2010-2019)	0
Average Number of Days with Death or Injury	0
Total Reported NCEI Property Damage (2010-2019)	$6,000
Average Property Damage per Year	$600
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	5
Average Number of Claims per Year	1
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	287
Average Number of Acres Damaged per Year	29
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$18,139
Average Crop Damage per Year	$1,814

Source: NCEI and USDA

Data from the NCEI indicates that Geary County can expect on a yearly basis, relevant to high wind events:

- Five events
- No deaths or injuries
- $600 in property damages

According to the USDA Risk Management Agency, Geary County can expect on a yearly basis, relevant to high wind occurrences:

- One insurance claim
- 29 acres impacted
- $1,814 in insurance claims

The following table summarizes High wind probability data for **Lyon County**.

Table 4.157: Lyon County High Wind Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	44
Average Events per Year	4
Number of Days with Event and Death or Injury (2010-2019)	0
Average Number of Days with Death or Injury	0
Total Reported NCEI Property Damage (2010-2019)	$19,000
Average Property Damage per Year	$1,900
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	7
Average Number of Claims per Year	1
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	456
Average Number of Acres Damaged per Year	46
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$34,759
Average Crop Damage per Year	$3,476

Source: NCEI and USDA

Data from the NCEI indicates that Lyon County can expect on a yearly basis, relevant to high wind events:

- Four events
- No deaths or injuries
- $1,900 in property damages

According to the USDA Risk Management Agency, Lyon County can expect on a yearly basis, relevant to high wind occurrences:

- One insurance claim
- 46 acres impacted
- $3,476 in insurance claims

The following table summarizes high wind probability data for **Morris County**.

Table 4.158: Morris County High Wind Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	17
Average Events per Year	2
Number of Days with Event and Death or Injury (2010-2019)	0
Average Number of Days with Death or Injury	0

Table 4.158: Morris County High Wind Probability Summary

Data	Recorded Impact
Total Reported NCEI Property Damage (2010-2019)	$25,000
Average Property Damage per Year	$2,500
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	1
Average Number of Claims per Year	<1
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	260
Average Number of Acres Damaged per Year	26
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$13,832
Average Crop Damage per Year	$1,383

Source: NCEI and USDA

Data from the NCEI indicates that Morris County can expect on a yearly basis, relevant to high wind events:

- Two events
- No deaths or injuries
- $2,500 in property damages

According to the USDA Risk Management Agency, Morris County can expect on a yearly basis, relevant to high wind occurrences:

- <1 insurance claim
- 26 acres impacted
- $1,383 in insurance claims

The following table summarizes high wind probability data for **Pottawatomie County**.

Table 4.159: Pottawatomie County High Wind Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	45
Average Events per Year	5
Number of Days with Event and Death or Injury (2010-2019)	0
Average Number of Days with Death or Injury	0
Total Reported NCEI Property Damage (2010-2019)	$18,000
Average Property Damage per Year	$1,800
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	8
Average Number of Claims per Year	1
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	453
Average Number of Acres Damaged per Year	45
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$39,515
Average Crop Damage per Year	$3,952

Source: NCEI and USDA

Data from the NCEI indicates that Pottawatomie County can expect on a yearly basis, relevant to high wind events:

- Five events
- No deaths or injuries
- $1,800 in property damages

According to the USDA Risk Management Agency, Pottawatomie County can expect on a yearly basis, relevant to high wind occurrences:

- One insurance claim
- 45 acres impacted
- $3,952 in insurance claims

The following table summarizes high wind probability data for **Riley County**.

Table 4.160: Riley County High Wind Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	40
Average Events per Year	4
Number of Days with Event and Death or Injury (2010-2019)	0
Average Number of Days with Death or Injury	0
Total Reported NCEI Property Damage (2010-2019)	$414,000
Average Property Damage per Year	$41,400
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	4
Average Number of Claims per Year	<1
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	60
Average Number of Acres Damaged per Year	6
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$1,122
Average Crop Damage per Year	$112

Source: NCEI and USDA

Data from the NCEI indicates that Riley County can expect on a yearly basis, relevant to high wind events:

- Four events
- No deaths or injuries
- $41,400 in property damages

According to the USDA Risk Management Agency, Riley County can expect on a yearly basis, relevant to high wind occurrences:

- One insurance claim
- 6 acres impacted
- $112 in insurance claims

The following table summarizes High wind probability data for **Wabaunsee County**.

Table 4.161: Wabaunsee County High Wind Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	32
Average Events per Year	3
Number of Days with Event and Death or Injury (2010-2019)	0
Average Number of Days with Death or Injury	0
Total Reported NCEI Property Damage (2010-2019)	$24,000
Average Property Damage per Year	$2,400
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	6
Average Number of Claims per Year	1
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	383
Average Number of Acres Damaged per Year	38
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$49,422
Average Crop Damage per Year	$4,942

Source: NCEI and USDA

Data from the NCEI indicates that Wabaunsee County can expect on a yearly basis, relevant to high wind events:

- Three events
- No deaths or injuries
- $2,400 in property damages

According to the USDA Risk Management Agency, Wabaunsee County can expect on a yearly basis, relevant to high wind occurrences:

- One insurance claim
- 38 acres impacted
- $4,942 in insurance claims

In addition, Kansas Region I has had six Presidentially Declared Disaster relating to straight-line winds (and other concurrent events) in the last 20 years. This represents an average of less than one declared straight-line wind disaster per year.

4.21.4 – Vulnerability Analysis

For purposes of this assessment, all counties within the region were determined to be at equal risk to high wind events. Counties with a higher or increasing population, and/or a high or increasing structural valuation are considered to have a potentially greater vulnerability.

The following table presents data from the NOAA NCEI and HAZUS concerning the value of structures and the percentage of structures for each Kansas Region I county incurring damage over the period 2009 to 2018 from high wind events. The greater the percentage of structures damaged the greater overall vulnerability going forward.

Table 4.162: Kansas Region I Structural Vulnerability Data for High Winds, 2010-2019

County	HAZUS Building Valuation	NCEI Structure Damage	Percentage of Building Valuation Damaged
Chase	$328,770,000	$851,000	0.26%
Geary	$3,163,291,000	$6,000	0.0%
Lyon	$4,037,043,000	$19,000	0.0%
Morris	$805,916,000	$25,000	0.0%
Pottawatomie	$2,254,592,000	$18,000	0.0%
Riley	$6,656,737,000	$414,000	0.01%
Wabaunsee	$812,583,000	$24,000	0.0%

Source: NCEI and HAZUS

Counties with a higher identified population are to be considered to have a potentially greater vulnerability to high wind events. The following table indicates the total county population and the percentage change over the period 2000 to 2018.

Table 4.163: Kansas Region I Population Vulnerability Data for High Wind

County	2018 Population	Percent Population Change 2000 to 2018
Chase	2,600	-14.2%
Geary	32,777	17.3%
Lyon	33,300	-7.3%
Morris	5,521	-9.6%
Pottawatomie	24,209	33.0%
Riley	73,703	17.3%
Wabaunsee	6,912	0.4%

Source: US Census Bureau

Data concerning potential vulnerabilities for specific jurisdictions relating to population and housing, including growth or decline, may be found in Section 3.2, Regional Population Data and Section 3.4, Regional Housing Data.

The USDA 2017 Census of Agriculture (the latest available data) provides data on the crop exposure value, the total dollar value of all crops, for each Kansas Region I County. The USDA Risk Management Agency provides information on insured crop losses related to identified hazard, with data from the ten-year period of 2009 to 2018 (with 2009 and 2018 being full data set years) used for analysis. The higher the percentage loss, the higher the potential vulnerability the county has to high wind events.

Table 4.164: High Wind Acres Impacted and Crop Insurance Paid per County from 2009-2018

Jurisdiction	Farm Acreage	Annualized Acres Impacted	Percentage of Total Acres Impacted Yearly	Market Value of Products Sold	Annualized Crop Insurance Paid	Percentage of Market Value Impacted Yearly
Chase	360,077	12	0.00%	$85,430,000	$0	0.00%
Geary	155,153	29	0.02%	$31,833,000	$1,814	0.01%
Lyon	522,934	46	0.01%	$134,440,000	$3,476	0.00%
Morris	409,269	26	0.01%	$138,615,000	$1,383	0.00%
Pottawatomie	406,031	45	0.01%	$101,363,000	$3,952	0.00%

Table 4.164: High Wind Acres Impacted and Crop Insurance Paid per County from 2009-2018

Jurisdiction	Farm Acreage	Annualized Acres Impacted	Percentage of Total Acres Impacted Yearly	Market Value of Products Sold	Annualized Crop Insurance Paid	Percentage of Market Value Impacted Yearly
Riley	214,311	6	0.00%	$51,171,000	$112	0.00%
Wabaunsee	378,759	38	0.01%	$63,146,000	$4,942	0.01%

Source: USDA

As with tornados, the following participating jurisdictions may have increased vulnerability to windstorm events due to having greater than 20% of housing stock as mobile homes:

- Elmdale (Chase County)
- Grandview Plaza (Geary County)
- Milford (Geary County)
- Admire (Lyon County)
- Hartford (Lyon County)
- Neosho Rapids (Lyon County)
- Dunlap (Morris County)
- Parkerville (Morris County)
- Belvue (Pottawatomie County)
- Emmet (Pottawatomie County)
- Lousiville (Pottawatomie County)
- Wheaton (Pottawatomie County)
- Ogden (Riley County)

4.21.5 – Impact and Consequence Analysis

As per EMAP requirements, the following table provides the Consequence Analysis.

Table 4.165: High Wind Consequence Analysis

Subject	Impacts of High Winds
Health and Safety of the Public	Impact of the immediate area could be severe depending on whether individuals were able to seek shelter. Casualties are dependent on warning systems and warning times.
Health and Safety of Responders	Impact to responders is expected to be minimal unless responders live within the affected area.
Continuity of Operations	Temporary to permanent relocation may be necessary if government facilities experience damage.
Property, Facilities, and Infrastructure	Localized impact could be severe in the wind path. Roads, buildings, and communications could be adversely affected. Damage could be severe.
Environment	Impact will be severe for the immediate impacted area. Impact will lessen as distance increases from the immediate incident area.
Economic Conditions	Impacts to the economy will greatly depend on the wind severity. Potential economic impact conditions could be minor to severe.
Public Confidence in the Jurisdiction's Governance	Response and recovery will be in question if not timely and effective. Warning systems and warning time will also be questioned.

4.22 – Winter Storms

Winter weather in Kansas Region I usually come in the form of light to heavy snow or freezing rain. A major winter storm can last for several days and be accompanied by high winds, freezing rain or sleet, heavy snowfall, and cold temperatures. Heavy accumulations of ice, often the result of freezing rain, can bring down trees, utility poles, and communications towers and disrupt communications and power for days.

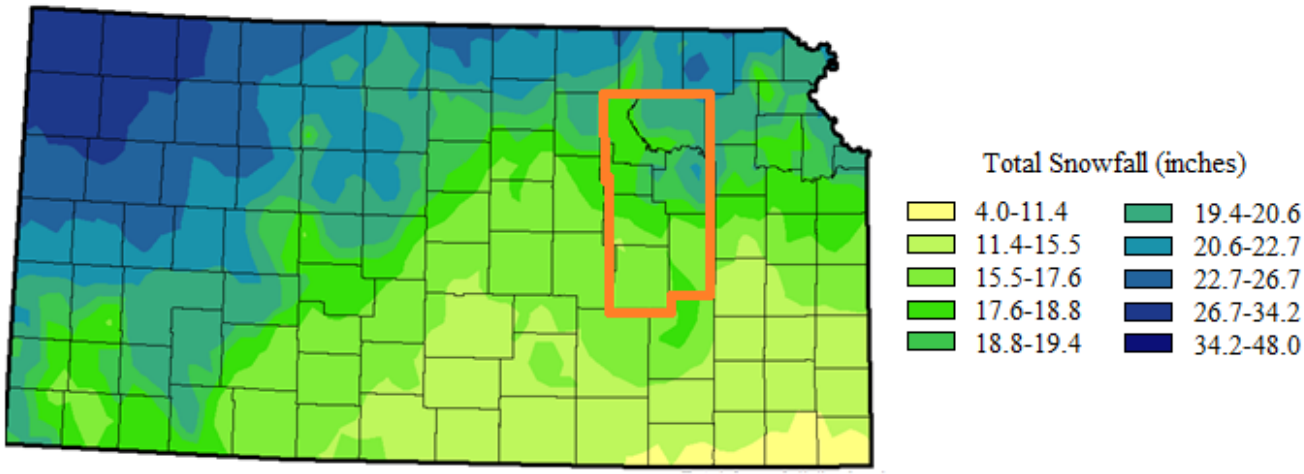
4.22.1 – Location and Extent

All of Kansas Region I is susceptible to severe winter storms. For winter weather, the NWS describes the different types of events 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:** Rain that falls onto a surface with a temperature below freezing. This causes it to freeze to surfaces 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.

The following map, generated Kansa State University, using the latest available data, indicates the average annual snowfall for Kansas Region I for a given year.

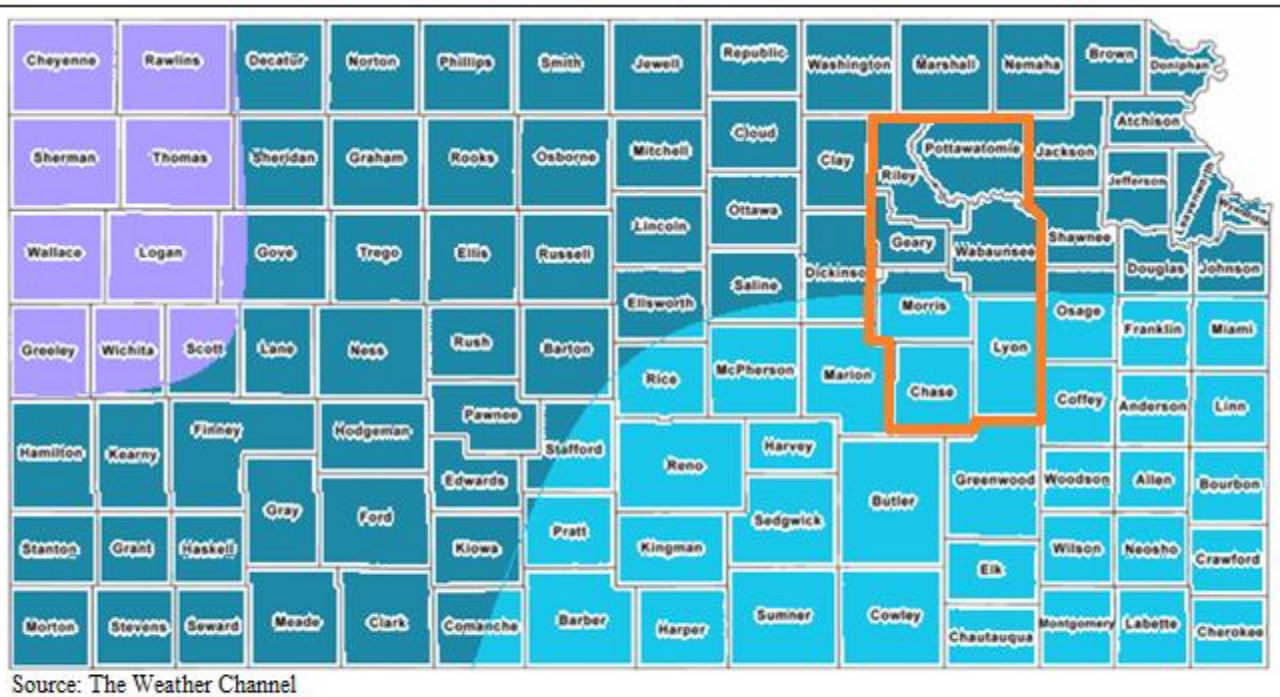
Average Annual Snowfall, 1981-2010



Source: Kansas State University

Additionally, as indicated by the map below, Kansas Region I can expect to receive the first measurable snow in November to December of each year.

Average Date of First Measurable Snow



4.22.2 – Previous Occurrences

In the 20-year period from 2000 to present, there have been five Presidential Disaster Declarations for Kansas Region I for severe winter storms. The following 20-year information (with 2000 and 2019 being full data years) on past declared disasters is presented to provide a historical perspective on winter storm events that have impacted Kansas Region I. Declaration numbers in bold indication declared disaster that have occurred since the previous mitigation plan update in 2015.

Table 4.166: Kansas Region I FEMA Severe Winter Storms Disaster Declarations, 2000-2020

Declaration Number	Incident Period	Disaster Description	Regional Counties Involved	Dollars Obligated
1885	03/09/2010 (12/9/2009-1/8/2010)	**Severe Winter Storms and Snowstorm**	Lyon, Morris, Pottawatomie, Riley and Wabaunsee	$19,100,658
1848	06/24/2009 (3/26-29/2009)	**Severe Winter Storm and Record and Near Record Snow**	Chase and Morris Chase, Lyon and Morris	$20,174,657
1741	02/01/2008	**Severe Winter Storms**	Chase, Geary, Lyon, Morris, Pottawatomie, Riley, and Wabaunsee	$359,557,345
1579	2/8/2005 (1/4-6/2005)	**Severe Winter Storm,** Heavy Rains, and Flooding	Chase, Lyon, Morris, and Wabaunsee	$106,873,672
1402	2/6/2002 (1/29-2/15/2002)	**Ice Storm**	Lyon	$60,185,754

Source: FEMA

The following presents NOAA NCEI data concerning winter storm events in Kansas Region I. It is worth noting that the NCEI data is regional, and sometimes statewide. As such reported damage is not specific to a regional county nor to any of the participating jurisdictions.

Table 4.167: Kansas Region I NCEI Winter Storm Events, 2009 - 2018

Event Type	Number of Days with Events	Property Damage	Deaths	Injuries
Blizzards	2	$0	0	0
Ice Storm	2	$1,000	0	0
Winter Storms	19	$0	0	0

Source: NOAA NCEI

Available crop loss data from the USDA Risk Management Agency detailing cause of loss was researched to determine the financial impacts of winter storms on the region's agricultural base. Crop loss data for the ten-year period of 2009- 2018 (with 2009 and 2018 being full data years), for the region, indicates 655 winter storm related claims on 277,561 acres for $21,793,227.

Table 4.168: USDA Risk Management Agency Cause of Loss Indemnities 2010-2019, Winter Storms

County	Number of Reported Claims	Acres Lost	Total Amount of Loss
Chase	10	637	$48,617

Table 4.168: USDA Risk Management Agency Cause of Loss Indemnities 2010-2019, Winter Storms

County	Number of Reported Claims	Acres Lost	Total Amount of Loss
Geary	25	2,137	$109,057
Lyon	46	3,175	$171,655
Morris	34	6,011	$374,960
Pottawatomie	37	1,444	$129,559
Riley	35	2,650	$179,615
Wabaunsee	16	776	$66,586

Source: USDA

4.22.3 – Hazard Probability Analysis

For probability purposes, each component of severe winter storms was examined and combined. The following table summarizes winter storm event data for Kansas Region I.

Table 4.169: Kansas Region I Winter Storm Probability Summary

Data	Recorded Impact
Number of Days with NCEI Reported Event (2010-2019)	23
Average Event Days per Year	2
Number of Days with Event and Death or Injury (2010-2019)	0
Average Number of Yearly Deaths and Injuries (2010-2019)	0
Total Reported NCEI Property Damage (2010-2019)	$1,000
Average Property Damage per Year	$100

Source: NCEI

Data from the NCEI indicates that Kansas Region I can expect on a yearly basis, relevant to winter storm events:

- Two events
- No deaths or injuries
- $100 in property damages

The following table summarizes USDA Risk Management Agency winter storm event data for **Chase County**.

Table 4.170: Chase County Winter Storm Probability Summary (Agricultural)

Data	Recorded Impact
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	10
Average Number of Claims per Year	1
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	637
Average Number of Acres Damaged per Year	64
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$48,617
Average Crop Damage per Year	$4,862

Source: USDA

According to the USDA Risk Management Agency, Chase County can expect on a yearly basis, relevant to winter storm occurrences:

- One insurance claim
- 64 acres impacted
- $4,862 in insurance claims

The following table summarizes USDA Risk Management Agency winter storm event data for **Geary County**.

Table 4.171: Geary County Winter Storm Probability Summary (Agricultural)

Data	Recorded Impact
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	25
Average Number of Claims per Year	3
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	2,137
Average Number of Acres Damaged per Year	214
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$109,057
Average Crop Damage per Year	$10,906

Source: USDA

According to the USDA Risk Management Agency, Geary County can expect on a yearly basis, relevant to winter storm occurrences:

- Three insurance claims
- 214 acres impacted
- $10,906 in insurance claims

The following table summarizes USDA Risk Management Agency winter storm event data for **Lyon County**.

Table 4.172: Lyon County Winter Storm Probability Summary (Agricultural)

Data	Recorded Impact
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	46
Average Number of Claims per Year	5
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	3,175
Average Number of Acres Damaged per Year	317
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$171,655
Average Crop Damage per Year	$17,165

Source: USDA

According to the USDA Risk Management Agency, Lyon County can expect on a yearly basis, relevant to winter storm occurrences:

- Five insurance claims
- 317 acres impacted
- $17,165 in insurance claims

The following table summarizes USDA Risk Management Agency winter storm event data for **Morris County**.

Table 4.173: Morris County Winter Storm Probability Summary (Agricultural)

Data	Recorded Impact
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	34
Average Number of Claims per Year	3
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	6,011
Average Number of Acres Damaged per Year	601
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$374,960
Average Crop Damage per Year	$37,496

Source: USDA

According to the USDA Risk Management Agency, Morris County can expect on a yearly basis, relevant to winter storm occurrences:

- Three insurance claims
- 601 acres impacted
- $37,496 in insurance claims

The following table summarizes USDA Risk Management Agency winter storm event data for **Pottawatomie County**.

Table 4.174: Pottawatomie County Winter Storm Probability Summary (Agricultural)

Data	Recorded Impact
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	37
Average Number of Claims per Year	4
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	1,444
Average Number of Acres Damaged per Year	144
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$129,559
Average Crop Damage per Year	$12,956

Source: USDA

According to the USDA Risk Management Agency, Pottawatomie County can expect on a yearly basis, relevant to winter storm occurrences:

- Four insurance claims
- 144 acres impacted
- $12,956 in insurance claims

The following table summarizes USDA Risk Management Agency winter storm event data for **Riley County**.

Table 4.175: Riley County Winter Storm Probability Summary (Agricultural)

Data	Recorded Impact
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	35
Average Number of Claims per Year	4
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	2,650
Average Number of Acres Damaged per Year	265
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$179,615
Average Crop Damage per Year	$17,961

Source: USDA

According to the USDA Risk Management Agency, Riley County can expect on a yearly basis, relevant to winter storm occurrences:

- Four insurance claims
- 265 acres impacted
- $17,961 in insurance claims

The following table summarizes USDA Risk Management Agency winter storm event data for **Wabaunsee County**.

Table 4.176: Wabaunsee County Winter Storm Probability Summary (Agricultural)

Data	Recorded Impact
USDA Farm Service Agency Number of Crop Damage Claims (2009-2018)	25
Average Number of Claims per Year	3
USDA Farm Service Agency Number of Acres Damaged (2009-2018)	2,137
Average Number of Acres Damaged per Year	214
USDA Farm Service Agency Crop Damage Claims Amount (2009-2018)	$109,057
Average Crop Damage per Year	$10,906

Source: USDA

According to the USDA Risk Management Agency, Wabaunsee County can expect on a yearly basis, relevant to winter storm occurrences:

- Three insurance claims
- 214 acres impacted
- $10,906 in insurance claims

In addition, Kansas Region I has had five Presidentially Declared Disasters relating to winter storms (and other concurrent events) in the last 20 years. This represents an average one declared winter storm related disaster per year.

4.22.4 – Vulnerability Analysis

For purposes of this assessment, all counties within the region were determined to be at equal risk to winter storm events. Counties with a higher or increasing population, and/or a high or increasing structural valuation are to be considered to have a potentially greater vulnerability.

The following table presents data from the NOAA NCEI and HAZUS concerning the value of structures and the percentage of structures for each Kansas Region I county (in total, due to the regional nature of both storms and NCEI reporting) incurring damage over the period 2009 to 2018 from winter storm events. The greater the percentage of structures damaged the greater overall vulnerability going forward.

Table 4.177: Kansas Region I Structural Vulnerability Data for Winter Storms, 2010-2019

County	HAZUS Building Valuation	NCEI Structure Damage	Percentage of Building Valuation Damaged
Regional Counties	$18,058,932,000	$1,000	0.0%

Source: NCEI and HAZUS

Counties with a higher identified population are to be considered to have a potentially greater vulnerability to winter storm events. The following table indicates the total county population and the percentage change over the period 2000 to 2018.

Table 4.178: Kansas Region I Population Vulnerability Data for Winter Storms

County	2018 Population	Percent Population Change 2000 to 2018
Chase	2,600	-14.2%
Geary	32,777	17.3%
Lyon	33,300	-7.3%
Morris	5,521	-9.6%
Pottawatomie	24,209	33.0%
Riley	73,703	17.3%
Wabaunsee	6,912	0.4%

Source: US Census Bureau

Data concerning potential vulnerabilities for specific jurisdictions relating to population and housing, including growth or decline, may be found in Section 3.2, Regional Population Data and Section 3.4, Regional Housing Data.

The USDA 2017 Census of Agriculture (the latest available data) provides data on the crop exposure value, the total dollar value of all crops, for each Kansas Region I County. The USDA Risk Management Agency provides information on insured crop losses related to identified hazard, with data from the ten-year period of 2009 to 2018 (with 2009 and 2018 being full data set years) used for analysis. The higher the percentage loss, the higher the potential vulnerability the county has to winter storm events.

Table 4.179: Winter Storm Acres Impacted and Crop Insurance Paid per County from 2009-2018

Jurisdiction	Farm Acreage	Annualized Acres Impacted	Percentage of Total Acres Impacted Yearly	Market Value of Products Sold	Annualized Crop Insurance Paid	Percentage of Market Value Impacted Yearly
Chase	360,077	64	0.02%	$85,430,000	$4,862	0.01%
Geary	155,153	214	0.14%	$31,833,000	$10,906	0.03%
Lyon	522,934	317	0.06%	$134,440,000	$17,165	0.01%
Morris	409,269	601	0.15%	$138,615,000	$37,496	0.03%
Pottawatomie	406,031	144	0.04%	$101,363,000	$12,956	0.01%
Riley	214,311	265	0.12%	$51,171,000	$17,961	0.04%

Table 4.179: Winter Storm Acres Impacted and Crop Insurance Paid per County from 2009-2018

Jurisdiction	Farm Acreage	Annualized Acres Impacted	Percentage of Total Acres Impacted Yearly	Market Value of Products Sold	Annualized Crop Insurance Paid	Percentage of Market Value Impacted Yearly
Wabaunsee	378,759	214	0.06%	$63,146,000	$10,906	0.02%

Source: USDA

4.22.5 – Impact and Consequence Analysis

As per EMAP requirements, the following table provides the Consequence Analysis.

Table 4.180: Winter Storm Consequence Analysis

Subject	Impacts of Winter Storm
Health and Safety of the Public	Severity and location dependent. Impacts on persons in the areas of snow and ice are expected to be severe if caught without proper shelter.
Health and Safety of Responders	Impacts will be predicated on the severity of the event. Damaged infrastructure will likely result in hazards such as downed utility lines, main breakages and debris on roadways. .
Continuity of Operations	Temporary relocation may be necessary if government facilities experience damage. Services may be limited to essential tasks if utilities are impacted.
Property, Facilities, and Infrastructure	Impact to property, facilities, and infrastructure could be minimal to severe, depending on the location and structural capacity of the facility. Loss of structural integrity of buildings and infrastructure could occur. Utility lines, roads, residential and business properties will be affected.
Environment	Impact could be severe for the immediate impacted area, depending on the size of the event. Impact will lessen as distance increases from the immediate incident area
Economic Conditions	Impacts to the economy will be dependent severity of the event and the impact on structures and infrastructure. Impacts could be severe if roads/utilities are affected.
Public Confidence in the Jurisdiction's Governance	Response and recovery will be in question if not timely and effective. The timeliness warnings could be questioned.

4.23 – Civil Disorder

Civil disorder is a term that generally refers to a public disturbance by three or more people involving acts of violence that cause immediate danger, damage, or injury to others or their property. However, it is important to remember that gatherings in protest are recognized rights of any person or group, and this right is protected under the United States Constitution.

4.23.1 – Location and Extent

Historically civil disorder has been most commonly associated with urban areas and college campuses. And while the entire planning area may be affected by civil disorder, with its generally small population and low population density, the magnitude of such an event would likely be limited to the major cities within the region.

In general, civil unrest usually accompanies, or is started by, a gathering of people for an event. And while most events occur with no violence, violence can occur with little warning or cause. Unfortunately, large crowds can be subject to control by skillful troublemakers who are often able to incite behavior from members of the crowd that they usually would not consider. When a crowd begins to exhibit signs of disorder, it can be categorized in three categories:

- **Public disorder:** Public disorder is a basic breach of civic order. Individuals or small groups assembling have a tendency to disrupt the normal flow of things around them.
- **Public disturbance:** Public disturbance is designed to cause turmoil on top of the disruption. Individuals and groups assembling into a crowd begin chanting, yelling, singing, and voicing individual or collective opinions.
- **Riot:** A riot is a disturbance that turns violent. Assembled crowds become a mob that violently expresses itself by destroying property, assaulting others, and creating an extremely volatile environment.

While civil disorder is not an everyday occurrence in the planning area, when they do occur they are extremely disruptive and difficult to control. Should a civil disorder event occur in the planning area the result could be measured in loss of life, economic upheaval, and destruction of property.

4.23.2 – Previous Occurrences

There have been no documented cases of civil unrest of disorder in Kansas Region I during the past ten years. The following reported events are reported under this section but represent civic action rather than civil disorder.

- **March and June 2020: Regional**
  Numerous peaceful protests occurred throughout the region to protest the death of George Floyd.

4.23.3 – Hazard Probability Analysis

By nature, acts of civil disorder are difficult to foresee. However, the probability of a major civil disorder event in Kansas Region I is considered low due the lack of any recent documented historical events. Again, it is worth noting that no previous occurrences in no way guarantees no future occurrences.

4.23.4 Vulnerability Analysis

Due to the unknown location and nature of civil disorder, all participating jurisdictions with Kansas Region I are vulnerable. Additionally, and again related to the capricious nature of civil disorder, all buildings and citizens are vulnerable.

Economic impacts and human injury or death are the primary concern with civil disorder. Increases in population or the hosting of major political, economic or social events could increase the likelihood and severity of a civil disturbance.

It is difficult to quantify potential losses of Civil Disorder due to the many variables and human elements and lack of historical precedence. Therefore, for the purposes of this plan, a **hypothetical scenario** is included for illustrative purposes only.

> **Event:** City organizers set up a two-block long fan zone near the local community sports field for an important sporting event. The population density in the fan zone is 6,000 people, with at least five persons per 25 square feet.
>
> **Riot:** The riot began to take shape as the game came to a close, with some spectators throwing bottles and other objects. Small fires were started and soon some rioters overturned a vehicle and set it alight. Fist fights broke out and in a nearby parking lot and two police cars were also set on fire. Riot police eventually managed to disperse the rioters and all fires were extinguished.
>
> **Results:** The following table presents potential event results:

Table 4.181: Hypothetical Riot Outcomes

Category	Result
Total Traumatic Injuries	250 persons
Total Urgent Care Injuries	1,000 persons
Injuries not Requiring Hospitalization	2,500 persons
Damage to Vehicles	Glass replacement cost for approximately 200 vehicles: $ 8,000 Repair / repainting cost for approximately 200 vehicles: $800,000
Damage to Buildings	Window replacement cost for approximately 50 buildings: $80,000

Source: Kansas State Hazard Mitigation Plan

4.23.5 – Impact and Consequence Analysis

As per EMAP standards, the following table provides the consequence analysis for drought conditions.

Table 4.182: Civil Disorder Consequence Analysis

Subject	Civil Disorder Potential Impacts
Health and Safety of the Public	Impact could be severe for persons in the incident area.
Health and Safety of Responders	Impact to responders could be severe if not trained and properly equipped. Responders that are properly trained and equipped will have a low to moderate impact.
Continuity of Operations	Depending on damage to facilities/personnel in the incident area, re-location may be necessary and lines of succession execution (minimal to severe).
Property, Facilities, and Infrastructure	Impact within the incident area could be severe, depending on the extent of the event. (minimal to severe)
Environment	Localized impact within the incident area could be severe depending on the type of human caused incident.
Economic Conditions	Economic conditions could be adversely affected and dependent upon time and length of clean up and investigation (minimal to severe).
Public Confidence in the Jurisdiction's Governance	Impact will be dependent on whether or not the incident could have been avoided by government or non-government entities, clean-up and investigation times, and outcomes. (minimal to severe).

4.24 – Hazardous Materials

Hazardous materials (HazMat) are any substances that pose a risk to health, life, or property when released or improperly handled. Generally, the term refers to materials with hazardous chemical or physical properties, though sometimes biological agents can fall under this category. The basic types of hazardous materials may be categorized according to more than six different systems; but the categories of U.S. Emergency Planning and Community Right-to-Know Act (42 U.S.C. 11002) provide a general guide to hazardous materials:

- ***Extremely Hazardous Substances:*** Materials that have acutely toxic chemical or physical properties and may cause irreversible damage or death to people or harm the environment if released or used outside their intended use.
- ***Hazardous Substances:*** Materials posing a threat to human health and/or the environment, or any substance designated by the EPA to be reported if a designated quantity of the substance is spilled into waterways, aquifers, or water supplies or is otherwise released into the environment.

4.24.1 – Location and Extent

In Kansas Region I, HazMat incidents are generally classified as:

- **Fixed Facility Incidents:** Commercial Facilities and Superfund Sites
- **Transportation Incidents:** Highway, Railway, Pipeline, Air, and Water

Fixed Facilities

When facilities have hazardous materials in quantities at or above the threshold planning quantity, they must submit Tier II information to appropriate federal and state agencies to facilitate emergency planning in accordance with the Community Right to Know Act. The forms are known as Tier II reports and the facilities included are referred to as Tier II facilities. According to data provided by KDEM, there are 185 Tier II Facilities housing hazardous chemicals in Kansas Region I. The following table details the number of Tier II facilities by county.

Table 4.183: Kansas Region I Tier II Facilities by County

County	Tier II Facilities
Chase	6
Geary	30
Lyon	37
Morris	30
Pottawatomie	28
Riley	33
Wabaunsee	21

Source: KDEM

The National Priorities List (NPL) is a published list of hazardous waste sites in the country that are eligible for extensive, long-term cleanup under the Superfund program. A Superfund site is an uncontrolled or abandoned location where hazardous waste is located which may affect local ecosystems and/or people. The EPA has indicated that there is one Superfund site located within Kansas Region I.

- **Fort Riley: Geary and Riley Counties**
  Numerous environmental investigations and sampling events were performed at Fort Riley in the 1970s and 1980s. These investigations identified activities and facilities where hazardous substances had been released or had the potential to be released to the environment. Potential sources of contamination include a variety of landfills; printing, dry cleaning, and furniture shops; and pesticide storage facilities. Fort Riley was placed on the National Priorities List on 30 August 1990. The Department of Army and Fort Riley entered into a Federal Facility Agreement with the Kansas Department of Health and the Environment and EPA Region VII in February 1991. The Federal Facility Agreement, which incorporates both the Comprehensive Environmental Response, Compensation, and Liability Act as amended by the Superfund Amendments and Reauthorization Act of 1986, and the Resource Conservation and Recovery Act actions, became effective in June 1991. An Installation-wide Site Assessment was performed in 1993 to identify potential areas of environmental concern. As a result, five operable units were established and a group of minor areas of concern identified.

Transportation

The following table, from Kansas Department of Transportation (KDOT), presents total roadway mileage by county.

Table 4.184: Kansas Region I Total Roadway Mileage by County

County	Roadways (Miles)
Chase	649
Geary	818
Lyon	1,696
Morris	1,171
Pottawatomie	1,455
Riley	1,216
Wabaunsee	1,059

Source: KDOT

Kansas Region I is served by numerous railroad companies. Railroads are generally defined by three classes, predicated on revenue and size, with Class I (Freight) being the largest. Class I railroads are of the greatest concern due to the type of freight carried, with categories including There are three Class I railroads in Kansas Region I providing service with long-haul deliveries to national market areas and intermodal rail/truck service providers:

- Burlington Northern and Santa Fe Railway
- Union Pacific

The following table, with information from KDOT, provides the total railroad track mileage of for each county within Kansas Region I.

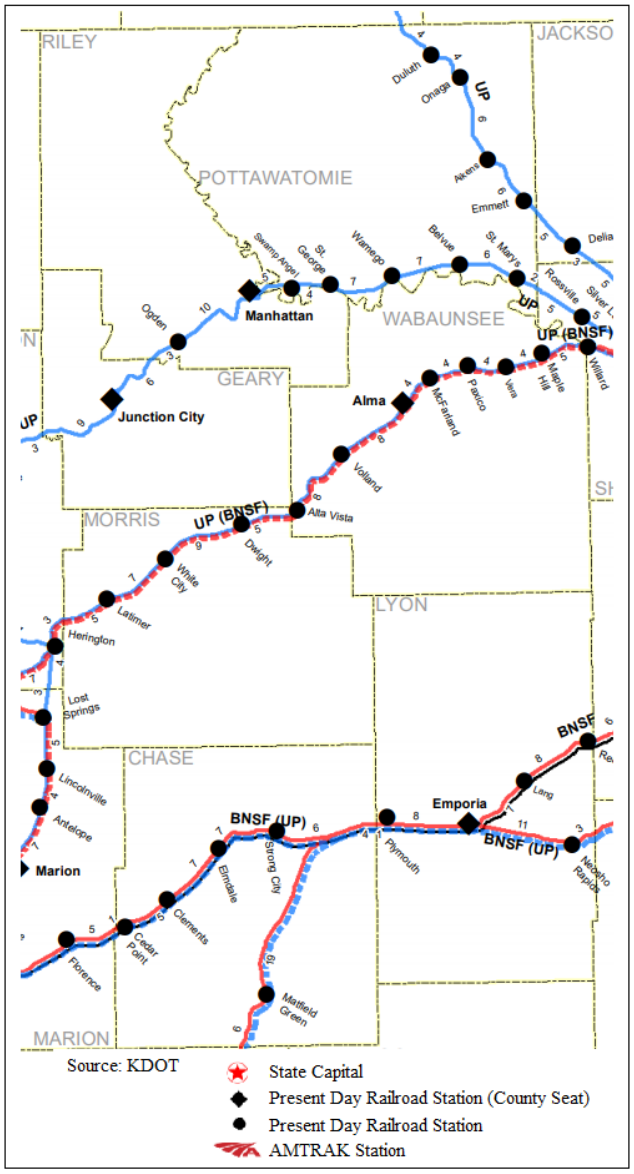
Table 4.185: Kansas Region I Total Class I Railroad Mileage by County

County	Interstates (Miles)
Chase	56
Geary	18
Lyon	37
Morris	26
Pottawatomie	55
Riley	15
Wabaunsee	37

Source: KDOT

The following map, from KDOT, shows Class I track locations in Kansas Region I.

Regional Class I Railway Lines



Pipelines

The following data, provided by KDEM and the United States Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA), indicates the total number of gas and liquid pipeline mileage per county

Table 4.186: PHMSA Pipeline Mileage by County

County	Gas (miles)	Liquid (miles)
Chase	176	37
Geary	91	25
Lyon	181	84
Morris	24	62
Pottawatomie	129	2
Riley	46	24
Wabaunsee	23	85

Source: KDEM and PHMSA

4.24.2 – Previous Occurrences

The following table, with data from KDEM, lists the number of hazardous materials incidents, injuries, fatalities and people evacuated from the public and facilities for each Kansas Region I county over the ten-year period 2016-2018 (the latest available data).

Table 4.187: Kansas Region I HazMat KDEM Reported Incidents, 2016-2018

Jurisdiction	Incidents	Injuries	Fatalities	People Evacuated
Chase	3	0	0	0
Geary	0	0	0	0
Lyon	2	0	0	0
Morris	0	0	0	0
Pottawatomie	1	0	0	0
Riley	1	0	0	0
Wabaunsee	0	0	0	0

Source: KDEM

Hazardous Materials Regulations (49 CFR Parts 171-180) require certain types of HazMat incidents be reported, with data tracked by PHMSA's Office of Hazardous Materials Safety (OHMS) by transportation category type (Air, Highway, Rail and Water). The OHMS Incident Report Database from 2010 to 2018 indicated 49 reported incidents within Kansas Region I for the period 2000 through 2018. The following charts detail the number of events per year per transportation category.

Table 4.188: Kansas Region I OHMS HazMat Incidents, 2000-2018

Jurisdiction	Highway	Air	Rail	Damages	Injuries	Deaths
Chase County						
Cottonwood Falls	0	0	1	$80,000	0	0
Geary County						
None Reported						
Lyon County						
Emporia	3	0	0	$50,000	0	0
Olpe	1	0	0	$0	0	0
Morris County						
Council Grove	2	0	0	$1,500	0	0
Pottawatomie County						
None Reported						
Riley County						
Manhattan	2	1	0	$0	0	0
Wabaunsee County						
Alma	1	0	0	$0	0	0

Source: PHMSA OHMS
-: No reported events

Data from PHMSA provides significant incident reports for the pipeline systems in Kansas Region I. Data from the period 2013 to 2017 indicate that there were ten pipeline incidents that no fatalities, no injuries and $2,209,467 in damages. The following table details reported pipeline incident details for each county with a reported event.

Table 4.189: Kansas Region I PHMSA Reported Pipeline Incidents by County, 2013 to 2017

County	Number of Incidents	Fatalities	Injuries	Total Damage	Gross Barrels Spilled
Chase	0	0	0	$0	0
Geary	0	0	0	$0	0
Lyon	0	0	0	$0	0
Morris	1	0	0	$607,003	0
Pottawatomie	0	0	0	$0	0
Riley	0	0	0	$0	0
Wabaunsee	0	0	0	$0	0

Source: PHMSA
-: No reported events

4.24.3 – Hazard Probability Analysis

HazMat incidents are not predictable. However, probabilities can be estimated using past occurrence data as a guide.

The following tables summarize occurrence data and probability for HazMat events for **Chase County** using data from KDEM.

Table 4.190: Chase County HazMat Incident Probability Summary

Data	Recorded Impact
Number of Reported Events (2016-2018)	3
Average Events per Year	1
Number of Reported Deaths (2016-2018)	0
Average Deaths per Year	0
Number of Reported Injuries (2016-2018)	0
Average Injuries per Year	0
Number of Reported Evacuations (2016-2018)	0
Average Evacuations per Year	0

Source: KDEM

Data indicates that Chase County can expect on a yearly basis, relevant to fixed facility related HazMat events:

- One event
- No deaths
- No injuries
- No evacuations

The following tables summarize occurrence data and probability for HazMat events for **Geary County** using data from KDEM.

Table 4.191: Geary County HazMat Incident Probability Summary

Data	Recorded Impact
Number of Reported Events (2016-2018)	0
Average Events per Year	0
Number of Reported Deaths (2016-2018)	0
Average Deaths per Year	0
Number of Reported Injuries (2016-2018)	0
Average Injuries per Year	0
Number of Reported Evacuations (2016-2018)	0
Average Evacuations per Year	0

Source: KDEM

Data indicates that Geary County can expect on a yearly basis, relevant to fixed facility related HazMat events:

- No events
- No deaths
- No injuries
- No evacuations

The following tables summarize occurrence data and probability for HazMat events for **Lyon County** using data from KDEM.

Table 4.192: Lyon County HazMat Incident Probability Summary

Data	Recorded Impact
Number of Reported Events (2016-2018)	2
Average Events per Year	1
Number of Reported Deaths (2016-2018)	0
Average Deaths per Year	0
Number of Reported Injuries (2016-2018)	0
Average Injuries per Year	0
Number of Reported Evacuations (2016-2018)	0
Average Evacuations per Year	0

Source: KDEM

Data indicates that Lyon County can expect on a yearly basis, relevant to fixed facility related HazMat events:

- One event
- No deaths
- No injuries
- No evacuations

The following tables summarize occurrence data and probability for HazMat events for **Morris County** using data from KDEM.

