October 2024

Kansas Region L Hazard Mitigation Plan

Johnson County
Leavenworth County
Wyandotte County

Prepared By:
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List of Appendices

List of Commonly Used Acronyms

Acronym	Meaning
ASCE	American Society of Civil Engineers
BRIC	Building Resilient Infrastructure and Communities
CDC	Centers for Disease Control and Prevention
CFR	Code of Federal Regulations
CRS	Community Rating System
DMA	Disaster Mitigation Act
EAL	Estimated Annual Loss
FEMA	Federal Emergency Management Agency
FIRMs	Flood Insurance Rate Maps
FMA	Flood Mitigation Assistance
GIS	Geographic Information System
HHPD	Rehabilitation Of High Hazard Potential Dam Grant Program
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
IBC	International Building Code
LEPC	Local Emergency Planning Committee
NCEI	National Centers for Environmental Information
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NRI	National Risk Index
NWS	National Weather Service
RAPT	Resilience Analysis and Planning Tool
RL	Repetitive Loss
SFHA	Special Flood Hazard Area
SHMO	State Hazard Mitigation Officer
MPC	Mitigation Planning Committee
SRL	Severe Repetitive Loss
STAPLEE	Social, Technical, Administrative, Political, Legal, Economic, and Environmental
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USGS	United States Geologic Survey
WUI	Wildland/Urban Interface

Section 1 – 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 multi-jurisdictional 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 Kansas Region L 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 2019 HMP
- Build for a safer future for all citizens
- Foster cooperation for planning and resiliency
- Identify, prioritize, and mitigate against hazards
- Assist with sensible and effective planning and budgeting
- Educate citizens about hazards, mitigation, and preparedness
- Comply with relevant federal requirements

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 all citizens.

1.2 Assurances

In an effort to reduce natural disaster losses, the United States Congress passed the Disaster Mitigation Act of 2000 (DMA 2000) in order to amend the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act). DMA 2000 amended the Stafford Act by repealing the previous Mitigation Planning section (409) and replacing it with a new Mitigation Planning section (322). Section 322 of the DMA makes the development of a hazard mitigation plan a specific eligibility requirement for any local government applying for Federal mitigation grant funds. This HMP was prepared to meet the requirements of the DMA 2000, as defined in regulations set forth by the Interim Final Rule (44 Code of Federal Regulations (CFR) Part 201.6).

All adopting jurisdictions certify that they will comply with all applicable Federal statutes and regulations during the periods for which they receive grant funding, in compliance with 44 CFR 13.11(c), and will amend this 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 requirements of the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988, as amended by the Disaster Mitigation Act of 2000. This plan complies with all the relevant requirements of:

- Code of Federal Regulations (44 CFR) pertaining to hazard mitigation planning
- Federal Emergency Management Agency (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.

Additionally, this HMP has been completed to address all State of Kansas recommendations and requirements concerning hazard mitigation planning and the requirements of FEMA's Local Mitigation Planning Policy Guide that went into effect April 19, 2023.

1.3 Authorities

The HMP relies on the authorities given to participating jurisdictions by its citizens and encoded in local and 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 and local laws, statutes, and policies will supersede the provisions of the plan.

1.4 Plan Adoption

Upon review and approved pending adoption status by FEMA Region VII, adoption resolutions will be signed by the participating jurisdictions. FEMA approval documentation may be found in Appendix A. Jurisdictional adoption resolutions may be found in Appendix B.

Administration and oversight of the hazard mitigation program is the responsibility of the Kansas Division of Emergency Management (KDEM) Mitigation Branch and local county Emergency Management Departments. The plan will be reviewed annually and will be updated every five years, or as required by changing hazard mitigation regulations or guidelines.