Table 4.193: Morris County HazMat Incident Probability Summary

Data	Recorded Impact
Number of Reported Events (2016-2018)	0
Average Events per Year	0
Number of Reported Deaths (2016-2018)	0
Average Deaths per Year	0
Number of Reported Injuries (2016-2018)	0
Average Injuries per Year	0
Number of Reported Evacuations (2016-2018)	0
Average Evacuations per Year	0

Source: KDEM

Data indicates that Morris County can expect on a yearly basis, relevant to fixed facility related HazMat events:

- No events
- No deaths
- No injuries
- No evacuations

The following tables summarize occurrence data and probability for HazMat events for **Pottawatomie County** using data from KDEM.

Table 4.194: Pottawatomie County HazMat Incident Probability Summary

Data	Recorded Impact
Number of Reported Events (2016-2018)	1
Average Events per Year	<1
Number of Reported Deaths (2016-2018)	0
Average Deaths per Year	0
Number of Reported Injuries (2016-2018)	0
Average Injuries per Year	0
Number of Reported Evacuations (2016-2018)	0
Average Evacuations per Year	0

Source: KDEM

Data indicates that Pottawatomie County can expect on a yearly basis, relevant to fixed facility related HazMat events:

- <1 event
- No deaths
- No injuries
- No evacuations

The following tables summarize occurrence data and probability for HazMat events for **Riley County** using data from KDEM.

Table 4.195: Riley County HazMat Incident Probability Summary

Data	Recorded Impact
Number of Reported Events (2016-2018)	1
Average Events per Year	<1
Number of Reported Deaths (2016-2018)	0
Average Deaths per Year	0
Number of Reported Injuries (2016-2018)	0
Average Injuries per Year	0
Number of Reported Evacuations (2016-2018)	0
Average Evacuations per Year	0

Source: KDEM

Data indicates that Riley County can expect on a yearly basis, relevant to fixed facility related HazMat events:

- <1 event
- No deaths
- No injuries
- No evacuations

The following tables summarize occurrence data and probability for HazMat events for **Wabaunsee County** using data from KDEM.

Table 4.196: Wabaunsee County HazMat Incident Probability Summary

Data	Recorded Impact
Number of Reported Events (2016-2018)	0
Average Events per Year	0
Number of Reported Deaths (2016-2018)	0
Average Deaths per Year	0
Number of Reported Injuries (2016-2018)	0
Average Injuries per Year	0
Number of Reported Evacuations (2016-2018)	0
Average Evacuations per Year	0

Source: KDEM

Data indicates that Wabaunsee County can expect on a yearly basis, relevant to fixed facility related HazMat events:

- No events
- No deaths
- No injuries
- No evacuations

4.24.4 – Vulnerability Analysis

Special populations are particularly vulnerable to the impacts of a hazardous materials incident because of the potential difficulties involved in the evacuation. The following table details the number of special population facilities in each Kansas Region I county located within ½ mile of a chemical facility. The locations of colleges, educational and correctional institution facilities is from the Kansas Data Access & Support Center, health facilities data is from HAZUS, aging facilities is from KDEM and childcare facilities is from KDHE.

Table 4.197: Kansas Region I Special Population Facilities Within

County	Health Facilities	Colleges	Educational Facilities	Aging Facilities	Child Care	Correctional Institutions
Chase	0	0	2	0	4	1
Geary	0	0	5	0	26	2
Lyon	0	1	8	3	43	1
Morris	0	0	2	0	6	0
Pottawatomie	0	1	3	2	17	1
Riley	0	1	8	0	32	1
Wabaunsee	0	0	5	0	15	1

Source: KDEM

Counties with a higher identified population are to be considered to have a potentially greater vulnerability to HazMat events. The following table indicates the total county population and the percentage change over the period 2000 to 2018.

Table 4.198: Kansas Region I Population Vulnerability Data for HazMat

County	2018 Population	Percent Population Change 2000 to 2018
Chase	2,600	-14.2%
Geary	32,777	17.3%
Lyon	33,300	-7.3%
Morris	5,521	-9.6%
Pottawatomie	24,209	33.0%
Riley	73,703	17.3%
Wabaunsee	6,912	0.4%

Source: US Census Bureau

Data concerning potential vulnerabilities for specific jurisdictions relating to population, including growth or decline, may be found in Section 3.2, Regional Population Data.

4.24.5 – Impact and Consequence Analysis

As per EMAP requirements, the following table provides the Consequence Analysis.

Table 4.199: HazMat Incident Consequence Analysis

Subject	Impacts of Hazardous Materials Incident
Health and Safety of Persons in the Area of the Incident	Impact in the immediate area could be severe and long lasting.
Responders	Impact to responders is expected to be moderate to severe, potentially even with required safety equipment.
Continuity of Operations	Long term relocation may be necessary if government facilities experience contamination or damage.
Property, Facilities, and Infrastructure	Localized impact could be severe in the incident area. Facilities may need to be abandoned and razed. Large areas may become inaccessible.
Environment	Impact could be severe for the immediate area. Impact will lessen with distance. The proximity of open bodies of water could compound the impact.
Economic Conditions	Local economy and finances may be adversely affected, depending on the nature, extent and duration of the event.
Public Confidence in Governance	Response and recovery will be in question if not timely and effective. Warning systems and the timeliness of those warnings could be questioned.

4.25 – Major Disease

For this plan, major disease is classified as infectious diseases caused by microscopic agents, including viruses, bacteria, parasites, and fungi or by their toxins, that may impact humans. They may be spread by direct contact with an infected person or animal, ingesting contaminated food or water, vectors such as mosquitoes or ticks, contact with contaminated surroundings such as animal droppings, infected droplets, or by aerosolization.

4.25.1 – Location and Extent

Human transmissible disease and infectious diseases are illnesses caused by microscopic agents, including viruses, bacteria, parasites, and fungi or by their toxins. They may be spread by direct contact with an infected person or animal, ingesting contaminated food or water, vectors such as mosquitoes or ticks, contact with contaminated surroundings such as animal droppings, infected droplets, or by aerosolization.

The entire planning area is susceptible to a transmissible disease outbreak. However, more densely populated areas may be more susceptible.

4.25.2 – Previous Occurrences

In the 20-year period from 2000 to present, there has been one Presidential Disaster Declaration and one State of Kansas Emergency Declaration for Kansas Region I for a major disease outbreak. The following information is presented to provide a historical perspective on major disease events that have impacted Kansas Region I.

Table 4.200: Kansas Region I FEMA Major Disease Disaster Declarations, 2000 - 2020

Declaration Number	Incident Period	Disaster Description	Regional Counties Involved	Dollars Obligated
4504	03/29/2020 (On-Going)	**COVID-19 Pandemic**	Chase, Geary, Lyon, Morris, Pottawatomie, Riley and Wabaunsee	-

Source: FEMA
-: Data unavailable

Table 4.201: Kansas Region I Emergency Major Disease Disaster Declarations, 2000 - 2020

Declaration Number	Incident Period	Disaster Description	Regional Counties Involved	Dollars Obligated
3481	03/12/2020 (On-Going)	**COVID-19**	Chase, Geary, Lyon, Morris, Pottawatomie, Riley and Wabaunsee	-

Source: State of Kansas
-: Data unavailable

- **Coronavirus Disease 2019**
  As of this plan, the World Health Organization, the Center for Disease Control (CDC) and KDHE is responding to a pandemic outbreak of respiratory illness caused by a novel coronavirus, SARs COV-2, which causes the respiratory illness Coronavirus Disease 2019 (COVID-19). The outbreak first started in Wuhan, China, but cases have been identified in a growing number national and international locations, including Kansas. COVID-19 is currently spreading rapidly and is

thought to spread mainly between people who are in close contact with one another (within about 6 feet) through respiratory droplets produced when an infected person coughs or sneezes. It also may be possible that transmission is occurring through touching a surface or object that has the virus on it and then touching your mouth, nose, or possibly their eyes

Risk of infection is higher for people who are close contacts of someone known to have COVID-19, for example healthcare workers, or household members. Other people at higher risk for infection are those who live in or have recently been in an area with ongoing spread of COVID-19.

Patients with COVID-19 have had mild to severe respiratory illness with symptoms of fever, cough and shortness of breath. Some patients have pneumonia in both lungs, multi-organ failure and in some cases death.

There is currently no vaccine to protect against COVID-19. The best way to prevent infection is to take everyday preventive actions, like avoiding close contact with people who are sick and washing your hands often. There is no specific antiviral treatment for COVID-19. People with COVID-19 can seek medical care to help relieve symptoms.

The economic impact of the pandemic is being felt by the region through job loss and business closures.

This is a rapidly evolving situation, and any further data considered for inclusion in this plan would likely be out of date. Up to date information may be found at the following CDC website:

- https://www.cdc.gov/coronavirus/2019-ncov/index.html

In addition, the KDHE was contacted concerning the epidemiological tracking of contagious and/or human transmissible diseases. Data was solicited concerning the following diseases of concern:

- Haemophilus Influenzae Invasive Disease
- Measles (Rubeola)
- Meningococcal Infections
- Mumps
- Pertussis
- Streptococcus pneumoniae, Invasive
- West Nile Virus
- Zika Virus

A review of available data indicates there have been no unusual or concerning spikes in these diseases.

4.25.3 – Hazard Probability Analysis

Data from the CDC indicates that COVID-19 is a concern for the state of Kansas and Kansas Region I. Based on this active and continuing threat, Kansas Region I is currently at risk to a large-scale major disease outbreak.

4.25.4 – Vulnerability Analysis

For purposes of this assessment, no facilities or agricultural commodities are considered vulnerable to the major disease hazard.

Due to the person to person transmission of many diseases of concern counties with a higher identified population are to be considered to have a potentially greater vulnerability. The following table indicates the total county population and the percentage change over the period 2000 to 2018.

Table 4.202: Kansas Region I Population Vulnerability Data for Major Disease

County	2018 Population	Percent Population Change 2000 to 2018
Chase	2,600	-14.2%
Geary	32,777	17.3%
Lyon	33,300	-7.3%
Morris	5,521	-9.6%
Pottawatomie	24,209	33.0%
Riley	73,703	17.3%
Wabaunsee	6,912	0.4%

Source: US Census Bureau

Additionally, there is an increased likelihood of mortality for very young and very old populations due to transmissible disease. The following table indicates the percentage of the total county population that may be considered especially vulnerable to a major disease.

Table 4.203: Kansas Region I Vulnerable Population Vulnerability Data for Major Disease

County	Percentage of Population 5 and Under (2018)	Percentage of Population 65+ (2018)
Chase	5.1%	25.1%
Geary	11.9%	8.6%
Lyon	6.0%	15.2%
Morris	5.4%	24.7%
Pottawatomie	7.8%	14.3%
Riley	5.6%	9.5%
Wabaunsee	5.8%	20.0%

Source: US Census Bureau

Data concerning potential vulnerabilities for specific jurisdictions relating to population, including growth or decline, may be found in Section 3.2, Regional Population Data.

4.25.5 – Impact and Consequence Analysis

As per EMAP requirements, the following table provides the Consequence Analysis.

Table 4.204: Major Disease Consequence Analysis

Subject	Impacts of Major Disease Outbreak
Health and Safety of Persons in the Area of the Incident	Impact over a widespread area could be severe depending on type of outbreak and whether it is a communicable disease. Casualties are dependent on warning systems, warning times and the availability of vaccines, antidotes, and medical svc.
Responders	Impact to responders could be severe, especially if they reside in the area and or their type of exposure during response. With proper precautions and safety nets in place the impact is lessened.
Continuity of Operations	Continuity of Operations will be greatly dependent on availability of healthy individuals. COOP is not expected to be exercised.
Property, Facilities, and Infrastructure	Access to facilities and infrastructure could be affected until decontamination is completed
Environment	Impact could be severe for the immediate impacted area depending on the source of the outbreak. Impact could have far-reaching implications if disease is transferable between humans and animals or to wildlife.
Economic Conditions	Impacts to the economy could be severe if the disease is communicable. Loss of tourism, revenue, and business as usual will greatly affect the local economy and the state as a whole.
Public Confidence in Governance	Response and recovery will be in question if not timely and effective. Availability of medical supplies, vaccines, and treatments will come into question.

4.26 – Radiological Incident

For purposes of this plan, a radiological incident is considered an accident involving a release of radioactive materials from a nuclear reactor. Radiological accidents could cause injury or death, contaminate property and valuable environmental resources, as well as disrupt the functioning of communities and their economies. Since 1980, each utility that owns a commercial nuclear power plant in the United States has been required to have both an onsite and offsite emergency response plan as a condition of obtaining and maintaining a license to operate that plant. Onsite emergency response plans are approved by the U.S. Nuclear Regulatory Commission (NRC).

4.26.1 – Location and Extent

The only active commercial nuclear reactor within the State of Kansas is the Wolf Creek Nuclear Power Plant (Wolf Creek) in Coffey County. Kansas Region I is well outside of both the 10-mile 50-mile emergency planning zones for Wolf Creek. The entire planning region is at risk from a radiological event due to transportation accidents.

4.26.2 – Previous Occurrences

There have been no reported major radiological events recorded in Kansas Region I.

4.26.3 – Hazard Probability Analysis

There have been no reported nuclear failure and/or release events in Kansas Region I.

4.26.4 – Vulnerability Assessment

The major usage of radioactive materials in the region are for medical diagnostics and therapy, soil density testing in the construction industry, and in radiography cameras in pipeline construction and repair. During all lawful operations of radioactive materials, the licensee is responsible for ensuring that the area around the source material is cordoned off or shielding is used to prevent unnecessary exposures. Inspections of practices and security measures are regularly conducted to ensure compliance and conformity to regulations in order to protect the public. The frequency of inspections can be adjusted in response to perceived risk. Public risk can be reduced by minimizing the duration of exposure, shielding the source material and maximizing the distance from the source.

It is common for materials, including pharmaceuticals, industrial sources and nuclear fuel rods destined to nuclear reactors, to be transported via highways and railroads. Areas near interstates and major highways have an increased risk of transportation accidents. Remote areas also have to account for long response times from hazardous materials and health physics personnel.

4.26.5 – Impact and Consequence Analysis

As per EMAP requirements, the following table provides the Consequence Analysis.

Table 4.205: Radiological Incident Consequence Analysis

Subject	Impacts of Nuclear Incident
Health and Safety of Persons in the Area of the Incident	Impact in the immediate area could be severe and long lasting.
Responders	Impact to responders is expected to be severe, potentially even with required safety equipment.
Continuity of Operations	Long term relocation may be necessary if government facilities experience contamination.
Property, Facilities, and Infrastructure	Localized impact could be severe in the incident area. Facilities may need to be abandoned and razed. Large areas may become inaccessible.
Environment	Impact could be severe for the immediate area. Impact will lessen with distance.
Economic Conditions	Local economy and finances may be adversely affected, depending on the nature, extent and duration of the event.
Public Confidence in Governance	Response and recovery will be in question if not timely and effective. Warning systems and the timeliness of those warnings could be questioned.

4.27 – Terrorism

The United States does not have a standardized definition of terrorism that is agreed upon by all agencies. The Federal Bureau of Investigation generally defines terrorism as:

> "the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives."

4.27.1 – Location and Extent

Kansas is home to a wide variety of criminal extremist groups. The Southern Poverty Law Center reported that in 2018 there were three active hate groups in Kansas: one neo-Nazi group, the National Socialist Movement in Lansing, one racist skinhead group, the Midland Hammerskins in Wichita, and one anti-homosexual group, the Westboro Baptist Church in Topeka. Other groups, such as the Animal Liberation Front, Earth Liberation Front, and People for the Ethical Treatment of Animals may have sympathizers in the region. Although no major terrorist acts have been attributed to any of these latter groups, their involvement in violent acts is meant to disrupt governmental functions and cannot be discounted.

4.27.2 – Previous Occurrences

Kansas Region I has been fortunate to escape a major terrorist incident.

4.27.3 – Hazard Probability Analysis

By nature, acts of terrorism are difficult to foresee. However, the probability of a major terrorist event in Kansas Region I is considered very low due the lack of any documented historical events. Again, it is worth noting that no previous occurrences in no way guarantees no future occurrences.

4.27.4 – Vulnerability Analysis

For purposes of this assessment, data is not available to quantify vulnerability or estimated losses as a result of terrorism incidents that might impact state-owned facilities.

For this assessment, it is not possible to calculate a specific vulnerability for each county or participating jurisdiction. However, because of the desire for publicity following attacks, it is more likely that counties and jurisdictions with greater population densities and /or larger evet venues have a greater risk.

It is difficult to quantify potential losses of terrorism due to the many variables and human elements and lack of historical precedence. Therefore, for the purposes of this plan, the loss estimates will take into account three hypothetical scenarios. The estimated impact of each event was calculated using the Electronic Mass Casualty Assessment and Planning Scenarios developed by Johns Hopkins University.

Please note that the hypothetical scenarios are included for illustrative purposes only.

Scenario #1: Mustard Gas Release

Event: Mustard gas is released from a light aircraft onto the stadium during a home football game. The agent directly contaminates the stadium and the immediate surrounding area. This attack would cause harm to humans and could render portions of the stadium unusable for a short time period in order to allow for a costly clean-up. There might also be a fear by the public of long-term contamination of the stadium and subsequent boycott of games resulting in a loss of revenue and tourism dollars.

Event Assumptions: For this scenario the number of people in the stadium is 50,000 with an additional 5,000 persons remain outside the stadium in the adjacent parking areas. The agent used, mustard gas, is extremely toxic and may damage eyes, skin and respiratory tract with death sometimes resulting from secondary respiratory infections. Death rate from exposure estimated to be 3%. The estimated decontamination cost is $12 person. For this scenario it is assumed that all persons with skin injuries will require decontamination.

Results: The following table presents the estimated human and economic impacts of the scenario.

Table 4.206: Estimated Impact of Scenario #1, Mustard Gas Release

Impact	Post Exposure Onset Time	Effect
Severe Eye Injuries (1-2 hours)	1 -2 Hours	41,250 persons
Severe Airway Injuries (1-2 hours)	1 - 2 Hours	41,250 persons
Severe Skin Injuries (2 hours to days)	2 Hours to Days	49,500 persons
Deaths	Immediate to Days	1,100 persons
Cost of Decontamination	N/A	$594,000

Source: Electronic Mass Casualty Assessment and Planning Scenarios by Johns Hopkins University

Scenario #2: Pneumonic Plague

Event: Four Canisters containing aerosolized pneumonic plague bacteria are opened in public bathrooms of heavily populated buildings (airports, stadiums, etc.). Each release location will directly infect 110 people; hence, the number of release locations dictates the initial infected population. The secondary infection rate is used to calculate the total infected population. This attack method would not cause damages to buildings or other infrastructure, only to human populations.

Event Assumptions: Each canister contains 650 milliliters of pneumonic plague bacteria. The type of infectious agent used is identified on Day 4. After identification, the fatality rate is 10% for new cases. Pneumonic plague has a 1-15 percent mortality rate in treated cases and a 40-60 percent mortality rate in untreated cases.

Results: The following table presents the estimated human impacts of the scenario.

Table 4.207: Estimated Impact of Scenario #2, Pneumonic Plague Release

Impact	Effect
Initial Infected Population	440 persons
Secondary Infected Population	883 persons
Deaths (7% of Infected)	62

Source: Electronic Mass Casualty Assessment and Planning Scenarios by Johns Hopkins University

Scenario #3: Improvised Explosive Device

Event: An improvised explosive device utilizing an ammonium nitrate/fuel oil mixture is carried in a panel van to a parking area during a time when stadium patrons are leaving their cars and entering the stadium and detonated. Potential losses with this type of scenario include both human and structural assets.

Event Assumptions: The quantity of ammonium nitrate/fuel oil mixture used is 4,000 pounds. The population density of the lot is assumed to be 1 person per every 25 square feet for a pre-game crowd. The Lethal Air Blast Range for such a vehicle is estimated to be 50 feet according to the Bureau of Alcohol, Tobacco, Firearms and Explosives Standards. The Falling Glass Hazard distance is estimated at 600 feet according to Bureau of Alcohol, Tobacco, Firearms and Explosives Explosive Standards. In this event, damage would occur to vehicles, and depending on the proximity of other structures, damages would occur to the stadium complex itself. The exact amount of these damages is difficult to predict because of the large numbers of factors, including the type of structures nearby and the amount of insurance held by vehicle owners. It is estimated that the average replacement cost for a vehicle is $20,000 and the average repair cost for damaged vehicles would be $4,000.

Results: The following table presents the estimated human impacts of the scenario.

Table 4.208: Estimated Impact of Scenario #3, Improvised Explosive Device

Impact	Effect
Deaths	1,391 persons
Trauma Injuries	2,438 persons
Urgent Care Injuries	11,935
Injuries not Requiring Hospitalization	4,467
Repair Costs for 100 Vehicles	$400,000
Replacement Costs for 50 Vehicles	$1,000,000

Source: Electronic Mass Casualty Assessment and Planning Scenarios by Johns Hopkins University

4.27.5 – Impact and Consequence Analysis

There is no consensus on estimates of potential fatalities and injuries for terrorism events. Injury and death tolls would be dependent on the type, size and weapon used. Areas with higher population densities would likely result in a greater number of casualties.

As per EMAP requirements, the following table provides the Consequence Analysis.

Table 4.209: Terrorism Consequence Analysis

Subject	Impacts of Terrorism
Health and Safety of Persons in the Area of the Incident	Impact could be severe for persons in the incident area.
Responders	Impact to responders could be severe if not trained and properly equipped. Responders that are properly trained and equipped will have a low to moderate impact.
Continuity of Operations	Depending on damage to facilities/personnel in the incident area, relocation may be necessary and lines of succession execution.
Property, Facilities, and Infrastructure	Impact within the incident area could be severe for explosion, moderate to low for Hazmat.
Environment	Localized impact within the incident area could be severe depending on the type of incident.
Economic Conditions	Economic conditions could be adversely affected and dependent upon time and length of clean up and investigation.
Public Confidence in Governance	Impact dependent on if the incident could have been avoided by government entities, clean-up, investigation times and outcomes.

4.28 – Utility/Infrastructure Failure

Critical infrastructure involves several different types of facilities and systems including:

- Electric power
- Transportation routes
- Natural gas and oil pipelines
- Water and sewer systems, storage networks
- Internet/telecommunications systems

Failure of utilities or infrastructure components in south-southwest Kansas can seriously impact public health, functioning of communities and the region's economy. Disruptions to utilities can occur from many of the hazards detailed in this plan, but the most likely causes include:

- Floods
- Lightning
- Tornados and Windstorms
- Winter Storms

In addition to being impacted by another listed hazard, utilities and infrastructure can fail as a result of faulty equipment, lack of maintenance, degradation over time, or accidental damage.

4.28.1 – Location and Extent

All of Kansas Region I is at risk for utility and/or infrastructure failure. The following sections discuss the major utilities in further detail.

Electric Power

The most common hazards analyzed in this plan that may disrupt the power supply are flood, lightning, tornado, windstorm, and winter weather. In addition, extreme heat can disrupt power supply when air conditioning use spikes during heat waves resulting in brownouts or rolling blackouts.

In general, electricity in Kansas Region I is provided by either investor-owned utilities or rural electric cooperatives (RECs). RECs are not-for-profit, member-owned electric utilities. Kansas RECs are governed by a board of trustees elected from the membership. Most Kansas RECs were set up under the Kansas Electric Cooperative Act, which, together with the federal Rural Electrification Act of 1934, made electric power available to rural customers. Information on regional electrical suppliers may be found at www.kec.org/servicearea_map.html. Additionally, locations of electric certified areas and transmission lines may be found at www.kcc.state.ks.us/maps/ks_electric_certified_areas.pdf.

Transportation Routes

Transportation routes can also be impacted by many of the hazards discussed in this plan. The primary hazards that impact transportation are flood, hazardous materials, and winter weather. Flood events can make roads and bridges impassible due to high water. Flood waters can also erode or scour roadbeds and bridge abutments. Highway and railroad accidents that involve hazardous materials can impact transportation routes through closures and/or evacuations. Winter weather frequently impacts transportation as roads become treacherous or impassible due to ice and snow. Other hazards that impact transportation routes include dam and levee failures if routes are in inundation areas, extreme temperatures that can cause damage to pavement, land subsidence that can damage roads/railroads, landslides that can cause debris and rock falls onto roadways, terrorism that can target routes, tornados that can directly damage infrastructure or deposit debris in routes, wildfires that can cause decreased visibility on transportation routes due to smoke, and windstorms that can cause vehicle accidents or overturning.

Pipelines Systems

Hazards that can impact natural gas and oil pipelines include earthquakes, expansive soils, land subsidence, landslide, and terrorism

Water and Sewer Systems

The primary hazards that can impact water supply systems include drought, floods, hazardous materials, and terrorism. Water district boundary maps are available for review at https://krwa.net/ONLINE-RESOURCES/RWD-Maps.

Internet and Telecommunications

Internet and telecommunications infrastructure can be impacted by floods, lightning, tornados, windstorms, and winter weather. Land line phone lines often utilize the same poles as electric lines, so when weather events such as windstorm or winter weather cause lines to break both electricity and telephone services may experience outages. With the increasing utilization of cellular phones, hazard events such as tornado that can damage cellular repeaters can cause outages. In addition, during any hazard event, internet and telecommunications systems can become overwhelmed due to the surge in call and usage volume. A map indicating telephone service providers in Kansas Region I is available at www.kcc.state.ks.us/maps /ks_telephone_certified_areas.pdf.

4.28.3 – Hazard Probability Analysis

Minor utility failures occur annually across the region, with larger failures usually tied to other disaster events such as tornados, winter storms and windstorms. As discussed throughout this plan, these concurrent events occur regularly. As such, it is expected that occasional, and largely concurrent utility failure events will occur.

4.28.4 – Vulnerability Assessment

Regionally, smaller utility suppliers generally have limited resources for mitigation. Thus, the large number of small utility service providers could mean greater vulnerability in the event of a major, widespread disaster, such as a major flood, severe winter storm or ice storm.

In recent years, regional electric power grid system failures in the western and east-central United States have demonstrated that similar failures could happen in Kansas Region I. This vulnerability is most appropriately addressed on a multi-state regional or national basis.

Since utility/infrastructure failure is generally a secondary or cascading impact of other hazards, it is not possible to quantify estimated potential losses specific to this hazard due to the variables associated with affected population, duration of outages, etc.

Although the limitless variables make it difficult to estimate future losses on a statewide basis, FEMA has developed standard loss of use estimates in conjunction with their Benefit-Cost Analysis methodologies to estimate the cost of lost utilities on a per-person, per-use basis.

Table 4.210: FEMA Benefit-Cost Analysis

Loss of Electric Power	Cost of Complete Loss of Service
Total Economic Impact	$131 per person per day
Loss of Potable Water Service	Cost of Complete Loss of Service
Total Economic Impact	$103 per person per day
Loss of Wastewater Service	Cost of Complete Loss of Service
Total Economic Impact	$45 per person per day
Loss of Road/Bridge Service	Cost of Complete Loss of Service
Vehicle Delay Detour Time	$29.63 per vehicle per hour (one-way trips)
Vehicle Delay Mileage	$0.54 per mile (or current federal mileage rate)

Source: FEMA BCA Reference Guide, June 2009, Appendix C

4.28.5 – Impact and Consequence Analysis

As per EMAP requirements, the following table provides the Consequence Analysis.

Table 4.211: Utility/Infrastructure Failure Consequence Analysis

Subject	Impacts of Utility/Infrastructure Failure
Health and Safety of Persons in the Area of the Incident	Localized impact will be moderate to severe for persons with special needs and the elderly, depending on length of failure and time of year.
Responders	Impact to responders will be minimal if properly trained and equipped.
Continuity of Operations	Due to the nature of the hazard, the COOP plan is not expected to be activated. however, if the recovery time is excessive than temporary relocation may become necessary.
Property, Facilities, and Infrastructure	Impact is dependent on the nature of the incident, e.g., electric, water, sewage, gas, communication disruptions.
Environment	Impact, depending on the nature of the incident, should be minimal.
Economic Conditions	Economic conditions could be adversely affected depending on damages suffered, extent of damages, etc.

Table 4.211: Utility/Infrastructure Failure Consequence Analysis

Subject	Impacts of Utility/Infrastructure Failure
Public Confidence in Governance	Impact will be dependent on whether or not the government or non-government entities response, recovery, and planning were not timely and effective.

5.0 Capability Assessment

5.1 – Introduction

44 CFR 201.6 does not require a capability assessment to be completed for local hazard mitigation plans. However, 201.6(c)(3) states "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 of the plan discusses the current capacity of regional communities to mitigate the effects of identified hazards. A capability assessment is conducted to determine the ability of a jurisdiction to execute a comprehensive mitigation strategy, and to identify potential opportunities for establishing or enhancing specific mitigation policies, programs or projects.

A capability assessment helps to determine which mitigation actions are practical based on a jurisdiction's fiscal, staffing and political resources. A capability assessment consists of:

- An inventory of relevant plans, ordinances, or programs already in place
- An analysis capacity to carry them out.

A thoughtful review of jurisdictional capabilities will assist in determining gaps that could limit current or proposed mitigation activities, or potentially aggravate a jurisdictions vulnerability to an identified hazard. Additionally, a capability assessment can detail current successful mitigation actions that should continue to receive support.

For this plan each participating jurisdiction was given an opportunity to present their capability assessment information.

5.2 – Granted Authority

In implementing a mitigation plan or specific action, a local jurisdiction may utilize any or all of the four broad types of government authority granted by the State of Kansas. The four types of authority are defined as:

- Regulation
- Acquisition
- Taxation
- Spending

Regulation

The scope of this local authority is subject to constraints, however, as all of Kansas' political subdivisions must not act without proper delegation from the State. Under a principle known as "Dillon's Rule," all power is vested in the State and can only be exercised by local governments to the extent it is delegated.

Acquisition

The power of acquisition can be a useful tool for pursuing local mitigation goals. Local governments may find the most effective method for completely "hazard-proofing" a particular piece of property or area is to acquire the property, thus removing the property from the private market and eliminating or reducing the possibility of inappropriate development occurring. Kansas legislation empowers cities, towns, counties to acquire property for public purpose by gift, grant, devise, bequest, exchange, purchase, lease or eminent domain (County Home Rule Powers, K.S.A. 19-101, 19-101a, 19-212).

Taxation

The power to levy taxes and special assessments is an important tool delegated to local governments by Kansas law. The power of taxation extends beyond merely the collection of revenue, and can have a profound impact on the pattern of development in the community. Communities have the power to set preferential tax rates for areas which are more suitable for development in order to discourage development in otherwise hazardous areas. Local units of government also have the authority to levy special assessments on property owners for all or part of the costs of acquiring, constructing, reconstructing, extending or otherwise building or improving flood control within a designated area. This can serve to increase the cost of building in such areas, thereby discouraging development. Because the usual methods of apportionment seem mechanical and arbitrary, and because the tax burden on a particular piece of property is often quite large, the major constraint in using special assessments is political. Special assessments seem to offer little in terms of control over land use in developing areas. They can, however, be used to finance the provision of necessary services within municipal or county boundaries. In addition, they are useful in distributing to the new property owners the costs of the infrastructure required by new development.

Spending

The Kansas General Assembly allocated the ability to local governments to make expenditures in the public interest. Hazard mitigation principles can be made a routine part of all spending decisions made by the local government, including the adoption of annual budgets and a Capital Improvement Plan. A Capital Improvement Plan is a schedule for the provision of municipal or county services over a specified period of time. Capital programming, by itself, can be used as a growth management technique, with a view to hazard mitigation. By tentatively committing itself to a timetable for the provision of capital to extend services, a community can control growth to some extent. In addition to formulating a timetable for the provision of services, a local community can regulate the extension of and access to services. A Capital Improvement Plan that is coordinated with extension and access policies can provide a significant degree of control over the location and timing of growth. These tools can also influence the cost of growth. If the Capital Improvement Plan is effective in directing growth away from environmentally sensitive or high hazard areas.

5.3 – Governance

All counties within Kansas Region I operate under a county commissioner form of governance, with the elected board of commissioners overseeing county operations.

Table 5.1: County Governance

Jurisdiction	Government Structure	Number of Commissioners
Chase County	Commission	3
Geary County	Commission	3
Lyon County	Commission	3
Morris County	Commission	3
Pottawatomie County	Commission	3
Riley County	Commission	3
Wabaunsee County	Commission	3

In general, the participating towns and cities in Kansas Region I operate either under a Mayoral form of governance or an elected city council form of governance.

5.4 – Jurisdictional Capabilities

Information as to the current capacity of participating jurisdictions is summarized in the following sections and tables. All capability information was provided by jurisdictional officials through the above referenced questions and through outreach from the MPC.

The ability of a local government to develop and implement mitigation projects, policies, and programs is directly tied to its ability to direct staff time and resources for that purpose. Administrative capability can be evaluated by determining how mitigation-related activities are assigned to local departments and if there are adequate personnel resources to complete these activities. The degree of intergovernmental coordination among departments will also affect administrative capability for the implementation and success of proposed mitigation activities.

Many smaller jurisdictions have very limited to no planning, management, response or mitigation capabilities. Often these jurisdictions rely on the county or nearby larger municipalities for assistance. This lack of capabilities is reflected in the following tables. Additionally, many very small or extremely limited participating small jurisdictions, largely townships, are not listed on the capability list. This in no way diminishes the participation in the process of these jurisdictions. Finally, special district capabilities are included in their overarching jurisdiction.

5.4.1 – Planning Capabilities

The planning capability assessment is designed to provide a general overview of the key planning and regulatory tools or programs in place or under development. This information helps identify opportunities to address existing planning gaps and provides an opportunity to review areas that mitigation planning actions can be utilized with existing plans. Jurisdictions were asked if they had completed the following:

Comprehensive Plan: A comprehensive plan establishes the overall vision for a jurisdiction and serves as a guide to decision making, and generally contains information on demographics, land use, transportation, and facilities. As a comprehensive plan is broad in scope the integration of hazard mitigation measures can enhance the likelihood of achieving risk reduction goals.

Critical Facilities Plan: A critical facilities plan is used to identify a jurisdiction's critical facilities, including fire stations, police stations, hospitals, schools, day care centers, senior care facilities, major roads and bridges, critical utility sites, and hazardous material storage areas. Additionally, this plan may be used to determine methods to mitigate damage to these facilities.

Debris Management Plan: A debris management plan covers the response and recovery from debris-causing incidents such as tornados or floods. Planning considerations include debris removal and disposal, disposal locations, equipment availability, and personnel training.

Emergency Operations Plan: An emergency operations plan outlines responsibility, means and methods by which resources are deployed during and following an emergency or disaster.

Evacuation Plan: A plan that outlines routes and methods by which populations are evacuated during and following an emergency or disaster.

Fire Mitigation Plan: A fire mitigation plan is used to mitigate a jurisdictions wildfire risk and vulnerability. The plan documents areas with an elevated risk of wildfires, and identifies the actions taken to decrease the risk. A fire mitigaion plan can influence and prioritize future funding for hazardous fuel reduction projects, including where and how federal agencies implement fuel reduction projects on federal lands.

Flood Mitigation Assistance Plan: The purpose of the flood mitigation assistance plan is to reduce or eliminate the long-term risk of flood damage to buildings and other structures insured under the NFIP.

Recovery Plan: A disaster recovery plan guides the recovery and reconstruction process following a disaster. Hazard mitigation principles should be incorporated into disaster recovery plans to assist in breaking the cycle of disaster loss.

Vulnerable Population Plan and/or Inventory: A vulnerable populations plan is used to develop a strategic approach for support to persons with functional or special needs before, during and following a disaster.

The table below summarizes relevant jurisdictional planning capabilities.

Table 5.2: Jurisdictional Planning Capabilities

Jurisdiction	Comprehensive Plan	Critical Facilities Plan	Debris Management Plan	Emergency Operations Plan	Evacuation Plan	Firewise or other Fire Mitigation Plan	Flood Mitigation Assistance Plan	Recovery Plan	Vulnerable Population Plan and/or Inventory
Chase County				x					
Cedar Point									
Cottonwood Falls									
Elmdale									
Matfield Green									
Strong City				x				x	
Geary County	x	x		x					
Grandview Plaza				x					
Junction City	x		x	x					
Milford	x			x					
Lyon County	x	x	x	x				x	
Admire			x						
Allen			x						
Americus			x	x					
Bushong			x						
Emporia	x	x	x	x			x	x	
Hartford			x						
Neosho Rapids			x						
Olpe			x						
Reading			x						
Morris County		x	x	x					
Council Grove				x			x		
Dunlap									
Dwight									
Latimer									
Parkerville									
White City									
Wilsey									
Pottawatomie County	x	x	x	x					
Belvue									
Emmett									
Havensville									

Table 5.2: Jurisdictional Planning Capabilities

Jurisdiction	Comprehensive Plan	Critical Facilities Plan	Debris Management Plan	Emergency Operations Plan	Evacuation Plan	Firewise or other Fire Mitigation Plan	Flood Mitigation Assistance Plan	Recovery Plan	Vulnerable Population Plan and/or Inventory
Louisville									
Olsburg				x					
Onaga		x		x			x		
St. George									
St Mary's				x					
Wamego	x		x	x					
Westmoreland	x			x					
Wheaton									
Riley County	x	x	x	x		x		x	
Leonardville				x					
Manhattan	x	x	x	x					
Ogden	x		x	x					
Randolph				x					
Riley	x			x					
Wabaunsee County	x			x					
Alma									
Alta Vista									
Eskridge									
Harveyville		x		x	x				
Maple Hill				x					
McFarland									
Paxico									

5.4.2 – Policies and Ordinances

Participating jurisdictions were asked if the following policies and ordinances and plans were established and enforced:

Building Code: Many structural mitigation measures involve constructing and retrofitting homes, businesses and other structures according to standards designed to make the buildings more resilient to the impacts of natural hazards. Many of these standards are imposed through the building code.

Floodplain Ordinance: In general, floodplain ordinances are used to:

- Minimize the extent of floods by preventing obstructions that inhibit water flow and increase flood height and damage.
- Prevent and minimize loss of life, injuries, and property damage in flood hazard areas.
- Promote the public health, safety and welfare of citizens in flood hazard areas.

Floodplain ordinances may allow jurisdictions to:

- Manage planned growth
- Adopt local ordinances to regulate uses in flood hazard areas
- Enforce those ordinances
- Grant permits for use in flood hazard areas that are consistent with the ordinance

These ordinances can also help ensure meeting the minimum requirements of participation in the NFIP. The incentive for local governments adopting such ordinances is that they will afford their residents the ability to purchase flood insurance through the NFIP.

Stormwater Ordinance: The purpose of a stormwater ordinance is to protect the quality and quantity of local, regional and state waters from the potential harm of unmanaged stormwater. Stormwater ordinances include protection from activities that result in the degradation of properties, water quality, stream channels, and other natural resources.

Nuisance Ordinance: Local governments may use their ordinance-making power to abate "nuisances," which could include, by local definition, any activity or condition making people or property more vulnerable to any hazard.

Zoning: Zoning is the traditional and most common tool available to local jurisdictions to control the use of land. Zoning is used to promote health, safety, and the general welfare of the community. Zoning is used to dictate the type of land use and to set minimum specifications for use such as lot size, building height and setbacks, and density of population. Local governments are authorized to divide their jurisdiction into districts, and to regulate and restrict the erection, construction, reconstruction, alteration, repair or use of buildings, structures, or land within those districts. Districts may include general use districts, overlay districts, special use districts or conditional use districts. Zoning ordinances consist of maps and written text.

The table below summarizes relevant jurisdictional policies and ordinances.

Table 5.3: Jurisdictional Policies and Ordinances

Jurisdiction	Building Code	Floodplain Ordinance	Nuisance Ordinance	Storm Water Ordinance	Zoning Ordinance
Chase County		x			
Cedar Point		x	x		
Cottonwood Falls		x	x		x
Elmdale		x	x		

Table 5.3: Jurisdictional Policies and Ordinances

Jurisdiction	Building Code	Floodplain Ordinance	Nuisance Ordinance	Storm Water Ordinance	Zoning Ordinance
Matfield Green			x		
Strong City		x	x		x
Geary County	x	x	x		x
Grandview Plaza	x	x	x		x
Junction City	x	x	x	x	x
Milford	x		x		x
Lyon County		x	x		x
Admire		x	x		x
Allen		x	x		x
Americus	x	x	x	x	x
Bushong			x		x
Emporia	x	x	x	x	x
Hartford		x	x		
Neosho Rapids		x	x		x
Olpe	x		x		x
Reading			x		x
Morris County					
Council Grove	x	x	x	x	x
Dunlap			x		
Dwight		x	x		
Latimer			x		
Parkerville			x		
White City			x		
Wilsey		x	x		
Pottawatomie County		x	x	x	x
Belvue	x	x	x		x
Emmett			x		x
Havensville		x	x		
Louisville			x		
Olsburg			x		x
Onaga	x	x	x		x
St. George		x	x		x
St Mary's		x	x		x
Wamego	x	x	x	x	x
Westmoreland			x		x
Wheaton			x		
Riley County	x	x	x	x	x
Leonardville	x		x		x

Table 5.3: Jurisdictional Policies and Ordinances

Jurisdiction	Building Code	Floodplain Ordinance	Nuisance Ordinance	Storm Water Ordinance	Zoning Ordinance
Manhattan	x	x	x	x	x
Ogden	x	x	x		x
Randolph					
Riley	x	x	x		x
Wabaunsee County		x			x
Alma		x			x
Alta Vista			x		x
Eskridge		x	x		x
Harveyville	x	x	x		x
Maple Hill		x			
McFarland		x	x		
Paxico		x	x		

5.4.3 – Programs

This part of the capability's assessment includes the identification and evaluation of existing programs for each participating jurisdiction:

Community Rating System program under the National Flood Insurance Program: The NFIP's Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. Participants are offered flood insurance premium rates at a discount to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS. These goals are the reduction of flood damage to insurable property, the strengthening and support of insurance aspects of the NFIP, and the encouragement of a comprehensive approach to floodplain management.

Firewise Community Certification: The Firewise Communities Program encourages local solutions for safety by involving homeowners in taking individual responsibility for preparing their homes from the risk of wildfire. Firewise is a key component of Fire Adapted Communities, a collaborative approach that connects all those who play a role in wildfire education, planning and action with comprehensive resources to help reduce risk. The program is co-sponsored by the USDA Forest Service, the US Department of the Interior, and the National Association of State Foresters.

ISO Fire Rating: This assessment also includes the identification and evaluation of existing ISO fire ratings. The Fire Suppression Rating Schedule is a manual containing the criteria ISO uses in reviewing the fire prevention and fire suppression capabilities of individual communities or fire

protection areas. The schedule measures the major elements of a community's fire protection system and develops a numerical grading called a Public Protection Classification.

National Flood Insurance Program: In 1968, Congress created the NFIP to help provide a means for property owners to financially protect themselves. The NFIP offers flood insurance to homeowners, renters, and business owners if their community participates in the NFIP. Participating communities agree to adopt and enforce ordinances that meet or exceed FEMA requirements to reduce the risk of flooding.

***National Weather Service StormReady Program*:** StormReady uses a grassroots approach to help communities develop plans to handle all types of severe weather. The program encourages communities to take a new, proactive approach to improving local hazardous weather operations by providing emergency managers with clear-cut guidelines on how to improve their hazardous weather operations

The table below summarizes relevant local programs.

Table 5.4: Jurisdictional Programs

Jurisdiction	Community Rating System program	Firewise Community Certification	ISO Fire Rating	National Flood Insurance Program	National Weather Service Storm Ready Certification
Chase County				x	
Cedar Point				x	
Cottonwood Falls				x	
Elmdale				x	
Matfield Green					
Strong City			6	x	
Geary County			9	x	x
Grandview Plaza			7	x	
Junction City			3	x	x
Milford			5		
Lyon County			x	x	x
Admire			x	x	
Allen			x	x	
Americus			6	x	
Bushong			x		
Emporia			x	x	
Hartford			x	x	
Neosho Rapids			x	x	
Olpe			x		

Table 5.4: Jurisdictional Programs

Jurisdiction	Community Rating System program	Firewise Community Certification	ISO Fire Rating	National Flood Insurance Program	National Weather Service Storm Ready Certification
Reading			x		
Morris County					
Council Grove			5	x	
Dunlap					
Dwight				x	
Latimer					
Parkerville					
White City			8		
Wilsey				x	
Pottawatomie County				x	
Belvue			7	x	
Emmett			x		
Havensville			7	x	
Louisville			x		
Olsburg			7		
Onaga			x	x	
St. George			x	x	
St Mary's			x	x	
Wamego		x	4	x	x
Westmoreland			x		
Wheaton			x		
Riley County		x	9	x	x
Leonardville			7		
Manhattan			9	x	x
Ogden			7	x	x
Randolph					
Riley			6	x	
Wabaunsee County				x	
Alma				x	
Alta Vista					
Eskridge				x	
Harveyville				x	
Maple Hill			7	x	
McFarland				x	
Paxico				x	

In addition, participating jurisdictions operate with mutual aid agreements. These are understandings among localities to lend assistance across jurisdictional boundaries. Mutual aid may be requested only when an emergency occurs that exceeds local resources.