Section 2 – Documentation of the Planning Process

2.1 Planning Process

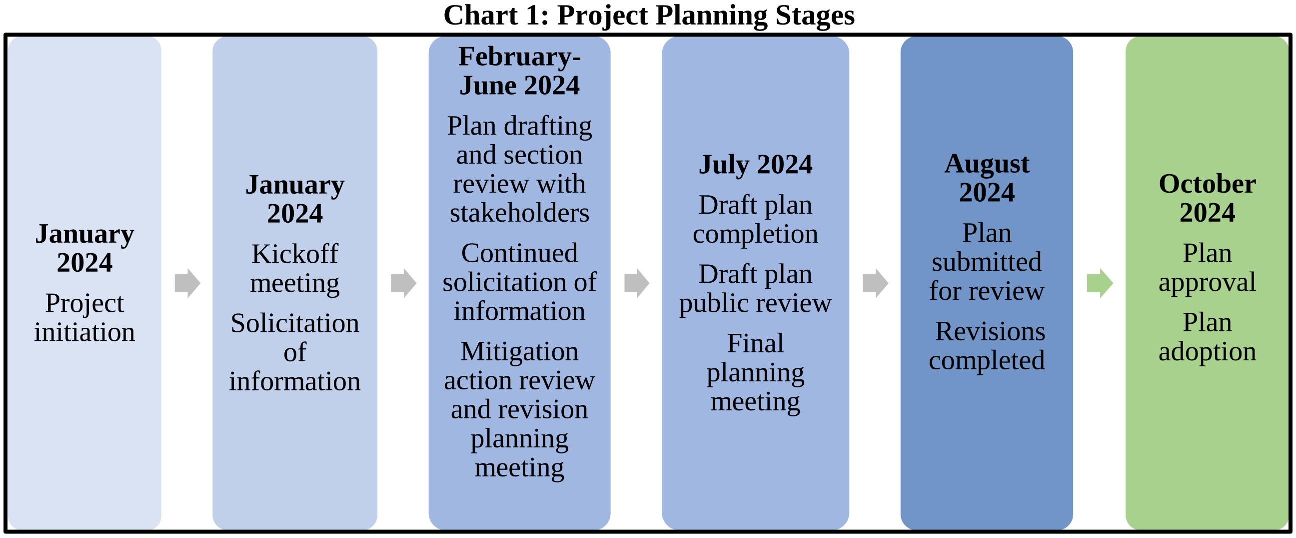
The process established for this planning effort is based on the Disaster Mitigation Act of 2000 planning and update requirements and the FEMA associated guidance for local hazard mitigation plans. To accomplish this, the following planning process methodology was followed:

- Inform, invite, and involve other mitigation plan stakeholders throughout the state, including federal agencies, state agencies, regional groups, businesses, non-profits, underserved communities, and local emergency management organizations.
- Conduct a thorough review of all relevant current and historic planning efforts.
- Collect data on all related state plans and initiatives, local plans' hazard risk, local plans' mitigation strategies and actions, state owned facilities, flood plains, Repetitive Loss/Severe Repetitive Loss properties, hazard events, on-going and completed mitigation actions, and mitigation program changes since the development of the previous plan.
- Conduct a review of all related and relevant state and local plans 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 and update the profile of Kansas Region L.
- Complete a risk and vulnerability assessment using a Geographic Information System (GIS) driven approach using data from the FEMA and other federal and state agency resources. Analyses were conducted at the state level, county by county, of state-owned facilities, and county by county drawing on local assessments.
- Develop a comprehensive mitigation strategy effectively addressing Kansas Region L's hazards and mitigation program objectives. This included identifying state and local 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 for review and approval.

2.2 Project Timeline

The Kansas Region L HMP review and revision process began in January 2024, with the first public meeting held in January 2024. The following chart indicates the planning stages completed as part of this process:

Chart 1: Project Planning Stages



2.3 2024 Plan Organization

This HMP is both a reference document and an action plan. It has information and resources to educate readers and decision-makers about hazard events and related issues and a comprehensive strategy that participating jurisdictions, stakeholders, and community members can follow to improve resilience. This HMP is composed of the following sections:

- **Section 1 - Introduction, Assurances, and Adoption:** Details the regulatory framework for plan development and adoption requirements.
- **Section 2 – Documentation of the Planning Process:** Outlines the steps taken to complete this HMP, consideration of planning equity, the people involved in its creation, strategies to invite public participation, and technical and planning resources utilized in completing this plan.
- **Section 3 - Regional Profile and Development Trends:** Details demographic information, vulnerable populations, critical facility and community lifeline information, agricultural data, and a discussion of climate change parameters.
- **Section 4 - Hazard Identification and Risk Assessment:** Describes the hazards that can impact the planning area, including extent, previous occurrences, changing conditions, and vulnerabilities.
- **Section 5 – Capability Assessment:** Provides a comprehensive evaluation of existing abilities to effectively mitigate hazards and manage disaster risks. This assessment involves analyzing the community's current resources, policies, programs, and systems to determine how well it can implement mitigation strategies.
- **Section 6 - Mitigation Strategy:** Outlines the specific actions, policies, and projects designed to reduce or eliminate the risks and impacts of hazards on a community. These strategies are developed based on the findings from the hazard identification and risk assessment phases and are tailored to address the unique vulnerabilities and capabilities of the community.
- **Chapter 7 - Plan Maintenance:** Summarizes plan maintenance responsibilities, monitoring and update requirements, and opportunities for continued public involvement.
- **Appendices:** Provides supplementary detailed information and supporting documents. The appendices serve to enhance the main content by offering further clarification, data, and documentation that support the planning process and implementation.

2.4 2024 Plan Update

In undertaking this planning effort, the KDEM determined that wide variances in planning format and data do not allow for effective continuous planning. To provide planning continuity every effort was made during this plan update to adhere as closely as possible to elements of the 2019 HMP. As such, the level of analysis and detail included in this risk assessment is cumulative, allowing participating jurisdictions to have a robust base to further mold and improve their mitigation strategies over the next five years.

As part of this planning effort, each section of the previous mitigation plan was reviewed and revised based on current and available data. The plan was reviewed and revised against the following elements:

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

Based on the above criteria, each section of the 2019 HMP was reviewed and revised as required. In addition to data revisions, the format and sequencing of the previous plan was updated for ease of use and plan clarity. Additionally, during this process, and after a thorough review and discussion with all stakeholders, it was determined that the priorities of the Kansas Region L in relation to hazard mitigation planning have not changed during the five years of the previous planning cycle.

Key updated elements from the previous HMP include:

- Integration of the current jurisdictional planning documents.
- Expanded definition and discussion of underserved communities and vulnerable populations.
- Updated critical facilities and community lifelines list.
- Expanded detailing of historic hazard event occurrences.
- Updated mapping using newly available data.
- Updated county and jurisdictional capabilities assessment.
- Updated mitigation actions, including progress on previous actions

2.5 Hazard Mitigation Planning Equity

Planning equity refers to the principle of fairness and justice in planning and development processes. It emphasizes the equitable distribution of resources, opportunities, and benefits among all members of a community, particularly those who have historically been marginalized or disadvantaged. The concept of planning equity recognizes that planning decisions can have significant impacts on different groups of people and aims to ensure that these decisions promote social justice and inclusivity. It involves addressing spatial inequalities, such as disparities in access to housing, transportation, public services, green spaces, and employment opportunities.

Planning equity entails involving diverse stakeholders in decision-making processes, including community members, advocacy groups, and underrepresented populations. It seeks to empower marginalized communities by giving them a voice in shaping the development and planning policies that directly affect their lives.

Planning equity and hazard mitigation planning are closely related, as both aim to create more resilient and inclusive communities. As part of this planning effort, the following intersections were considered between planning equity and hazard mitigation planning:

- Vulnerability assessment: Planning equity recognizes that certain communities, particularly marginalized and disadvantaged populations, may be more vulnerable to hazards due to social, economic, and environmental factors. When conducting a vulnerability assessment as part of hazard mitigation planning, it is important to consider equity issues and identify areas or groups that may experience disproportionate impacts.
- Engaging marginalized communities: Planning equity emphasizes the inclusion and participation of diverse stakeholders, including marginalized communities, in decision-making processes. In hazard mitigation planning it is crucial to engage these communities to understand their unique needs, concerns, and perspectives regarding hazards.
- Addressing social disparities: Hazard mitigation planning can help address social disparities by considering the unequal distribution of resources and opportunities in the context of hazards. This can involve implementing mitigation measures that specifically target vulnerable populations, such as affordable housing in safer areas or improved access to emergency services and transportation for underserved communities.
- Equitable distribution of resources: Planning equity promotes the equitable distribution of resources, and this principle can be applied to hazard mitigation planning. It involves ensuring that mitigation measures and investments are allocated fairly, with consideration given to communities that have historically received less attention or investment. This can help reduce existing disparities and enhance the resilience of marginalized communities.

By integrating planning equity into hazard mitigation planning, it becomes possible to develop strategies and actions that not only reduce the risks associated with hazards but also promote social justice, inclusivity, and resilience for all members of the community.

As part of this planning process, the MPC considered potential inequities within the region and encouraged the participation of potentially vulnerable citizens and communities. This process began with recognizing that disparities exist within the region, including health outcomes and living conditions for people of color, people with disabilities, and historically disadvantaged communities. It was recognized that these populations may be at greater risk to the hazards identified in this plan and may be limited in their ability to adapt, respond, and recover if an event were to occur.

As recommended in FEMA's "Guide to Expanding Mitigation," Kansas Region L took a whole community approach to this planning effort, including:

- Inviting historically underserved populations to participate in the planning and decision-making processes,
- Inviting faith based and community organizations, nonprofit groups, schools, and academia to be plan stakeholders,

2.6 Mitigation Planning Committee

Project initiation began with the selection of a Mitigation Planning Committee (MPC), consisting of each participating county emergency manager from Kansas Region L and KDEM Mitigation Branch staff. From project inception to completion, the MPC was notified at each major plan development milestone through a combination of meetings and electronic communication.

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

- Attend and participate in meetings
- Assist with the collection of data
- Assure the accuracy and completeness of data
- Assist with the revision and development of mitigation actions
- Review planning elements and drafts
- Integrate hazard mitigation planning elements with other planning mechanisms

As an additional responsibility as part of the MPC, KDEM members helped establish project operating procedures and timelines, and assisted with the establishment of project milestones.