5.4.4 – Staffing and Departmental Capabilities

A comprehensive mitigation program relies on many skilled professionals. These professionals include:

- Planners
- Emergency managers
- Floodplain managers
- GIS personnel

While exact responsibilities differ from jurisdiction to jurisdiction, the general duties of applicable departments are described below:

Building Official: Building officials are generally the jurisdictional administrator of building and construction codes, engineering calculation supervision, permits, facilities management, and accepted construction procedures. They may also inspect structures to ensure compliance with the plans and to check workmanship as well as code compliance.

Emergency Management Coordinator: The Emergency Management office is responsible for the mitigation, preparedness, response and recovery operations that deal with both natural and man-made disaster events. The formation of an emergency management department in each county is mandated under Kansas General Statutes.

Local Emergency Planning Committee: Local Emergency Planning Committees are generally housed at the county or municipal level. They do not function in actual emergency situations, but attempt to identify and catalogue potential hazards, identify available resources, mitigate hazards when feasible, and write emergency plans. The role of the LEPC is to anticipate and plan the initial response for foreseeable disasters in their jurisdiction.

Mapping Specialist: A geographic information system (GIS) is a system designed to capture, store, manipulate, analyze, manage, and present all types of geographical data. A GIS mapping specialist uses this data to create county maps, including flood plain, fire hazard, drought and other mitigation maps.

NFIP Floodplain Administrator: The NFIP floodplain administrator ensures a jurisdiction is meeting the minimum requirements of participation in the NFIP, and often is tasked with applying for funding or grants.

Planning Department: A planning department usually provides management and oversight of development through the application of codes, ordinances, building regulations and public input.

Public Works Official: Public works officials usually provide management and oversight of infrastructure projects such as public buildings (municipal buildings, schools, hospitals), transport infrastructure (roads, railroads, bridges, pipelines, airports), public spaces (public squares, parks), public services (water supply, sewage, electrical grid, dams), and other physical assets and facilities.

The table below summarizes relevant local staffing and departmental capabilities.

Table 5.5: Staffing and Departmental Capabilities

Jurisdiction	Building Code Official or Inspector	Emergency Management Coordinator	Local Emergency Planning Committee	Mapping Specialist	NFIP Floodplain Administrator	Planning Department	Public Works Official
Chase County		x	x		x		x
Cedar Point					x		x
Cottonwood Falls					x		x
Elmdale					x		x
Matfield Green							x
Strong City					x		x
Geary County	x	x	x	x	x	x	x
Grandview Plaza	x				x	x	x
Junction City	x			x	x	x	x
Milford	x						x
Lyon County		x	x	x	x		x
Admire					x		x
Allen					x		x
Americus	x				x		x
Bushong							x
Emporia	x			x	x		x
Hartford					x		x
Neosho Rapids					x		x
Olpe							x
Reading							x
Morris County		x	x			x	x
Council Grove	x				x	x	x
Dunlap							x
Dwight					x		x
Latimer							x
Parkerville							x
White City							x
Wilsey					x		x
Pottawatomie County		x	x	x	x	x	x
Belvue					x		x

Table 5.5: Staffing and Departmental Capabilities

Jurisdiction	Building Code Official or Inspector	Emergency Management Coordinator	Local Emergency Planning Committee	Mapping Specialist	NFIP Floodplain Administrator	Planning Department	Public Works Official
Emmett							x
Havensville					x		x
Louisville							x
Olsburg	x						x
Onaga					x		x
St. George					x		x
St Mary's					x		x
Wamego	x				x	x	x
Westmoreland	x						x
Wheaton							x
Riley County	x	x	x	x	x	x	x
Leonardville	x						x
Manhattan	x	x		x	x	x	x
Ogden	x			x	x	x	x
Randolph							x
Riley	x				x		x
Wabaunsee County	x	x	x		x		x
Alma					x		x
Alta Vista							x
Eskridge					x		x
Harveyville	x		x		x	x	x
Maple Hill					x		x
McFarland					x		x
Paxico					x		x

5.4.5 – Non-Governmental Organizations Capabilities

Non-Governmental Organizations (NGOs) are legally constituted corporations that operate independently from any form of government and are not conventional for-profit businesses. In the cases in which NGOs are funded totally or partially by a government agency, the NGO maintains its non-governmental status by excluding government representatives from membership in the organization. The following is a brief discussion of both the American Red Cross and the Salvation Army, both of which provide regional operations and coverage.

American Red Cross: The American Red Cross is a humanitarian organization that provides emergency assistance, disaster relief and education. In addition, they offers services in five other areas: community services that help the needy; communications services and comfort for military members and their family members; the collection, processing and distribution of blood and blood products; educational programs on preparedness, health, and safety; and international relief and development programs.

Salvation Army: The Salvation Army is a Christian denomination and international charitable organization. In addition to being among the first to arrive with help after natural or man-made disasters, the Salvation Army runs charity shops and operates shelters for the homeless.

5.4.6 – Fiscal Capabilities

In general, the jurisdictions of the Kansas Region I receive the majority of their revenue through state and local sales tax and federal and state pass through dollars. Based on available revenue information, and given that both the state and counties are experiencing budget deficits, funding for mitigation programs and disaster response is at a premium. Adding to the budget crunch is the increased reliance on local accountability by the federal government.

The following provide brief definitions of applicable fiscal programs:

Application and Management of Grant Funding: The jurisdiction has the staffing and capabilities to apply for grant funding and oversee all necessary provisions of the funding.

Authority to Levy Taxes: The authority to levy taxes would allow the jurisdiction to tax its population base.

Authority to Withhold Spending in Hazard Prone Areas: The ability of a jurisdiction to not provide funding for activities or actions in an area that is known to be prone to specific hazards.

Incur Debt through General Obligation Bonds: General obligation bonds are issued with the belief that a municipality will be able to repay its debt obligation through taxation or revenue from projects. General obligation bonds can be used to generate funds for mitigation projects.

Usage of Capital Improvement Funding for Mitigation Projects: Capital improvement allows for spending on identified capital projects and for equipment purchases, in this context related to mitigation projects.

The following table highlights each jurisdiction's fiscal capabilities.

Table 5.6: Jurisdictional Fiscal Capabilities

Jurisdiction	Apply for and Manage Grant Funding	Authority to levy taxes for specific purposes	Authority to Withhold spending in hazard prone areas	Incur Debt through General Obligation Bonds	Usage of Capital Improvement Funding for Mitigation Projects
Chase County	x	x		x	x
Cedar Point	x	x		x	x
Cottonwood Falls	x	x		x	x
Elmdale	x	x		x	x
Matfield Green	x	x		x	x
Strong City	x	x	x	x	x
Geary County	x	x		x	x
Grandview Plaza	x	x		x	x
Junction City	x	x		x	x
Milford	x	x		x	x
Lyon County	x	x		x	x
Admire	x	x		x	x
Allen	x	x		x	x
Americus	x	x		x	x
Bushong	x	x		x	x
Emporia	x	x		x	x
Hartford	x	x		x	x
Neosho Rapids	x	x		x	x
Olpe	x	x		x	x
Reading	x	x		x	x
Morris County	x	x		x	x
Council Grove	x	x		x	x
Dunlap	x	x		x	x
Dwight	x	x		x	x
Latimer	x	x		x	x
Parkerville	x	x		x	x
White City	x	x		x	x
Wilsey	x	x		x	x
Pottawatomie County	x	x		x	x
Belvue	x	x		x	x
Emmett	x	x		x	x
Havensville	x	x		x	x
Louisville	x	x		x	x
Olsburg	x	x		x	x
Onaga	x	x		x	x

Table 5.6: Jurisdictional Fiscal Capabilities

Jurisdiction	Apply for and Manage Grant Funding	Authority to levy taxes for specific purposes	Authority to Withhold spending in hazard prone areas	Incur Debt through General Obligation Bonds	Usage of Capital Improvement Funding for Mitigation Projects
St. George	x	x		x	x
St Mary's	x	x		x	x
Wamego	x	x		x	x
Westmoreland	x	x		x	x
Wheaton	x	x		x	x
Riley County	x	x	x	x	x
Leonardville	x	x		x	x
Manhattan	x	x	x	x	x
Ogden	x	x		x	x
Randolph	x	x		x	x
Riley	x	x		x	x
Wabaunsee County	x	x		x	x
Alma	x	x	x	x	x
Alta Vista	x	x	x		
Eskridge	x	x		x	x
Harveyville	x	x	x	x	x
Maple Hill	x	x		x	x
McFarland	x	x		x	x
Paxico	x	x		x	x

5.4.7 – School Capability Assessment

Participating school districts were provided with a different set of questions that participating governmental jurisdictions. These questions were asked to ascertain the level of preparedness of the institution.

The following provides brief definitions of terms used in the capability assessment of schools. Please note that some definitions have been provided in previous sections.

Access to Local, Regional and State Funds: The ability to use local, regional and state funding on school activities and improvements.

Active Shooter Plan: An active shooter plan outlines responsibility, means and methods by which resources are deployed during an active shooter scenario.

Capital Improvement Plan: A capital improvement plan guides scheduling of, and spending on, school improvements. A capital improvement plan can guide future development away from identified hazard areas, an incorporate identified mitigation strategies.

District Master Plan: A master plan establishes the overall vision and serves as a guide to decision making. A master plan generally contains information on demographics, land use, transportation, and facilities. As a master plan is broad in scope the integration of hazard mitigation measures can enhance the likelihood of achieving risk reduction goals.

Emergency Operations Plan/Evacuation Plan: An emergency operations plan outlines responsibility, means and methods by which resources are deployed during and following an emergency or disaster. Often included in these plans are detailed evacuation procedures and policies.

Incur Debt through General Obligation Bonds: General obligation bonds are issued with the belief that an entity will be able to repay its debt obligation through taxation or revenue from projects. General obligation bonds can be used to generate funds for mitigation projects.

School Safety or Resource Officer: A person with overall responsibility for safety of the school, students and staff.

Information as to the current capacity of participating schools, colleges and universities is summarized in the following table.

Table 5.7: College, Unified School District or University Capabilities

Jurisdiction	Access to Local, Regional and State funds	Active Shooter Plan or Policy	Capital Improvement Plan	District Master Plan	School Emergency and Evacuation Plans	School Safety or Resource Officers or Dedicated Law Enforcement
Chase County						
USD #284 – Chase County	x	x	x	x	x	
Geary County						
Cloud County Community College	x	x			x	
USD #475 – Geary County	x	x			x	
Lyon County						
Emporia State University	x	x	x		x	x
Flint Hills Technical College	x	x	x		x	x
USD #251 – North Lyon County	x	x			x	
USD #252 – Southern Lyon County	x	x			x	
USD #253 - Emporia	x	x			x	

Table 5.7: College, Unified School District or University Capabilities

Jurisdiction	Access to Local, Regional and State funds	Active Shooter Plan or Policy	Capital Improvement Plan	District Master Plan	School Emergency and Evacuation Plans	School Safety or Resource Officers or Dedicated Law Enforcement
Morris County						
USD #417 – Morris County	x	x			x	
USD #481 – Rural Vista	x	x			x	
Pottawatomie County						
USD #320 – Wamego	x	x			x	
USD #321 – Kaw Valley	x	x			x	
USD #322 – Onaga / Havensville / Wheaton	x	x			x	
USD #323 – Rock Creek	x	x			x	
USD #384 – Blue Valley	x	x			x	
Riley County						
Kansas State University	x	x	x		x	x
USD #378 – Riley County	x	x			x	
USD #383 – Manhattan / Ogden	x	x			x	
USD #384 – Blue Valley	x	x			x	
Wabaunsee County						
USD #329 – Mill Creek Valley	x	x			x	
USD #330 – Mission Valley	x	x			x	

Additionally, under K.S.A. 72-5457 (General Provisions for the Issuance of Bonds), all Kansas USDs may issue general obligation bonds to:

- Purchase or improve any site or sites necessary for school district purposes including housing and boarding pupils enrolled in an area vocational school
- Acquire, construct, equip, furnish, repair, remodel or make additions to buildings including housing and boarding pupils enrolled in an area vocational school operated under the board of education of a school district

5.5 – Opportunities for Capability Improvement

As part of this plan update, the MPC identified the following opportunities for improvement across the region concerning current capabilities:

- **Local Funding**

- Integration of mitigation plans with other local plans and programs, such as capital improvement plans
- Adoption of cost-effective mitigation measures when developing capital improvement projects

- **Public Education and Outreach**
  - Regular deployment of hazard awareness campaigns to enhance public awareness

- **Land Use Planning and Regulations**
  - Continued encouragement of using land use planning to identify areas at risk to natural hazards
  - Stormwater retention/detention projects to reduce flooding
  - Locally funded buyouts of hazard prone properties

.

- **Floodplain Management**
  - Encourage and support new participation in the NFIP and in the CRS
  - Continue the promotion and enforcement of NFIP and CRS floodplain management programs

6.0 Mitigation Strategy

6.1 – Introduction

As part of this planning effort, Kansas Region I and its participating jurisdictions worked to minimize the risk of future impacts from identified hazards to all citizens. In an attempt to shape future regulations, ordinances and policy decisions, the MPC reviewed and developed a hazard mitigation strategy. This comprehensive strategy includes:

- The consistent review and revision, as necessary, of obtainable goals and objectives
- The consistent review, revision, and development of a comprehensive list of potential hazard mitigation actions

The development of a robust mitigation strategy allows for:

- The ability to effectively direct limited resources for maximum benefit
- The ability to prioritize identified hazard mitigation projects to maximize positive outcomes
- The increase in public and private level participation in hazard mitigation through transparency and awareness
- The potential direction of future policy decisions through awareness and education
- The achievement of the ultimate goal of a safer Region Ior all our citizens

Considering the factors listed above, the MPC continues to implement the following mitigation strategy:

- **Implement** the recommendations of this plan.
- **Utilize** existing regulations, policies, programs, procedures, and plans already in place.
- **Share** information on Funding opportunities.
- **Communicate** the information contained in this plan so all jurisdictions and citizens have a clearer understanding of the hazards facing the region and what can be done to mitigate their impacts.
- **Publicize** the success stories that have been achieved through the region's ongoing mitigation efforts.

6.2 – Emergency Management Accreditation Program Integration

As per requirements, in identifying and reviewing mitigation actions the following activities recommended by the EMAP were considered:

- The use of applicable building construction standards
- Hazard avoidance through appropriate land-use practices
- Relocation, retrofitting, or removal of structures at risk
- Removal or elimination of the hazard
- Reduction or limitation of the amount or size of the hazard
- Segregation of the hazard from that which is to be protected
- Modification of the basic characteristics of the hazard
- Control of the rate of release of the hazard
- Provision of protective systems or equipment for both cyber and physical risks

- Establishment of hazard warning and communication procedures
- Redundancy or duplication of essential personnel, critical systems, equipment, and information materials.

6.3 – Problem Statements

Based on the regionally identified hazards, problem statements have been developed to detail identified major concerns that can potentially be addressed through proposed mitigation actions. Problems statements were developed using the following inputs:

- Identify a key point of concern
- Is the problem getting worse, better, or staying the same?
- What are the identified or potential impacts?

The following table present regional problem statements to be utilized in informing the review, modification, and development of hazard mitigation actions.

Table 6.1: Kansas Region I Problem Statements

Identified Hazard	Problem Statement
Tornado/Windstorm	The number of community shelters is inadequate to protect all populations, especially in smaller communities

County specific problem statements were generated through discussions with participating jurisdictions within that county, to be utilized in informing the review, modification and development of hazard mitigation actions. Additionally, problem statements from the public survey are incorporated to provide a community wide view. Problems statements were developed using the following inputs:

- Location
- Identified hazard
- Key point of concern

The following table present problem statements for each county

Table 6.2: Kansas Region I Community Problem Statements

Jurisdiction	Identified Hazard	Problem Statement
Chase County	All Hazards	Areas of county are underserved by warning sirens.
Chase County	Utility Failure	Tree damage and downed limbs may cause loss of utilities.
Chase County	Utility Failure	County does not have an adequate number of generators for critical facilities.
Geary County	All Hazards	Public outreach initiatives need to be expanded concerning hazard mitigation.
Geary County	Wildfire	Equipment shortfalls may hamper fire response efforts.
Lyon County	Flood	Repeat flood areas are of concern to the county.
Lyon County	Wildfire	Mapping of wildfire areas in the county needs to be expanded.

Table 6.2: Kansas Region I Community Problem Statements

Jurisdiction	Identified Hazard	Problem Statement
Morris County	All Hazards	Public outreach initiatives need to be expanded concerning hazard mitigation.
Pottawatomie County	All Hazards	Public outreach initiatives need to be expanded concerning hazard mitigation.
Pottawatomie County	Utility Failure	County does not have an adequate number of generators for critical facilities.
Pottawatomie County	All Hazards	Areas of county are underserved by warning sirens.
Riley County	All Hazards	Public outreach initiatives need to be expanded concerning hazard mitigation.
Riley County	Flood	Repeat flood areas are of concern to the county.
Wabaunsee County	All Hazards	County does not have an adequate number of generators for critical facilities.
Wabaunsee County	All Hazards	Public outreach initiatives need to be expanded concerning hazard mitigation.

6.4 – Identification of Goals

44 CFR 201.6 (c)(3)(i) A description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

Through thorough discussions at stakeholder meetings, the MPC determined that the four previously identified primary hazard mitigation goals remained relevant and applicable. This was because the priorities of Kansas Region I in relation to hazard mitigation planning have not changed during the five-year planning cycle. These goals were reviewed through a well-established consideration process, instituted by the MPC during previous plan updates, which consisted of:

- A review of previously identified hazard mitigation goals
- A review of demographic and built environment data
- A review of identified hazards, hazard events, and vulnerabilities
- A review all identified hazard mitigation actions

The following goals represent the Kansas Region I vision for hazard mitigation and disaster resilience.

- **Goal 1:** Reduce or eliminate risk to the people and property of Kansas Region I from the impacts of the identified hazards in this plan.
- **Goal 2:** Strive to protect all vulnerable populations, structures, and critical facilities in Kansas Region I from the impacts of the identified hazards.
- **Goal 3:** Improve public outreach initiatives to include education, awareness and partnerships with all entities in order to enhance understanding of the risk Kansas Region I faces due to the impacts of the identified hazards.

- **Goal 4:** Enhance communication and coordination among all agencies and between agencies and the public.

6.5 – Completed Mitigation Actions

Sine the completion of the previous HMP, each jurisdiction has been tracking the completion status of all identified hazard mitigation actions. Each of the following completed actions should be viewed as a testament to the effectiveness of the HMP and a positive step in creating safer and more resilient communities.

Table 6.3: Region I Participating Jurisdictions Completed Hazard Mitigation Actions

Jurisdiction	Action Description
None	

Kansas Region I remains committed to investigating and obtaining all available grant funding for the completion of hazard mitigation projects.

6.6 – Review and Addition of Mitigation Actions

For this plan update, members of the MPC and participating jurisdictions were asked to complete a thorough review of all not completed mitigation actions. Additionally, MPC members and participating jurisdictions were provided with the opportunity to identify and incorporate newly identified actions based on:

- Hazard events that have occurred since the last plan revision
- Updated risk assessments
- Identified goals and objectives
- Changing local capabilities
- New vulnerabilities.

In identifying new, or reviewing existing mitigation actions, the following general categories were considered:

Local Plans and Regulations: Actions that influence the way land and buildings are developed or constructed. Actions may include:

- Revision or institution planning and zoning ordinances
- Revision or institution of building codes
- Open space preservation
- Revision or institution floodplain regulations
- Revision or institution stormwater management regulations
- Drainage system maintenance
- Requirements for riverine setbacks

Structure and Infrastructure Projects: Actions that involve the modification of existing structures to protect, or remove from, a hazard or hazard area., such as:

- Acquisition of hazard prone properties
- Relocation of hazard prone properties
- Revision or institution of building elevation requirements
- Critical facilities protection
- Installation or retrofitting of community safe rooms
- Requiring insurance
- Installation or update of warning systems

Natural Systems Protection: Actions that minimize hazard losses to natural systems. Actions may include:

- Mandatory floodplain area protection
- Revision or institution of comprehensive watershed management programs
- Requirements for riparian buffers
- Requirements for forest and shrub management
- Revision or institution of erosion and sediment control
- Wetland preservation and restoration
- Slope stabilization programs

Education and Awareness Programs: Actions to inform and educate about potential hazards and actions to mitigate against them. Actions may include:

- Educational outreach programs
- Speaker and/ or demonstration events
- Notifying citizens on where to get information
- School educational and event programs

Each action was reviewed using the following metrics, asking if it was:

- **Specific** – The action addresses a hazard or need
- **Measurable** – Achievement or progress can be measured
- **Attainable** – Accepted by those responsible for achieving it
- **Relevant –** Substantively addresses the problem
- **Time-bound** – Time period for achievement is clearly stated

Additionally, the MPC and each jurisdiction was instructed to provide a brief summary regarding the status of each of these actions using the following:

- **Not Started:** Action will provide reason(s) for lack of progress, which may include lack of Funding, differing priorities, changes in political climate, lack of technical skills, etc.

- **In progress:** Action will provide a summary, and if applicable, a of percentage work completed to date.
- **Deleted:** Actions deemed no longer viable were marked for deletion from the plan. These actions are detailed in the next section.

6.7 – Prioritization of Mitigation Actions

44 CFR 201.6 (c)(3)(iii) An action plan describing how the actions identified in paragraph (c)(3)(ii) of this section 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 benefit review of the proposed projects and their associated costs.

All participating jurisdictions worked together to review and prioritize both previously identified and newly created hazard mitigation actions, with a self-analysis method used for prioritization. This methodology takes all considerations into account to ensure that, based on capabilities, funding, public wishes, political climate, and legal framework and context, reasonable actions are determined. Major determining factors included the potential effects on the overall risk to life and property, ease of implementation, community and agency support, consistency with mitigation goals, and the availability of Funding.

Of major concern was the potential cost of each action. In general, identified actions were proposed to reduce future damages. As such, it is critical that selected and implemented actions provide a greater saving over the life of the action than the initial cost. For structural and property protection actions cost effectiveness is primarily assessed on:

- Likelihood of damages occurring
- Severity of the damages
- Potential effectiveness

For all other type of actions, including legislative actions, codes and ordinances, maintenance and education, cost effectiveness is primarily assessed on likely future benefits as these actions may not easily result in a quantifiable reduction in damage.

Based on this review, both previously identified and new action items were prioritized as per the following:

High priority:
- Actions that should be implemented as soon as possible
- Actions deemed most critical to achieve the identified mitigation goals

Medium priority:
- Actions that should be implemented in the long-term
- Actions deemed important to meet identified mitigation goals

Low priority

- Actions that should be implemented if Funding becomes available
- Actions that have lowest impact toward achieving mitigation goals

6.8 – Jurisdictional Mitigation Actions

44 CFR 201.6 (c)(3)(ii): 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.

44 CFR 201.6 (c)(3)(iv): For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.

The following tables identify mitigation action items for each participating jurisdiction, along with the following information:

- Hazard addressed
- Responsible party
- Overall priority
- Goal(s) addressed
- Estimated cost
- Potential Funding source
- Proposed completion timeframe
- Current status
- New actions that have been added to this plan update are identified as such.
- Actions that are in support of NFIP compliance are identified with a bold type **NFIP**

6.8.1 – Chase County Mitigation Actions

Table 6.4: Chase County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Chase County-1	Chase County is committed to continued participation and compliance with the **NFIP**.	Flood	NFIP Administrator	High	1,2	Staff time	Local, State, Federal	Continuous	In progress
Chase County-2	Regularly contact owners identified in high-risk flood areas and inform them of potential availability of flood insurance, in addition to other flood protection measures. **(NFIP)**	Flood	Emergency Manager	High	1,2	Staff time	Local, State, Federal	Continuous	In progress
Chase County-3	Collect educational materials on individual and family preparedness and/or mitigation measures for property owners, and display at both the library and routinely visited jurisdiction offices.	All Hazards	Emergency Manager	High	3	Staff time	Local	Continuous	In progress
Chase County-4	Construct safe rooms and storm shelters in underserved areas of the county.	Tornado, Windstorm, Winter Storm	Emergency Manager	High	1,2	$1,750,000=	Local, State, Federal	Three years	Not started, lack of funding
Chase County-5	Educate residents about driving in winter storms and handling winter-related health effects.	Winter Storm	Emergency Manager	High	3	Staff time	Local	Continuous	Not started, lack of funding
Chase County-6	Purchase and install emergency generators at Courthouse, Community Building, and all Fire Departments	Utility/ Infrastructure Failure	Emergency Manager	High	1,2	$80,000	Local, State, Federal	Three years	Not started, lack of funding
Chase County-7	Develop and implement a wildfire prevention/education program.	Wildfire	Fire Chief, Emergency Manager	High	1,2,3	$30 per attendee	Local	Continuous	Not started, lack of funding
Chase County-8	Identify flash-flood prone areas and implement flood reduction measures. **(NFIP)**	Flood	Road Supervisor	Medium	4	Staff time, per project cost	Local	Five years	Not started, lack of staff and funding
Chase County-9	Regularly host a hazards workshop in combination county events.	All Hazards	Emergency Manager	Medium	4	$1,000 per workshop	Local	Continuous	In progress
Chase County-10	Conduct inventory/survey for the county's emergency response services to	All Hazards	Emergency Manager	Medium	1,2	Staff time, per	Local	Four years	Not started, lack of funding

Table 6.4: Chase County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
	identify any existing needs or shortfalls. Purchase identified equipment.					equipment cost			
Chase County-11	Work closely with Drainage District #2 to assist fund projects for storm water management and maintenance of water quality, flood control, and water conservation efforts. **(NFIP)**	Flood	Director Road and Bridge, Water District Commissioner	Medium	1,2	Dependent on severity of issue	Local, State, Federal	Five years	Not started, lack of funding
Chase County-12	Conduct security assessments for all rural water districts and water suppliers and complete all recommended upgrades.	All Hazards	Director RWD#1	Medium	1,2,4	Staff time	Local, State, Federal	Five years	Not started, lack of staff and funding
Chase County-13	Install a severe weather warning siren on the Camp Wood YMCA grounds.	All Hazards	Director Camp Woods	Medium	1,2	$20,000	Local, State, Federal	Five years	Not started, lack of funding
Chase County-14	Design and construct a tornado safe room at Camp Wood Lodge.	Tornado, Windstorm	Director Camp Woods	Medium	1,2	$500,000	Local, State, Federal	Five years	Not started, lack of funding
Chase County-15	Identify and develop alternate flood-proof route to evacuate children and/or provide emergency vehicle access road to Camp Wood. **(NFIP)**	Flood	Director Camp Woods	Medium	1,2	Dependent on severity of issue	Local, State, Federal	Five years	Not started, lack of funding
Chase County-16	Subsidize purchase and distribution of weather radios.	All Hazards	City Administrator	Medium	1,2	$20,000	Local, State, Federal	Five years	Not started, lack of funding
Chase County-17	Regularly calculate and document the amount of flood prone property that is preserved as open space to reduce flood insurance burden to the county. **(NFIP)**	Flood	Road Supervisor	Low	1,2	Staff time	Local	Continuous	Not started, lack of staff
Chase County-18	Work with jurisdictions within the county to identify levee owners.	Dam and Levee Failure, Flood	Road Supervisor	Low	4	Staff time	Local	Five years	Not started, lack of staff
Chase County-19	Implement a study to determine the residual flood risk in levee-protected areas.	Dam and Levee Failure, Flood	County Planner	Low	1,2,4	Staff time	Local	Continuous	Not started, lack of staff
Cedar Point-1	The city of Cedar Point is committed to continued participation in the **NFIP**.	Flood	City Administrator	High	1,2	Staff time	Local	Continuous	In progress

Table 6.4: Chase County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Cedar Point-2	Seek funding for the Cedar Point potable water supply and develop a strategy to protect the well system from flooding, power failure, and potential contamination. **(NFIP)**	Flood	City Administrator	High	1,2	$30,000	Local, State, Federal	Five years	Not started, lack of funding
Cedar Point-3	Seek funding to replace the existing all-weather outdoor warning siren in Cedar Point.	Tornado, Windstorm	City Administrator	High	1,2	$20,000	Local, State, Federal	Five years	Not started, lack of funding
Cedar Point-4	Engineering study and the construction of a drainage system to protect the built environment and infrastructure in Cedar Point from flooding. **(NFIP)**	Flood	City Administrator	Medium	1,2	$40,000	Local, State, Federal	Five years	Not started, lack of funding
Cedar Point-5	Design and build a tornado shelter for the community of Cedar Point.	Tornado, Windstorm	City Administrator	Medium	1,2	$500,000	Local, State, Federal	Five years	Not started, lack of funding
Cottonwood Falls-1	The City of Cottonwood Falls is committed to continued participation in the **NFIP.**	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress
Cottonwood Falls-2	Acquire and demolish flood prone properties. **(NFIP).**	Flood	NFIP Administrator	High	3	Market dependent	Local	Not started, lack of funding	Not started, lack of funding
Cottonwood Falls-3	Conduct regular bridge maintenance.	Utility/ Infrastructure Failure	City Clerk	High	1,2	$150,000	Local, State, Federal	Continuous	Not started, lack of funding
Cottonwood Falls-4	Purchase and install outdoor warning sirens and upgrade current warning devices.	Tornado, Windstorm	City Clerk	High	1,2	$30,000	Local, State, Federal	Five years	Not started, lack of funding
Cottonwood Falls-5	Purchase and install a permanently mounted emergency generator at community building.	Utility/ Infrastructure Failure	City Clerk	High	1,2	$35,000	Local, State, Federal	Five years	Not started, lack of funding
Cottonwood Falls-6	Seek funding to design and build a safe room for the community of Cottonwood Falls.	Tornado, Windstorm	City Clerk	High	1,2	$250,000	Local, State, Federal	Five years	Not started, lack of funding
Cottonwood Falls-7	Incorporate the inspection and management of trees into the city's	All Hazards	Utility Supervisor	Medium	1,2	$8,000	local	Continuous	Not started, lack of funding

Table 6.4: Chase County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
	routine maintenance process to remove trees as required.								
Elmdale-1	The city of Elmdale is committed to continued participation in the **NFIP**.	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress
Elmdale-2	Conduct a study to determine the city's flood control levee is in compliance with applicable regulations and maintenance requirements. Seek funding for engineering studies and compliance upgrades. **(NFIP).**	Dam and Levee Failure, Flood	Mayor	High	1,2	$80,000	Local, State, Federal	Continuous	Not started, lack of funding
Elmdale-3	Appoint a committee to establish efficacy of existing storm warning system. Seek funding to upgrade or replace the warning siren for the city.	Tornado, Windstorm	Mayor	High	1,2	$25,000	Local, State, Federal	Five years	Not started, lack of funding
Matfield Green-1	Seek funding to purchase and install a storm warning siren	Tornado, Windstorm, Hail, Lightning	City Administrator	High	1,2	$20,000	Local, State, Federal	Three years	Not started, lack of funding
Matfield Green-2	Purchase and install backup generators to maintain potable water supplies to the community during periods of power loss.	Winter Storm, Tornado	City Administrator	High	1,2	$50,000	Local, State, Federal	Three years	Not started, lack of funding
Matfield Green-3	Construct a community tornado/storm shelter.	Tornado, Windstorm	City Administrator	High	1,2	$350,000	Local, State, Federal	Three years	Not started, lack of funding
Matfield Green-4	Seek funding to perform an assessment of the two community well houses.	Terrorism/ Agri-terrorism	City Administrator	Medium	1,2	$55,000	Local, State, Federal	Five years	Not started, lack of funding
Strong City-1	Continued participation in the **NFIP.**	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress
Strong City-2	Prepare and adopt an Outdoor Warning Sirens Plan for Strong City. Purchase all recommended equipment from the study.	Tornado, Windstorm	Planning Director	High	1,2	$50,000	Local, State, Federal	Three years	Not started, lack of funding
Strong City-3	Construct community storm shelters for Strong City.	Tornado, Windstorm	Planning Director	High	1,2	$350,000	Local, State, Federal	Three years	Not started, lack of funding

Table 6.4: Chase County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Strong City-4	Install backup generators to maintain potable water supplies and sewer lift stations during periods of power loss.	Utility/ Infrastructure Failure	Floodplain Manager	High	1,2	$50,000	Local, State, Federal	Three years	Not started, lack of funding
Strong City-5	Replace the levee floodgate and pumps. **(NFIP).**	Flood	Floodplain Manager	Medium	1,2	$300,000	Local, State, Federal	Five years	Not started, lack of funding
Strong City-6	Conduct a study to determine capacity requirements to maximize available water supply for firefighting services. Seek funding to upgrade raw water well pumps.	Wildfire	Fire Chief	Medium	1,2	$25,000	Local, State, Federal	Five years	Not started, lack of funding
USD #284-1	Construct tornado safe rooms in Cottonwood Falls Elementary and High School.	Tornado, Windstorm	Superintendent	High	1,2	$1,000,000	Local, State, Federal	Three years	Not started, lack of funding
USD #284-2	Develop a contingency plan for school operations following a loss of facilities from severe weather events and establish a reserve fund for damages repair due to natural hazards.	All Hazards	Superintendent	Medium	1,2	$100,000	Local, State	Five years	Not started, lack of funding
USD #284-3	Seek funding to retain a professional to review and update the school's Security Plan for domestic violence, building security, and contagious disease response.	Terrorism/ Civil Disorder	Superintendent	Medium	1,2	$40,000	Local, State, Federal	Five years	Not started, lack of funding
USD #284-4	Develop and implement a severe weather prevention/education program targeting school children, faculty, and staff. Program information can also be sent home to parents.	Windstorm, Tornados, Hail, Lightning	Superintendent	Medium	1,2	Staff time and $3,000	Local, State, Federal	Continuous	Not started, lack of funding
Rural Water Districts (all)-1	Acquire a permanent back-up generator for each critical facility and pump station.	Drought	Director	Medium	3	$200	Local	Five years	Not started, lack of funding
Rural Water Districts (all)-2	Replace existing waterlines in jeopardy of being damaged due to expansive soils.	Expansive Soils	Director	Medium	1,2	$1,000,000	HMGP, PDM, Local, Other Grants	Five years	Not started, lack of funding

Table 6.4: Chase County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
PWWSD #26-1	Acquire a permanent back-up generator for each critical facility	Utility/ Infrastructure Failure	Director	Medium	3	$500.00	Local	Five years	Not started, lack of funding
Flint Hill RECs-1	Enhance and upgrade all power lines within the County to better withstand all hazard events.	Utility/ Infrastructure Failure	Assistant Manager	High	1,2	$4,000,000	Local, State, Federal	Five years	Not started, lack of funding
Lyon-Coffey - 1	Enhance and upgrade all power lines within the County to better withstand all hazard events.	Utility/ Infrastructure Failure	Assistant Manager	High	1,2	5,000,000	Local, State, Federal	Five years	Not started, lack of funding

6.8.2 – Geary County Mitigation Actions

Table 6.5: Geary County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Geary County-1	Geary County is committed to continued participation and compliance with the **NFIP**.	Flood	NFIP Administrator	High	1,2	Staff time	Local, State, Federal	Continuous	In progress
Geary County-2	Regularly contact owners identified in high-risk flood areas and inform them of potential availability of flood insurance, in addition to other flood protection measures. **(NFIP).**	Flood	Emergency Manager	High	1,2	Staff time	Local, State, Federal	Continuous	In progress
Geary County-3	Collect educational materials on individual and family preparedness and/or mitigation measures for property owners, and display at both the library and routinely visited jurisdiction offices.	All Hazards	Emergency Manager	High	3	Staff time	Local	Continuous	In progress
Geary County-4	Regularly host a public hazards workshop in combination with local festivals, fairs, or other appropriate events.	All Hazards	Emergency Manager	High	3	$500 per workshop	Local	Continuous	In progress
Geary County-5	Research, design and recommend an appropriate stream buffer ordinance to further protect the jurisdiction's water resources and to limit future flood damages adjacent to major waterways.	Flood	County Planner	High	1,2	Staff time	Local, State, Federal	Three years	On-going, no progress
Geary County-6	Construct safe rooms and storm shelters in underserved areas of the county.	Tornado, Windstorm, Winter Storm	Emergency Manager	High	1,2	$1,000,000 per shelter	Local, State, Federal	Three years	Not started, lack of funding
Geary County-7	Educate residents about driving in winter storms and handling winter-related health effects.	Winter Storm	Emergency Manager	High	3	Staff time	Local	Continuous	In progress
Geary County-8	Research and recommend appropriate building codes for the County that include wind-resistant design techniques for new construction.	Tornados, Windstorms	County Planner	High	1,2	Staff time	Local	Three years	Not started, lack of staff

Table 6.5: Geary County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Geary County-9	Research and develop a Comprehensive Land Use Plan for Geary County. **(NFIP).**	Flood	Mitigation Officer, County Planner	High	1,2	$35,000	Local	Three years	Not started, lack of funding
Geary County-10	Identify flash-flood prone areas to implement flood reduction measures. **(NFIP).**	Flood	County Planner	High	1,2	Staff time. per project cost	Local	Three years	Not started, lack of staff and funding
Geary County-11	Develop and recommend an amendment to the existing Flood Damage Prevention Ordinance to include a "no-rise (in base flood elevation)" clause for the county. **(NFIP).**	Flood	Floodplain Manager	High	1,2	Staff time	Local	Three years	Not started, lack of staff
Geary County-12	Conduct an inventory/survey for the emergency response services to identify any existing needs or shortfalls in terms of personnel, equipment or required resources.	All Hazards	Emergency Manager	High	1,2	Staff time, per equipment cost	Local, State, Federal	Continuous	Not started, lack of staff and funding
Geary County-13	Develop and implement a wildfire prevention/education program.	Wildfire	Fire Chief	High	3	Staff time and $1,000	Local	Continuous	Not started, lack of staff and funding
Geary County-14	Examine the current agreements within the county and assess the need to expand or update cooperative agreements for firefighting resources. Include agreements with local, state and federal agencies.	Wildfire	Fire Chief	High	4	Staff time	Local	Continuous	Not started, lack of staff
Geary County-15	Evaluate the firefighting water supply resources within the County.	Wildfire	Fire Chiefs	High	4	Staff time	Local	Five years	Not started, lack of staff
Geary County-16	Develop an annex to the Local Emergency Operations Plan for dam/levee failure response and evacuation plans for high hazard dams/levees in Geary County.	Dam and Levee Failure	Emergency Manager	Medium	1,2	Staff time and $15,000	Local	Five years	Not started, lack of staff and funding
Geary County-17	Purchase and install warning sirens in underserved areas of the county.	Tornados, Windstorms	Emergency Manager	Medium	1,2	$100,000	Local, State, Federal	Five years	Not started, lack of funding

Table 6.5: Geary County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Geary County-18	Develop a program to acquire and preserve parcels of land subject to repetitive flooding from willing and voluntary property owners. **(NFIP).**	Flood	Mitigation Officer, County Planner	Low	1,2	Dependent upon number and fair market value	Local, State, Federal	Continuous	Not started, lack of funding
Geary County-19	Assess the impact of natural hazards on water distribution lines, systems, and equipment and seek funding sources to mitigate any damage to critical infrastructure.	Utility/ Infrastructure Failure	Superintendent Water District No. 4	Low	1,2	$200,000	Local, State, Federal	Five years	Not started, lack of funding
Geary County-20	Establish a livestock disposal plan and compost team to address livestock fatality during extreme heat events.	Agricultural Infestation	Emergency Manager	Low	1,2	Staff time	Local, State, Federal	Five years	Not started, lack of staff
Grandview Plaza-1	Continued participation and compliance with the **NFIP.**	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress
Grandview Plaza-2	Purchase and demolish flood prone properties. **(NFIP).**	Flood	NFIP Administrator r	High	1,2	$2,000,000	Local, State, Federal	Five years	Not started, lack of funding
Grandview Plaza-3	Purchase and install warning storm sirens.	All Hazards	Public Works Director	High	1,2	$27,000	Local, State, Federal	Five years	Not started, lack of funding
Grandview Plaza-4	Purchase and install backup power generator for the community shelter.	All Hazards	City Administrator	Medium	1,2	$40,000	Local, State, Federal	Three years	Not started, lack of funding
Junction City-1	Junction City is committed to continued participation and compliance with the **NFIP.**	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress
Junction City-2	Seek funding for retention projects to decrease exposure to flooding. **(NFIP).**	Flood	City Administrator	Medium	1,2	$2,000,000	Local, State, Federal	Five years	Not started, lack of funding
Junction City-3	Improve storm water management by completing projects throughout the city. **(NFIP).**	Flood	Assistant Manager, Finance Director	Medium	1,2	$45,000,000	Local, State, Federal	Five years	Not started, lack of funding
Junction City-4	Seek funding to bring the GIS System improvements up to par.	All Hazards	Assistant Manager, Finance Director	Medium	1,2	$1,000,000	Local, State, Federal	Five years	Not started, lack of funding

Table 6.5: Geary County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Junction City-5	Establish a disaster evacuation plan.	All Hazards	Assistant Manager, Finance Director	Medium	1,2	$10,000	Local, State, Federal	Five years	Not started, lack of funding
Junction City-6	Improve traffic controls to improve safety during an event	Utility/ Infrastructure Failure	Assistant Manager, Finance Director	Medium	1,2	$200,000	Local, State, Federal	Five years	Not started, lack of funding
Milford-1	Construct a community safe room for Milford citizens.	Tornados, Windstorms	City Clerk	High	1,2	$350,000	Local, State, Federal	Five years	Not started, lack of funding
Milford-2	Seek funding for the purchase of backup generators for the water treatment plant, sewer lift station, and the wastewater lagoon lift station.	Utility/ Infrastructure Failure	City Clerk	Medium	1,2	$60,000	Local, State, Federal	Five years	Not started, lack of funding
Milford-3	Seek funding to perform an assessment of the Milford Water Plant and Milford Waster Water Lagoon and develop an Emergency Response Plan.	Terrorism/ Agri-Terrorism	City Administrator	Low	1,2	$50,000	Local, State, Federal	Five years	Not started, lack of funding
Milford-5	Develop and implement flood mitigation projects for the City of Milford. **(NFIP).**	Flood	City Administrator	Low	1,2,4	Staff time, per project cost	Local, State, Federal	Five years	Not started, lack of funding
Cloud County Community College-1	Purchase and install an emergency communication and notification system.	All Hazards	Campus Vice-President	High	1,2	$150,000	Local, State, Federal	Five years	Not started, lack of funding
Cloud County Community College -2	Design and construct a safe room.	Tornados, Windstorms	Campus Vice-President	High	1,2	$750,000	Local, State, Federal	Five years	Not started, lack of funding
USD #475-1	Design and construct safe rooms for all USD #475 buildings.	All Hazards	Director of Operations	High	1,2	$1,000,000 each	Local, State, Federal	Five years	Not started, lack of funding
USD #475-2	Install a generator at all USD #475 buildings.	Tornados, Windstorms	Director of Operations	High	1,2	$50,000 each	Local, State, Federal	Five years	Not started, lack of funding
Rural Water Districts (all)-1	Replace water lines in jeopardy of being damaged due to expansive soils.	Expansive Soils	Operator	High	1,2	$350,000	Local, State, Federal	Five years	Not started, lack of funding

Table 6.5: Geary County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Rural Water Districts (all)-1	Purchase and install automatic switchover on all booster station generators.	Multi-Hazard	Operator	Medium	1,2	$10,000 each	Local, State, Federal	Five years	Not started, lack of funding
Rural Water Districts (all)-1	Purchase and install automatic switchover on all well generators.	Multi-Hazard	Operator	Medium	1,2	$10,000 each	Local, State, Federal	Five years	Not started, lack of funding
Blue Stem REC-1	Enhance and upgrade all power lines within the County to better withstand all hazard events.	Utility/ Infrastructure Failure	Assistant Manager	High	1,2	$75,000,000	Local, State, Federal	12/31/2025	Not started, lack of funding
DS&O REC-1	Enhance and upgrade all power lines within the County to better withstand all hazard events.	Utility/ Infrastructure Failure	Assistant Manager	High	1,2	$75,000,000	Local, State, Federal	12/31/2025	Not started, lack of funding
Flint Hills REC-1	Enhance and upgrade all power lines within the County to better withstand all hazard events.	Utility/ Infrastructure Failure	Assistant Manager	High	1,2	$5,000,000	Local, State, Federal	Five years	Not started, lack of funding