The following table represents members of the MPC:

Table 1: MPC Members

County	Representative	Title
Johnson County	Dan Robeson	Emergency Management Coordinator)
Johnson County	Cary Gerst	Assistant Director, Planning
Johnson County	Morgan Hunter	Emergency Management Planner
Leavenworth County	Charles (Chuck) Magaha	Emergency Manager
Wyandotte County	Matt May	Emergency Manager
KDEM	Stephanie Goodman	State Hazard Mitigation Officer
KDEM	Mike Ahlf	Mitigation Planner
KDEM	Dirk Christian	Planning and Mitigation Bureau Director
KDEM	Terry Kegin	KDEM Regional Coordinator

Repeated outreach efforts were made to equity partners extending opportunities to have a representative on the MPC, including Tribal partners. No answer was received.

2.7 Stakeholders

Kansas Region L acknowledges that effective hazard mitigation planning should involve a diverse group of stakeholders, including government agencies, private sector entities, private non-profit organizations, quasi-governmental authorities, and special districts. The coordination and cooperation of these stakeholders assists with all aspects of plan development, including:

- Data collection

- Risk analysis
- High and Significant Hazard dam information
- Capability assessment
- Mitigation action review, revision, and development
- Plan implementation

The Kansas Region L MPC provided the opportunity for additional HMP stakeholders, including jurisdictional National Flood Insurance Program (NFIP) coordinators, agencies involved in regulating and overseeing development, neighboring communities, agencies, businesses, academia, non-profits, underserved or marginalized communities, and other interested parties to be involved in the mitigation planning process. Stakeholders were notified of the process through direct communication with the Kansas Region L MPC members, who were provided with details on who to invite at the beginning of the planning process, jurisdictional website notices, and advertisements on social media.

The Kansas Region L MPC provided the opportunity for a wide variety of stakeholders to participate in the planning process, including:

- Local and regional agencies involved in hazard mitigation activities.
- Agencies that have the authority to regulate development.
- National Flood Insurance Program coordinators.
- Neighboring communities.
- Representatives of business, academia, and other private organizations.
- Non-profit and community-based organizations who work to provide support to socially vulnerable and underserved communities.

While not all of these organizations attended meetings, each was actively courted to provide information, data, and feedback as necessary and as related to their areas of expertise. Emphasis was placed on inviting local building departments, who played a critical role in creating and reviewing this HMP. Their expertise was used to help identify local vulnerabilities and develop building-related mitigation measures (please see section 5.3) Additionally, jurisdictional NFIP coordinators played a key role in mitigation planning at the community level. These coordinators were actively engaged and for their expertise on flood risk, mitigation strategies, and NFIP compliance (please see Section 5.4).

The following provides a listing of all stakeholders involved in the development of this HMP:

- KDEM
- Kansas Department of Agriculture
- Kansas Department of Transportation
- Kansas Department of Health and Environment
- Kansas Department of Wildlife and Parks
- Kansas Water Office
- Jurisdictional Building, Planning, and Zoning Departments
- Jurisdictional NFIP Coordinators
- U.S. Army Corps of Engineers (USACE)
- U.S. Department of Agriculture (USDA)
- U.S. Geological Survey (USGS)
- National Weather Service (NWS)
- United States Census Bureau
- University of Wisconsin SILVIS Labs
- National Oceanic and Atmospheric Administration
- Adjacent Region Emergency Management Departments

2.8 Adopting Jurisdictions

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 2: Adopting Jurisdictions

Jurisdiction	Planning Engagement	Name	Title
Johnson County	**x**	**Cary Gerst**	**Assistant Director, Planning**
City of DeSoto	x	Brandon Mills	Assistant City Administrator/Clerk
City of Edgerton	x	Trey Whitaker	Public Works Superintendent
City of Fairway	x	Nathan Nogelmeier	City Administrator
City of Gardner	x	Zachary Roberts	Captain, PD
City of Lake Quivira	x	Manny Olmos	Chief, PD
City of Leawood	x	Colin Fitzgerald	Fire Chief
City of Lenexa	x	Tom Miller	Captain
City of Merriam	x	Jeremiah Waters	Sergeant, PD
City of Mission	x	Ron Ruhulessin	Captain, PD
City of Mission Hills	x	Jennifer Lee	City Administrator
City of Mission Hills	x	Justin Carroll	Assistant City Administrator
City of Mission Woods	x	John Sullivan	Director of Public Works
City of Olathe	x	Rob Cole	Emergency Prep. Coordinator
City of Overland Park	x	Jared McPhee	Emergency Management Coord.
City of Prairie Village	x	Tim Schwartzkopf	Assistant City Administrator
City of Roeland Park	x	John Morris	Chief, PD
City of Shawnee	x	Matt Epperson	Division Chief
City of Spring Hill	x	Lane Massey	City Administrator
City of Westwood	x	John Sullivan	Director of Public Works
City of Westwood	x	Curt Mansell	Chief, PD
City of Westwood Hills	x	Rosemary Podrebarac	Mayor
City of Westwood Hills	x	Beth O'Bryan	City Clerk
Johnson County Community College	x	Alisa Pacer	Director Emergency Management
Kansas School for the Deaf	x	Mike Brewington	Facilities Operations
University of Kansas Edwards Campus	x	John Stipetich	Emergency Management Coord.
University of Kansas Edwards Campus	x	Matt Matheis	Manager
USD #229 – Blue Valley	x	Sid Cumberland	Risk Manager
USD #229 – Blue Valley	x	Jacob Slobodnik	Executive Director of Operations
USD #230 – Spring Hill	x	Timothy Meek	Operations Direction
USD #231 – Gardner/Edgerton	x	Mark DeWitt	Operations Direction
USD #232 – DeSoto	x	Rob Moser	Operations Direction
USD #233 – Olathe	x	Travis Palangi	Executive Director Facilities