6.8.3 – Lyon County Mitigation Actions

Table 6.6: Lyon County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Lyon County-1	Lyon County is committed to continued participation and compliance with the **NFIP**.	Flood	NFIP Administrator	High	1,2	Staff time	Local, State, Federal	Continuous	In progress
Lyon County-2	Regularly contact owners identified in high-risk flood areas and inform them of potential availability of flood insurance, in addition to other flood protection measures. **(NFIP).**	Flood	Emergency Manager	High	1,2	Staff time	Local, State, Federal	Continuous	In progress
Lyon County-3	Collect educational materials on individual and family preparedness and/or mitigation measures for property owners, and display at both the library and routinely visited jurisdiction offices.	All Hazards	Emergency Manager	High	3	Staff time	Local	Continuous	In progress
Lyon County-4	Construct safe rooms and storm shelters in underserved areas of the county.	Tornado, Windstorm, Winter Storm	Emergency Manager	High	1,2	$1,000,000 per shelter	Local, State, Federal	Three years	Not started, lack of funding
Lyon County-5	Educate residents about driving in winter storms and handling winter-related health effects.	Winter Storm	Emergency Manager	High	1,2,3	Staff time	Local	Continuous	Not started, lack of staff
Lyon County-6	Develop a public outreach program educating residents about the dangers of floods. **(NFIP).**	Flood	Floodplain Manager, Emergency Manager	High	4	Staff time	local	Continuous	20% complete - on-going
Lyon County-7	Complete a Community Wildfire Protection Plan.	Wildfire	Fire Chief, Emergency Manager	High	4	Staff time	Local	Three years	Not started, lack of staff
Lyon County-8	Map hazardous wildfire areas in the county.	Wildfire	Fire Chief, Emergency Manager	High	4	Staff time	Local	Three years	Not started, lack of staff
Lyon County-9	Identify flash-flood prone areas to implement flood reduction measures. **(NFIP).**	Flood	County Planner	High	1,2	Staff time. per project cost	Local	Three years	Not started, lack of funding
Lyon County-10	Research and design an appropriate stream buffer ordinance to further	Flood	County Planner	High	1,2	Staff time	Local	Three years	Not started, lack of staff

Table 6.6: Lyon County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
	protect the jurisdiction's water resources and to limit future flood damages adjacent to major waterways.								
Lyon County-11	Annually host a public hazards workshop in combination with local festivals, fairs, or other appropriate events.	All Hazards	Floodplain Manager, Emergency Manager	Medium	3	Staff time and $1,000 per workshop	Local	Continuous	In progress
Lyon County-12	Promote and educate the jurisdiction's public and private sectors on potential agricultural terrorism and bio-terrorism issues that can severely impact the county and regional economies and develop and implement plans to address these issues.	Terrorism/ Agri-Terrorism	Directors, Health Department and County Extension	Medium	3	Staff time	Local	Continuous	20% complete - on-going
Lyon County-13	Identify the most at-risk critical facilities and implement all needed mitigation techniques for protecting each facility e.	All Hazards	Emergency Manager	Medium	1,2	Per project cost	Local	Five years	Not started, lack of funding
Lyon County-14	Develop a program to acquire and preserve parcels of land subject to repetitive flooding from willing and voluntary property owners. **(NFIP).**	Flood	Floodplain Manager, Emergency Manager	Low	1,2	Dependent on number of properties and fair market value.	Local, State	Continuous	Not started, lack of funding.
Admire-1	City of Admire is committed to continued participation and compliance with the **NFIP**.	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress
Admire-2	Assess flood prone areas and recommend floodplain ordinance updates to city planners. **(NFIP).**	Flood	City Planner, City Manager	High	1,2	Staff time	Local	Three years	Not started, lack of staff
Admire-3	Install portable generators at city critical facilities.	Utility/ Infrastructure Failure	City Manager	Medium	1,2	$60,000	Local, State, Federal	Five years	Not started, lack of funding
Admire-4	Seek funding to renovate fire station, including a community safe room.	Tornados, Windstorms	City Manager	Low	1,2	$350,000	Local, State, Federal	Five years	60% complete. On-going

Table 6.6: Lyon County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Allen-1	Continued participation and compliance with the **NFIP**.	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress
Allen-2	Seek funding to subsidize purchase and distribution of weather radios.	All Hazards	City Manager	High	1,2	$10,000	Local, State, Federal	Three years	Not started, lack of funding
Allen-3	Assess flood prone areas and implement floodplain ordinance updates to city planners. **(NFIP).**	Flood	City Manager	High	1,2	Staff time	Local	Three years	Not started, lack of staff
Allen-4	Complete a stormwater drainage study/plan for the City of Allen that will lead to a stormwater management ordinance. **(NFIP).**	Flood	City Manager	Medium	1,2,4	$35,000	Local, State, Federal	Three years	Not started, lack of funding
Allen-5	Perform improvements to minimize flood damage to existing development by maximizing the effectiveness of the storm sewer infrastructure. **(NFIP).**	Flood	City Manager	Low	1,2	$200,000	Local, State, Federal	Three years	Not started, lack of funding
Americus-1	Continued participation with the **NFIP.**	Flood	NFIP Administrator	High	1,2	Staff time	Local, State	Continuous	In progress
Americus-2	Assess flood prone areas and implement floodplain ordinance updates. **(NFIP).**	Flood	City Manager	High	1,2	Staff time	Local	Five years	Not started, lack of staff
Bushong-1	Construct a community safe room.	Tornados, Windstorms	Mayor	High	3	$300,000	Local, State, Federal	Five years	Not started, lack of funding
Bushong-2	Purchase and install warning sirens for the city.	Tornados, Windstorms	Mayor	High	1,2	$40,000	Local, State, Federal	Five years	Not started, lack of funding
Emporia-1	The City of Emporia is committed to continued participation and compliance with the **NFIP.**	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress
Emporia-2	Construct a community safe room.	Tornados, Windstorms	City Administrator	High	1,2	$500,000	Local, State, Federal	Five years	Not started, lack of funding
Emporia-3	Develop a public outreach program educating residents about the dangers of floods. **(NFIP).**	Flood	Floodplain Manager, City Administrator	High	4	Staff time	Local	Continuous	Not started, lack of staff

Table 6.6: Lyon County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Emporia-6	Assess flood prone areas and implement floodplain ordinance. **(NFIP).**	Flood	Floodplain Manager, City Administrator	High	1,2	Staff time	Local	Five years	Not started, lack of staff
Emporia-7	Develop projects and pursue funding for the repair and upgrade of stormwater infrastructure. **(NFIP).**	Flood	Floodplain Manager, City Administrator	Low	1,2	$300,000	Local, State, Federal	Three years	Not started, lack of funding
Hartford-1	The City of Hartford is committed to continued participation and compliance with the **NFIP**.	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress
Hartford-2	Construct a community safe room for the protection of our citizens.	Tornados, Windstorms	City Administrator	High	1,2	$500,000	Local, State, Federal	Five years	Not started, lack of funding
Hartford-3	Assess flood prone areas and implement floodplain ordinance updates. **(NFIP).**	Flood	Floodplain Manager, City Administrator	High	1,2	Staff time	Local	Five years	Not started, lack of funding
Hartford-4	Subsidize purchase and distribution of weather radios.	All Hazards	City Administrator	High	1,2	$8,000	Local, State, Federal	Five years	Not started, lack of funding
Hartford-5	Seek funding for the purchase of backup power generator.	Utility/ Infrastructure Failure	City Administrator	Medium	1,2	$60,000	Local, State, Federal	Three years	Not started, lack of funding
Neosho Rapids-1	The City of Neosho Rapids is committed to continued participation and compliance with the **NFI**P.	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress
Neosho Rapids-2	Construct a community safe room.	Tornados, Windstorms	City Administrator	High	1,2	$500,000	Local, State, Federal	Three years	Not started, lack of funding
Neosho Rapids-3	Assess flood prone areas and implement floodplain ordinance updates. **(NFIP).**	Flood	Floodplain Manager, City Administrator	High	1,2	Staff time	Local	Three years	Not started, lack of staff
Olpe-1	Construct a community safe room.	Tornados, Windstorms	City Manager	High	1,2	$350,000	Local, State, Federal	Three years	Not started, lack of funding
Olpe-2	Purchase and install portable generators at city critical facilities.	Utility/ Infrastructure Failure	City Manager	Medium	1,2	$60,000	Local, State, Federal	Five years	Not started, lack of funding

Table 6.6: Lyon County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Reading-1	Construct a community safe room.	Tornados, Windstorms	City Administrator	High	1,2	$300,000	Local, State, Federal	Three years	Not started, lack of funding
Reading-2	Pursue funding for emergency oxygen for emergency services.	All Hazards	City Administrator	Medium	1,2	$50,000	Local, State, Federal	Five years	Not started, lack of funding
Emporia State University-1	Construct safe rooms on the Emporia State University campus.	Tornados, Windstorms	President	Low	1,2	$1,000,000	Local, State, Federal	Five years	Not started, lack of funding
Flint Hills Technical College-1	Purchase and install backup power sources for Flint Hills Technical College facilities.	Utility/Infrastructure Failure	President	Low	1,2	$100,000	Local, State, Federal	Five years	Not started, lack of funding
USD #251-1	Construct safe rooms in the schools of USD #251.	Tornados, Windstorms	Superintendent	Low	1,2	$1,000,000	Local, State, Federal	Five years	Not started, lack of funding
USD #252-1	Construct safe rooms in the schools of USD #252.	Tornados, Windstorms	Superintendent	Low	1,2	$1,000,000	Local, State, Federal	Five years	Not started, lack of funding
USD #252-2	Purchase and install backup generators for all facilities.	Utility/ Infrastructure Failure	Superintendent	Medium	1,2	$100,000	Local, State, Federal	Five years	Not started, lack of funding
USD #253-1	Construct safe rooms in the schools of USD #253.	Tornados, Windstorms	Superintendent	Low	1,2	$1,000,000	Local, State, Federal	Five years	Not started, lack of funding
Allen Creek Watershed District #89-1	Install increased diameter water lines and additional hydrants throughout county.	Utility/ Infrastructure Failure	Assistant Manager	High	1,2	$4,000,000	Local, State, Federal	Three years	Not started, lack of funding
Allen Creek Watershed District #89-2	Purchase and install generators for all facilities.	Utility/ Infrastructure Failure	Operator	High	1,2	$20,000 each	Local, State, Federal	Three years	Not started, lack of funding
Rural Water Districts (all)-1	Replace water lines in jeopardy of being damaged due to expansive soils.	Expansive Soils	Operator	High	1,2	$350,000	Local, State, Federal	Three years	Not started, lack of funding
Rural Water Districts (all)-2	Purchase and install automatic switchover on all booster station generators.	Multi-Hazard	Operator	Medium	1,2	$10,000 each	Local, State, Federal	Five years	Not started, lack of funding

Table 6.6: Lyon County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Rural Water Districts (all)-3	Purchase and install automatic switchover on all well generators.	Multi-Hazard	Operator	Medium	1,2	$10,000 each	Local, State, Federal	Five years	Not started, lack of funding
Rural Water Districts (all)-4	Install increased diameter water lines and additional hydrants throughout county.	Utility/ Infrastructure Failure	Assistant Manager	High	1,2	$4,000,000	Local, State, Federal	Three years	Not started, lack of funding
Rural Water Districts (all)-5	Purchase and install generators for all facilities.	Utility/ Infrastructure Failure	Operator	High	1,2	$20,000 each	Local, State, Federal	Three years	Not started, lack of funding
Salt Creek Watershed Joint District #104-1	Install increased diameter water lines and additional hydrants throughout county.	Utility/ Infrastructure Failure	Assistant Manager	High	1,2	$4,000,000	Local, State, Federal	Three years	Not started, lack of funding
Salt Creek Watershed Joint District #104-2	Purchase and install generators for all facilities.	Utility/ Infrastructure Failure	Operator	High	1,2	$20,000 each	Local, State, Federal	Three years	Not started, lack of funding
Upper Marais Des Cygnes Watershed Joint District #101-1	Install increased diameter water lines and additional hydrants throughout county.	Utility/ Infrastructure Failure	Assistant Manager	High	1,2	$4,000,000	Local, State, Federal	Three years	Not started, lack of funding
Upper Marais Des Cygnes Watershed Joint District #101 -2	Purchase and install generators for all facilities.	Utility/ Infrastructure Failure	Operator	High	1,2	$20,000 each	Local, State, Federal	Three years	Not started, lack of funding
Flint Hills REC-1	Enhance and upgrade all power lines within the County to better withstand all hazard events.	Utility/ Infrastructure Failure	Assistant Manager	High	1,2	$5,000,000	Local, State, Federal	Ten years	Not started, lack of funding

6.8.4 – Morris County Mitigation Actions

Table 6.7: Morris County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Morris County-1	Collect educational materials on individual and family preparedness and/or mitigation measures for property owners, and display at both the library and routinely visited jurisdiction offices.	All Hazards	Emergency Manager	High	3	Staff time	Local	Continuous	In progress
Morris County-2	Construct safe rooms and storm shelters in underserved areas of the county.	Tornado, Windstorm, Winter Storm	Emergency Manager	High	1,2	$1,000,000 per shelter	Local, State, Federal	Three years	Not started, lack of funding
Morris County-3	Educate residents about driving in winter storms and handling winter-related health effects.	Winter Storm	Emergency Manager	High	1,2,3	Staff time	Local	Continuous	Not started, lack of staff
Morris County-4	Host a public hazards workshop in combination with local festivals, fairs, or other public events.	All Hazards	Emergency Manager	High	1,2,3	Staff time	Local	Continuous	On-going, continuous
Morris County-5	Coordinate mitigation efforts with RECs, encourage identification of hazards and vulnerabilities potentially affecting their infrastructure, and identification of mitigation strategies.	All Hazards	Emergency Manager	High	1,2,4	Staff time	Local	Five years	Not started, lack of staff
Morris County-6	Examine the current agreements within the jurisdiction and assess the need to expand or update cooperative agreements for firefighting resources. Include agreements with local, state and federal agencies.	Wildfire	Fire Chief, Emergency Manager	High	1,2,4	Staff time	Local	Five years	Not started, lack of staff
Morris County-7	Develop an annex to the Local Emergency Operations Plan for dam failure response and evacuation plans for high hazard dams in the jurisdiction.	Dam and Levee Failure	Emergency Manager	High	1,2	Staff time	Local	Five years	Not started, lack of staff
Morris County-8	Conduct an inventory/survey for the county's emergency response services to identify any existing needs or shortfalls in terms of personnel, equipment or	All Hazards	Emergency Manager	High	1,2	Staff time, per equipment cost	Local, State, Federal	Five years	Not started, lack of funding and staff

Table 6.7: Morris County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
	required resources. Purchase needed equipment.								
Morris County-9	Inform the owners of the high hazard dams in the county of their responsibility to provide EAPs to the Morris County Emergency Management as prescribed by the KDA-DWR, Chief Engineer.	Dam and Levee Failure	Emergency Manager	High	1,2,4	Staff time	Local	Five years	Not started, lack of staff
Morris County-10	Promote and educate the jurisdiction's public and private sectors on potential agricultural terrorism and bio-terrorism issues that can severely impact the county and regional economies and develop and implement plans to address these issues.	Terrorism/ Agri-Terrorism	Director Health Department, Extension Officer, Emergency Manager	Medium	3	Staff time and $5,000	Local, State, Federal	Five years	Not started, lack of funding and staff
Morris County-11	Identify the jurisdiction's most at-risk critical facilities and implement mitigation actions to protect each facility.	All Hazards	Emergency Manager	Medium	1,2	Staff time, per project cost	Local	Five years	Not started, lack of funding and staff
Morris County-12	Evaluate the firefighting water supply resources within the jurisdiction. This should include both fixed and mobile supply issues.	Wildfire	Fire Chief, Emergency Manager	Medium	1,2	Staff time	Local	Five years	Not started, lack of staff
Morris County-13	Developing a Land Use Plan for Morris County.	Flood	Emergency Manager	Medium	1,2	Staff time and $35,000	Local	Five years	Not started, lack of funding and staff
Morris County-14	Purchase and install warning sirens in the White Memorial Camp area.	Tornados, Windstorms	Emergency Manager	Medium	1,2	$500,000	Local, State, Federal	Five years	Not started, lack of funding
Morris County-15	Subsidize purchase and distribution of weather radios.	All Hazards	Emergency Manager	Medium	1,2	$10,000	Local, State, Federal	Five years	Not started, lack of funding
Council Grove-1	The City of Council Grove is committed to continued participation and compliance with the **NFIP.**	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress

Table 6.7: Morris County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Council Grove-2	Construct community safe rooms.	Tornados, Windstorms	City Manager	High	1,2	$500,000	Local	Three years	Not started, lack of funding
Council Grove-3	Research funding options to assist in repairing the levees located in Council Grove. **(NFIP).**	Flood	Roads and Parks Superintendent	High	1,2	Dependent on severity of repairs needed.	Local, State, Federal	Three years	Not started, lack of funding
Council Grove-4	Purchase and install a security fence around the water tower.	Utility/ Infrastructure Failure	Water Superintendent	High	1,2	$50,000	Local, State, Federal	Three years	Not started, lack of funding
Council Grove-5	Purchase and install a water plant clarifier roof to protect the water supply.	Utility/ Infrastructure Failure	Water Superintendent	High	1,2	$80,000	Local, State, Federal	Three years	Not started, lack of funding
Council Grove-6	Purchase and install a 200-amp backup electric generator.	Utility/ Infrastructure Failure	Water Superintendent	High	1,2	$70,000	Local, State, Federal	Three years	Not started, lack of funding
Council Grove-7	Purchase and install a generator at the Council Grove Armory.	Utility/ Infrastructure Failure	Recreation Director	High	1,2	$42,200	Local, State, Federal	Three years	Not started, lack of funding
Council Grove-8	Assess flood prone areas and implement flood reduction measures. **(NFIP).**	Flood	City Manager	Medium	1,2	$20,000	Local	Five years	Not started, lack of funding
Council Grove-9	Seek funding to upgrade and purchase and install new warning sirens.	Tornados, Windstorms	City Manager	Medium	1,2	$90,000	Local, State, Federal	Five years	Not started, lack of funding
Dunlap-1	Continued participation and compliance in the **NFIP.**	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress
Dunlap-2	Construct community safe rooms to protect the population during weather events.	Tornados, Windstorms	City Manager	High	1,2	$300,000	Local	Five years	Not started, lack of funding
Dunlap-3	Assess flood prone areas and implement flood reduction measures. **(NFIP).**	Flood	City Manager	Medium	1,2	Staff time, per project cost	Local	Five years	Not started, lack of staff and funding
Dunlap-4	Purchase and install warning sirens in the City of Dunlap.	All Hazards	City Manager	Medium	1,2	$90,000	Local, State, Federal	Five years	Not started, lack of funding

Table 6.7: Morris County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Dwight-1	Continued participation and compliance in the **NFIP.**	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress
Dwight-2	Construct community safe rooms to protect the population during weather events.	Tornados, Windstorms	City Manager	High	1,2	$300,000	Local	Five years	Not started, lack of funding
Dwight-3	Conduct an inventory / survey for emergency response services within the City of Dwight to identify existing needs in terms of personnel, equipment, or required resources	All Hazards	City Manager	Medium	1,2	Staff time	Local	Five years	Not started, lack of staff
Dwight-4	Assess flood prone areas and implement flood reduction measures. **(NFIP).**	Flood	City Manager	Medium	1,2	Staff time, per project cost	Local	Five years	Not started, lack of staff and funding
Latimer-1	Construct community safe rooms.	Tornados, Windstorms	City Manager	High	1,2	$300,000	Local	Five years	Not started, lack of funding
Latimer-2	Incorporate the inspection and management of trees that may pose a threat to the city's routine maintenance system process.	All Hazards	City Manager	Medium	1,2	Staff time and $8,000	Local, State, Federal	Five years	Not started, lack of staff and funding
Parkerville-1	Construct community safe rooms to protect the population during weather events.	Tornados, Windstorms	City Manager	High	1,2	$300,000	Local	Five years	Not started, lack of funding
Parkerville-2	Incorporate the inspection and management of trees that may pose a threat to the city's routine maintenance system process.	All Hazards	City Manager	Medium	1,2	$8,000	Local, State, Federal	Five years	Not started, lack of staff and funding
White City-1	Construct community safe rooms to protect the population during weather events.	Tornados, Windstorms	City Manager	High	1,2	$300,000	Local	Five years	Not started, lack of funding
White City-2	Purchase and install backup power generators and/or transfer switches for the city water supply.	Utility/ Infrastructure Failure	City Manager	Medium	1,2	$60,000	Local, State, Federal	Five years	Not started, lack of funding
Wilsey-1	Continued participation and compliance in the **NFIP.**	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress

Table 6.7: Morris County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Wilsey-2	Construct community safe rooms.	Tornados, Windstorms	City Manager	High	1,2	$300,000	Local	Five years	Not started, lack of funding
Wilsey-3	Assess flood prone areas and implement flood reduction measures. **(NFIP).**	Flood	City Manager	Medium	1,2	Staff time, per project cost	Local	Five years	Not started, lack of staff and funding
USD #417-1	Construct safe rooms in all USD #417 buildings.	Tornados, Windstorms	Superintendent	Medium	1,2	$1,000,000	Local, State, Federal	Five years	Not started, lack of funding
USD #417-2	Promote and educate the students and staff members of USD #417 on tornado safety in schools.	Tornados, Windstorms	Superintendent	High	1,2	Staff time	Local	Continuous	In progress
USD #481-1	Construct safe rooms in all USD #481 buildings.	Tornados, Windstorms	Superintendent	Medium	1,2	$1,000,000	Local, State, Federal	Five years	Not started, lack of funding
USD #481-2	Purchase and install weather-resistant roofing for the school buildings of USD #481.	All Hazards	Superintendent	High	1,2	$300,000	Local, State, Federal	Five years	Not started, lack of funding
Diamond Creek WJD #61-1	Purchase and install backup generators	Utility/ Infrastructure Failure	Operations Manager	Medium	1,2	$300,000	Local, State, Federal	Five years	Not started, lack of funding
Lyon Creek WJD #41-1	Purchase and install backup generators	Utility/ Infrastructure Failure	Operations Manager	Medium	1,2	$300,000	Local, State, Federal	Five years	Not started, lack of funding
Rock Creek WJD #84-1	Purchase and install backup generators	Utility/ Infrastructure Failure	Operations Manager	Medium	1,2	$300,000	Local, State, Federal	Five years	Not started, lack of funding
Rural Water Districts (all)-1	Replace water lines in jeopardy of being damaged due to expansive soils.	Expansive Soils	Operator	High	1,2	$350,000	Local, State, Federal	Five years	New
Rural Water Districts (all)-1	Purchase and install automatic switchover on all booster station generators.	Multi-Hazard	Operator	Medium	1,2	$10,000 each	Local, State, Federal	Five years	New
Rural Water Districts (all)-1	Purchase and install automatic switchover on all well generators.	Multi-Hazard	Operator	Medium	1,2	$10,000 each	Local, State, Federal	Five years	New

Table 6.7: Morris County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Flint Hills-1	Enhance and upgrade all power lines within the County to better withstand all hazard events.	Utility/ Infrastructure Failure	Assistant Manager	High	1,2	$5,000,000	Local, State, Federal	Ten years	Not started, lack of funding

6.8.5 – Pottawatomie County Mitigation Actions

Table 6.8: Potawatomie County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Pottawatomie County-1	Pottawatomie County is committed to continued participation and compliance with the **NFIP**.	Flood	Emergency Manager	High	1,2	Staff time	Local	Continuous	In progress
Pottawatomie County-2	Regularly contact owners identified in high-risk flood areas and inform them of potential availability of flood insurance, in addition to other flood protection measures. **(NFIP).**	Flood	Emergency Manager	High	1,2	Staff time	Local, State, Federal	Continuous	In progress
Pottawatomie County-3	Collect educational materials on individual and family preparedness and/or mitigation measures for property owners, and display at both the library and routinely visited jurisdiction offices.	All Hazards	Emergency Manager	High	3	Staff time	Local	Continuous	In progress
Pottawatomie County-5	Construct safe rooms and storm shelters in underserved areas of the county.	Tornado, Windstorm, Winter Storm	Emergency Manager	High	1,2	$1,000,000 per shelter	Local, State, Federal	Three years	Not started, lack of funding
Pottawatomie County-5	Collect educational materials on individual and family preparedness / mitigation measures for property owners, to include vulnerable needs.	All Hazards	Emergency Manager	High	3	Staff time and $6,000 per year	Local	Continuous	In progress
Pottawatomie County-7	Regularly host a public hazards workshop in combination with local festivals, fairs, or other appropriate events.	All Hazards	Emergency Manager	High	3	Staff time and $1,500 per workshop	Local, State	Continuous	In progress
Pottawatomie County-8	Construct safe rooms and storm shelters in underserved areas of the county.	Tornado, Windstorm, Winter Storm	Emergency Manager	High	1,2	$1,000,000 per shelter	Local, State, Federal	Three years	Not started, lack of funding
Pottawatomie County-12	Install warning sirens in underserved areas of the county.	All Hazards	Emergency Manager	Low	1,2	$90,000	Local, State, Federal	Three years	Not started, lack of funding
Pottawatomie County-11	Develop an annex to the Local Emergency Operations Plan for dam failure response and evacuation plans for	Dam and Levee Failure	Emergency Manager	High	1,2,4	Staff time	Local	Three years	Not started, lack of staff

Table 6.8: Potawatomie County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
	high hazard dams in Pottawatomie County.								
Pottawatomie County-14	Research and recommend an appropriate stream buffer ordinance to further protect the jurisdiction's water resources and to limit future flood damages adjacent to major waterways. **(NFIP).**	Flood	Zoning and Floodplain Manager	High	1,2	Staff time	Local	Three years	Not started, lack of staff
Pottawatomie County-16	Conduct an inventory/survey for the county's emergency response services to identify any existing needs or shortfall and purchase recommended equipment.	All Hazards	Emergency Manager	High	1,2	Staff time, per equipment cost	Local	Three years	Not started, lack of staff and funding
Pottawatomie County-9	Educate residents about driving in winter storms and handling winter-related health effects.	Winter Storm	Emergency Manager	High	3	Staff time	Local	Continuous	Not started, lack of staff
Pottawatomie County-10	Promote and educate the jurisdiction's public and private sectors on potential agricultural terrorism and bio-terrorism issues that can severely impact the county and regional economies and develop and implement plans to address these issues.	Terrorism/ Agri-terrorism	Director County Health Department, Emergency Manager, Extension Officer	Medium	3	Staff time and $5,000	Local, State, Federal	Five years	Not started, lack of staff and funding
Pottawatomie County-19	Develop and implement a wildfire prevention/education program.	Wildfire	Fire Chief	Medium	3	Staff time and $10,000 per year	Local, State, Federal	Continuous	Not started, lack of staff and funding
Pottawatomie County-21	Evaluate the firefighting water supply resources within the county.	Wildfire	Fire Chief	Medium	4	Staff time	Local	Five years	Not started, lack of staff
Pottawatomie County-22	Incorporate the inspection and management of hazardous trees into the county's routine maintenance process.	All Hazards	Director Public Works	Low	1,2	$10,000	Local, State, Federal	Five years	Not started, lack of funding
Pottawatomie County-13	Develop a program to acquire and preserve parcels of land subject to flooding from willing and voluntary property owners. **(NFIP).**	Flood	Zoning and Floodplain Manager	Low	1,2	Dependent on fair market value	Local, State, Federal	Five years	Not started, lack of funding
Belvue-1	The City of Belvue is committed to continued participation and compliance with the **NFIP**.	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress

Table 6.8: Potawatomie County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Belvue-2	Construct a community safe room.	Tornados, Windstorm	City Administrator	High	1,2	$300,000	Local, State, Federal	Three years	Not started, lack of funding
Belvue-3	Repair, purchase and install new sirens as needed to ensure area coverage.	All Hazards	City Administrator	Medium	1,2	$30,000	Local, State, Federal	Five years	Not started, lack of funding
Belvue-4	Assess flood prone areas and implement flood reduction measures. **(NFIP).**	Flood	City Administrator	Medium	1,2	Staff time, per project cost	Local	Five years	Not started, lack of staff and funding
Belvue-5	Purchase and install generators at critical facilities.	Utility/ Infrastructure Failure	City Administrator	Low	1,2	$50,000	Local, State, Federal	Five years	Not started, lack of funding
Emmett-1	Construct a community safe room.	Tornados, Windstorm	City Administrator	High	1,2	$300,000	Local, State, Federal	Three years	Not started, lack of funding
Havensville-1	Continued participation and compliance with the **NFIP**.	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress
Havensville-2	Construct a community safe room.	Tornados, Windstorm	City Administrator	High	1,2	$300,000	Local, State, Federal	Three years	Not started, lack of funding
Havensville-3	Assess flood prone areas and implement flood reduction measures. **(NFIP).**	Flood	City Administrator	Medium	1,2	Staff time, per project cost	Local	Five years	Not started, lack of staff and funding
Havensville-4	Purchase and install warning sirens.	Tornados, Windstorm	City Administrator	Medium	1,2	$15,000	Local, State, Federal	Five years	New
Louisville-1	Continued participation and compliance with the **NFIP.**	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress
Louisville-2	Construct a community safe room.	Tornados, Windstorm	City Administrator	High	1,2	$300,000	Local, State, Federal	Three years	Not started, lack of funding
Louisville-3	Purchase emergency cones and barricades for the city.	All Hazards	City Administrator	Medium	1,2	$20,000	Local, State, Federal	Five years	Not started, lack of funding
Louisville-4	Assess flood prone areas and implement flood reduction measures. **(NFIP).**	Flood	City Administrator	Medium	1,2	Staff time, per project cost	Local	Five years	Not started, lack of staff and funding

Table 6.8: Potawatomie County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Olsburg-1	Construct a community safe room.	Tornados, Windstorm	City Administrator	High	1,2	$300,000	Local, State, Federal	Three years	Not started, lack of funding
Olsburg-2	Purchase and install generators at critical city facilities.	Utility/ Infrastructure Failure	City Clerk	High	1,2	$50,000 each	Local, State, Federal	Three years	Not started, lack of funding
Onaga-1	Continued participation and compliance with the **NFIP.**	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress
Onaga-2	Construct a community safe room.	Tornados, Windstorm	Mayor	High	1,2	$300,000	Local, State, Federal	Three years	Not started, lack of funding
Onaga-3	Purchase and install warning sirens.	Tornados, Windstorm	City Clerk	High	1,2	$100,000	Local, State, Federal	Three years	Not started, lack of funding
Onaga-4	Purchase and install generators at lift station and wells	Utility/ Infrastructure Failure	City Clerk	High	1,2	$50,000 each	Local, State, Federal	Three years	Not started, lack of funding
Onaga-5	Assess flood prone areas and implement flood reduction measures. **(NFIP).**	Flood	City Administrator	Medium	1,2	Staff time, per project cost	Local	Five years	Not started, lack of staff and funding
St. George-1	Continued participation and compliance with the **NFIP.**	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress
St. George-2	Construct a community safe room.	Tornados, Windstorm	City Administrator	High	1,2	$300,000	Local, State, Federal	Three years	On-going, no funding
St. George-3	Assess flood prone areas and implement flood reduction measures. **(NFIP).**	Flood	City Administrator	High	1,2	Staff time, per project cost	Local	Three years	Not started, lack of staff and funding
St. Mary's-1	Continued participation and compliance with the **NFIP**.	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress
St. Mary's-2	Assess flood prone areas and implement flood reduction measures. **(NFIP).**	Flood	City Administrator	High	1,2	Staff time, per project cost	Local	Three years	Not started, lack of staff and funding
St. Mary's-3	Construct a community safe room.	Tornados, Windstorm	City Administrator	High	1,2	$300,000	Local, State, Federal	Threee years	Not started, lack of funding

Table 6.8: Potawatomie County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
St. Mary's-4	Seek funding to initiate a weather radio program by purchasing and subsidizing radios.	All Hazards	City Administrator	Medium	1,2	$5,000	Local, State, Federal	Five years	Not started, lack of funding
St. Mary's-5	Supplement existing public works equipment to better respond to severe weather.	All Hazards	City Administrator	Low	1,2	$25,000	Local, State, Federal	Five years	Not started, lack of funding
St. Mary's-6	Conduct an assessment of cities water supply system to evaluate potential hazard exposure, develop a plan to upgrade, and secure and protect the water supply. Seek funding to implement study results.	Utility/ Infrastructure Failure	City Administrator	Low	1,2	Dependent on study results.	Local, State, Federal	Five years	Not started, lack of funding
St. Mary's-7	Purchase and install generators at critical facilities.	Utility/ Infrastructure Failure	City Administrator	Low	1,2	$50,000	Local, State, Federal	Five years	Not started, lack of funding
St. Mary's-8	The City will fund and repair deficiencies noted by the KDA-DWR dam inspection report for College Park Dam (FRD No. 2).	Dam and Levee Failure	City Administrator	Low	1,2	$300,000	Local, State, Federal	Five years	Not started, lack of funding
Wamego-1	Continued participation and compliance with the **NFIP.**	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress
Wamego-2	Assess flood prone areas and implement flood reduction measures. **(NFIP).**	Flood	City Administrator	High	1,2	Staff time, per project cost	Local	Three years	Not started, lack of staff and funding
Wamego-3	Construct a community safe room.	Tornados, Windstorm	City Administrator	High	1,2	$300,000	Local, State, Federal	Five years	Not started, lack of funding
Westmoreland -1	Construct a community safe room.	Tornados, Windstorm	City Clerk	High	1,2	$300,000	Local, State, Federal	Five years	On-going, funding not available
Wheaton-1	Construct a community safe room.	Tornados, Windstorm	Mayor	High	1,2	$300,000	Local, State, Federal	Three years	Not started, lack of funding
USD #320-1	Construct safe rooms for all USD #320 facilities	Tornados, Windstorm	Superintendent	High	1,2	$1,000,000 per shelter	Local, State, Federal	Three years	Not started, lack of funding

Table 6.8: Potawatomie County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
USD #320-2	Retain a professional to review and update the school's Security Plan and contagious disease response. Implement recommendations.	All Hazards	Operations Director	High	1,2	$75,000	Bonds, State, Federal	Three years	Not started, lack of funding
USD #320-4	Replace sewer lines under the Wamego High School Locker rooms and West Elementary School.	Utility/ Infrastructure Failure	Operations Director	High	1,2	$1,000,000	Local, State, Federal	Three years	Not started, lack of funding
USD #320-6	Replace metal roofs at all facilities.	Tornados, Windstorm, Winter Storm	Operations Director	High	1,2	$1,500,000 - $5,000,000	Local, State, Federal	Five years	Not started, lack of funding
USD #320-7	Re-key all interior doors in the Middle School.	Terrorism, Civil Disorder	Operations Director	Medium	1,2	$35,000	Local, State, Federal	Five years	Not started, lack of funding
USD #320-8	Purchase and install an electronic access system for all school facilities.	Terrorism/, Civil Disorder	Operations Director	Medium	1,2	$25,000	Local, State, Federal	Five years	Not started, lack of funding
USD #320-3	Purchase and install generators for USD #320 facilities	Utility/ Infrastructure Failure	Superintendent	Low	1,2	$100,000	Local, State, Federal	Five years	Not started, lack of funding
USD #321-1	Construct safe rooms for USD #321 facilities	Tornados, Windstorm	Superintendent	High	1,2	$1,000,000 per shelter	Local, State, Federal	Three years	Not started, lack of funding
USD #322-1	Construct safe rooms for USD #322 facilities	Tornados, Windstorm	Superintendent	High	1,2	$1,000,000 per shelter	Local, State, Federal	Three years	Not started, lack of funding
USD #323-1	Construct safe rooms for USD #323 facilities	Tornados, Windstorm	Superintendent	High	1,2	$1,000,000 per shelter	Local, State, Federal	Three years	Not started, lack of funding
USD #384-1	Construct safe rooms for USD #384 facilities	Tornados, Windstorm	Superintendent	High	1,2	$1,000,000 per shelter	Local, State, Federal	Three years	Not started, lack of funding
Belvue Drainage District-1	Purchase equipment and institute program to clear brush off all dikes.	Dam/Levee Failure	Board Members	High	1,2	$10,000	Local, State, Federal	Five years	Not started, lack of funding

Table 6.8: Potawatomie County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Cross Creek WJD #42-1	Purchase and install lightning suppression equipment at all facilities.	Utility/ Infrastructure Failure	Manager	High	1,2	$50,000	Local, State, Federal	Five years	Not started, lack of funding
Cross Creek WJD #42-2	Purchase and install security fences, gates and video surveillance at all facilities.	Utility/ Infrastructure Failure	Manager	High	1,2	$75,000 each facility	Local, State, Federal	Five years	Not started, lack of funding
Cross Creek WJD #42-3	Purchase and install backup generators and automatic switching for all facilities.	Utility/ Infrastructure Failure	Manager	High	1,2	$200,000 each	Local, State, Federal	Five years	Not started, lack of funding
Cross Creek WJD #42-4	Construct water storage tanks near all subdivisions to ensure constant water flow.	Utility/ Infrastructure Failure	Manager	High	1,2	$75,000 each facility	Local, State, Federal	Five years	Not started, lack of funding
Rural Water Districts (all)-1	Purchase and install lightning suppression equipment at all facilities.	Utility/ Infrastructure Failure	Manager	High	1,2	$50,000	Local, State, Federal	Five years	Not started, lack of funding
Rural Water Districts (all)-2	Purchase and install security fences, gates and video surveillance at all facilities.	Utility/ Infrastructure Failure	Manager	High	1,2	$75,000 each facility	Local, State, Federal	Five years	Not started, lack of funding
Rural Water Districts (all)-3	Purchase and install backup generators and automatic switching for all facilities.	Utility/ Infrastructure Failure	Manager	High	1,2	$200,000 each	Local, State, Federal	Five years	Not started, lack of funding
Rural Water Districts (all)-4	Construct water storage tanks near all subdivisions to ensure constant water flow.	Utility/ Infrastructure Failure	Manager	High	1,2	$75,000 each facility	Local, State, Federal	Five years	Not started, lack of funding
Blue Stem-1	Enhance and upgrade all power lines, utility poles and distribution line equipment to better withstand all hazard events.	Utility/ Infrastructure Failure	Assistant Manager	High	1,2	$75,000,000	Local, State, Federal	Ten years	Not started, lack of funding
Nemaha-Marshall Electric-1	Enhance and upgrade all power lines within the County to better withstand all hazard events.	Utility/ Infrastructure Failure	Assistant Manager	High	1,2	$55,000,000	Local, State, Federal	Ten years	Not started, lack of funding

6.8.6 – Riley County and Participating Jurisdiction Mitigation Actions

Table 6.9: Riley County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Riley County-1	Riley County is committed to continued participation and compliance with the **NFIP**.	Flood	Floodplain Manager, Mitigation Officer	High	1,2	Staff time	Local	Continuous	In progress
Riley County-2	Fund a reoccurring outreach program to educate citizens about the advantage of protecting their property from flooding and complying with **NFIP.**	Flood	Floodplain Manager, Mitigation Officer	High	1,2	$10,000	Local, State, Federal	Continuous	In progress
Riley County-3	Fund a reoccurring outreach program to educate citizens about emergency preparedness and mitigation measures.	All Hazards	Emergency Management	High	3	$10,000	Local, State, Federal	Continuous	In progress
Riley County-4	Seek funding for the construction of FEMA-approved safe rooms and storm shelters in public and private schools, day care centers, senior care facilities, mobile home parks, and multi-family residential.	Tornado, Windstorm	Floodplain Manager, Emergency Manager	High	1,2,3	$2,000,000	Local, State, Federal	Three years	Not started, lack of funding
Riley County-5	Advertise and promote the availability of flood insurance to county property owners by direct mail once a year. **(NFIP)**	Flood	Floodplain Manager, Mitigation Officer	High	1,2	Staff time	Local	Continuous	In progress
Riley County-6	Fund a future conditions floodplain map that depicts the extent of the 1% floodplain following the build out of city of Manhattan to 2035. **(NFIP)**	Flood	GIS Department Director, Floodplain Manager	High	1,2	$50,000	Local, State, Federal	Three years	On-going, lack of funds
Riley County-7	Fund the development of a fire management plan.	Wildfire	Fire Chief	High	4	$20,000,000	Local, State, Federal	Three years	In progress
Riley County-8	Fund a study to identify the medium and high hazard dams in Riley County and develop a Dam Safety Plan for each.	Dam and Levee Failure	Emergency Manager, Planning and Development Supervisor	High	1,2	$10,000	Local, State, Federal	Three years	Not started, lack of funding
Riley County-9	Fund the hiring of a consultant to develop higher standard floodplain regulations. **(NFIP)**	Flood	Planning and Development Supervisor	High	1,2	$10,000	Local, State, Federal	Three years	Not started, lack of funding

Table 6.9: Riley County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Riley County-20	Fund the expansion of outdoor warning and notification systems.	All Hazards	Emergency Manager	High	1,2	$200,000	Local, State, Federal	Three years	Not started, lack of funding
Riley County-11	Purchase and install an engineered radio system that allows county-wide interoperability with regional and state partners and train users on system.	All Hazards	Emergency Manager	High	1,2	$11,000,000	Local, State, Federal	Three years	Not started, lack of funding
Riley County-12	Fund a reoccurring outreach program to educate public and private sectors to prepare for and mitigate against potential agricultural terrorism and bioterrorism.	Terrorism/ Agri-terrorism	County Health Department Director, Extension Officer, Emergency Manager, Police Chief	Medium	3	$10,000	Local, State, Federal	Five years	Not started, lack of funding
Riley County-13	Fund a program for buyout/relocation. This would include the acquisition of parcels of land within the 1 percent annual chance floodplain from willing property owners, the relocation of structures and their occupants, demolition, and any necessary environmental remediation.	Flood	Planning and Development Supervisor, Emergency Manager	Medium	1,2	$10,000,000	Local, State, Federal	Five years	Not started, lack of funding
Riley County-14	Fund a software program to conduct risk analysis and assessments for land use decision making	All Hazards	Public Works Supervisor, Planning and Development Supervisor, Emergency Manager	Medium	1,2	$50,000	Local, State, Federal	Five years	Not started, lack of funding
Riley County-15	Fund the hiring of a consultant to develop zoning and subdivision regulations to mitigate hazards.	All Hazards	Planning and Development Supervisor	Medium	1,2	$150,000	Local, State, Federal	Five years	Not started, lack of funding
Riley County-16	Fund the hiring of a consultant to develop a stormwater management plan for Riley County. **(NFIP)**	Flood	Planning and Development Supervisor	Medium	1,2	$50,000	Local, State, Federal	Five years	Not started, lack of funding

Table 6.9: Riley County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Riley County-17	Create a working group to evaluate the firefighting water supply resources within the County. This should include both fixed and mobile supply issues.	Wildfire	Fire Chief	Medium	4	Staff time	Local	Five years	Not started, lack of staff
Riley County-18	Fund the formation of a Wildcat Creek Watershed District. **(NFIP)**	Flood	Planning and Development Supervisor	Low	1,2	$25,000,000	Local, State, Federal	Five years	Not started, lack of funding
Riley County-19	Fund a study to identify the county's critical facilities and infrastructure and develop mitigation techniques for protecting each facility in a cost-effective manners	All Hazards	Emergency Manager, Public Works Director	Low	1,2	$20,000	Local, State, Federal	Five years	Not started, lack of funding
Leonardville-1	Develop educational brochures for city residents to inform them of the availability of Community Center services during inclement weather.	All Hazards	City Administrator	High	1,2	Staff time	Local	Continuous	In progress
Leonardville-2	Purchase and install backup power sources for critical facilities in Leonardville.	Utility/ Infrastructure Failure	City Administrator	High	1,2	$50,000	Local, State, Federal	Three years	Not started, lack of funding
Manhattan-1	The city of Manhattan is committed to continued participation and compliance with the **NFIP**.	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress
Manhattan-2	Develop a program to acquire and preserve parcels of land subject to flooding from willing and voluntary property owners. **(NFIP)**	Flood	Mitigation Officer, Floodplain Manager, City Manager	High	1,2	Dependent upon fair market value and number of properties	Local, State, Federal	Three years	Not started, lack of funding
Manhattan-3	Identify and map flash-flood prone areas implement flood reduction measures. **(NFIP)**	Flood	Mitigation Officer, Floodplain Manager	High	1,2	Staff time, per project cost	Local	Three years	Not started, lack of staff and funding
Manhattan-4	Develop and implement standards designed to restrict development in natural hazard areas and	All Hazards	City Manager	High	1,2,4	Staff time	Local	Three years	Not started, lack of staff