Table 2: Adopting Jurisdictions

Jurisdiction	Planning Engagement	Name	Title
USD #512 – Shawnee Mission	x	Michelle Hubbard	Superintendent
Fire District No. 1	x	Trig Morley	Division Chief Special Operations
Consolidated Fire District No. 2	x	Mike Morse	Deputy Chief
Consolidated Fire District No. 2	x	Steve Chick Jr.	Fire Chief
Johnson County Fire District No. 2	x	Jim Francis	Fire Services Administrator, DES
Northwest Consolidated Fire District	x	Todd Maxton	Fire Chief
Water District #7	x	Allan Soetaert	Manager
Water District #7	x	Colin Stalter	Manager
WaterOne	x	Sarah Tuite	Manager – Process Engineering
WaterOne	x	Melissa Mokry	Emergency Coordinator
Evergy	x	Tisha Johnson	Emergency Response Manager
Evergy	x	Chuck Tuttle	Director
Leavenworth County	**x**	**Chuck Magaha**	**Emergency Manager**
City of Basehor	x	Richard Drennon	Mayor
City of Easton	x	Phillip Mires	Mayor
City of Lansing	x	Tony McNeill	Mayor
City of Leavenworth	x	Jermaine Wilson	City Manager
City of Linwood	x	Brian Christenson	Mayor
City of Tonganoxie	x	David Frese	Mayor
USD #207 – Fort Leavenworth	x	Dr. Keith Mispagel	Superintendent
USD #449 – Easton	x	Tim Beying	Superintendent
USD #453 – Leavenworth	x	Dr. Kellen Adams	Superintendent
USD #458 – Basehor-Linwood	x	Doug Powers	Superintendent
USD #464 – Tonganoxie	x	Loren Feldkamp	Superintendent
USD #469 – Lansing	x	Marty Kobza	Superintendent
University of Saint Mary	x	Diane Steele	President
Leavenworth Waterworks Board	x	Joel Mahnken	General Manager
Rural Water District #7	x	Zac Sherburn	Certified Operator
Rural Water District #12	x	Zac Sherburn	Certified Operator
WaterOne	x	Sarah Tuite	Manager – Process Engineering
WaterOne	x	Melissa Mokry	Emergency Coordinator
Unified Government of Wyandotte County and Kansas City, Kansas	**x**	**Matt May**	**Emergency Manager**
City of Bonner Springs	x	Sean Pederson	City Manager
City of Edwardsville	x	Mark Mathies	City Manager
Kansas City Community College	x	Dr. Greg Mosier	President
Kansas School for the Deaf and Blind	x	Luanne Barron	Superintendent
Kansas University Medical Center	x	Bob Page	President
Providence Medical Center	x	Karen Orr	CEO
University of Kansas Hospital	x	Bob Page	President
USD #202 - Turner	x	Dr. Jason Dandoy	Superintendent
USD #203 - Piper	x	Dr. Jessica Dain	Superintendent
USD #204 – Bonner-Edwardsville	x	Daniel Brungardt	Superintendent
USD #500 – Kansas City, Kansas	x	Dr. Anna Stubblefield	Superintendent
Board of Public Utilities	x	Robert L. Milan Sr.	President
Boy Scouts of America	x	Jeremy Croucher	Council President
Harvesters	x	Stephen Davis	President
Fairfax Drainage District	x	Andrew Dailey	General Manager
Kaw Valley Drainage District	x	Dave Davis	Operations Manager
WaterOne	x	Sarah Tuite	Manager – Process Engineering
WaterOne	x	Melissa Mokry	Emergency Coordinator

As indicated in the above list, success was had in engaging faith-based organizations, particularly religious schools, and Unified School Districts and universities. No tribal organizations identified in this region elected to participate, preferring to create their own stand-alone plans.

2.9 Community Outreach

As part of the overall planning process, the public (defined as any person(s) living or working within Kansas Region L and/or any person with a vested interest in the long-term resilience of the county) was provided with numerous opportunities to contribute and comment on the creation and adoption of the plan. These opportunities included:

- Advertised meeting invitations
- Comment period upon completion of draft plan
- Online survey

Experience has indicated that public meetings, no matter how well advertised, generally do not generate either participation or interest in the planning process. Even so, three open meetings were held at an easily accessible community locations. To help generate community interest and participation, a parallel online outreach strategy was undertaken. An online HMP survey was created, the Kansas Region L Hazard Mitigation Plan Update Survey. This online survey portal allowed community members to provide feedback and input on the HMP update using a series of guided questions and open comment fields. Community members commented through this survey, and these comments are both incorporated in this HMP and are included in Appendix B

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. 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.