Table 6.9: Riley County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
	environmentally sensitive areas as identified in the Comprehensive Plan.								
Manhattan-5	Develop and implement standards for open space dedication requirements.	Flood	City Manager	High	1,2,4	Staff time	Local	Three years	Not started, lack of staff
Manhattan-6	The city of Manhattan will complete PM 43 certification of the city levee according to the FEMA Provisionally Accredited Levee agreement.	Dam and Levee Failure	City Engineer, Director Planning and Zoning	High	1,2,4	$200,000	Local, State, Federal	Three years	Not started, lack of funding
Ogden-1	The city of Ogden is committed to continued participation and compliance with the **NFIP**.	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress
Ogden-2	Research and pursue funding for the purchase and installation of alternative forms of public warning and mass notification systems.	All Hazards	City Administrator	High	1,2	$60,000	Local, State, Federal	Three years	Not started, lack of funding
Ogden-3	Develop a program to acquire and preserve parcels of land subject to flooding from willing and voluntary property owners. **(NFIP)**	Flood	City Administrator	High	1,2	Dependent upon fair market value and number of properties	Local, State, Federal	Three years	Not started, lack of funding
Ogden-4	Seek funding to design and construct a community safe room	Tornado, Windstorm	City Clerk, City Engineer	High	1,2	$100,000 - $200,000	Local, State, Federal	Three years	Not started, lack of funding
Ogden-5	Purchase and install backup generators for the Ogden Community Center and critical facilities.	Utility/ Infrastructure Failure	City Clerk	High	1,2	$260,000	Local, State, Federal	Three years	Not started, lack of funding
Randolph-1	Purchase and install alternative forms of public warning and mass notification systems.	All Hazards	City Administrator	High	1,2	$60,000	Local, State, Federal	Five years	Not started, lack of funding
City of Riley-1	The city of Riley is committed to continued participation and compliance with the **NFIP**.	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress
City of Riley-2	Develop a program to acquire and preserve parcels of land subject to	Flood	City Manager	High	1,2	Dependent upon fair market	Local, State, Federal	Five years	Not started, lack of funding

Table 6.9: Riley County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
	flooding from willing and voluntary property owners. **(NFIP)**					value and number of properties			
City of Riley-3	Research and pursue funding for the installation of alternative forms of public warning and mass notification systems.	All Hazards	City Manager	Medium	1,2	$60,000	Local, State, Federal	Five years	Not started, lack of funding
City of Riley-4	Seek funding for the purchase of transfer switches for facilities designated as community shelters to be compatible with generator use	Utility/ Infrastructure Failure	City Manager	High	1,2	$15,000	Local, State, Federal	Five years	Not started, lack of funding
City of Riley-5	Develop a city emergency operations plan	All Hazards	City Manager	Medium	1,2	Staff time	Local	Five years	Not started, lack of staff
KSU-1	Public Safety will research and implement enhancements to the University's early warning emergency notification systems (K-State Alerts) for faculty, staff, students and the general public for weather alerts and campus emergencies.	All Hazards	KSU Public Safety Director	Medium	1,2	$100,000	Local, State, Federal	Five years	Not started, lack of staff
USD #378-1	Construct safe rooms for all USD #378 schools	Tornado, Windstorm	Superintendent	High	1,2	$1,000,000	Local, State, Federal	Three years	Not started, lack of staff
USD #378-2	Review and design access features for all school buildings to determine appropriate upgrades to building entrances and exits, and passageways between facilities.	Terrorism/ Agri-terrorism	Superintendent	Medium	1,2	$85,000	Local, State, Federal	Five years	Not started, lack of staff
USD #383-1	Construct safe rooms for USD #383 schools	Tornado, Windstorm	Superintendent	High	1,2	$1,000,000	Local, State, Federal	Three years	Not started, lack of staff
USD #384-1	Construct safe rooms for USD #384 schools	Tornado, Windstorm	Superintendent	High	1,2	$1,000,000	Local, State, Federal	Three years	Not started, lack of staff
Blue Stem-1	Enhance and upgrade all power lines, utility poles and distribution line equipment to better withstand all hazard events.	Utility/ Infrastructure Failure	Assistant Manager	High	1,2	$75,000,000	Local, State, Federal	Ten years	Not started, lack of staff

Table 6.9: Riley County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Flint Hills-1	Enhance and upgrade all power lines within the County to better withstand all hazard events.	Utility/ Infrastructure Failure	Assistant Manager	High	1,2	$10,000,000	Local, State, Federal	Ten years	Not started, lack of staff

6.8.7 – Wabaunsee County and Participating Jurisdictions Mitigation Actions

Table 6.10: Wabaunsee County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Wabaunsee County-1	Wabaunsee County is committed to continued participation and compliance with the **NFIP**.	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress
Wabaunsee County-2	Regularly contact owners identified in high-risk flood areas and inform them of potential availability of flood insurance, in addition to other flood protection measures. **(NFIP)**	Flood	Emergency Manager	High	1,2	Staff time	Local, State, Federal	Continuous	In progress
Wabaunsee County-3	Collect educational materials on individual and family preparedness / mitigation measures for property owners, and display at both the library and routinely visited county offices.	All Hazards	Emergency Manager	High	3	Staff time	Local	Continuous	In progress
Wabaunsee County-4	Annually host a public hazards workshop for the residents of the jurisdiction, in combination with local festivals, fairs, or other appropriate events.	All Hazards	Emergency Manager	High	3	Staff time	Local	Continuous	In progress
Wabaunsee County-5	Construct FEMA-approved safe rooms and storm shelters in underserved areas of the county and care facilities.	Tornado, Windstorm	Emergency Manager	High	1,2	Staff time	Local	Continuous	Not started, lack of funding
Wabaunsee County-6	Educate residents about driving in winter storms and handling winter-related health effects.	Winter Storm	Emergency Manager	High	3	Staff time	Local	Continuous	In progress
Wabaunsee County-7	Promote and educate the jurisdiction's public and private sectors on potential agricultural terrorism and bio-terrorism issues that can severely impact the county and regional economies and develop and implement plans to address these issues.	Terrorism/ Agri-terrorism	Director County Health Department, Emergency Manager, Extension Officer	High	3	Staff time	Local, State, Federal	Five years	Not started, lack of staff
Wabaunsee County-8	Develop an annex to the Local Emergency Operations Plan for dam	Dam and Levee Failure	Emergency Manager	High	1,2	Staff time	Local	Five years	Not started, lack of staff

Table 6.10: Wabaunsee County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
	failure response and evacuation plans for high hazard dams in Wabaunsee County.								
Wabaunsee County-9	Research and recommend appropriate building codes for the County that include wind -resistant design techniques for new construction.	All Hazards	Emergency Manager	High	1,2	Staff time	Local	Five years	Not started, lack of staff
Wabaunsee County-10	Regularly calculate and document the amount of flood prone property that is preserved as open space to reduce flood insurance burden to the county. **(NFIP).**	Flood	Emergency Manager	High	1,2	Staff time	Local	Five years	Not started, lack of staff
Wabaunsee County-11	Research and recommend an ordinance/resolution to require tornado shelters for new major manufactured and/or mobile home parks with more than 10 mobile home spaces.	Tornado, Windstorm	Emergency Manager	High	1,2	Staff time	Local	Five years	Not started, lack of staff
Wabaunsee County-12	Examine the all current agreements within the county and assess the need to expand or update cooperative agreements for firefighting resources.	Wildfire	Fire Chief	High	4	Staff time	Local	Continuous	Not started, lack of staff
Wabaunsee County-13	Develop and implement a wildfire prevention/education program.	Wildfire	Fire Chief	Medium	3	Staff time and $5,000	Local	Continuous	Not started, lack of staff and funding
Wabaunsee County-14	Evaluate the firefighting water supply resources within the County. This should include both fixed and mobile supply issues.	Wildfire	Fire Chief	Medium	4	Staff time	Local	Five years	Not started, lack of staff
Wabaunsee County-15	Contact owners of high hazard dams in Wabaunsee County and inform them of their responsibility to complete and provide EAPs to the Wabaunsee County Emergency Management Department as required by the KDA-DWR, Chief Engineer.	Dam and Levee Failure	Mill Creek WJD No 85 Manager, Emergency Manager	Medium	3,4	Staff time	Local	Five years	Not started, lack of staff
Alma-1	The City of Alma is committed to continued participation and compliance with the **NFIP**.	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	Not started, lack of staff

Table 6.10: Wabaunsee County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Alma-2	Assess flood prone areas and implement flood reduction measures. **(NFIP)**	Flood	City Administrator	Medium	1,2	Staff time, per project cost	Local	Five years	Not started, lack of funding and staff
Alta Vista-1	Construct a community safe room.	Tornado, Windstorm	City Administrator	Medium	1,2	$250,000	Local, State, Federal	Five years	Not started, lack of funding
Eskridge-1	The City of Eskridge is committed to continued participation and compliance with the **NFIP**.	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress
Eskridge-2	Assess flood prone areas and implement flood reduction measures. **(NFIP)**	Flood	City Administrator	High	1,2	Staff time	Local	Continuous	Not started, lack of funding and staff
Harveyville-1	The City of Harveyville is committed to continued participation and compliance with the **NFIP**.	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress
Harveyville-2	Assess flood prone areas and implement flood reduction measures. **(NFIP)**	Flood	City Administrator	High	1,2	Staff time	Local	Continuous	Not started, lack of funding and staff
Maple Hill-1	The City of Maple Hill is committed to continued participation and compliance with the **NFIP**.	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress
Maple Hill-2	Assess flood prone areas and implement flood reduction measures. **(NFIP)**	Flood	City Administrator	High	1,2	Staff time	Local	Continuous	Not started, lack of funding and staff
McFarland-1	The City of McFarland is committed to continued participation and compliance with the **NFIP**.	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress
McFarland-2	Assess flood prone areas and implement flood reduction measures. **(NFIP)**	Flood	City Administrator	High	1,2	Staff time	Local	Continuous	Not started, lack of funding and staff

Table 6.10: Wabaunsee County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
McFarland-3	Develop and submit an EAP for the High Hazard Dam owned by the city.	Dam and Levee Failure	City Administrator	Medium	1,2	Staff time	Local	Five years	Not started, lack of staff
Paxico-1	The City of Paxico is committed to continued participation and compliance with the **NFIP**.	Flood	NFIP Administrator	High	1,2	Staff time	Local	Continuous	In progress
Paxico-2	Assess flood prone areas and implement flood reduction measures. **(NFIP)**	Flood	City Administrator	High	1,2	Staff time	Local	Continuous	Not started, lack of funding and staff
USD #329-1	Construct safe rooms in all USD #329 schools.	Tornado, Windstorm	Superintendent	High	1,2	$1,000,000	Local, State, Federal	Three years	Not started, lack of funding
USD #329-2	Purchase and install backup generators in USD #329 schools.	Utility/ Infrastructure Failure	Superintendent	Medium	1,2	$200,000	Local, State, Federal	Five years	Not started, lack of funding
USD #329-3	Assess elevations and water flow in the district to qualify the benefit of flood control projects in the District.	Flood	Superintendent	Medium	1,2	$45,000	Local, State, Federal	Five years	Not started, lack of funding
USD #329-4	Purchase flood insurance for the school facilities located in the floodplain.	Flood	Superintendent	Medium	1,2	Staff time	Local	Five years	Not started, lack of funding
USD #330-1	Construct safe rooms in USD #330 schools.	Tornado, Windstorm	Superintendent	Low	1,2	$1,000,000	Local, State, Federal	Five years	Not started, lack of funding
Rural Water Districts (all)-1	Replace water lines in jeopardy of being damaged due to expansive soils.	Expansive Soils	Operator	High	1,2	$350,000	Local, State, Federal	Five years	Not started, lack of funding
Rural Water Districts (all)-2	Purchase and install automatic switchover on all booster station generators.	Multi-Hazard	Operator	Medium	1,2	$10,000 each	Local, State, Federal	Five years	Not started, lack of funding
Rural Water Districts (all)-3	Purchase and install automatic switchover on all well generators.	Multi-Hazard	Operator	Medium	1,2	$10,000 each	Local, State, Federal	Five years	Not started, lack of funding
Bluestem-1	Enhance and upgrade all power lines, utility poles and distribution line	Utility/ Infrastructure Failure	Assistant Manager	High	1,2	$8,000,000	Local, State, Federal	Ten years	Not started, lack of funding

Table 6.10: Wabaunsee County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
	equipment to better withstand all hazard events.								
Flint Hills-1	Complete upgrades and enhancements of existing power lines to protect infrastructure and future exposure to natural hazards.	Utility/ Infrastructure Failure	Assistant Manager	High	1,2	$4,000,000	Local, State, Federal	Ten years	Not started, lack of funding
Kaw Valley-1	Enhance and upgrade all power lines, utility poles and distribution line equipment to better withstand all hazard events.	Utility/ Infrastructure Failure	Assistant Manager	High	1,2	$5,000,000	Local, State, Federal	Ten years	Not started, lack of funding
Lyon-Coffey - 1	Complete upgrades and enhancements of existing power lines to protect infrastructure and future exposure to natural hazards.	Utility/ Infrastructure Failure	Assistant Manager	High	1,2	$2,000,000	Local, State, Federal	Ten years	Not started, lack of funding

6.9 –Mitigation Actions No Longer Under Consideration

For this plan update, members of the MPC and participating jurisdictions were asked to consider if all previous mitigation actions were still viable. Due to the thorough nature of the review, and the comprehensive updating of mitigation actions to meet both the needs of the participating jurisdictions and FEMA planning requirements, many actions were either modified or removed from consideration. A full comparison of jurisdictional actions may be completed by comparing the actions detailed in this plan against the actions from the 2014 regional hazard mitigation plan.

6.10 – Action Implementation and Monitoring

44 CFR 201.6 (c)(3)(iii) An action plan describing how the actions identified in paragraph (c)(3)(ii) of this section 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 benefit review of the proposed projects and their associated costs.

Kansas Region I and relevant participating jurisdictions are responsible for implementing their identified mitigation action(s). To foster accountability and increase the likelihood that actions will be implemented, every proposed action is assigned to an action champion. In general:

- The identified champion will be responsible for tracking and reporting on action status.
- The identified champion will provide input on whether the action as implemented is successful in reducing vulnerability.
- If the action is unsuccessful in reducing vulnerability, the identified champion will be tasked with identifying deficiencies and additional required actions.

Additionally, each action has been assigned a proposed completion timeframe to assist in tracking the continued viability of the action if not completed, and to assist participating jurisdictions in potentially programming Funding to complete the actions.

In general, each participating jurisdiction, along with the MPC, is responsible for monitoring the progress of mitigation activities and projects. To facilitate the tracking of mitigation actions the Kansas Region I MPC and KDEM, in conjunction with participating jurisdictions, will compile a list of projects funded and completed. Additionally, the MPC and participating jurisdictions will be solicited annually to provide information on any other mitigation projects that were not funded through hazard mitigation grants for tracking and update purposes.

To track mitigation projects from initiation to closeout, participating jurisdictions will use a project tracking methodology that includes, at a minimum, the following information:

- Applicant data
- Grant identifier
- Award date

- Awarded contractor
- Period of Performance
- Total project cost, including local share of project
- Quarterly Reports

Upon completion of a project the awarded participating jurisdiction will conduct a closeout site visit to:

- Review all project documents
- Review all procurement documents and contracts
- Photograph completed project

Project closeout packages will generally be submitted no more than 90 days after a project has been completed, and should include the following:

- All available documentation
- Photographs of completed project
- Materials, labor and equipment documentation
- Close-out certification

6.11 – Jurisdictional Compliance with NFIP

44 CFR 201.6 (c)(3)(ii) All plans approved by FEMA after October 1, 2008, must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.

Participating jurisdictions are committed to continued involvement and compliance with the **NFIP**. To help facilitate compliance, each participating jurisdiction:

- Adopts Floodplain regulations through local ordinance
- Enforces floodplain ordinances through building restrictions as detailed in relevant ordinance
- Regulates new construction in Special Flood Hazard Areas as outlined in their floodplain ordinance
- Utilizes FEMA FIRMs
- Monitors floodplain activities

Key to achieving across the board reduction in flood damages is a robust community assistance, education and awareness program. As such, Kansas Region I and its participating jurisdictions will continue to develop both electronic (including social media) and in person outreach activities.

Specific mitigation actions supporting regional commitment to both the NFIP and potential CRS application and compliance were identified above with a bold type **NFIP** in the subsequent mitigation action sections.

6.12 –Primary Mitigation Action Funding Sources

It is generally recognized that mitigation actions help communities realize long term savings by preventing future losses due to hazard events. However, many mitigation actions are beyond the budgetary capabilities a jurisdiction and Funding assistance, often in the form of grants, may be required. This following table provides a general description of some of the primary avenues available to jurisdictions to defray the cost of implementing mitigation actions.

Table 6.11: Primary Hazard Mitigation Funding Mechanisms

Program	Funding Agency	Funding Match Requirement	Program Description
Community Development Block Grant Program	Department of Housing and Urban Development	N/A	Program is a competitive grant process through which about half of the Funding goes to support the development of community facilities and water and sewer projects. grants in four categories, community improvement, urgent need, Kansas Small Towns Environment Program and economic development.
Federal Public Assistance	FEMA	Varied	Provides Funding used to restore the parts of a structure that was damaged during a disaster. The restoration must provide protection from subsequent events.
Federal Individual Assistance	FEMA	Varied	Provides assistance for qualified homeowners/renters whose primary residence was damaged or destroyed in a declared designated area.
Flood Mitigation Assistance	FEMA	Varied	Program provides funding to States, Territories, federally recognized tribes and local communities for projects and planning that reduces or eliminates long-term risk of flood damage to structures insured under the NFIP. Funding is also available for management costs.
Hazard Mitigation Grant Program	FEMA	25%	Program is to ensure that the opportunity to take critical mitigation measures to reduce the risk of loss of life and property from future disasters is not lost during the reconstruction process following a disaster. Funding is available, when authorized under the Presidential Major Disaster Declaration, in the areas of the state requested by the governor. The amount of Funding available to the applicant is based upon the total federal assistance provided by FEMA for disaster recovery under the major disaster declaration.
Pre-Disaster Mitigation Program	FEMA	25%	Program is designed to assist states, territories, Indian tribal governments, and local communities to implement a sustained pre-disaster natural hazard mitigation program to reduce overall risk to the population and structures from future hazard events, while also reducing reliance on federal Funding from future major disaster declarations.

6.13 – Additional Hazard Mitigation Funding Mechanisms

A wide variety of federal and state agencies offer mechanisms for funding mitigation projects. A thorough, but by no means complete, list of potential mitigaion funding sources are detailed in the following table along with a brief program description.

Table 6.12: Additional Potential Hazard Mitigation Funding Mechanisms

Department	Program	Program Description
FEMA	Fire Management Assistance Grant Program	Provides for the mitigation, management, and control of fires on publicly or privately-owned forests or grasslands. The process is initiated when the state requests federal assistance for an event where the threat of major disaster exists for either single fires or numerous small fires.
FEMA	Risk Mapping, Assessment, and Planning (Risk Map)	The Risk MAP strategy incorporates floodplain management with hazard mitigation by using tools such as DFIRMs, HAZUS reports, and risk assessment data to deliver quality data that increases public awareness and leads to action to reduce risk to life and property.
National Oceanic and Atmospheric Administration National Weather Service (NOAA NWS)	StormReady Program	StormReady is a voluntary program that was developed by NOAA NWS to help communities better prepare for and mitigate effects of all types of severe weather from tornadoes to flooding. The program encourages communities to take a new, proactive approach to improving local hazardous weather operations by providing emergency managers with clear-cut guidelines on how to improve their hazardous weather operations.
Mutual Aid	Kansas Water, Wastewater, Gas and Electric Utility Mutual Aid Program (KSMAP)	KSMAP has been developed to serve as the mutual aid program for Kansas utilities to help with provision of equipment, materials and personnel to assist in the restoration and continuation of utility service for those utilities needing assistance. The project is a joint effort of Kansas Municipal Utilities, Kansas Rural Water Association, the Kansas Section – American Water Works Association, the Kansas Water Environment Association, Kansas Corporation Commission, Kansas Department of Health & Environment and the Kansas Division of Emergency Management.
FEMA	Individual & Households, Other Needs Assistance (ONA) Program	The ONA program provides financial assistance to individuals or households who sustain damage or develop serious needs because of a natural or man-made disaster. The funding share is 75% federal funds and 25% state funds. The program gives funds for disaster-related necessary expenses and serious needs, including personal property, transportation, medical and dental, funeral, essential tools, flood insurance, and moving and storage. The current maximum allowable amount for any one disaster to individuals or families is $25,000.
Kansas Department of Agriculture – Division of Conservation (KDA-DoC)	Multipurpose Small Lakes Program	Provides state cost-share assistance to a government entity for the construction or renovation of a dam for flood control and water supply and/or recreational purposes. It requires a general plan of works and a local nonpoint source pollution control plan. https://agriculture.ks.gov/divisions-programs/division-of-conservation/flood-control-and-lakes-programs
(KDA-DoC)	State Assistance to Watershed Dam Construction	Provides state cost-share assistance to a government entity for the construction or renovation of a dam for flood control and water supply and/or recreational purposes. It requires a general plan of works and a local nonpoint source pollution control plan.
(KDA-DoC)	State Assistance to Watershed Dam Construction	Provides cost-share assistance to organized watershed districts and other special purpose districts for the implementation of structural and nonstructural practices that reduce flood damage. Structural

Table 6.12: Additional Potential Hazard Mitigation Funding Mechanisms

Department	Program	Program Description
		practices must be approved by the chief engineer of the Division of Water Resources. https://agriculture.ks.gov/divisions-programs/division-of-conservation/flood-control-and-lakes-programs
(KDA-DoC)	Water Resources Cost Share Program	Provides state cost-share assistance to landowners for the establishment of enduring water conservation practices to protect and improve the quality and quantity of Kansas water resources. https://agriculture.ks.gov/divisions-programs/division-of-conservation/financial-assistance
(KDA-DoC)	Water Conservation Program	Provides financial incentives for voluntary retirements of private water rights in high priority areas. For more information about WRAP enrollment opportunities, please contact
Kansas Department of Agriculture – Division of Water Resources (KDA-DWR)	Community Assistance Program State Support Services Element	This program enhances the State's capability to provide floodplain management information and technical assistance to help local officials in NFIP and CRS participating communities. It also encourages nonparticipating communities to join the NFIP and CRS.
KDA-DWR	Floodplain Management Program	Program provides technical assistance for local, state and federal floodplain management, including managing the NFIP and floodplain ordinances and regulations adopted by city and county governments. https://agriculture.ks.gov/divisions-programs/dwr/floodplain/flood-safety-2
Kansas Department of Commerce (KDC)	Community Service Tax Credit	Program offers Kansas tax credits to for nonprofit organizations for contributions to approved projects. Projects eligible for tax credit awards include community service, crime prevention and health care https://www.kansascommerce.gov/programs-services/community-development-assistance/community-service-tax-credit-program/
Kansas Department of Health and Environment—Bureau of Environmental Remediation (KDHE-BER)	Abandoned Mine Land Program	Program provides for the remediation of sites that are an immediate threat to the health and safety of the public. http://www.kdheks.gov/mining/abandoned_mineland.htm
Kansas Department of Commerce (KDC)	CDBG Urgent Need Grant Abandoned Mine Land Program	This funding is intended to resolve emergency issues created by a severe disaster that pose a threat to the health and safety of citizens. https://www.kansascommercce.gov/programs-services/community-development-assistance/community-development-block-grant-program/urgent-need/
KDHE-BER	Kansas Brownfields Program	Programs to assist communities with the redevelopment of brownfields properties http://www.kdheks.gov/brownfields/index.html
KDHE-BER	State Water Plan Contamination Remediation Orphan Sites Program	Program provides Funding for the evaluation, monitoring, and remediation of contaminated groundwater or surface water sites and provides Funding to supply alternate water sources as an emergency http://www.kdheks.gov/ars/swp/index.html
Kansas Department of Transportation	Transportation Alternative Program	This is an annual competitive Federal Transportation Alternatives program that can be used for transportation enhancement activities that include: Vegetation Management - improvement of roadway safety; prevention of invasive species; providing erosion control.

Table 6.12: Additional Potential Hazard Mitigation Funding Mechanisms

Department	Program	Program Description
		Stormwater Mitigation - pollution prevention and abatement activities to address stormwater management; water pollution prevention related to highway construction or due to highway runoff. Wildlife Management - reduction of vehicle-caused wildlife mortality; restoration and maintenance of connectivity among terrestrial or aquatic habitats. http://www.ksdot.org/bureaus/burtransplan/TransAlt.asp
Kansas Forest Service (KFS)	Community Forestry Program	Program provides assistance, education, and support to communities and municipalities in organizing urban and community forestry programs, identifying resource needs, setting priorities of work, and training city employees. https://www.kansasforests.org/community_forestry/
KFS	Rural Forestry Program	Professional foresters provide on-site forest management and agro-forestry analysis and recommendations through inventory of forests, woodlands and windbreaks. https://www.kansasforests.org/rural_forestry/
KFS	Firewise Program	The Kansas Firewise program offers prevention materials for homeowners to reduce the threat of wildland fire in rural and high-risk areas. https://www.kansasforests.org/fire_management/fireprevention.html
KFS	Forest Health Program	Program monitors the impacts of insects, diseases, drought, flooding and other health issues in forests, woodlands, windbreaks and conservation tree plantings by providing diagnosis and control recommendations and mitigation and planning for Emerald Ash Borer, Asian Bush Honeysuckles and other invasive species. https://www.kansasforests.org/forest_health/
KFS	Landowner Education	Provides information and education to farmers regarding the benefits of good forest management. This includes information about federal cost share practices including the Environmental Quality Incentives Program, Conservation Reserve Program, and the Riparian and Wetland Protection Program. https://www.kansasforests.org/forest_health/
KFS	Rural Fire Protection	Program provides fire support services to rural fire departments, including wildfire training, Smokey Bear fire prevention materials, and the acquisition and distribution of excess military vehicles for conversion to firefighting units.
Kansas Highway Patrol	Federal Preparedness Grant Program	Through this program, the Department of Homeland Security/FEMA provides Funding to states to prevent, respond to, and recover from acts of terrorism by enhancing and sustaining capabilities. https://www.kansashighwaypatrol.org/
Kansas State Fire Marshal's Office	Fire Prevention Program	Program focuses on structural inspection to ensure compliance with the Kansas Fire Prevention Code.
Kansas State Fire Marshal's Office	Hazardous Materials Program	Program provides training, planning, and analysis related to hazardous materials accidents/incidents and WMD events to help local facilities and local, state, and federal agencies before an event occurs.

Table 6.12: Additional Potential Hazard Mitigation Funding Mechanisms

Department	Program	Program Description
Kansas Water Office (KWO)	Public Information and Education	This public education program provides information on water resource issues to the general public through publication of articles, pamphlets, news reports, etc. It also provides support for environmental education and local leadership development programs. https://www.kwo.ks.gov/
KWO	Stream Gauging Program	State financial assistance is provided for the operation of selected gauging stations operated by the U.S. Geological Survey. https://www.kwo.ks.gov/projects/stream-gaging-network
KWO	Technical Assistance to Water Users	Program provides technical assistance to municipalities, irrigators, and other groups to assist in the reduction of water use and improve water use efficiency. (For assistance contact KWO at 785-296-3185.
KWO	Water Resource Planning	As the water planning, policy, coordination and marketing agency for the state the Kansas Water Office works to maintain a comprehensive State Water Plan for the management, conservation and development of the water resources of the state. This includes the collection and compilation of information pertaining to climate, water and soil as related to the usage of water for agricultural, industrial and municipal purposes and the availability of water supplies in the several watersheds of the state; development of a state plan of water resources management, conservation and development for water planning areas; the development and maintenance of guidelines for water conservation plans and practices; and the establishment of guidelines as to when conditions indicative of drought exist. https://www.kwo.ks.gov/about-the-kwo/kwo

7.0 Plan Maintenance

7.1 – Hazard Mitigation Plan Monitoring and Evaluation

44 CFR 201.6 (c)(4) A plan maintenance process that includes: (i) A section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

The Kansas Region I Hazard Mitigation Plan will be updated then approved by FEMA every five years. During the five-year cycle, the plan will undergo continuous monitoring and evaluation to ensure that the policies, procedures, priorities, and state environment established in the plan reflect current conditions.

To achieve this, the MPC will meet annually after plan approval. If needed, additional meetings will take place during this timeframe. The State of Kansas State Hazard Mitigation Officer will determine the meeting dates and location and is responsible for sending invitations.

During the five-year evaluation phase, the MPC is responsible for assessing the effectiveness of the plan by:

- Reviewing the hazards and determining if any of them have changed
- Determining if there are new hazards that pose a risk to the state
- Ensuring goals and objectives are still relevant
- Determining if any actions have been completed or are deemed irrelevant
- Determining if new actions should be added
- Determining if capabilities have changed

In addition to these meetings, the MPC will monitor and evaluate the progress of mitigation projects via regular reports, site visits, and correspondence. Progress and viability of identified mitigation actions will be measured based on the following variables:

- The number of projects successfully implemented
- The breadth of disbursement of mitigation grant funds
- The disaster losses avoided over time
- Public awareness
- Success of completed mitigation projects in helping address and achieve identified goals and objectives
- Have the completed mitigation actions resulted in a safer Kansas Region I

In order to monitor the implementation of plan actions and the overall progress of plan goals, MPC members will report on the following information:

- How the actions from the mitigation strategy are being pursued and completed
- Are actions being prioritized
- How the plan goals and objectives are being carried out
- How mitigation funding mechanisms are being utilized
- How participating jurisdictions are receiving technical assistance

7.2 – Jurisdictional Maintenance Requirements

Kansas Region I and all participating jurisdictions will be tasked with plan monitoring, evaluation, and maintenance. All participating jurisdictions, led by MPC, will:

- Regularly monitor and evaluate the implementation of the plan
- When applicable, after a disaster event, evaluate the effectiveness of the plan
- Act as a think tank for all issues related to hazard mitigation planning
- Act as a clearinghouse for hazard mitigation ideas and activities
- Assist with the implementation of all identified actions with available resources
- Monitor all available funding opportunities for mitigation actions
- Coordinate the cycle for the revision and update of the mitigation plan
- Report on plan progress and recommended changes to the relevant governing bodies
- Inform and solicit input from the public

Each participating jurisdiction will also be responsible for promoting the integration of the hazard mitigation plan into all relevant plans, policies, procedures and ordinances.

7.3 – Plan Maintenance and Update Process

44 CFR 201.6 (c)(4) A plan maintenance process that includes: (i) A section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle."

Kansas Region I, the State of Kansas, and the MPC will facilitate a yearly plan review and the subsequent hazard mitigation plan revision and re-adoption process within the required five-year period.

Information from the annual meetings will be incorporated into the plan update. Starting in calendar year 2022, the formal update process will begin. A thorough review and revision of the plan will take place, following all requirements detailed in 44 CFR 201.4, FEMA guidance documents, and DMA 2000. The following represents a general timeline for the next required plan revision.

- **Three years before plan expiration, Spring:** The MPC will begin updating the plan risk assessment. Hazards will be analyzed for continued relevancy and a review will be conducted to determine and new potential hazards.
- **Three years before plan expiration, Fall:** The MPC will begin updating the vulnerability assessment. Data will be gathered on jurisdictional assets, critical facilities, building stock values, crop losses, jurisdictional damages, etc.
- **Two years before plan expiration, Spring:** The MPC will review all information from previous meetings and determine if hazard mitigation goals and objectives are still relevant. Actions will be reviewed for currency and applicability. Work will begin on HMP revision.
- **Two years before plan expiration, Fall:** The MPC will evaluate the policies, programs, capabilities, and funding sources from the previous plan and plan revision to determine if they are still accurate and determine if additions are required.

- **One year before plan expiration:** Work will begin on the revision of the 2019 HMP.
- **Six months before plan expiration:** The MPC will review the final draft copy of the mitigation plan and make comments and updates if necessary. All participating jurisdictions and the public will be given an opportunity to review and comment on draft HMP.
- **Two months before plan expiration:** Formal submittal to FEMA for re-approval.

As part of the plan maintenance process, and consistently during the five-year HMP approval period, the MPC will continually monitor all elements of the plan, including:

- The incorporation of the HMP into other planning mechanisms
- All revisions and updates to the HMP
- Continued public participation

This monitoring will be done through outreach efforts to include:

- Email communication
- Phone communication
- In person communication at meetings, relevant conferences, and local planning events

Through consistent monitoring the MPC will then be able to efficiently incorporate these elements into the next plan revision.

Upon each successive revision, the plan will need to be re-adopted by all participating jurisdictions. Circumstances, including a major disaster or a change in regulations or laws, may modify the required five-year planning cycle.

7.4 – Post-Disaster Declaration Procedures

Following a disaster, each participating jurisdiction and the MPC may review the plan to determine if any additional actions need to be identified, additional funding has become available, or any identified actions need to be re-prioritized.

7.5 – Incorporation of HMP into Other Planning Mechanisms

44 CFR 201.6 (c)(4)(ii) 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.

The hazard mitigation plan is an overarching document that is both comprised of, and contributes to, various county and local plans. Under the leadership of the MPC, it is hoped that when each of these other plans is updated, they will be measured against the contents of this HMP.

Below is a list of the various jurisdictional planning efforts, either solely or jointly administered, and relevant planning documents. While each plan can stand alone, each participating jurisdiction, under the

leadership of their MPC member, will actively work to incorporate relevant parts of this hazard mitigation plan into the following:

- All participating jurisdictions Codes and Ordinances
- All participating jurisdictions Comprehensive Plans
- All participating jurisdictions Critical Facilities Plans
- All participating jurisdictions Economic Development Strategic Plans
- All participating jurisdictions Emergency Operations Plans
- All participating jurisdictions Flood Mitigation Assistance Plan
- All participating jurisdiction Land-Use Plans
- Community Wildfire Protection Plans

Additionally, in cooperation with the MPC, each participating jurisdiction will be actively courted on incorporating elements of this hazard mitigation plan for any relevant plan, code or ordinance revision or creation.

Finally, each participating jurisdiction has committed to actively encourage all departments to implement actions that minimize loss of life and property damage. Whenever possible, each participating jurisdiction will use existing plans, policies, procedures and programs to aid in the implementation of identified hazard mitigation actions. Potential avenues for implementation may include:

- Budget revisions or adoptions
- Capital improvement plans
- General or master plans
- Hiring of staff
- Land use planning
- Operation plans
- Ordinances
- Stormwater planning

Participating jurisdictions are encouraged to utilize all available budget avenues for the completion of hazard mitigation items. Budgetary options may include:

- Annual budgets
- Application for grant funding
- Departmental budgets
- In-kind donations

Where appropriate, the MPC will take the lead in integrating this HMP into overarching, countywide plans, code, ordinances and any other relevant documents, policies or procedures.

7.6 – Continued Public Involvement

44 CFR 201.6 (c)(4)(iii) Discussion on how the community will continue public participation in the plan maintenance process.

Public participation is an important part of the continued mitigation planning process. Every effort will be made to keep the public informed on both relevant mitigation issues and the five-year plan revision cycle. Strategies for continued public involvement may include:

- Postings on electronic media, to include websites
- Notifications, when possible, in local media
- Making plans available for review in public locations
- A review of local mitigation strategies and goals
- A review completed and remaining hazard mitigation actions

Appendix A

Adoption Resolutions

Model Resolution

Resolution # _____: **Adopting the Kansas Homeland Security Region I Hazard Mitigation Plan**

Whereas, the (Name of Government/District/Organization) 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 Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple Federal Emergency Management Agency (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 FEMA Region VII officials have reviewed the Kansas Homeland Security Region I 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 Kansas Homeland Security Region I 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 plan, and

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 Kansas Homeland Security Region I 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 FEMA Region VII officials to enable the plan's final approval.

_____:Date _____: Approved by

Appendix B

FEMA Approval Documents

Appendix D

Critical Facilities

(Restricted, Not for Release)

RESTRICTED

Introduction to Critical Facilities

A critical facility is essential in providing utility or direction either during the response to an emergency or during the recovery operation, with facilities determined from jurisdictional feedback. The following are examples of critical facilities and assets:

- Communications facilities
- Emergency operations centers
- Fire stations
- Government buildings
- HazMat Facilities
- Hospitals and other medical facilities
- Police stations
- As deemed necessary by the jurisdiction

The information below is the inventory of critical facilities for all participating jurisdictions who elected to provide this information for this plan. All information was gathered from the Kansas Division of Emergency Management, participating jurisdictions, and prior plans.

Details concerning critical facilities have been deemed as sensitive information, and as such their specific information is not for release to the general public.

RESTRICTED

Chase County Critical Facilities

Chase County			
Facility and/or Asset Name	**Number of Facilities**	**Replacement or Estimated Value**	**Occupancy**
Communications (radio, TV, similar)	0	$0	0
County EOC (see LEC below)	0	$0	0
Fire / EMS Stations	5	$300,000	30
Hospital/Clinic	1	$200,000	10
Law Enforcement Center (Police/Sheriff/EOC)	1	$25,000,000	150
Emergency Shelters (schools)	3	$10,000,000	0
Major government buildings	5	$10,000,000	50
Major Hwy / roads (Mi)	149	$603,472,000	0
Bridges (No.)	150	$37,500,000	0
Fuel storage areas	3	$5,000	2
Electric / Gas utilities	4	$13,949,347	40
Pumping stations	0	$0	0
Response staging areas	1	$10,000	0
Sewage treatment plants	3	$1,000,000	6
Transportation systems	3	$89,860,000	4
Water treatment plants	5	$3,000,000	10
Wells and storage tanks	20	$500,000	0

Geary County Critical Facilities

Geary County			
Facility and/or Asset Name	**Number of Facilities**	**Replacement or Estimated Value**	**Occupancy**
Communications (radio, TV, similar)	4	$380,000	20
County Emergency Operations Center	1	$300,000	3
Fire / EMS stations	10	$800,000	10
Hospital(s)	1	$9,975,000	130
Law Enforcement (Sheriff/Police Bldgs)	1	$5,320,000	0
Emergency shelters	14	$10,450,000	5,033
Major government buildings	4	$1,700,000	40
Major roads (miles)	237	$515,586,000	0
Bridges (number)	136	$123,981,000	0
Fuel storage areas	1	$80,000	0
Electric / Gas utilities	0	$0	0
Pumping stations	1	$50,000	0
Response staging areas	0	$0	0
Sewage treatment plants	1	$100,000	0
Transportation systems	1	$93,000	0
Water treatment plants	1	$100,000	0
Wells and storage tanks	1	$75,000	0

Lyon County Critical Facilities

Lyon County			
Facility and/or Asset Name	**Number of Facilities**	**Replacement or Estimated Value**	**Occupancy**
Communications (radio, TV, similar)	4	$529,240	51
Fire / EMS Stations	8	$6,322,365	187
Hospital / Mental Health / Public Health	2	$14,617,520	622
Law Enforcement Center (Sheriff/Jail/EOC)	1	$5,013,230	135
Major government buildings	5	$13,977,220	229
Major Hwy / roads (237 miles)	0	$966,853,000	0
Bridges (502 each)	0	$245,383,000	0
Electric / Gas utilities	37	$99,751,676	0
Transportation systems	5	$245,975,000	5
Water treatment plants	1	$10,285,725	10

Morris County Critical Facilities

Morris County			
Facility and/or Asset Name	**Number of Facilities**	**Replacement or Estimated Value**	**Occupancy**
Communications (radio, TV, similar)	0	$0	0
County Emergency Operations Center	0	$0	0
Fire / EMS stations	0	$0	0
Hospital(s)	1	$3,325,000	150
Law Enforcement (Sheriff/Police Bldgs)	0	$0	0
Emergency shelters	0	$0	0
Major government buildings	4	$4,377,387	120
Major roads (miles)	109	$533,000,000	0
Bridges (number)	25	$6,190,000	0
Fuel storage areas	18	$552,145	50
Electric / Gas utilities	0	$0	0
Pumping stations	0	$0	0
Response staging areas	0	$0	0
Sewage treatment plants	0	$0	0
Transportation systems	0	$0	0
Water treatment plants	0	$0	0
Wells and storage tanks	0	$0	0

Pottawatomie County Critical Facilities

Pottawatomie County			
Facility and/or Asset Name	**Number of Facilities**	**Replacement or Estimated Value**	**Occupancy**
Communications (radio, TV, similar)	3	$285,000	10
County Emergency Operations Center	0	$0	0
Fire / EMS stations	17	$8,998,059	13
Hospital(s)	3	$66,529,778	27
Law Enforcement (Sheriff/Police Bldgs)	6	$7,980,000	15
Emergency shelters (schools)	15	$7,125,000	5
Response Staging areas	0	$0	0
Major government buildings	1	$3,345,400	0
Major roads (miles)	311	$671,088,000	0
Major Highway Bridges (number)	285	$91,090,941	0
Fuel storage areas	0	$0	0
Electric / Gas utilities	3	$210,035,500	5
Pumping stations	1	$200,000	0
Sewage treatment plants	11	$695,970,000	15
Transportation systems	5	$222,438,779	5
Water treatment plants	1	$338,200	0
Wells and storage tanks	0	$0	0

Riley County Critical Facilities

Riley County			
Facility and/or Asset Name	**Number of Facilities**	**Replacement or Estimated Value**	**Occupancy**
Communications (radio, TV, similar)	5	$475,000	15
County Emergency Operations Center	1	$12,873,900	150
Fire / EMS stations	17	$1,815,950	45
Hospital(s)	1	$6,650,000	426
Law Enforcement (Sheriff/Police Bldgs)	5	$7,980,000	50
Emergency shelters	17	$8,075,000	50
Major government buildings	7	$19,854,730	180
Major roads (miles)	167	$487,534,000	0
Bridges (number)	166	$103,299,000	0
Fuel storage areas	3	$150,000	3
Electric / Gas utilities	1	$104,500,000	5
Pumping stations	2	$150,000	0
Response staging areas	0	$0	0
Sewage treatment plants	6	$379,620,000	6
Transportation systems	6	$21,746,000	50
Water treatment plants	4	$12,660,000	24
Wells and storage tanks	0	$0	0

Wabaunsee County Critical Facilities

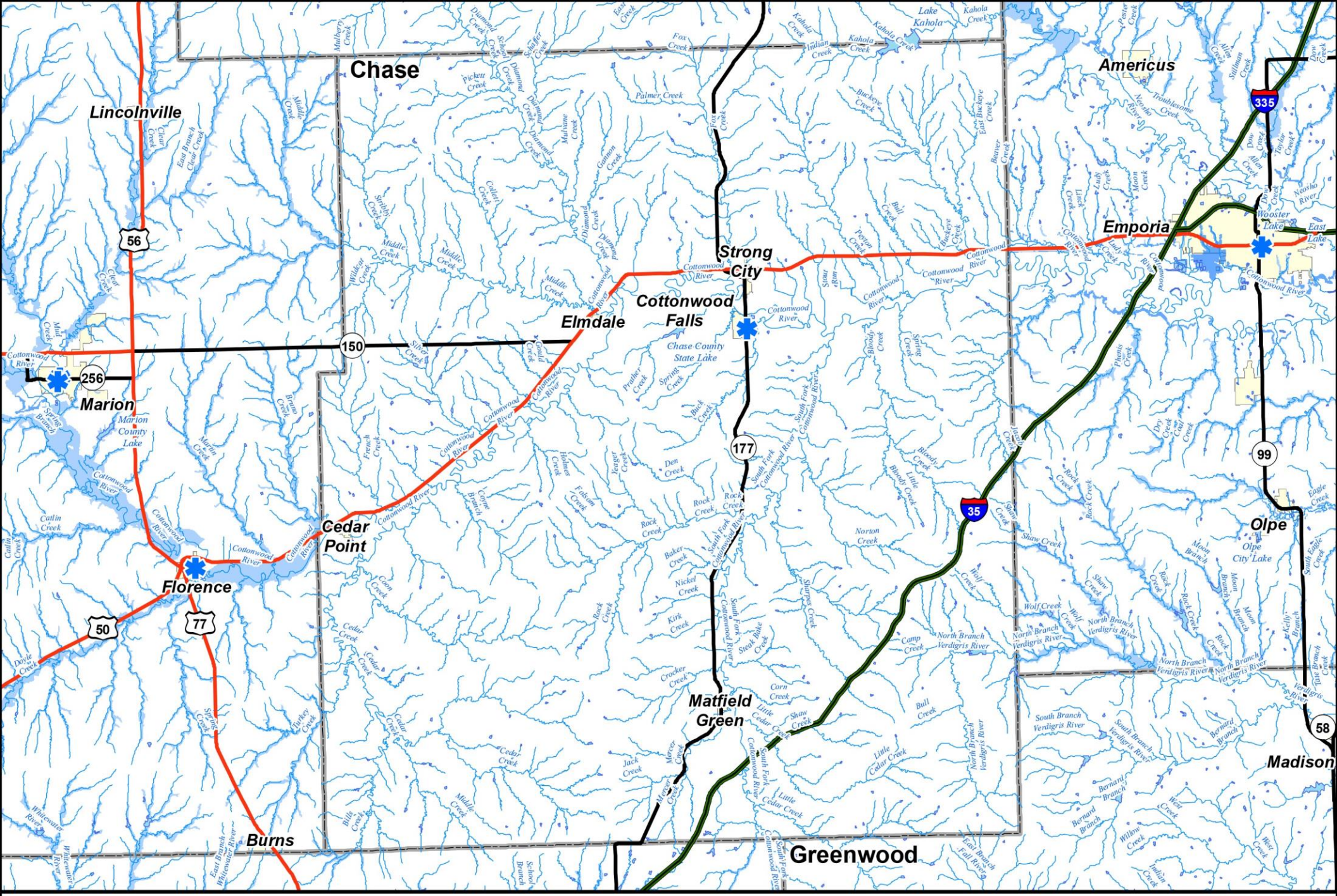
Wabaunsee County			
Facility and/or Asset Name	**Number of Facilities**	**Replacement or Estimated Value**	**Occupancy**
Communications (radio, TV, similar)	24	$2,280,000	0
County Emergency Operations Center (See Law Enforcement Center)	0	$0	0
Fire / EMS Stations	11	$1,045,000	50
Law Enforcement Center (Police/Sheriff/EOC)	6	$1,330,000	37
Emergency Shelters (schools, other)	14	$3,800,000	100
Major government buildings	15	$75,000,000	80
Major Hwy / roads (250 miles)	0	$592,396,000	0
Bridges (190 each)	0	$93,734,000	0
Electric / Gas / Phone utilities	27	$32,340,360	0
Sewage treatment plants	8	$8,000,000	0
Transportation systems	3	$119,930,000	10
Water Treatment Plants	8	$24,000,000	8
Pumping Stations	4	$1,400,000	0
Wells and storage tanks	24	$720,000	0

Critical Facilities in Flood Plains

The following county maps show critical facilities located in flood plains, if flood plain information was available for the county. If flood plain information was not available, the location of the facilities is shown in relation to streams and bodies of water. Identified critical facilities include:

- Schools
- Police Stations
- Fire Stations
- Hospitals (if information made available)
- Elderly care facilities (if information made available)

Please note that not all participating counties and/or jurisdictions had this data available.