2.10 Planning Meetings

Three in-person meetings were conducted for the 2024 HMP update. All of the meetings were held in a publicly accessible location and advertised as open to the public. These meeting were conducted to discuss the mitigation planning process as well as gain public support and input for the plan update. The following is a brief synopsis of those meetings.

- **HMP Update Kick-Off and Public Information Meeting – January 29, 2024:** Kansas Region L hosted a kick-off meeting for the MPC, stakeholders, and the public. At the meeting, MPC members, plan stakeholders, and the public were invited to voice any concerns, ask questions, and provide input on the mitigation plan update. Additionally, MPC members were tasked with collecting contact information, hazard history, facility information, and other pertinent information from participating jurisdictions.
- **HMP Plan Review, Capability Review, and Mitigation Strategy Review Meeting – June 6, 2023:** Kansas Region L hosted two mid-term planning meetings for the MPC, jurisdictional representatives, and members of the public. Attendees met to review and revise, as necessary, the region's hazards list and vulnerability assessment. MPC members also reviewed the proposed and revised mitigation strategy to ensure it was in-line with the current planning environment.
- **HMP Update Final Review Meeting – July 18, 2024:** Kansas Region L hosted a public final plan review meeting for the MPC, stakeholders, and the public. At the meeting, MPC members, jurisdictional representatives, plan stakeholders, and the public were invited to voice any concerns, ask questions, and provide input on the mitigation plan update. Additionally, members of the public were invited to review a draft copy of the HMP update posted to jurisdictional and county websites for two weeks prior to the final meeting, and prior to its submission to FEMA Region VII.

Additionally, there were frequent phone and email communications with project stakeholders, and frequent situation calls provided to the State Hazard Mitigation Officer (SHMO) to provide updates concerning the phases of plan development.

2.11 Planning Document Resources

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 a jurisdiction's resilience to disasters.

- **Kansas Region L 2019 Multi-Jurisdictional Natural Hazard Mitigation Plan**
  The previous HMP has been reviewed and is incorporated throughout this plan per FEMA requirements.
- **Jurisdictional Comprehensive Plans**
  These plans, as available, set policies that help the jurisdiction address critical issues facing the community, achieve goals based on priority, and coordinate public and private efforts for mutual success. They also provide the historical context, background, and current data necessary to understand issues and choose solutions as well as seek various forms of funding.
- **Participating Jurisdictions Master and/or Comprehensive Plans:**
  These plans, as available, help jurisdictions set policies that help address critical issues facing the community, achieve goals based on priority, and coordinate public and private efforts for mutual success. They also provide the historical context, background, and current data necessary to understand issues and choose solutions as well as seek various forms of funding.
- **Participating Jurisdiction Critical Facilities List**
  The MPC compiled a list of critical facilities and pertinent information on those facilities. This list is used throughout the plan and is the basis for the vulnerability assessments and loss estimates. The complete list is posted in Appendix E.
- **Jurisdictional Emergency Operations Plans**
  These plans are used by jurisdictions to develop procedures for the protection of personnel, equipment, and critical records to help determine existing established policies that ensure the continuity of government and essential services during and after disasters.
- **State of Kansas Hazard Mitigation Plan**
  The State of Kansas Hazard Mitigation Plan is intended to provide the framework for hazard mitigation. This plan set a baseline for standards and practices for hazard mitigation planning and was used as a resource for information and data.
- **Community Wildfire** Protection Plans
  Created in collaboration with local governments, fire departments, and relevant stakeholders to address the risk of wildfire in the county. The primary goals are to enhance wildfire preparedness, reduce the risk of wildfire to life, property, and critical infrastructure, and improve community resilience.
- **Participating Jurisdiction Planning and Zoning Documents and Ordinances**
  These documents were reviewed, assessed, and cataloged to compile each participating jurisdiction's capabilities.

2.12 Technical Resources

The MPC employed a variety of technical resources during plan development. These technical resources were instrumental in completing an accurate vulnerability and risk assessment, and include:

- **Kansas Emergency Operations Plan Mapping Program:** Assisted with the development of maps for this plan.
- **FEMA Digital Flood Insurance Rate Maps**: FEMA's National Flood Hazard Layer data was instrumental in mapping floodplain locations and estimating potential flood impacts and loss estimates.
- **FEMA National Risk Index (NRI):** An online mapping application that identifies communities most at risk to natural hazards. The mapping service visualizes natural hazard risk metrics and includes data about expected

annual losses from natural hazards, social vulnerability, and community resilience. The NRI's interactive web maps are at the county and Census tract level and made available via GIS services for custom analyses.