EMS locations, and Floodplains

Chase County, KS

EMS
Interstates
US Highways
Kansas Highways
Lake
Streams
County Boudaries
0.2% chance flood hazard
1% chance flood hazard
Cities (Census 2010)

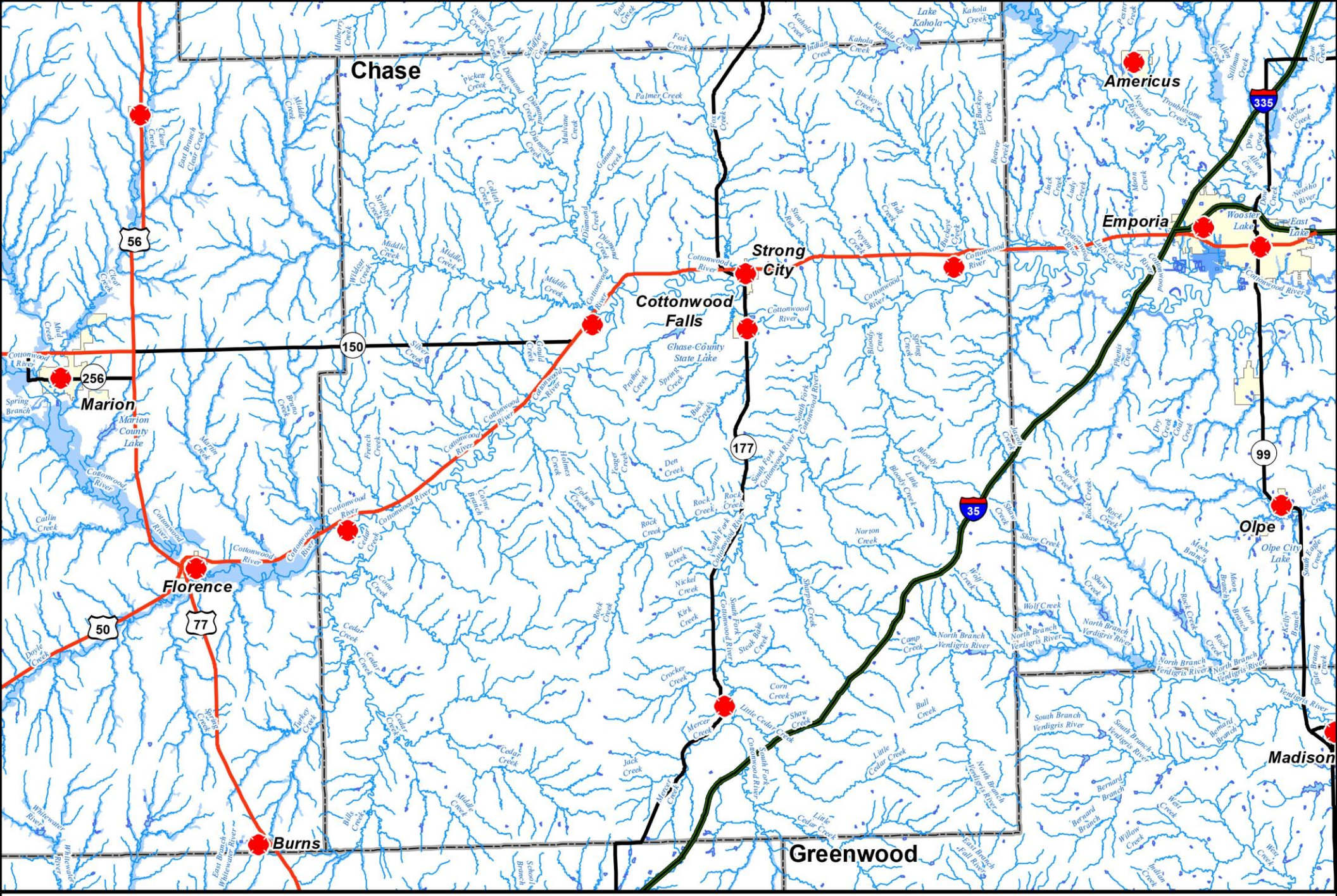
N

0 2.5 5 10 Miles

Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA

Date: 2/10/2014

Kansas
Adjutant General
Division of Emergency Management



Fire Stations and Floodplains
Chase County, KS

Fire Station

Interstates
US Highways
Kansas Highways
Lake
Streams

County Boudaries
0.2% chance flood hazard
1% chance flood hazard
Cities (Census 2010)

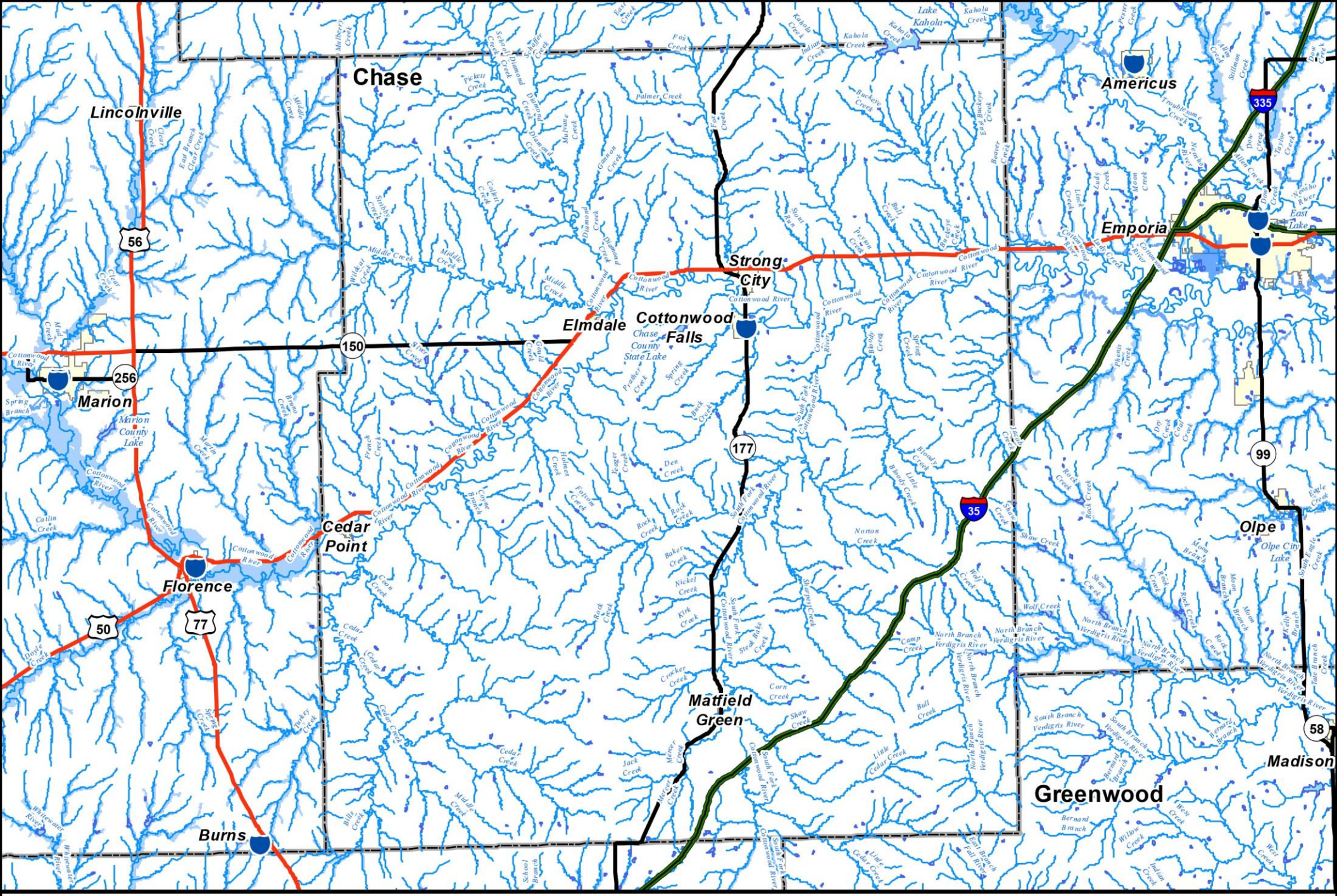
N

0 2.5 5 10 Miles

Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA

Date: 2/10/2014

Kansas
Adjutant General
Division of Emergency Management



Law Enforcement and Floodplains Chase County, KS

- Law Enforcement
- 0.2% chance flood hazard
- 1% chance flood hazard
- Interstates
- US Highways
- Kansas Highways
- Streams
- Lake
- County Boudaries
- City Boundaries

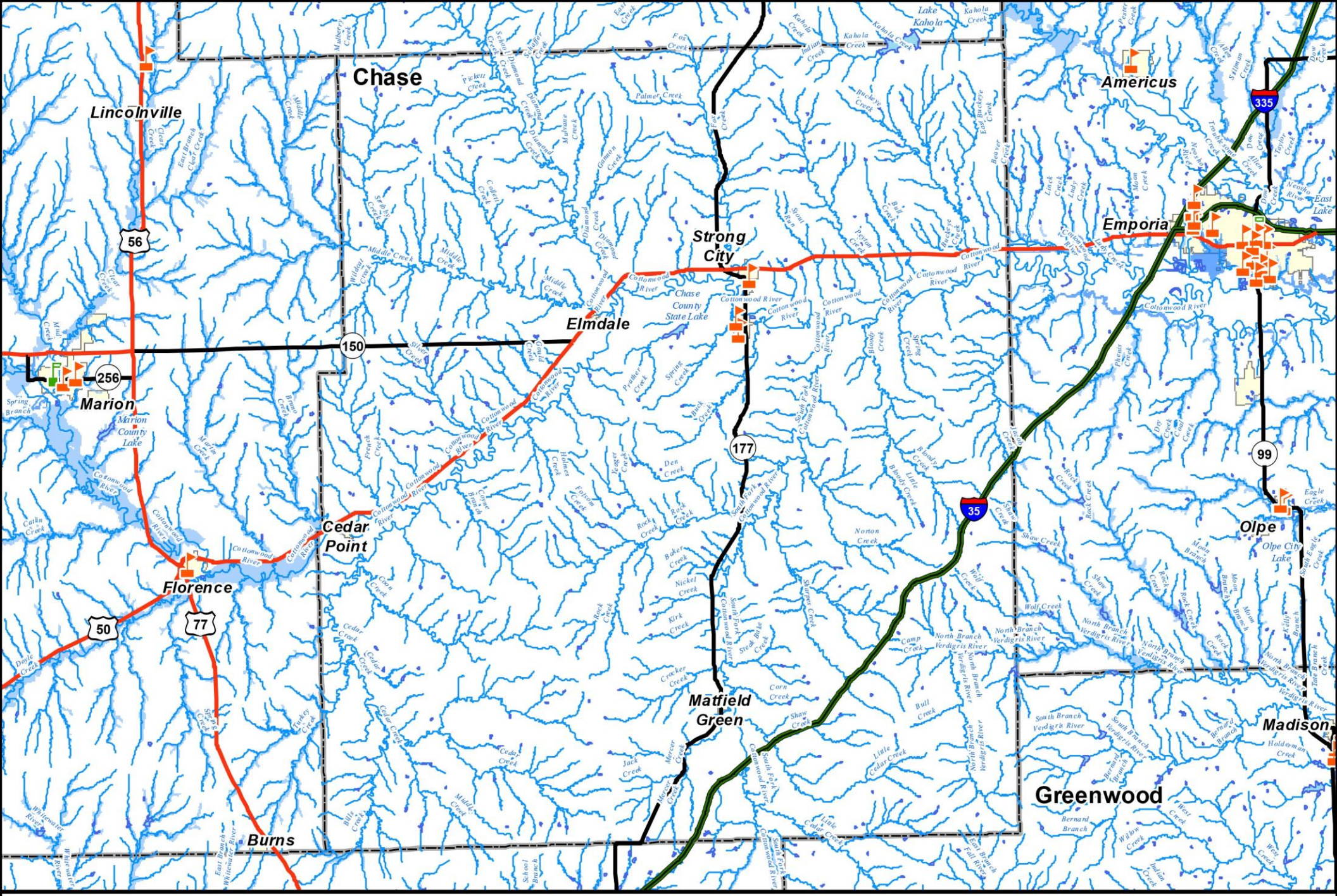
N

0 2.5 5 10 Miles

Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA

Date: 3/6/2014

Kansas
Adjutant General
Division of Emergency Management



Schools, Colleges and Floodplains
Chase County, KS

School
College

Interstates
US Highways
Kansas Highways
Streams
Lake

County Boudaries
City Boundaries
0.2% chance flood hazard
1% chance flood hazard

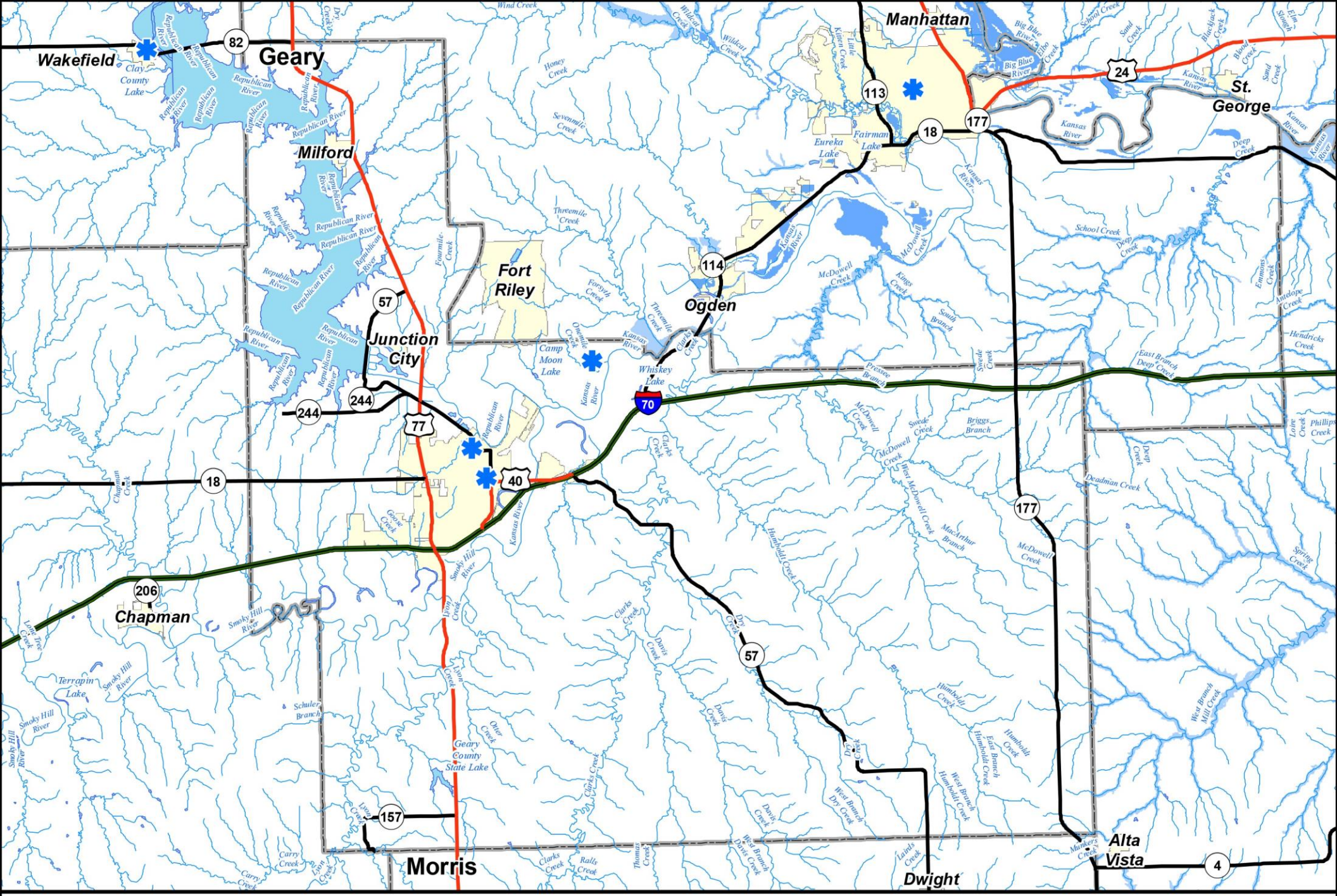
N

0 2.5 5 10 Miles

Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA

Date: 4/1/2014

Kansas
Adjutant General
Division of Emergency Management



EMS locations, and Floodplains

Geary County, KS

EMS
Interstates
US Highways
Kansas Highways
Lake
Streams
County Boudaries
0.2% chance flood hazard
1% chance flood hazard
Cities (Census 2010)

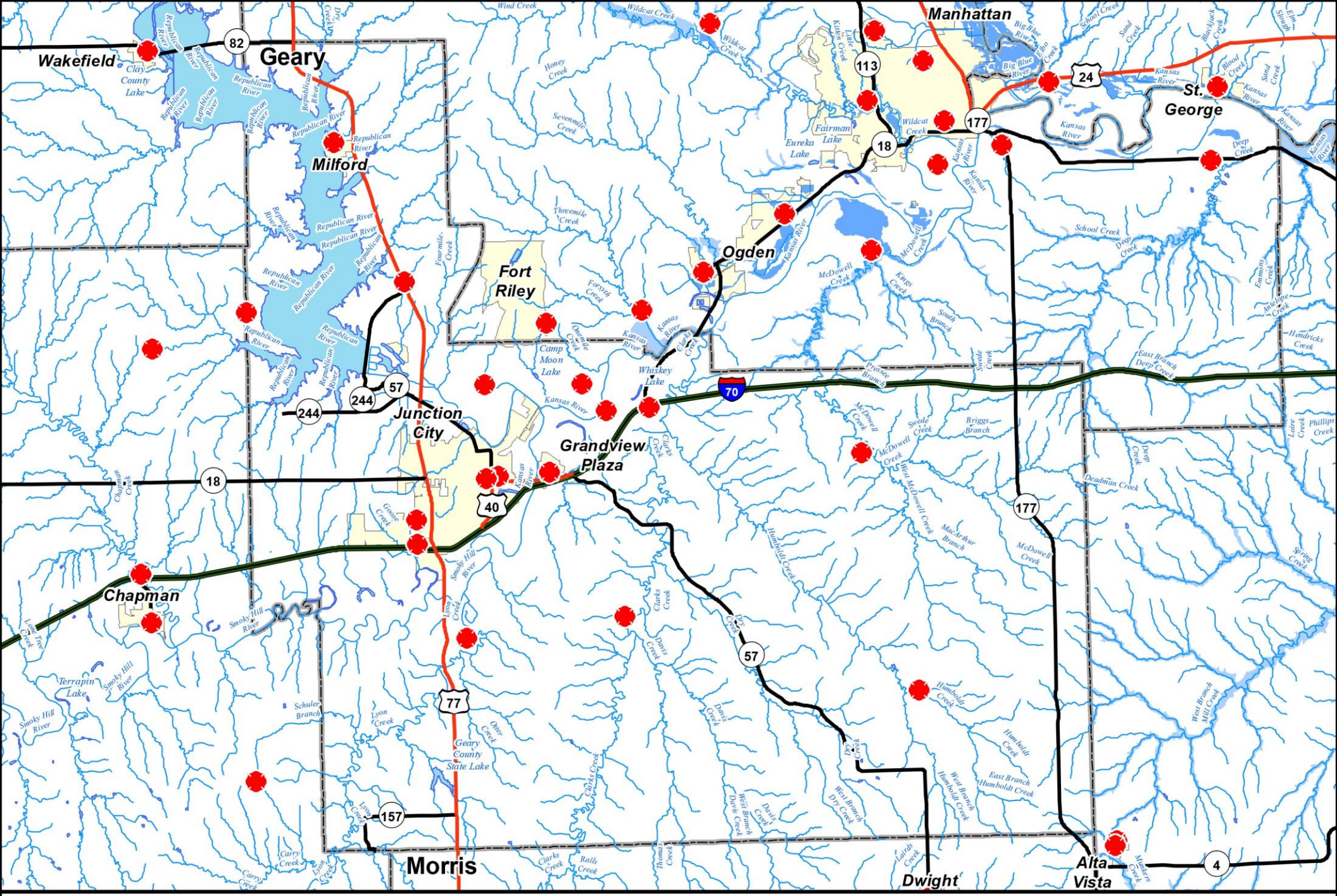
N

0 2 4 8 Miles

Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA

Date: 2/10/2014

Kansas Adjutant General
Division of Emergency Management



Fire Stations and Floodplains
Geary County, KS

Fire Station

Interstates
US Highways
Kansas Highways
Lake
Streams

County Boudaries
0.2% chance flood hazard
1% chance flood hazard
Cities (Census 2010)

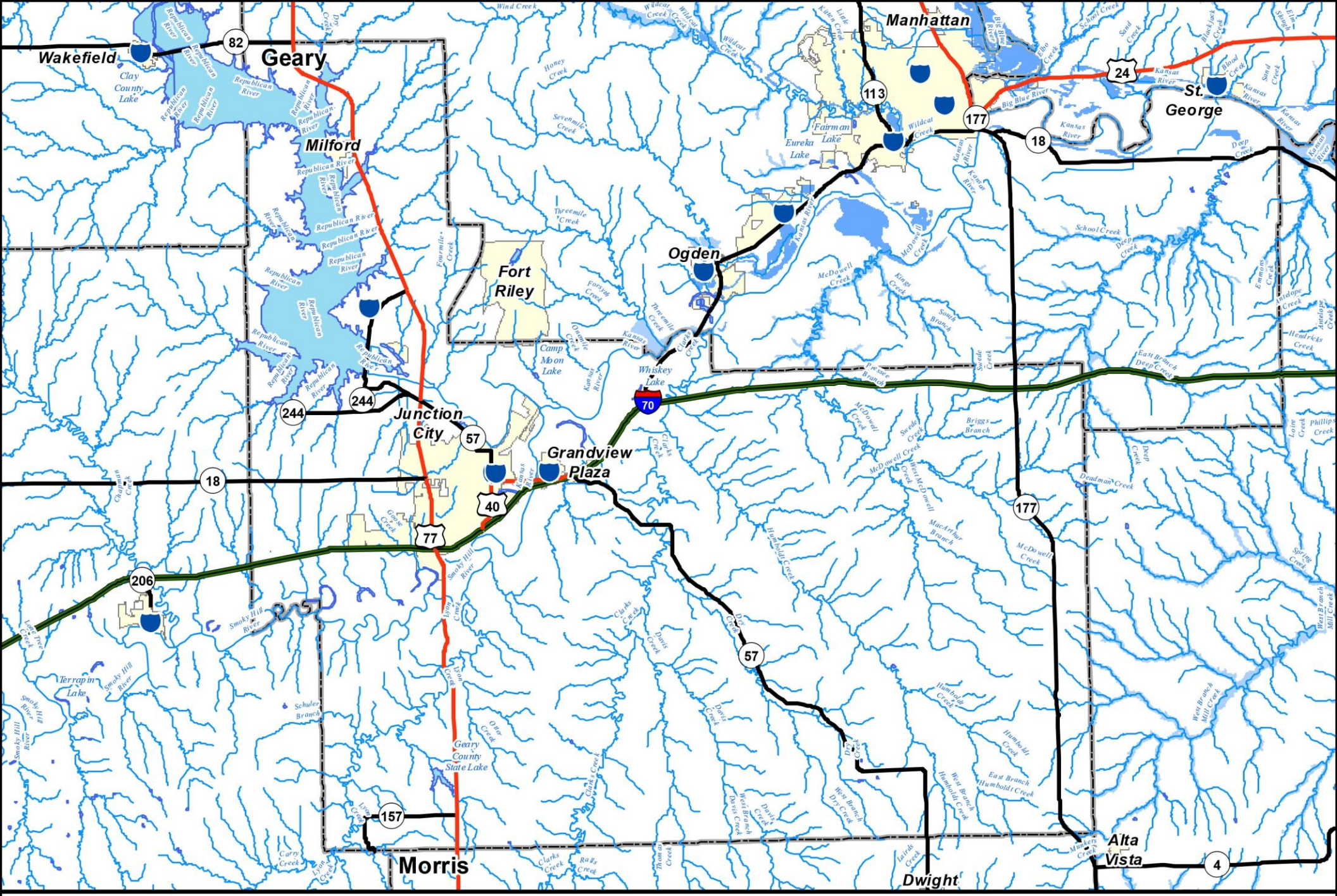
N

0 2 4 8 Miles

Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA

Date: 2/10/2014

Kansas Adjutant General
Division of Emergency Management



Law Enforcement and Floodplains Geary County, KS

Law Enforcement
0.2% chance flood hazard
1% chance flood hazard
Interstates
US Highways
Kansas Highways
Streams
Lake
County Boudaries
City Boundaries

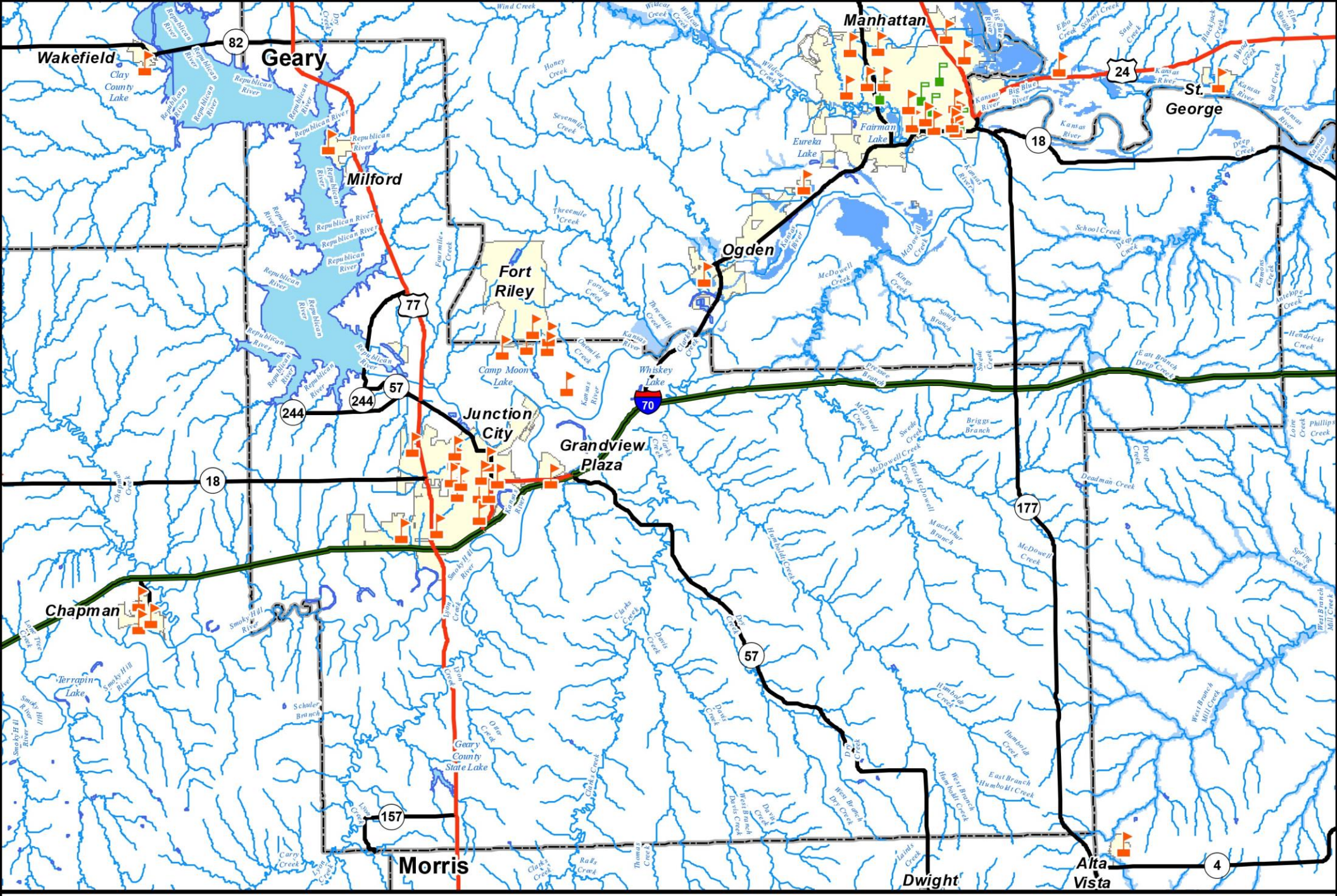
N

0 2 4 8 Miles

Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA

Date: 3/6/2014

Kansas
Adjutant General
Division of Emergency Management



Schools, Colleges and Floodplains
Geary County, KS

School
College
Interstates
US Highways
Kansas Highways
Streams
Lake
County Boudaries
City Boundaries
0.2% chance flood hazard
1% chance flood hazard

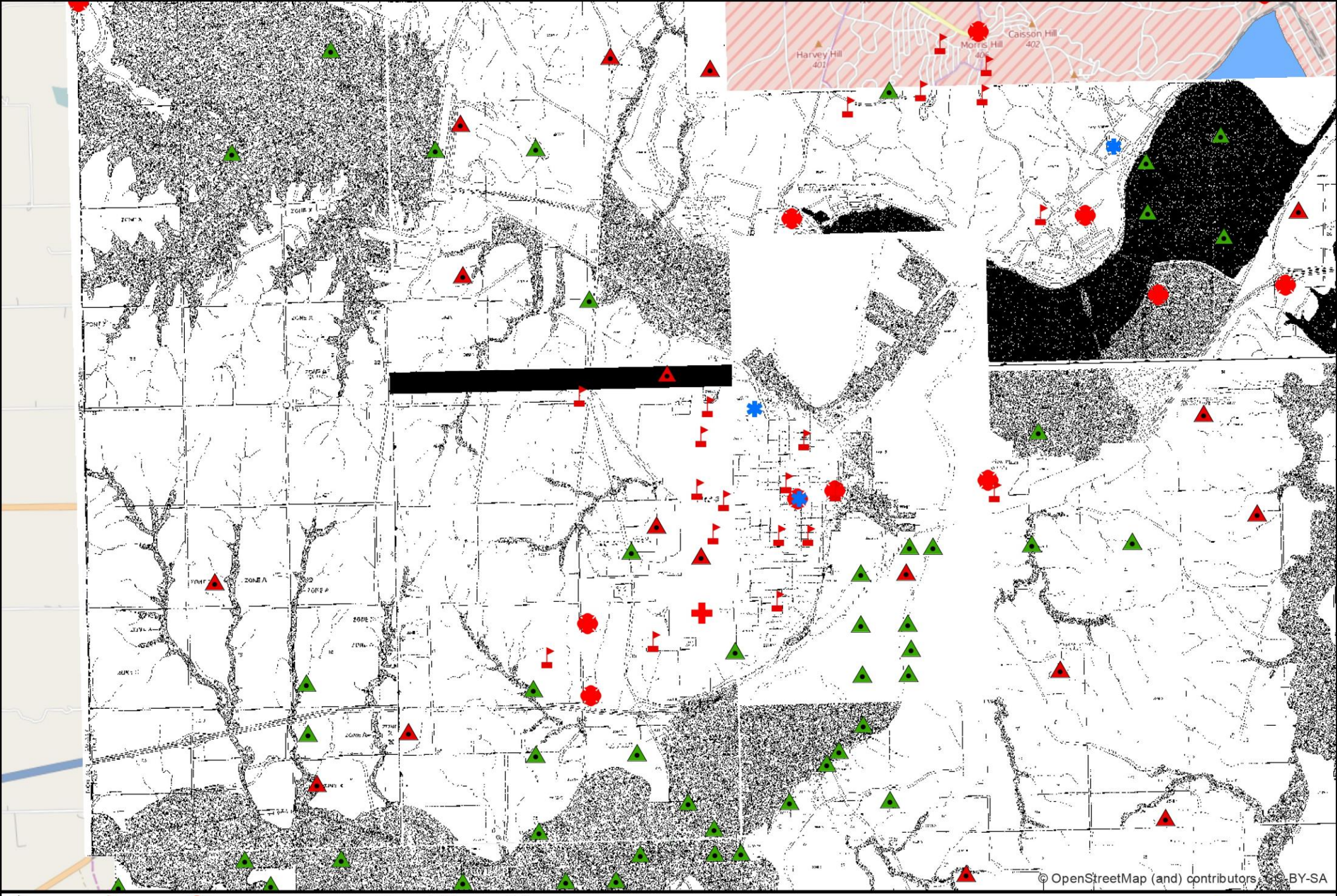
N

0 2 4 8 Miles

Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA

Date: 4/1/2014

Kansas
Adjutant General
Division of Emergency Management



Dam
Levee
Hospital
School
College
EMS
Fire Station

Flood Zone

0.2% Chance Annual Flood
A
AE
Floodway

Flood Hazard Areas
Critical Infrastructure
City of Junction City
Geary
County, KS

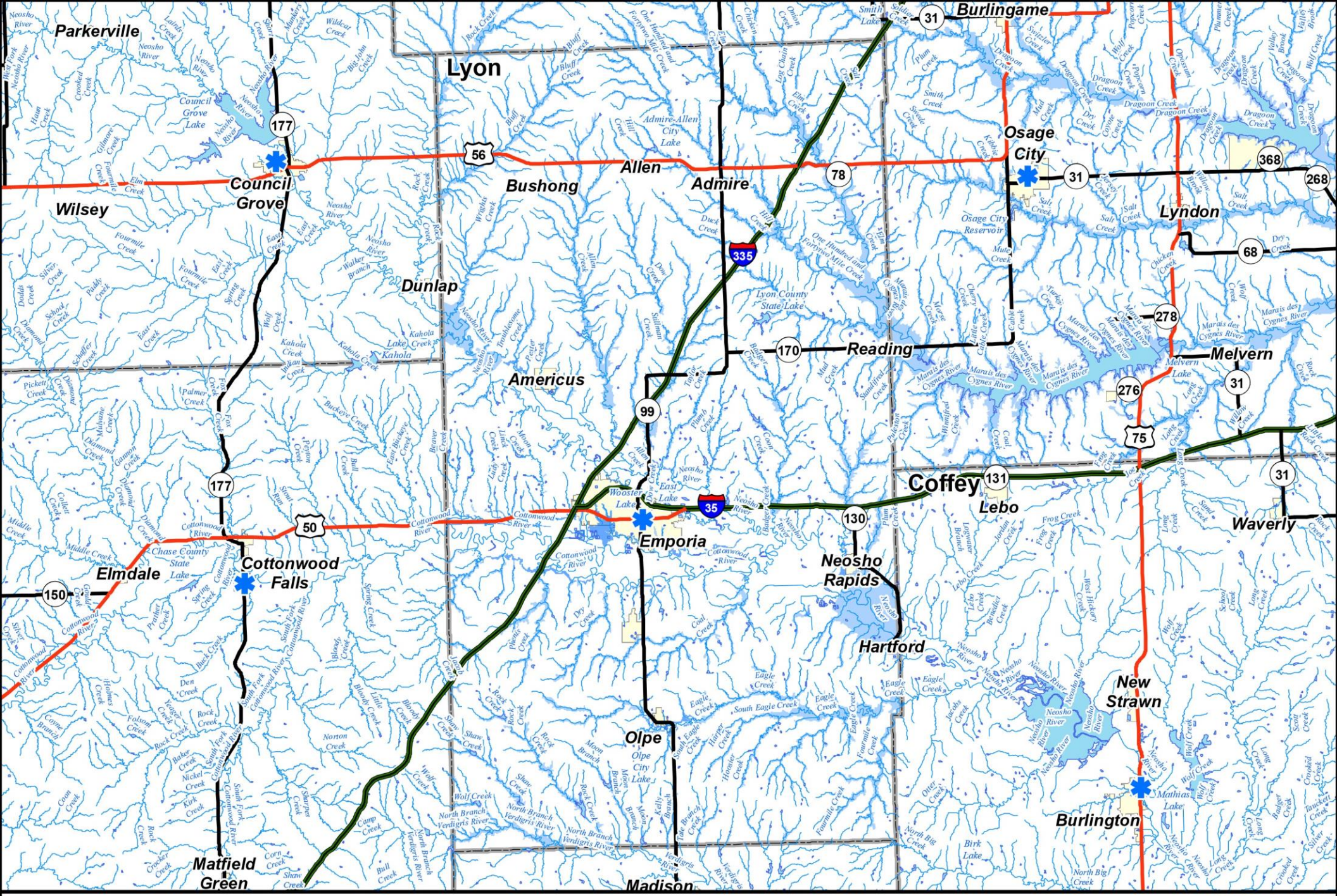
N

0 0.5 1 2 Miles

Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA, KDA, KDHE

Date: 7/31/2014

Kansas
Adjutant General
Division of Emergency Management



EMS locations, and Floodplains
Lyon County, KS

- ✱ EMS
- Interstates
- US Highways
- Kansas Highways
- Lake
- Streams
- County Boudaries
- 0.2% chance flood hazard
- 1% chance flood hazard
- Cities (Census 2010)

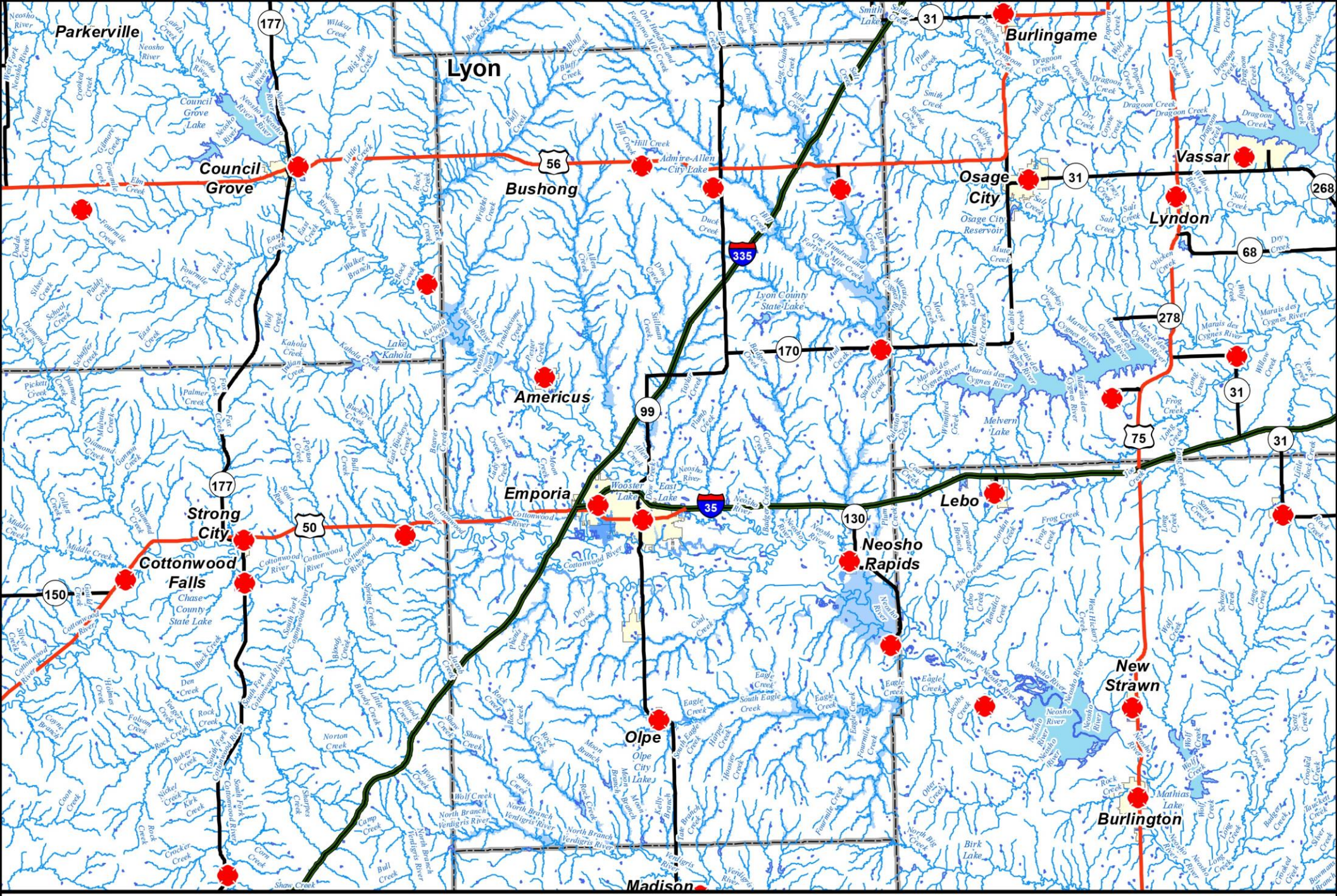
N

0 3.25 6.5 13 Miles

Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA

Date: 2/10/2014

AD ASTRA PER ASPERA
Kansas
Adjutant General
Division of Emergency Management



Fire Stations and Floodplains

Lyon County, KS

Fire Station

Interstates

US Highways

Kansas Highways

Lake

Streams

County Boudaries

0.2% chance flood hazard

1% chance flood hazard

Cities (Census 2010)

N

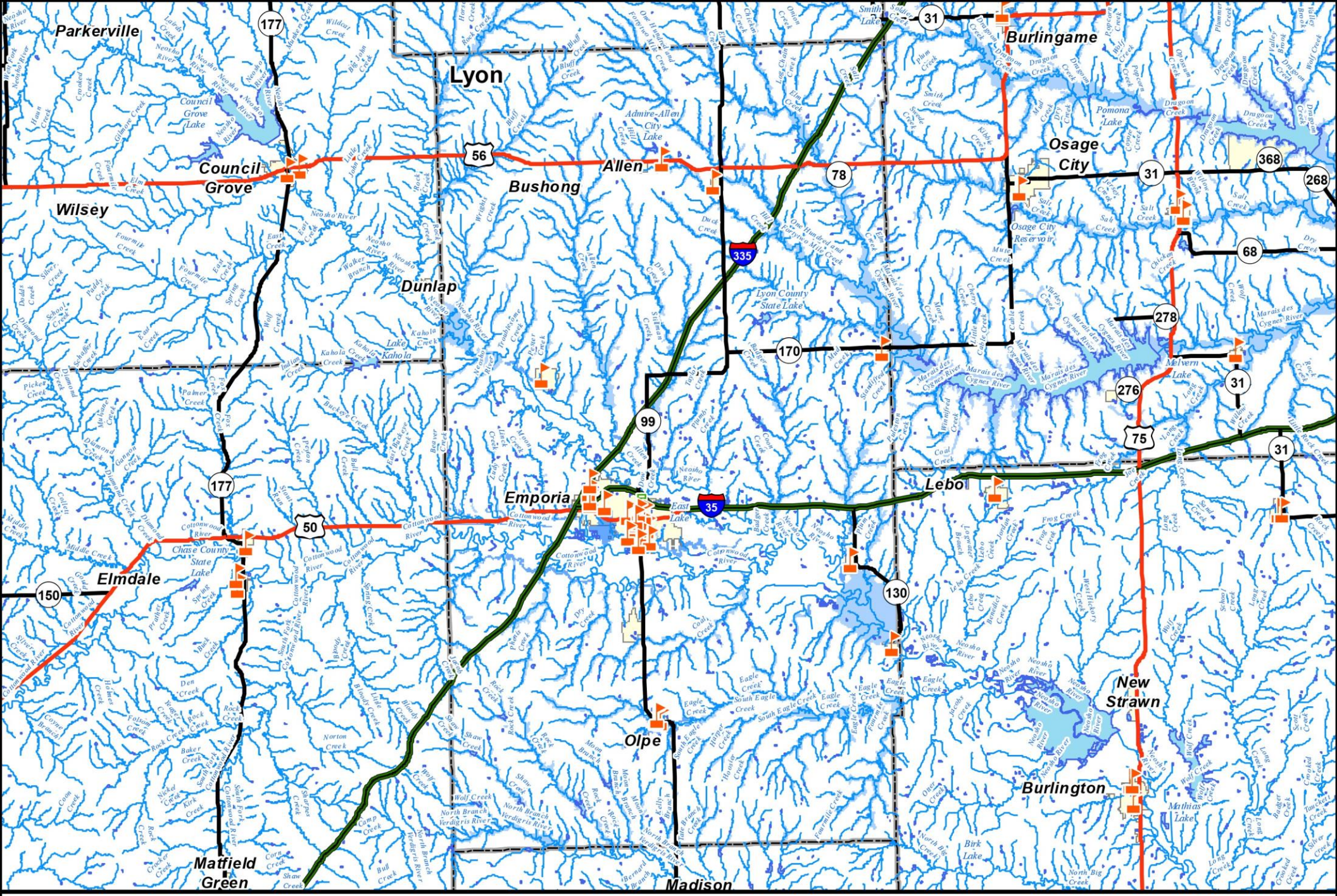
0 3.25 6.5 13 Miles

Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA

Date: 2/10/2014

Kansas Adjutant General

Division of Emergency Management



Schools, Colleges and Floodplains

Lyon County, KS

School

College

Interstates

US Highways

Kansas Highways

Streams

Lake

County Boudaries

City Boundaries

0.2% chance flood hazard

1% chance flood hazard

N

0 3.25 6.5 13 Miles

Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA

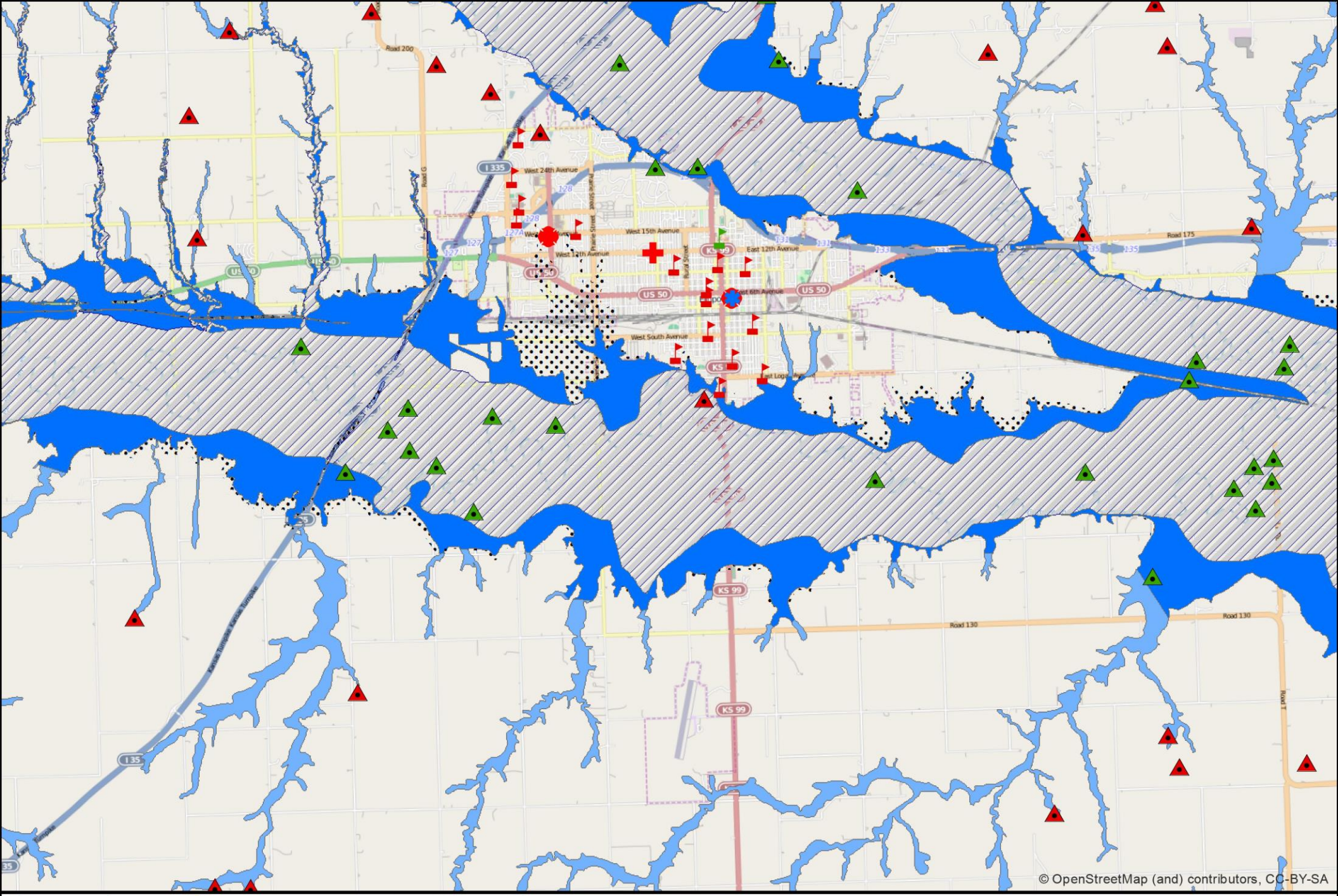
Date: 4/1/2014

AD ASTRA PER ASPERA

Kansas

Adjutant General

Division of Emergency Management



Dam
Levee
Hospital
School
College
EMS
Fire Station

Flood Zone

0.2% Chance Annual Flood
A
AE
Floodway

Flood Hazard Areas
Critical Infrastructure
City of Emporia
Lyon
County, KS

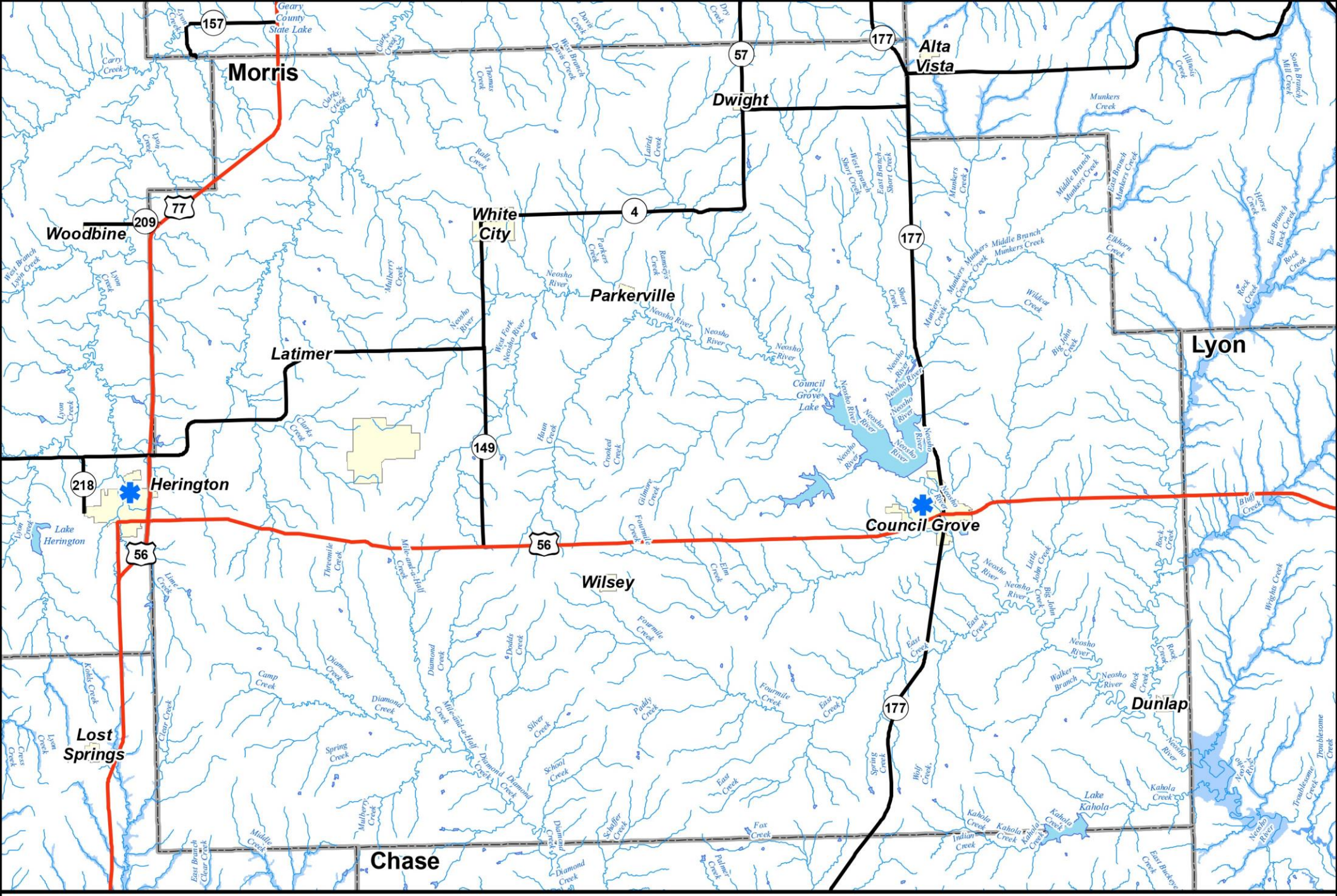
N

0 0.75 1.5 3 Miles

Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA, KDA, KDHE

Date: 7/31/2014

Kansas
Adjutant General
Division of Emergency Management



EMS locations, and Floodplains

Morris County, KS

EMS
Interstates
US Highways
Kansas Highways
Lake
Streams
County Boudaries
0.2% chance flood hazard
1% chance flood hazard
Cities (Census 2010)

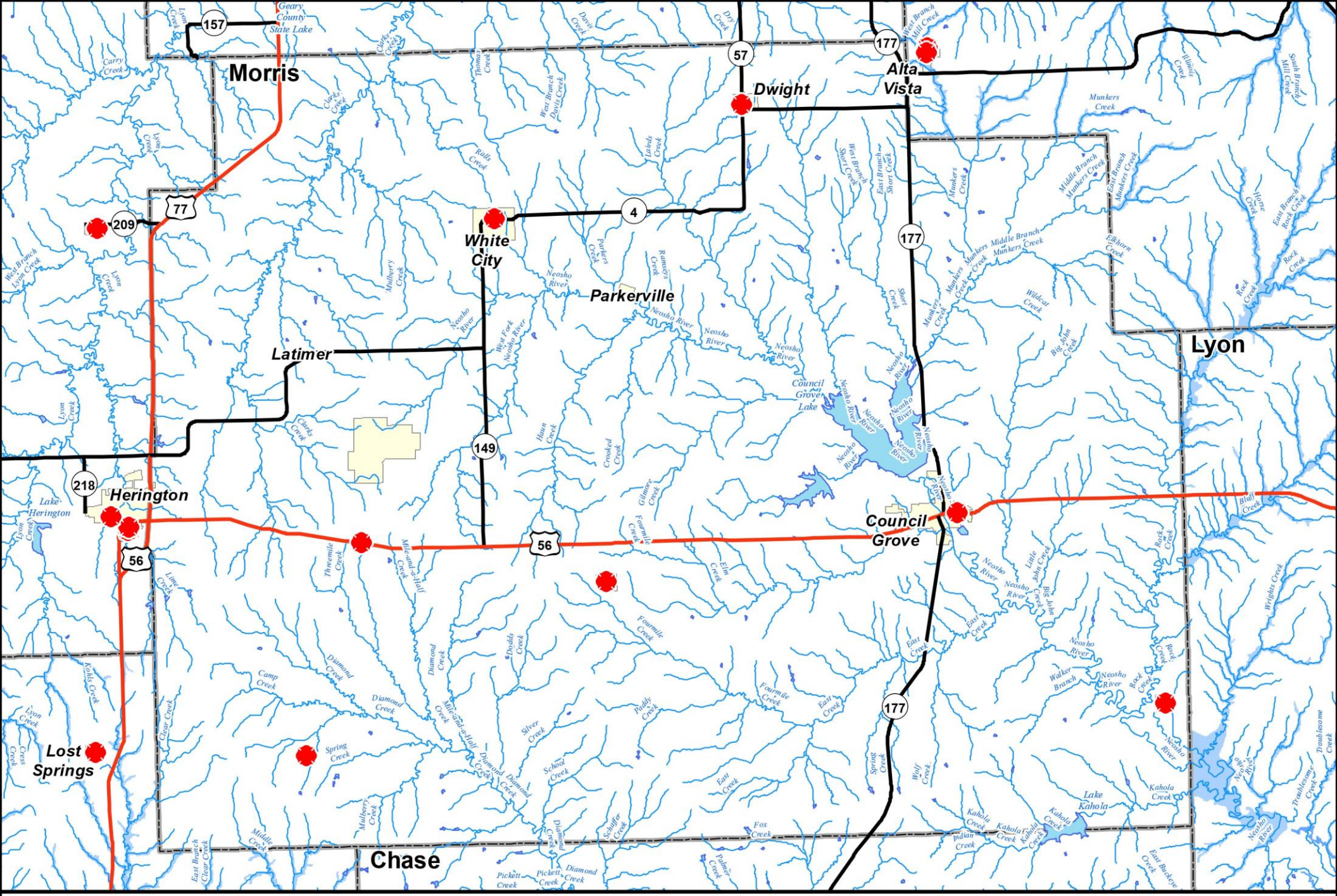
N

0 2 4 8 Miles

Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA

Date: 2/10/2014

Kansas Adjutant General
Division of Emergency Management



Fire Stations and Floodplains

Morris County, KS

Fire Station

Interstates

US Highways

Kansas Highways

Lake

Streams

County Boudaries

0.2% chance flood hazard

1% chance flood hazard

Cities (Census 2010)

N

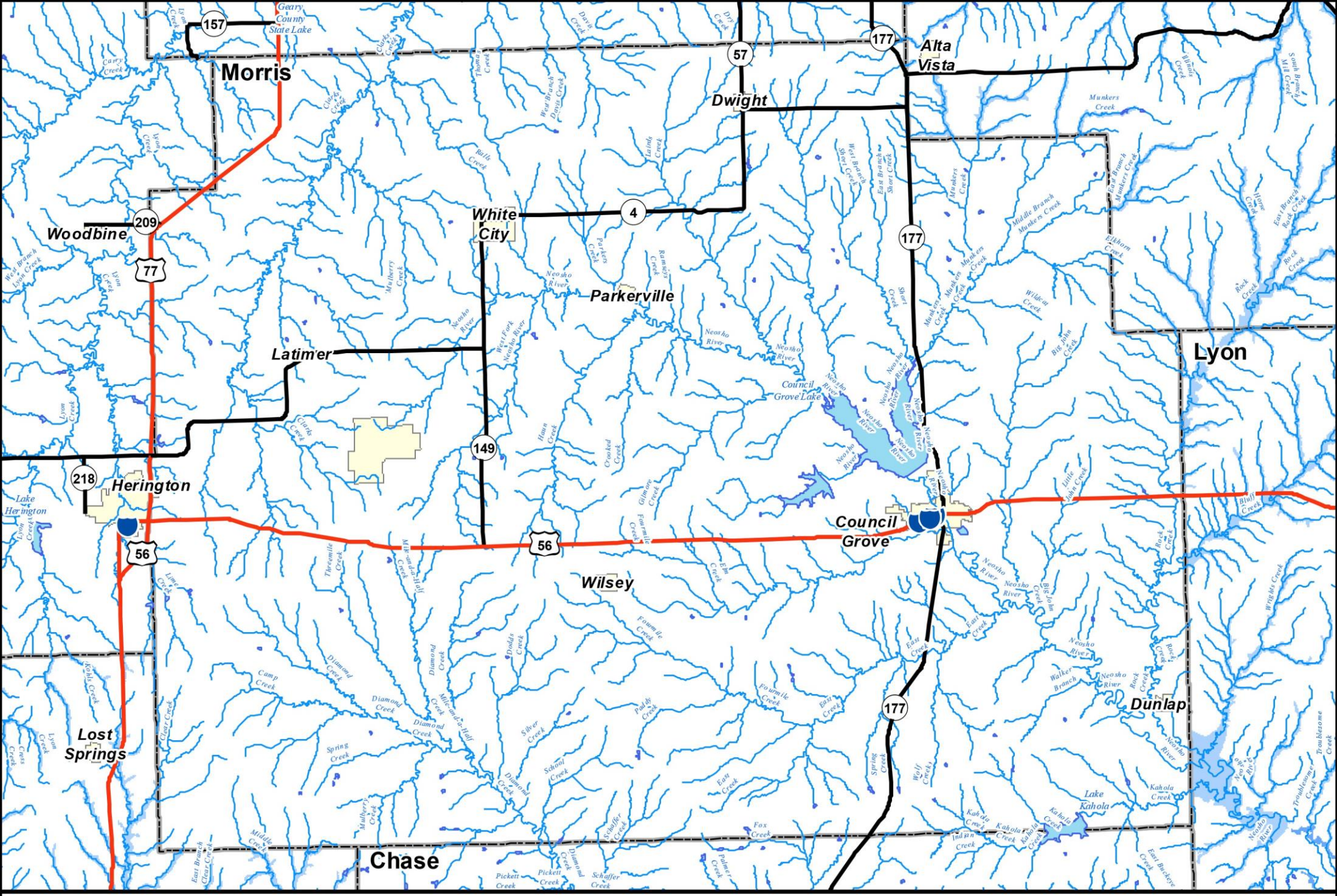
0 2 4 8 Miles

Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA

Date: 2/10/2014

Kansas Adjutant General

Division of Emergency Management



Law Enforcement and Floodplains Morris County, KS

Law Enforcement
0.2% chance flood hazard
1% chance flood hazard
Interstates
US Highways
Kansas Highways
Streams
Lake
County Boudaries
City Boundaries

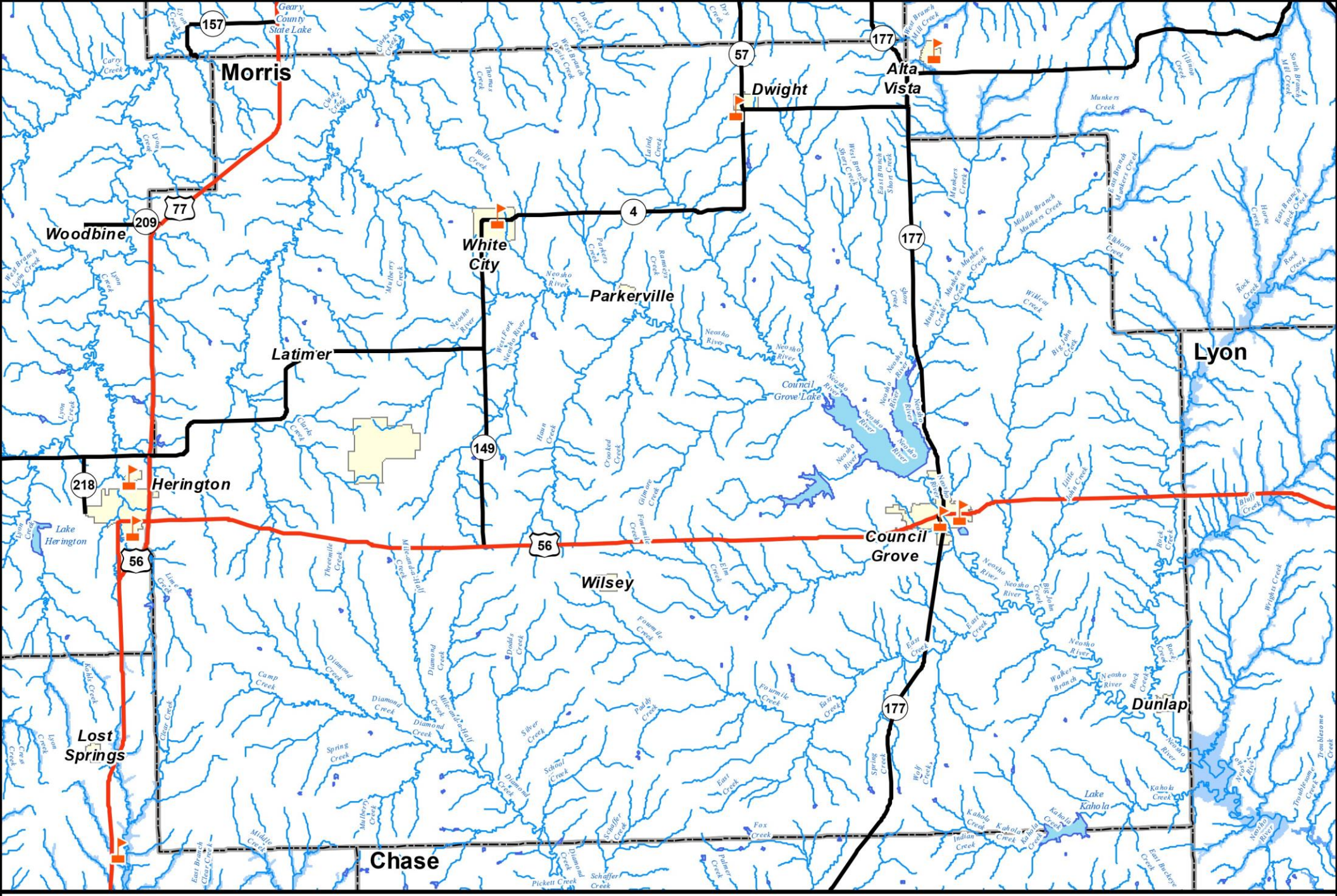
N

0 2 4 8 Miles

Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA

Date: 3/6/2014

Kansas
Adjutant General
Division of Emergency Management



Schools, Colleges and Floodplains
Morris County, KS

School
College

Interstates
US Highways
Kansas Highways
Streams
Lake

County Boudaries
City Boundaries
0.2% chance flood hazard
1% chance flood hazard

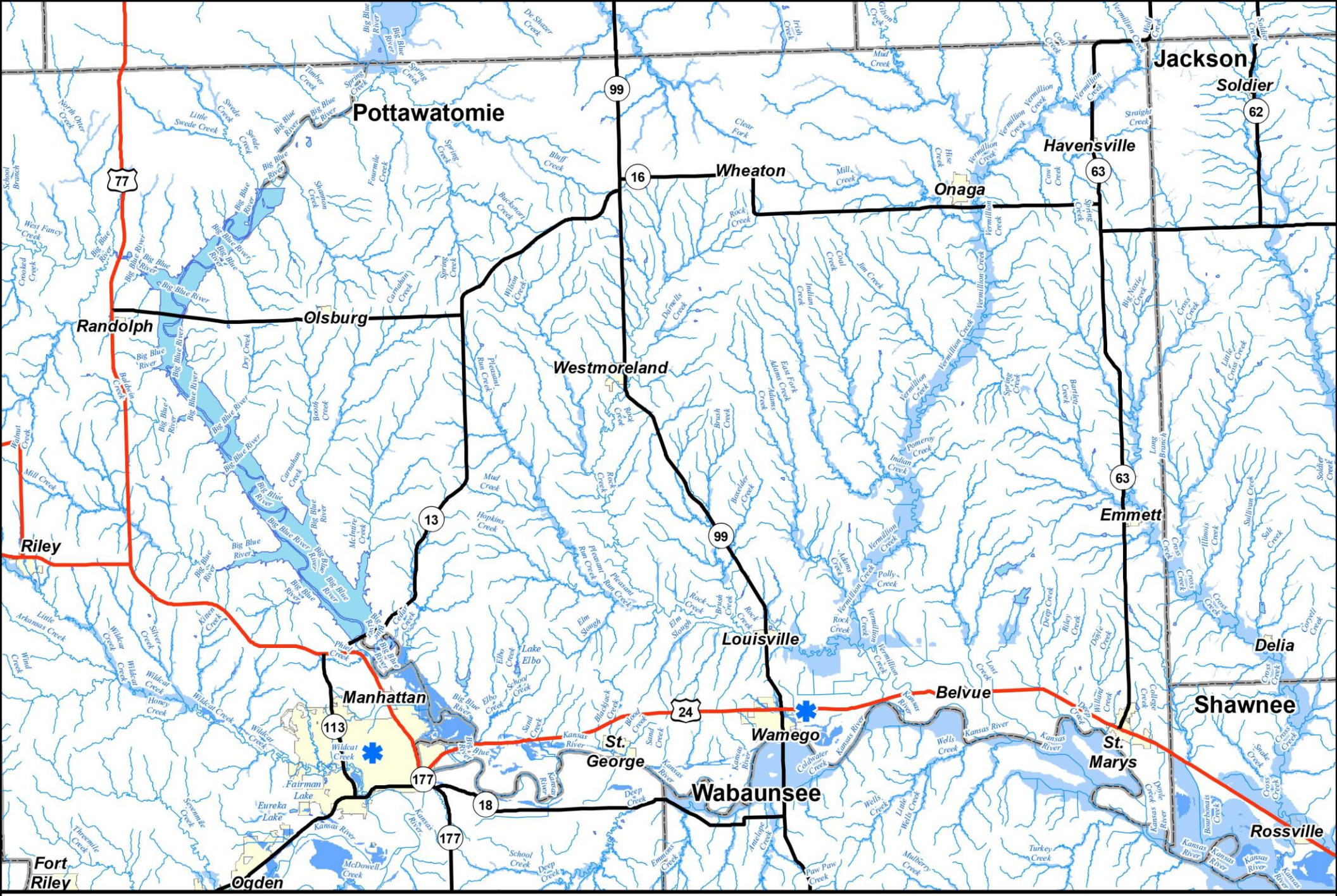
N

0 2 4 8 Miles

Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA

Date: 4/1/2014

Kansas
Adjutant General
Division of Emergency Management



EMS locations, and Floodplains

Pottawatomie County, KS

EMS
Interstates
US Highways
Kansas Highways
Lake
Streams
County Boudaries
0.2% chance flood hazard
1% chance flood hazard
Cities (Census 2010)

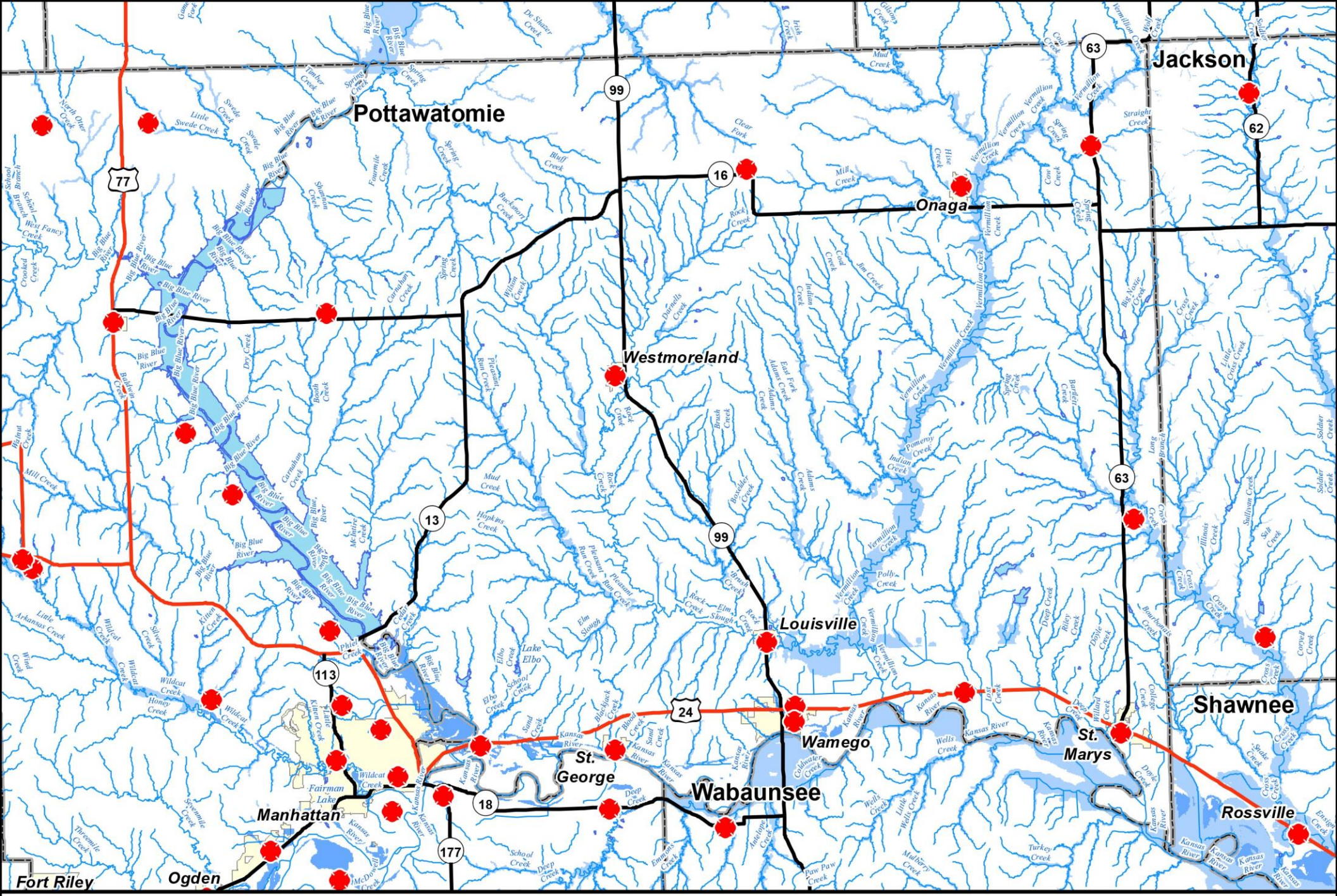
N

0 2.5 5 10 Miles

Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA

Date: 2/10/2014

Kansas
Adjutant General
Division of Emergency Management



Fire Stations and Floodplains
Pottawatomie County, KS

Fire Station

Interstates
US Highways
Kansas Highways
Lake
Streams

County Boudaries
0.2% chance flood hazard
1% chance flood hazard
Cities (Census 2010)

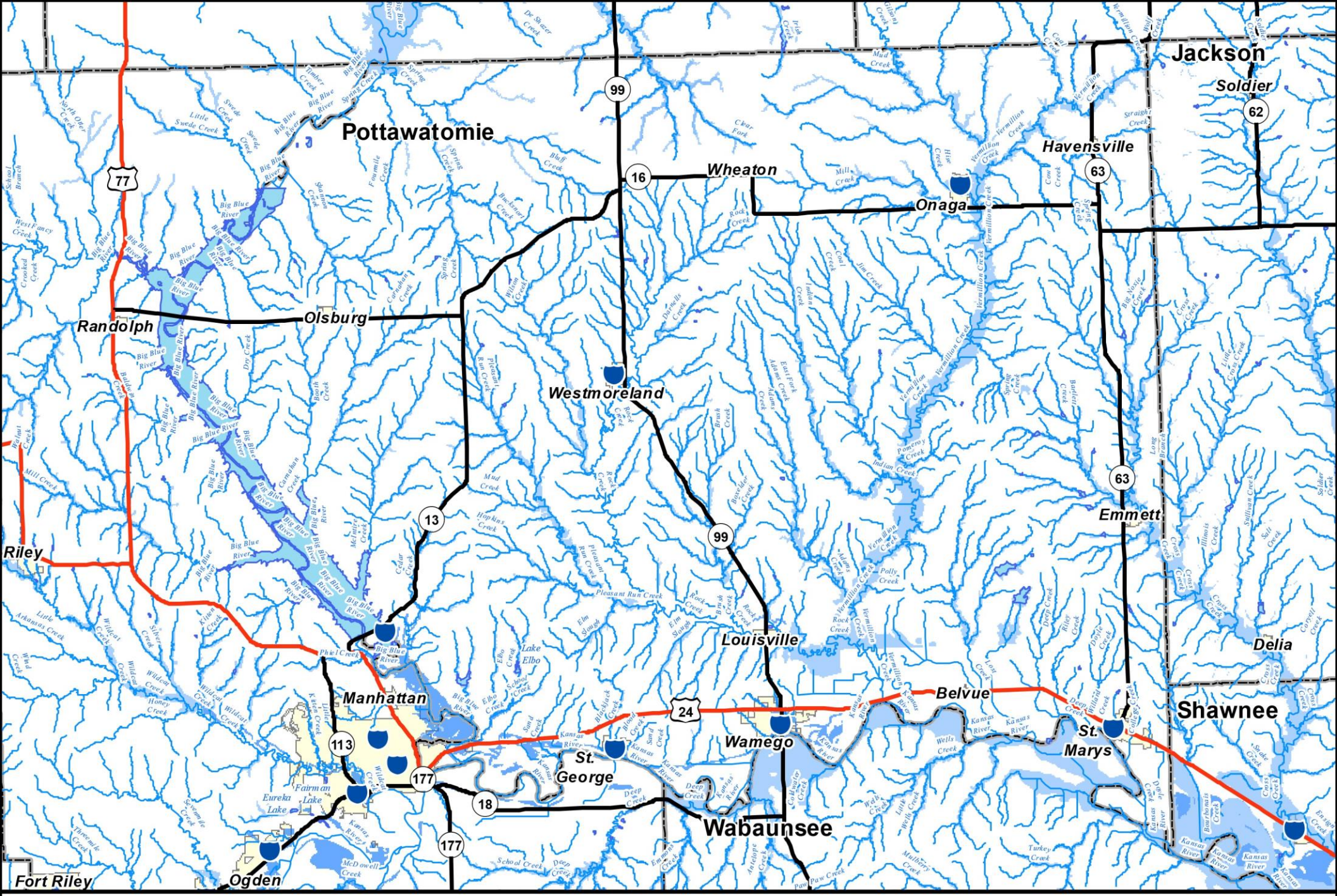
N

0 2.5 5 10 Miles

Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA

Date: 2/10/2014

Kansas
Adjutant General
Division of Emergency Management



Law Enforcement and Floodplains Pottawatomie County, KS

Law Enforcement
0.2% chance flood hazard
1% chance flood hazard
Interstates
US Highways
Kansas Highways
Streams
Lake
County Boudaries
City Boundaries

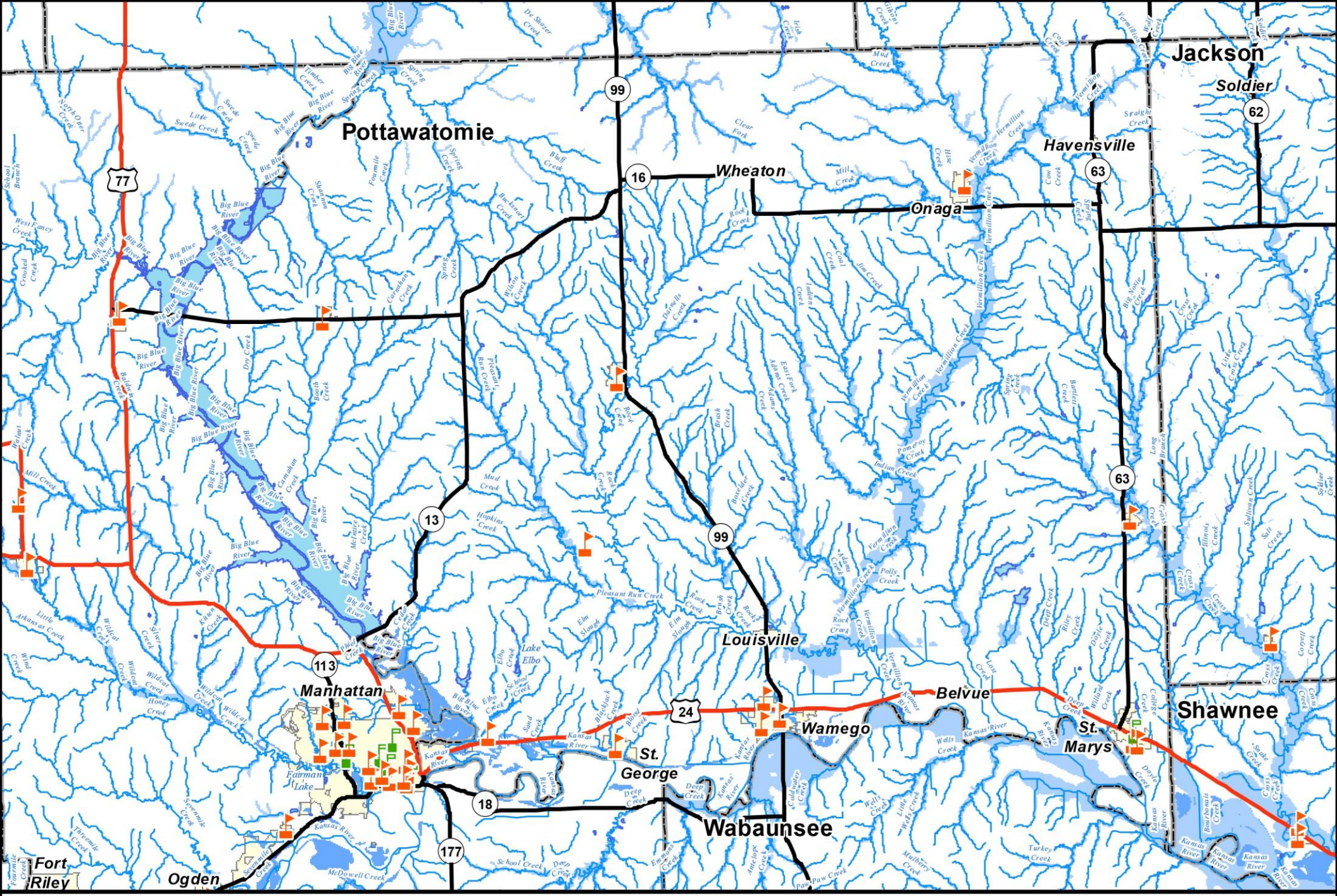
N

0 2.5 5 10 Miles

Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA

Date: 3/6/2014

Kansas
Adjutant General
Division of Emergency Management



Schools, Colleges and Floodplains
Pottawatomie County, KS

School
College

Interstates
US Highways
Kansas Highways
Streams
Lake

County Boudaries
City Boundaries
0.2% chance flood hazard
1% chance flood hazard

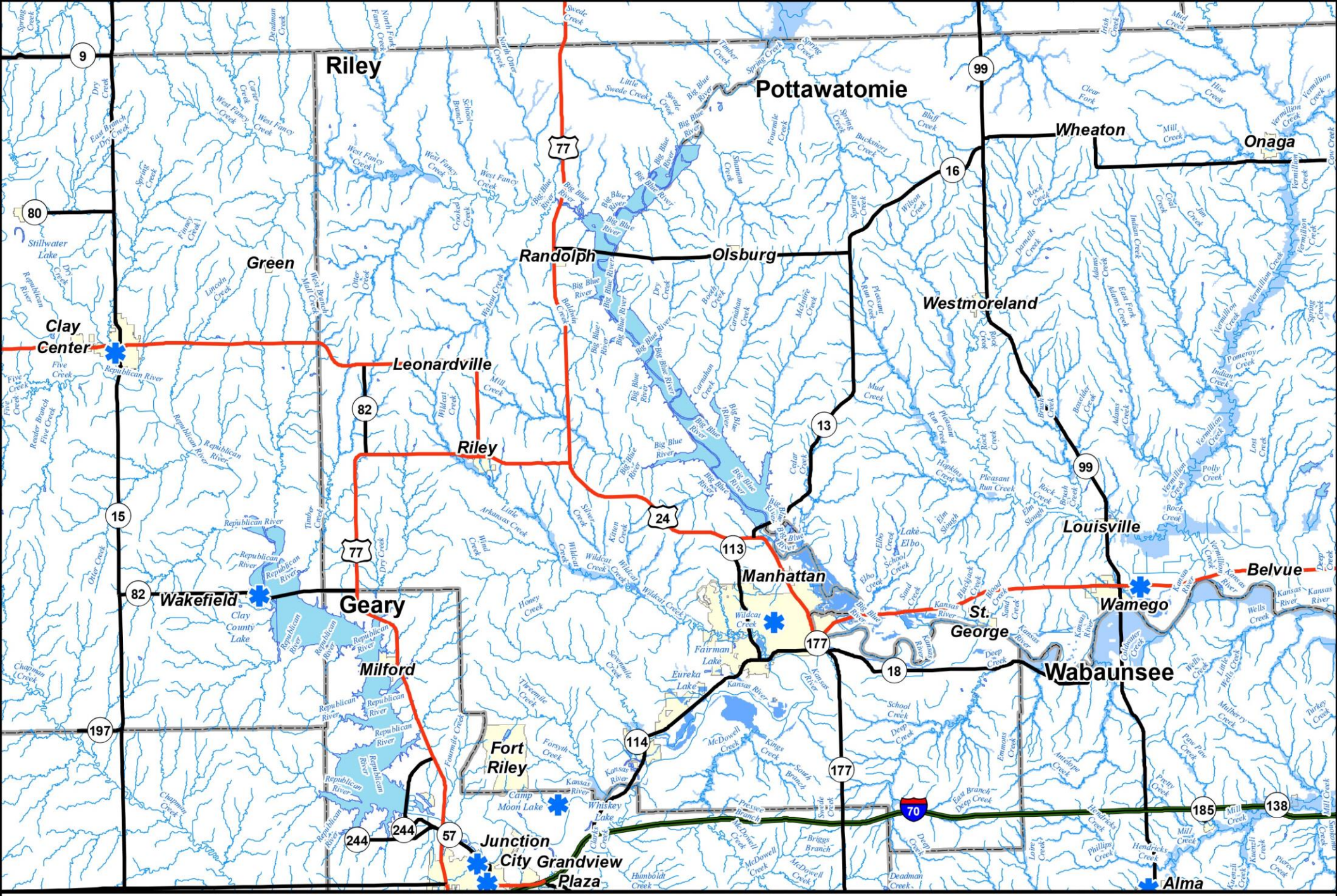
N

0 2.5 5 10 Miles

Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA

Date: 4/1/2014

Kansas
Adjutant General
Division of Emergency Management



EMS locations, and Floodplains

Riley County, KS

EMS
Interstates
US Highways
Kansas Highways
Lake
Streams
County Boudaries
0.2% chance flood hazard
1% chance flood hazard
Cities (Census 2010)