- **FEMA Resilience Analysis and Planning Tool (RAPT):** FEMA and Argonne National Laboratory created RAPT to support state, local, tribal, territorial analysis in identifying focus areas for building resilience, response, and recovery capabilities. RAPT is a geographic information system web map tool with clickable layers of community resilience indicators, infrastructure locations, and hazard data.
- **U.S. Drought Monitor:** Provided drought occurrence and intensity data.
- **National Oceanic and Atmospheric Administration (NOAA)/National Centers for Environmental Information (NCEI):** Weather data and historical events were primarily provided by NCEI.
- **U.S. Army Corps of Engineers (USACE):** Levee and flood control data.
- **U.S. Department of Agriculture (USDA):** Drought and agricultural data.
- **U.S. Geological Survey:** Geologic hazard occurrence and probability data.
- **National Weather Service (NWS):** Storm event occurrence and probability data.
- **United States Census Bureau:** Data concerning populations, socially vulnerable populations, and housing.
- **KDEM:** HMP planning guidance and technical support.
- **Kansas Silver Jackets:** Representatives from Federal and State agencies which support comprehensive and sustainable actions that reduce flood risk.
- **FEMA National Safety of Dams Program:** The State of Kansas is responsible for regulating the safety of dams and supports the National Safety of Dams Program.