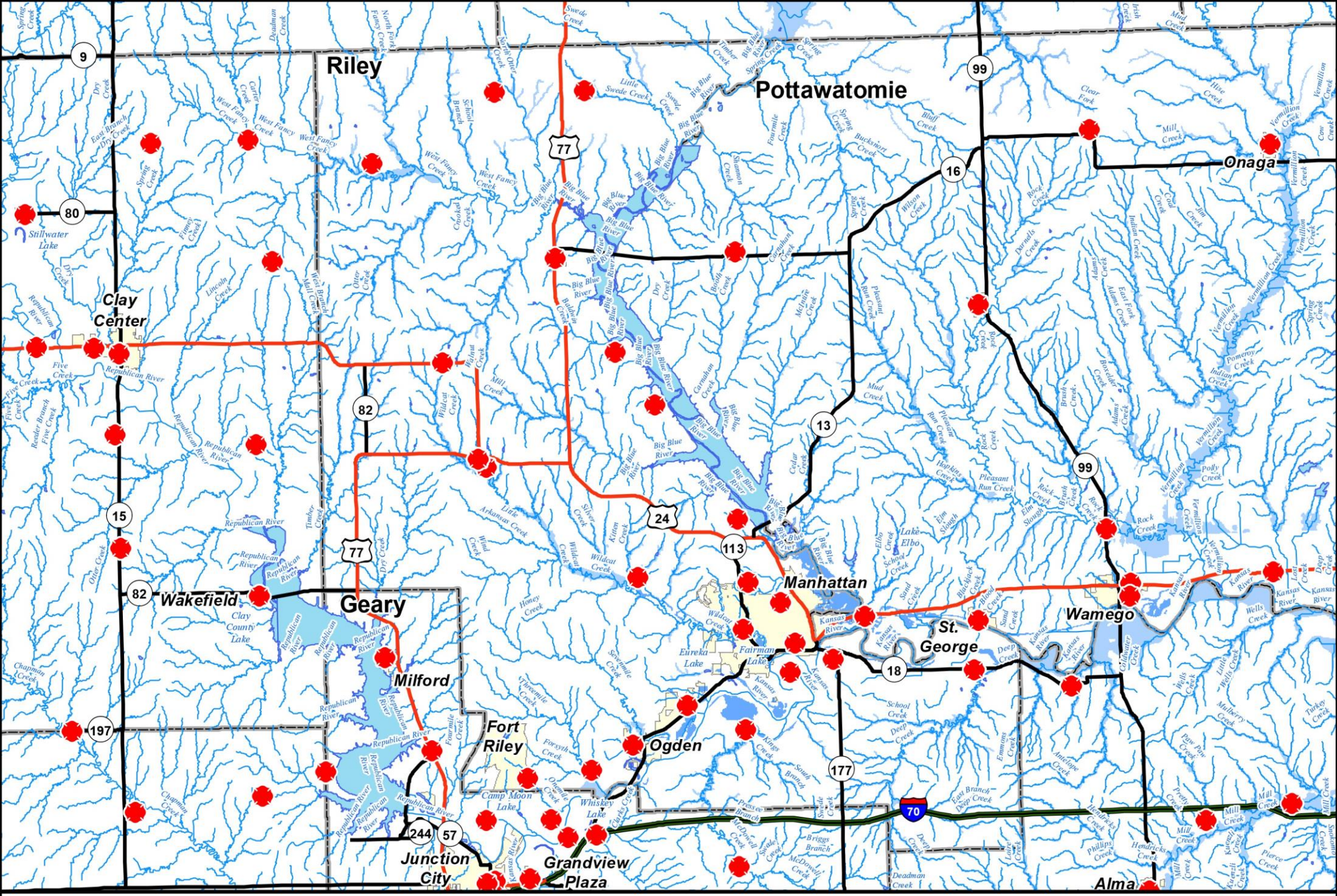
N

0 3 6 12 Miles

Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA

Date: 2/10/2014

Kansas
Adjutant General
Division of Emergency Management



Fire Stations and Floodplains

Riley County, KS

Fire Station

Interstates

US Highways

Kansas Highways

Lake

Streams

County Boudaries

0.2% chance flood hazard

1% chance flood hazard

Cities (Census 2010)

N

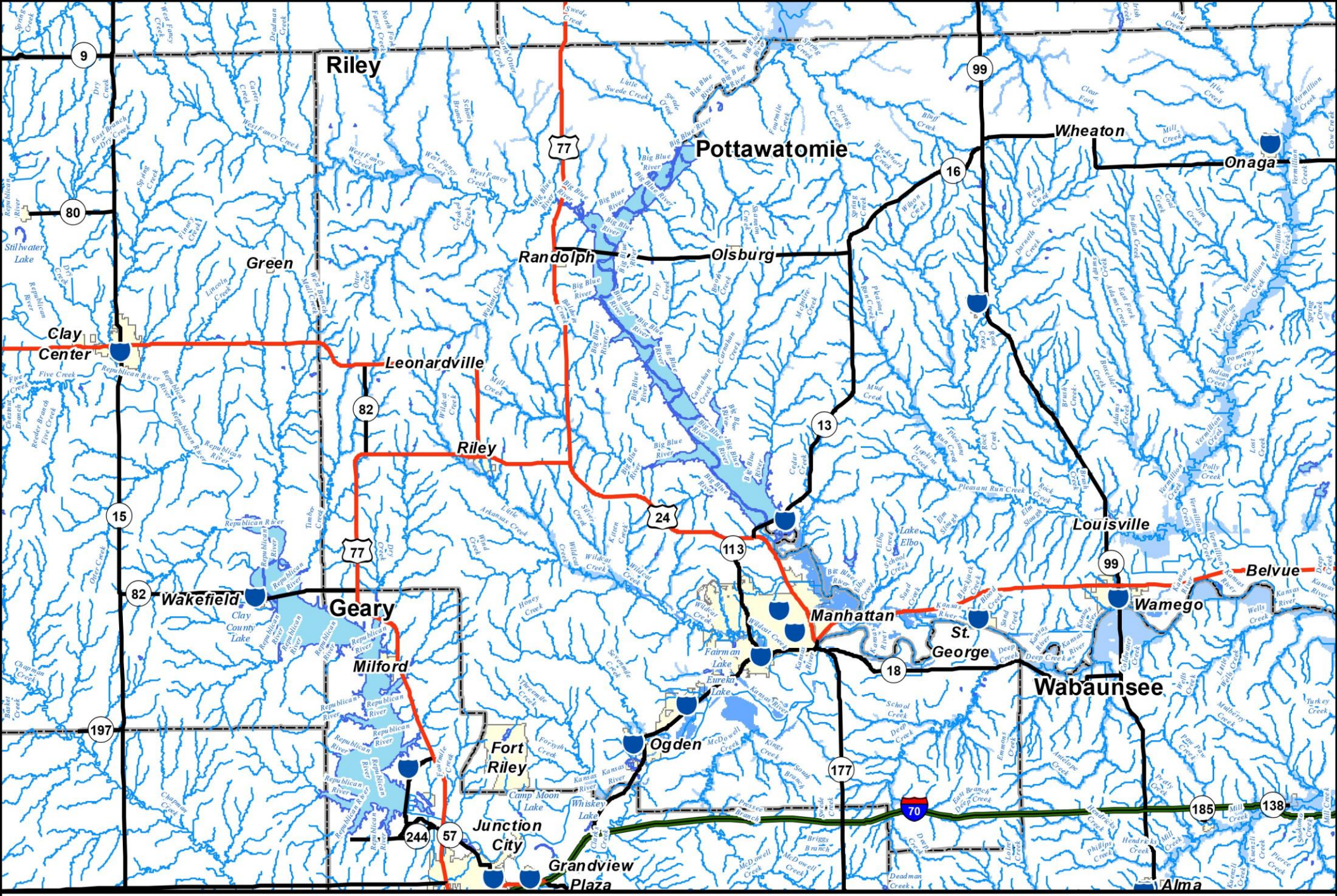
0 3 6 12 Miles

Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA

Date: 2/10/2014

Kansas Adjutant General

Division of Emergency Management



Law Enforcement and Floodplains Riley County, KS

- Law Enforcement
- 0.2% chance flood hazard
- 1% chance flood hazard
- Interstates
- US Highways
- Kansas Highways
- Streams
- Lake
- County Boudaries
- City Boundaries

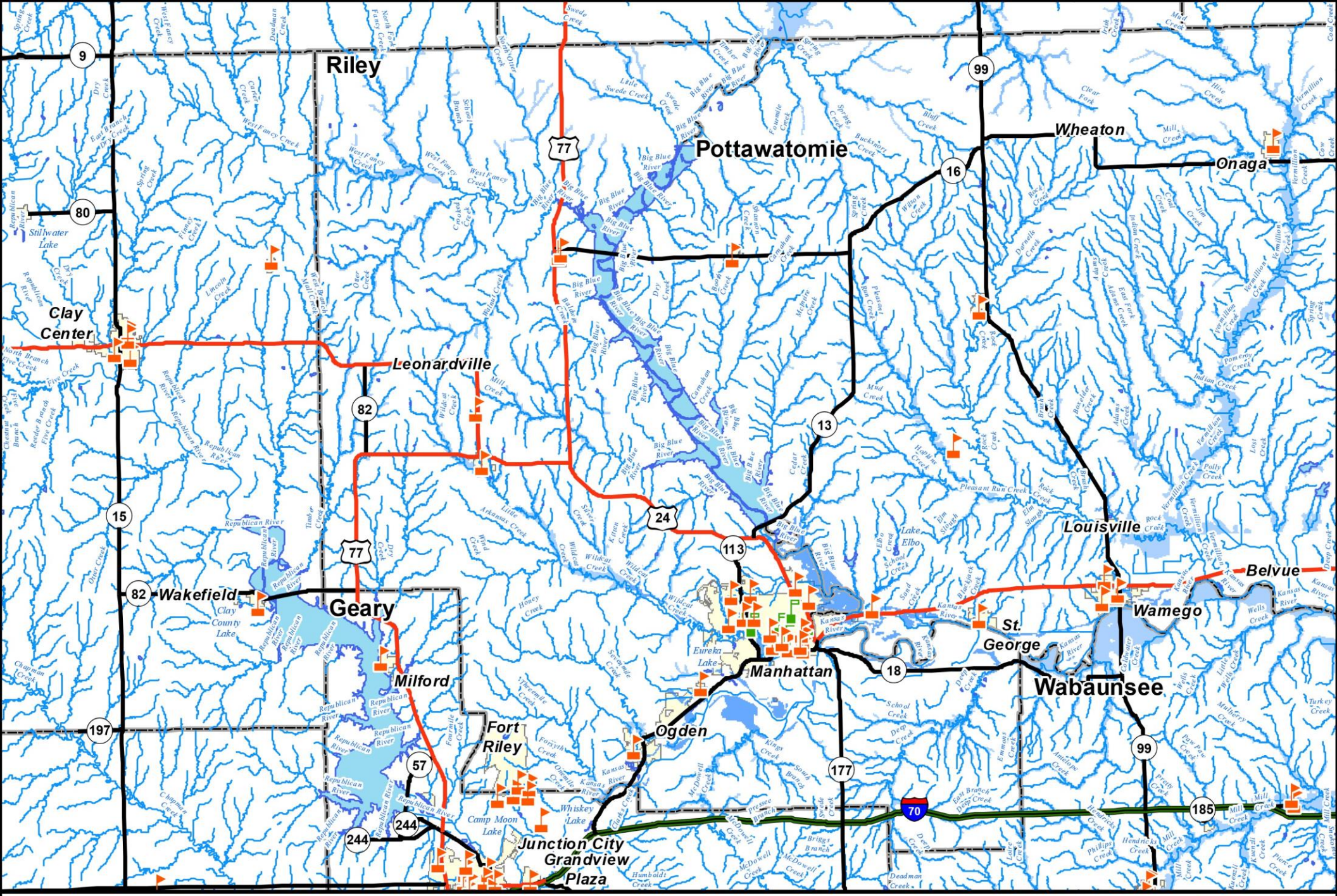
N

0 3 6 12 Miles

Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA

Date: 3/6/2014

Kansas
Adjutant General
Division of Emergency Management



Schools, Colleges and Floodplains
Riley County, KS

School
College
Interstates
US Highways
Kansas Highways
Streams
Lake
County Boudaries
City Boundaries
0.2% chance flood hazard
1% chance flood hazard

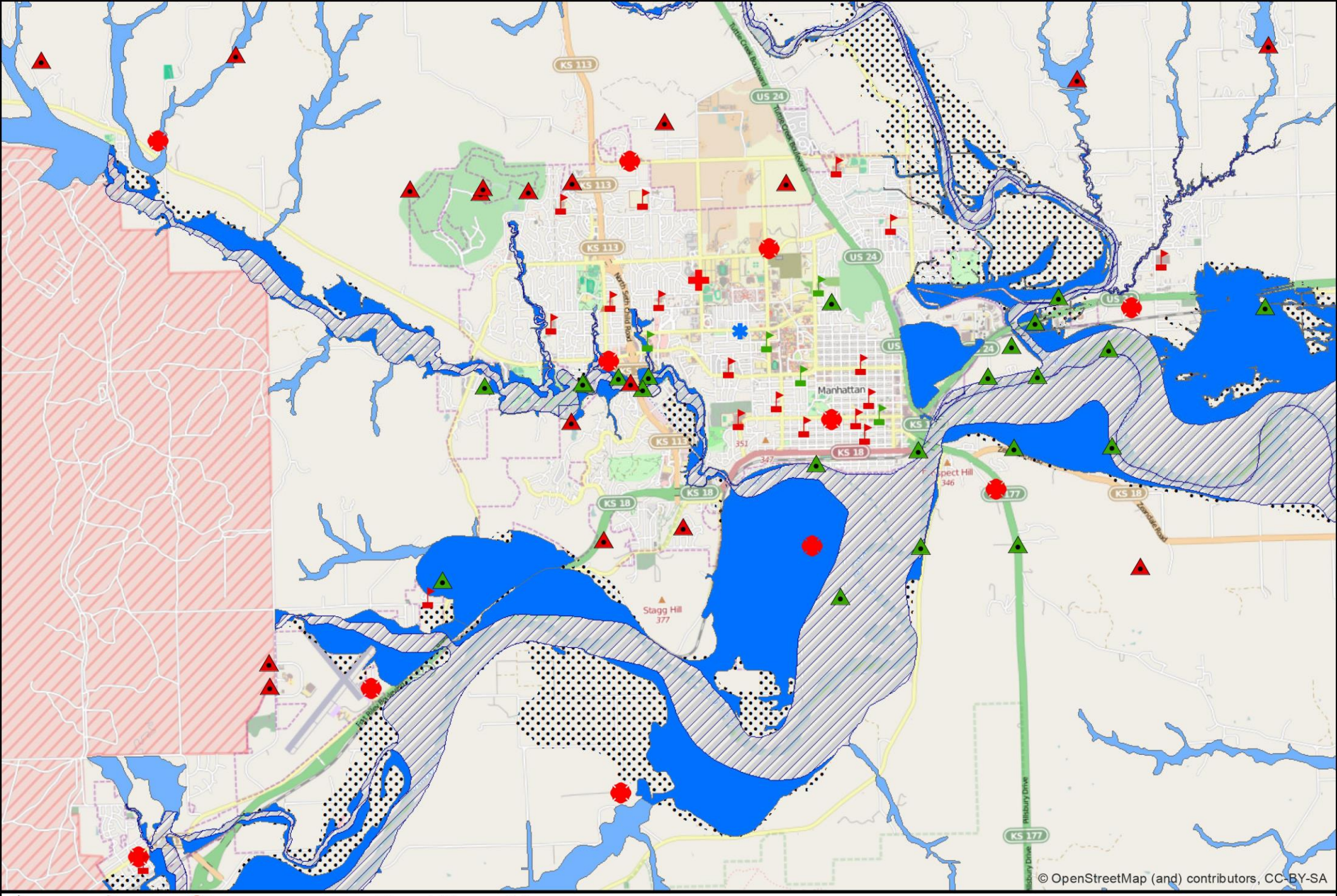
N

0 3 6 12 Miles

Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA

Date: 4/1/2014

Kansas
Adjutant General
Division of Emergency Management



Dam
Levee
Hospital
School
College
EMS
Fire Station

Flood Zone

0.2% Chance Annual Flood
A
AE
Floodway

Flood Hazard Areas
Critical Infrastructure
City of Manhattan
County, KS

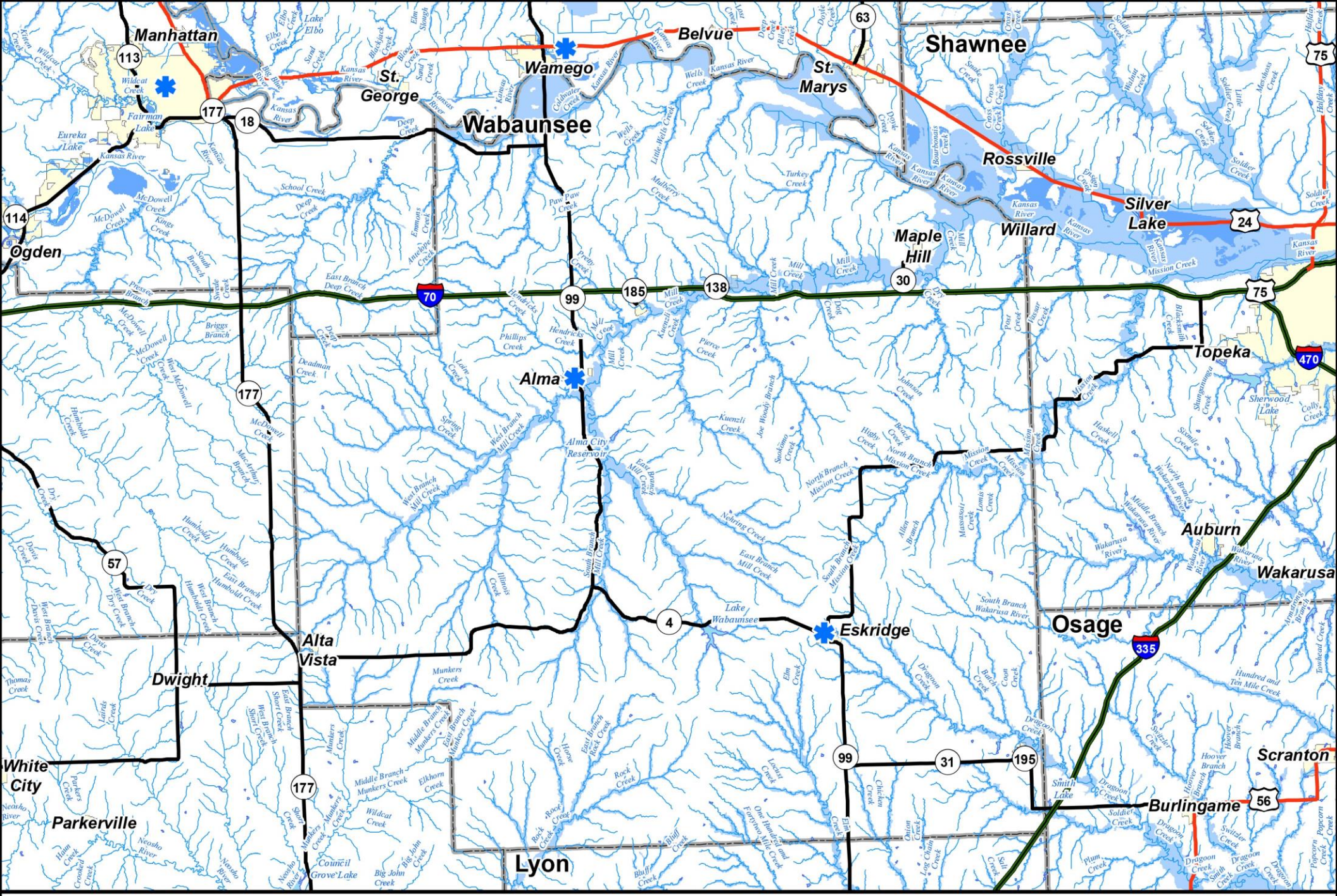
N

0 0.5 1 2 Miles

Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA, KDA, KDHE

Date: 7/31/2014

Kansas
Adjutant General
Division of Emergency Management



EMS locations, and Floodplains

Wabaunsee County, KS

EMS
Interstates
US Highways
Kansas Highways
Lake
Streams
County Boudaries
0.2% chance flood hazard
1% chance flood hazard
Cities (Census 2010)

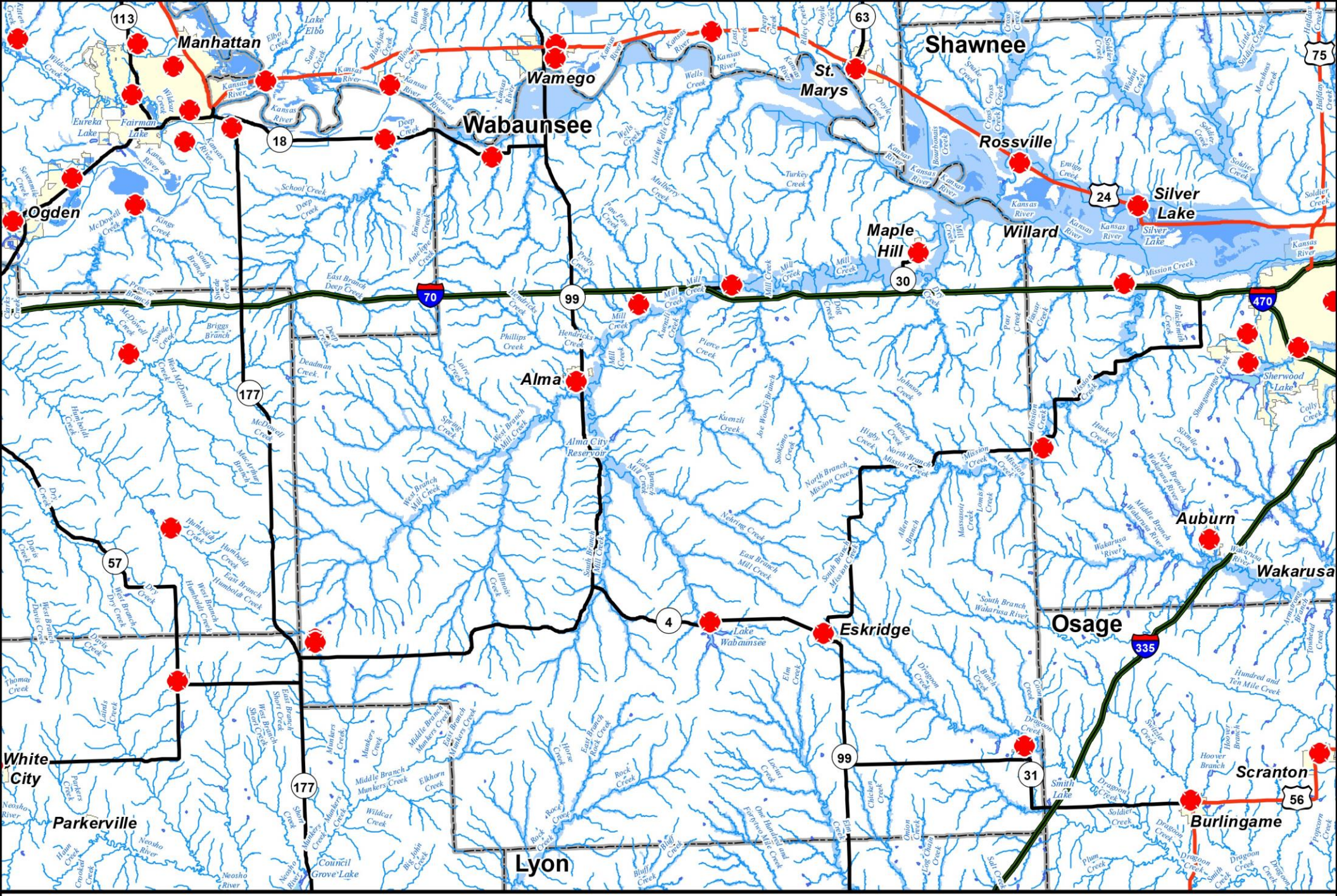
N

0 2.75 5.5 11 Miles

Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA

Date: 2/10/2014

Kansas
Adjutant General
Division of Emergency Management



Fire Stations and Floodplains

Wabaunsee County, KS

Fire Station

Interstates

US Highways

Kansas Highways

Lake

Streams

County Boudaries

0.2% chance flood hazard

1% chance flood hazard

Cities (Census 2010)

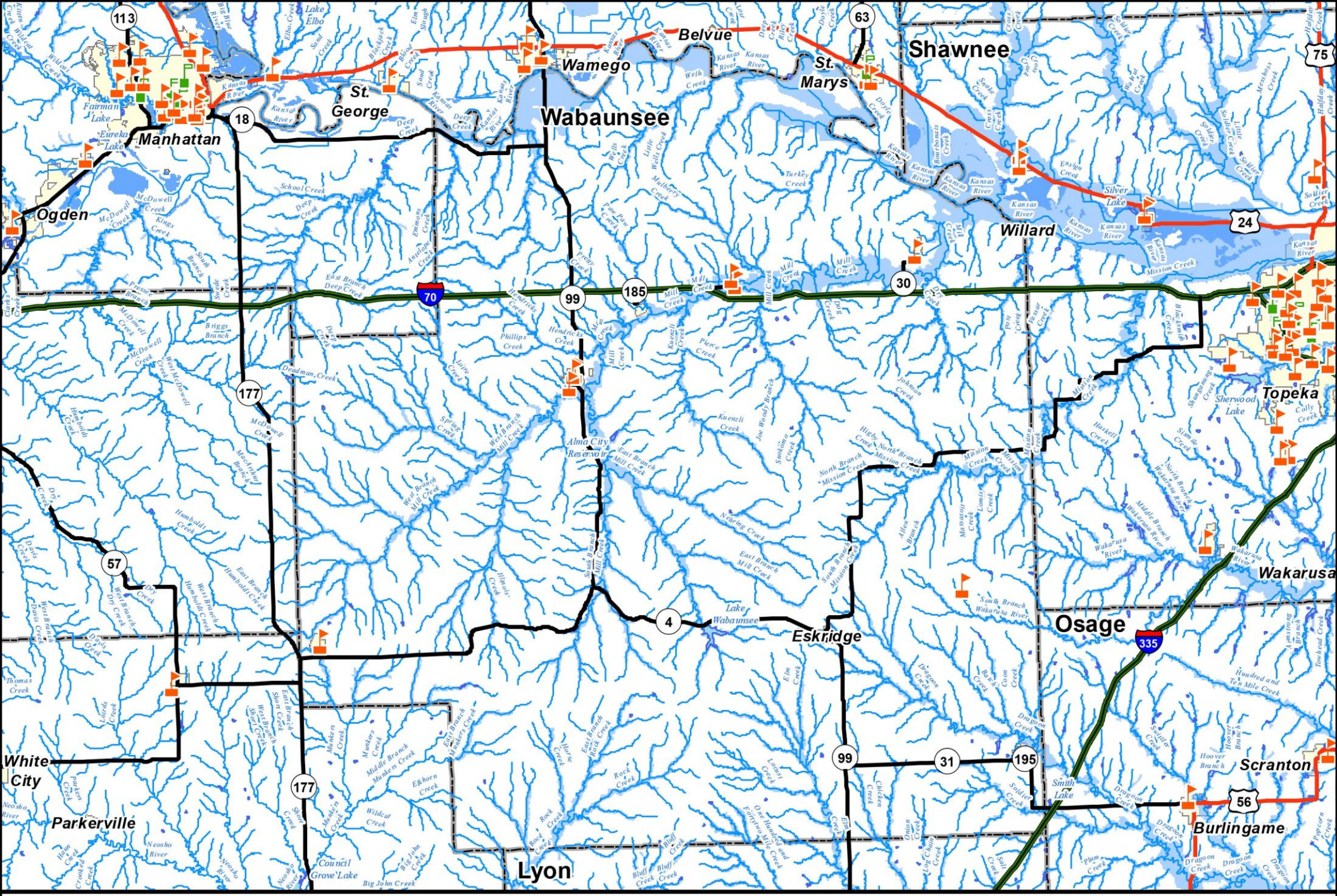
N

0 2.75 5.5 11 Miles

Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA

Date: 2/10/2014

Kansas Adjutant General
Division of Emergency Management



Schools, Colleges and Floodplains Wabaunsee County, KS

School

College

Interstates

US Highways

Kansas Highways

Streams

Lake

County Boudaries

City Boundaries

0.2% chance flood hazard

1% chance flood hazard

N

0 2.75 5.5 11 Miles

Data Sources: USGS, US Census Bureau, KS Adjutant General, KDOT, USDA

Date: 4/1/2014

Kansas
Adjutant General
Division of Emergency Management

Appendix C

Meeting Minutes and Sign-In Sheets

To	**Region "I" Hazard Mitigation Planning Committee**
Through	**Jeanne Bunting, State Hazard Mitigation Officer** **Kansas Division of Emergency Management (KDEM)**
From Tel / E-mail	**Matt Eyer** **Blue Umbrella Co**
Date	**March 5, 2020**
Subject	**Minutes from the Region "I" Mitigation Planning Meeting held on 5 March 2020 in Geary County, KS @ 0930**

This document is a record of attendance and a summary of the issues discussed during the above Kickoff meeting. Topics covered during the meeting included: (1) an introduction to the purpose of hazard mitigation planning, (2) the benefits of a multi-jurisdictional approach, (3) the reasons for the regional mitigation planning process, (4) grant programs linked to an approved plan and (5) action items in the previous county hazard mitigation plans. The hazard mitigation planning process was reviewed to include requirements for public involvement and the use of data collection guides, and the new action criteria. The planning committee reviewed the list of hazards to be used as a part of the regional plan. The group discussed mitigation actions and the availability of grant programs during the meeting. The meeting concluded with a discussion of the next steps in the planning process. The formal presentation portion of the meeting began at 0930 CDT and concluded at 1130 CDT.

Attendees

See attached sign in sheet

Introductions

Matt Eyer contractor with Blue Umbrella Co began the meeting by welcoming and thanking the attendees. Participants introduced themselves and identified what jurisdiction they represented.

Introduction to Hazard Mitigation Planning

Matt Eyer, the plan author contractor, presented information on the purpose and requirements of the Disaster Mitigation Act of 2000. The attendees were reminded that this is a regional planning effort which will update the current Region I mitigation plan. The plan includes: Geary, Riley, and Pottawatomie. The presentation also addressed the benefits for jurisdictions participating in this mitigation plan update, including eligibility for federal hazard mitigation assistance funding programs.

Matt Eyer described the benefits of participating in a multi-jurisdictional plan as improving coordination and communication among local jurisdictions and that these hazards do not stop at jurisdictional boundaries thus this multi-jurisdictional plan allows for a more comprehensive approach. The group also heard information regarding the significant cost savings being realized by the regional approach to planning. The regional approach now being used allows

planning services to be provided to each county for the update at no cost to the county. Matt Eyer with Blue Umbrella will be completing the Region "I" mitigation plan for committee review.

Mr. Eyer also described the role of the Hazard Mitigation Planning Committee (HMPC).Each jurisdiction participating in development of the plan must meet the following minimum requirements:

- Designate a representative to serve on the Region "I" Hazard Mitigation Planning Committee, which will meet twice during the planning process, Emergency Managers will meet three times.
- Provide data for and assist in the development of the updated risk assessment that describes how various hazards impact your jurisdiction,
- Provide data to describe current capabilities,
- Develop/update mitigation actions (at least one) specific to your jurisdiction,
- Provide comments on plan drafts as requested,
- Inform the public, local officials, and other interested parties about the planning process and provide opportunities for them to comment on the plan, and
- Formally adopt the mitigation plan.

Planning for Public Involvement

The local/regional hazard mitigation plan requirements state that the public must have the opportunity to comment on the plan. The public will be given two opportunities to comment on the plan, once during the drafting stage and another when the plan is complete in the final draft stage. KDEM is planning to utilize a questionnaire on SurveyMonkey.com to ask the public's opinion about hazards that affect them during the drafting stage. The HMPC members in the county are also requested to post the SurveyMonkey.com link, once available, on their websites and newsletters to the public and to distribute the survey as widely as possible.

Data Collection Process

The participating jurisdictions at the meeting were provided hard copies of Data Collection Guides. Local County Emergency Management Agencies will follow-up with jurisdictions that were not in attendance at this meeting to provide an overview of the process being used and copies of data collection guides for completion. Mr. Eyer briefed on the Data Collection Guides, and reminded the attendees that they are specific for local units of government and schools. There are two different guides, one for local governments, and one for schools and universities. The jurisdictions were requested to provide data regarding hazards that had occurred in their jurisdiction since the last plan update (2015) for the 22 hazards that are in the Regional Plan. The Data Collection Guides were requested to be returned to Jenni Ellerman by 01 April 2020.

Plan Format/ Regional and Countywide Risk Assessment

The list of hazards in the State of Kansas plan is the list that is being used for the regional plans. All of the hazards included in the State Plan were included in the current plan for the counties in Region I. Blue Umbrella staff will be updating the regional hazard ranking using the State Plan methodology for hazards in their current plan.

Hazard Mitigation Assistance Grants Available Linked to Approved Plan

The following four Hazard Mitigation Assistance grant programs were outlined, priority activities discussed, deadline of grants, and current funds available for:

- Hazard Mitigation Grant Program (HMGP)
- Pre-disaster Mitigation (PDM)
- Flood Mitigation Assistance (FMA)
- POST HMGP Fire
- The BRIC program for 2020 was discussed at length.

Other state and federal grant programs for mitigation projects were also mentioned.

Mitigation Actions

The planning committee was provided an introduction to update and development of mitigation actions. Jurisdictional representatives were requested to provide updates as to: (1) action status – in a measureable format, i.e. 100% complete. They were also advised of the FEMA SMART action criteria and the four categories for actions. The group was reminded that each participating jurisdiction must have at least one action and that all NFIP jurisdictions must have at least two NFIP-related actions. The date for the final planning meeting will be sent to each agency. At that final meeting, the mitigation actions for the plan will be prioritized.

Next Steps

The meeting concluded with a discussion of the remaining steps to complete the planning process as follows:

- **April 1, 2020 — Data Collection Guides Due to KDEM**
- **April 2020, TBD – Meeting #2 for Emergency Management Officials**
- **TBD (Beginning of June 2020) – Meeting #3 All Committee Members – Action Priorities**
- **July 2020 (beginning of) — Submit Plan to FEMA**

REGION I

Name	County/Jurisdiction	E-Mail	Phone	Signature
	AWD	org		
M H v				
g	C y	org		
J		p y g		
Jennif Me ow	Pttawatome	jme row@pottcounty org	7-3353	
H		jager@ptsheriff com		Shane E Jager
g	P ITAWA	a com @ptshe		
Kathy Bru n	N maha Mars 11	nemaha mars 1 p	5	
m e Mo	m p	vm		
T D ederich	Bluste			
La r Harrison	R leyCo E.M.	go	3	
R bert c x	R.l yCo	ycountyks gov 7	6	
RAY LBARRA	ITY	Ray lbar a@ucks.com	1732	
I mmy M	C ty Junch ty	Jcks om		
M hell Wolfe		@f g v	3	Mi alfe
Sty M gov	EMA, R	kema gov	9	
mt Ellman	KDEM	nfg@mail m	646	
RRY ER	GEARY Co EM	geary y y rg		
age	y ty	g y y g		
1 g m	y C	g y	5	

Name	County/Jurisdiction	E-Mail	Phone	Signature
Corwyn pp	y	g / tr. g		
rgl	atomie	c rgy com		M. Pu
y McKee	Pottawatomie	c.pottcounty g	26	
Try J	FD	te y.j hum jcks on	12	
tsky	mCo	okr e s	0	

To	**Region "I" Hazard Mitigation Planning Committee**
Through	**Jeanne Bunting, State Hazard Mitigation Officer** **Kansas Division of Emergency Management (KDEM)**
From Tel / E-mail	**Matt Eyer** **Blue Umbrella Co**
Date	**March 5, 2020**
Subject	**Minutes from the Region "I" Mitigation Planning Meeting held on 5 March 2020 in Lyon County, KS @ 1330**

This document is a record of attendance and a summary of the issues discussed during the above Kickoff meeting. Topics covered during the meeting included: (1) an introduction to the purpose of hazard mitigation planning, (2) the benefits of a multi-jurisdictional approach, (3) the reasons for the regional mitigation planning process, (4) grant programs linked to an approved plan and (5) action items in the previous county hazard mitigation plans. The hazard mitigation planning process was reviewed to include requirements for public involvement and the use of data collection guides, and the new action criteria. The planning committee reviewed the list of hazards to be used as a part of the regional plan. The group discussed mitigation actions and the availability of grant programs during the meeting. The meeting concluded with a discussion of the next steps in the planning process. The formal presentation portion of the meeting began at 1330 CDT and concluded at 1530 CDT.

Attendees

See attached sign in sheet

Introductions

Matt Eyer contractor with Blue Umbrella Co began the meeting by welcoming and thanking the attendees. Participants introduced themselves and identified what jurisdiction they represented.

Introduction to Hazard Mitigation Planning

Matt Eyer, the plan author contractor, presented information on the purpose and requirements of the Disaster Mitigation Act of 2000. The attendees were reminded that this is a regional planning effort which will update the current Region I mitigation plan. The plan includes: Lyon, Morris, Chase, and Wabaunsee. The presentation also addressed the benefits for jurisdictions participating in this mitigation plan update, including eligibility for federal hazard mitigation assistance funding programs.

Matt Eyer described the benefits of participating in a multi-jurisdictional plan as improving coordination and communication among local jurisdictions and that these hazards do not stop at jurisdictional boundaries thus this multi-jurisdictional plan allows for a more comprehensive approach. The group also heard information regarding the significant cost savings being realized by the regional approach to planning. The regional approach now being used allows

planning services to be provided to each county for the update at no cost to the county. Matt Eyer with Blue Umbrella will be completing the Region "I" mitigation plan for committee review.

Mr. Eyer also described the role of the Hazard Mitigation Planning Committee (HMPC).Each jurisdiction participating in development of the plan must meet the following minimum requirements:

- Designate a representative to serve on the Region "I" Hazard Mitigation Planning Committee, which will meet twice during the planning process, Emergency Managers will meet three times.
- Provide data for and assist in the development of the updated risk assessment that describes how various hazards impact your jurisdiction,
- Provide data to describe current capabilities,
- Develop/update mitigation actions (at least one) specific to your jurisdiction,
- Provide comments on plan drafts as requested,
- Inform the public, local officials, and other interested parties about the planning process and provide opportunities for them to comment on the plan, and
- Formally adopt the mitigation plan.

Planning for Public Involvement

The local/regional hazard mitigation plan requirements state that the public must have the opportunity to comment on the plan. The public will be given two opportunities to comment on the plan, once during the drafting stage and another when the plan is complete in the final draft stage. KDEM is planning to utilize a questionnaire on SurveyMonkey.com to ask the public's opinion about hazards that affect them during the drafting stage. The HMPC members in the county are also requested to post the SurveyMonkey.com link, once available, on their websites and newsletters to the public and to distribute the survey as widely as possible.

Data Collection Process

The participating jurisdictions at the meeting were provided hard copies of Data Collection Guides. Local County Emergency Management Agencies will follow-up with jurisdictions that were not in attendance at this meeting to provide an overview of the process being used and copies of data collection guides for completion. Mr. Eyer briefed on the Data Collection Guides, and reminded the attendees that they are specific for local units of government and schools. There are two different guides, one for local governments, and one for schools and universities. The jurisdictions were requested to provide data regarding hazards that had occurred in their jurisdiction since the last plan update (2015) for the 22 hazards that are in the Regional Plan. The Data Collection Guides were requested to be returned to Jenni Ellerman by 01 April 2020.

Plan Format/ Regional and Countywide Risk Assessment

The list of hazards in the State of Kansas plan is the list that is being used for the regional plans. All of the hazards included in the State Plan were included in the current plan for the counties in Region I. Blue Umbrella staff will be updating the regional hazard ranking using the State Plan methodology for hazards in their current plan.

Hazard Mitigation Assistance Grants Available Linked to Approved Plan

The following four Hazard Mitigation Assistance grant programs were outlined, priority activities discussed, deadline of grants, and current funds available for:

- Hazard Mitigation Grant Program (HMGP)
- Pre-disaster Mitigation (PDM)
- Flood Mitigation Assistance (FMA)
- POST HMGP Fire
- The BRIC program for 2020 was discussed at length.

Other state and federal grant programs for mitigation projects were also mentioned.

Mitigation Actions

The planning committee was provided an introduction to update and development of mitigation actions. Jurisdictional representatives were requested to provide updates as to: (1) action status – in a measureable format, i.e. 100% complete. They were also advised of the FEMA SMART action criteria and the four categories for actions. The group was reminded that each participating jurisdiction must have at least one action and that all NFIP jurisdictions must have at least two NFIP-related actions. The date for the final planning meeting will be sent to each agency. At that final meeting, the mitigation actions for the plan will be prioritized.

Next Steps

The meeting concluded with a discussion of the remaining steps to complete the planning process as follows:

- **April 1, 2020 — Data Collection Guides Due to KDEM**
- **April 2020, TBD – Meeting #2 for Emergency Management Officials**
- **TBD (Beginning of June 2020) – Meeting #3 All Committee Members – Action Priorities**
- **July 2020 (beginning of) — Submit Plan to FEMA**

Ray Mattas	Empo a P	6203 353	rmatta @emporia kansas.gov
Ste	A/ WR dp	n 8 4	tere @ g
Jen Lerman			ynnifer.l ellerman@fg.@mail.mil
Amy Terrapi	G	85 55 751	ap.n@ c 4.0 g
B			
Samuel Seeley	yon	620	sseeley 4 ty g
A d M He y	M		1@ mpor
Soo Hse	CSCO M	6207 3 3	CSCO A@SMA m
M W Ise			
/H	LY	62	jt /yo oanxg.
W K	trong ty	62 6	Strongcity
Jeff Cope	y	62 3 3	P y ty g
	po		gov
C G	I R	6	c kg@ I r um
e m lbe	FHCH	62 4 1	jm berg@fl.thl ralth org

Josh eng		620 30	Jb llenger@Finth . h
Kelly B			elly

To	**Region "I" Hazard Mitigation Planning Committee**
Through	**Jenni Ellerman, Mitigation Planner**
	Kansas Division of Emergency Management (KDEM)
From	**Jenni Ellerman, Mitigation Planner**
Tel / E-mail	**Kansas Division of Emergency Management (KDEM)**
Date	**16 June 2020**
Subject	**Minutes from the Region "I" Mitigation Planning Meeting held on 16 June 2020, On-Line.**

This document is a record of attendance and a summary of the issues discussed during the above meeting. Topics covered during the meeting included: (1) Strategy, (2) Goals, and (3) actions, 4) final steps, 5) draft plan. The meeting concluded with a discussion of the next steps in the planning process and the necessity to open the plan for public comment.

Attendees

This meeting was conducted online due to the COVID-10 pandemic and social distancing requirements. Due to the online nature of this meeting, no attendance form was circulated. The following MPC members were in attendance.

MPC Member	Title	County
Scott Wiltse	Emergency Manager	Chase County
Mike Haase	Emergency Manager	Geary County
Jarrod Fell	Emergency Manager	Lyon County
Christopher Blackledge	Emergency Manager	Morris County
Jennifer Merrow	Emergency Manager	Pottawatomie County
Pat Collins	Emergency Manager	Riley County
Amy Terrapin	Emergency Manager	Wabaunsee County

Agenda

The meeting was scheduled in order to finalize the draft plan of Region I. Matt Eyer, the plan author, reviewed the strategy, goals, and went in depth on the next steps, which include public comments.

Next Steps

The meeting concluded with a discussion of the remaining steps to complete the planning process as follows:

- **July 7th, 2020 – Final Meeting**
- **July 16, 2020 – Submit plan to FEMA**

//s//
Jennifer Ellerman, Hazard Mitigation Planner, KDEM

To Region I Hazard Mitigation Planning Committee
Through Jenni Ellerman, Mitigation Planner
Kansas Division of Emergency Management (KDEM)
From Jenni Ellerman, Hazard Mitigation Planner
Tel / E-mail Kansas Division of Emergency Management (KDEM)
Date 7 July 2020
Subject Minutes from the Region I Final Mitigation Planning Meeting

This document is a record of attendance and a summary of the issues discussed during the above meeting. Topics covered during the meeting included: (1) Strategy, (2) Goals, and (3) actions, 4) final steps, 5) draft plan. The meeting concluded with a discussion of the next steps in the planning process and the necessity to open the plan for public comment.

Attendees

This meeting was conducted online due to the COVID-10 pandemic and social distancing requirements. Due to the online nature of this meeting, no attendance form was circulated. To ensure wide circulation and participation, the following Hazard Mitigation Committee members were tasked with conducting outreach to participating jurisdictions within their county.

MPC Member	Title	County
Scott Wiltse	Emergency Manager	Chase County
Mike Haase	Emergency Manager	Geary County
Jarrod Fell	Emergency Manager	Lyon County
Christopher Blackledge	Emergency Manager	Morris County
Jennifer Merrow	Emergency Manager	Pottawatomie County
Pat Collins	Emergency Manager	Riley County
Amy Terrapin	Emergency Manager	Wabaunsee County

Agenda

The meeting was scheduled in order to finalize the draft plan of Region I. Matt Eyer, the plan author, reviewed the strategy, goals, and went in depth on the next steps, which include public comments.

Next Steps

The meeting concluded with a discussion of the remaining steps to complete the planning process as follows:

- **July 2020 – Submit Plan to FEMA**

//s//
Jeanne Bunting, State Hazard Mitigation Officer, KDEM