Section 3 – Regional Profile and Development Trends

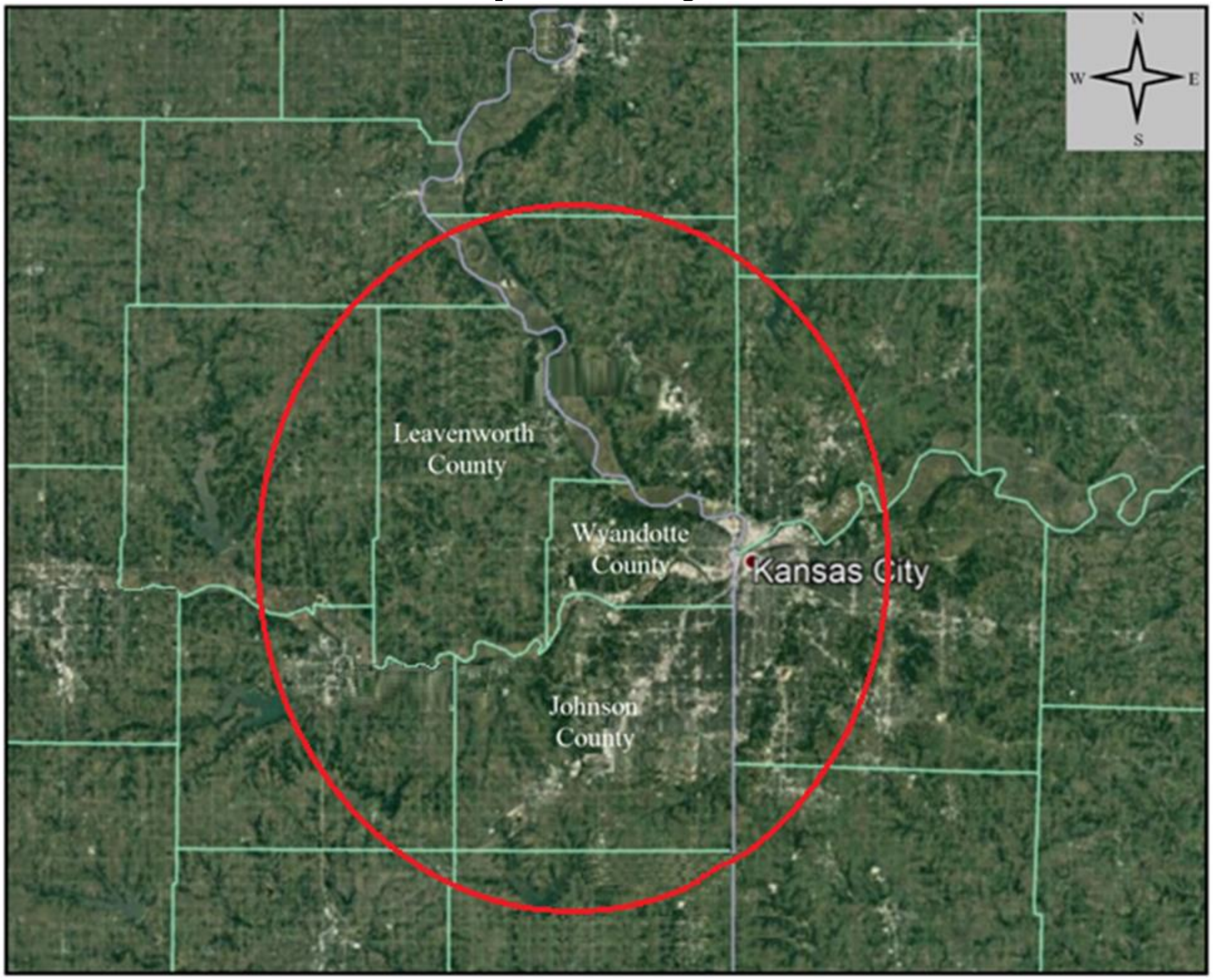
3.1 Introduction

Data concerning development trends and conditions is of great importance in determining regional and local risk and vulnerability to identified hazards, especially in locations which are susceptible to identified hazards. In general, any increase in population or development in hazard susceptible areas tends to increase both the risk and the vulnerability to that hazard. As such, the information presented in this chapter details relevant population and building statistics for the region on a local level basis. This data will then be used to determine and refine potential hazard vulnerability in succeeding sections.

3.2 Regional Maps

The following map details the locations of Kansas Region L relative to the State of Kansas:

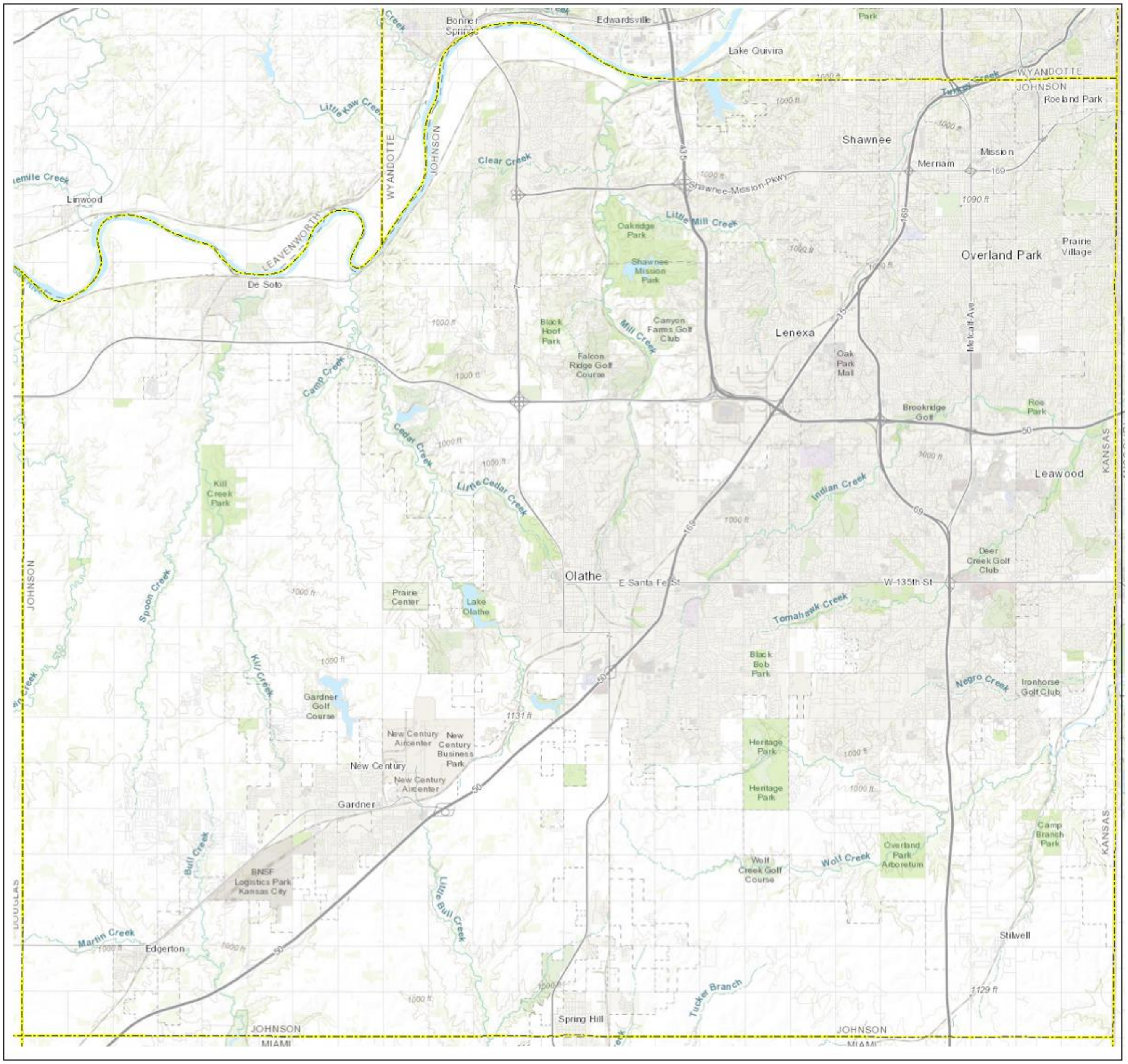
Map 1: Kansas Region L



Source: KDEM

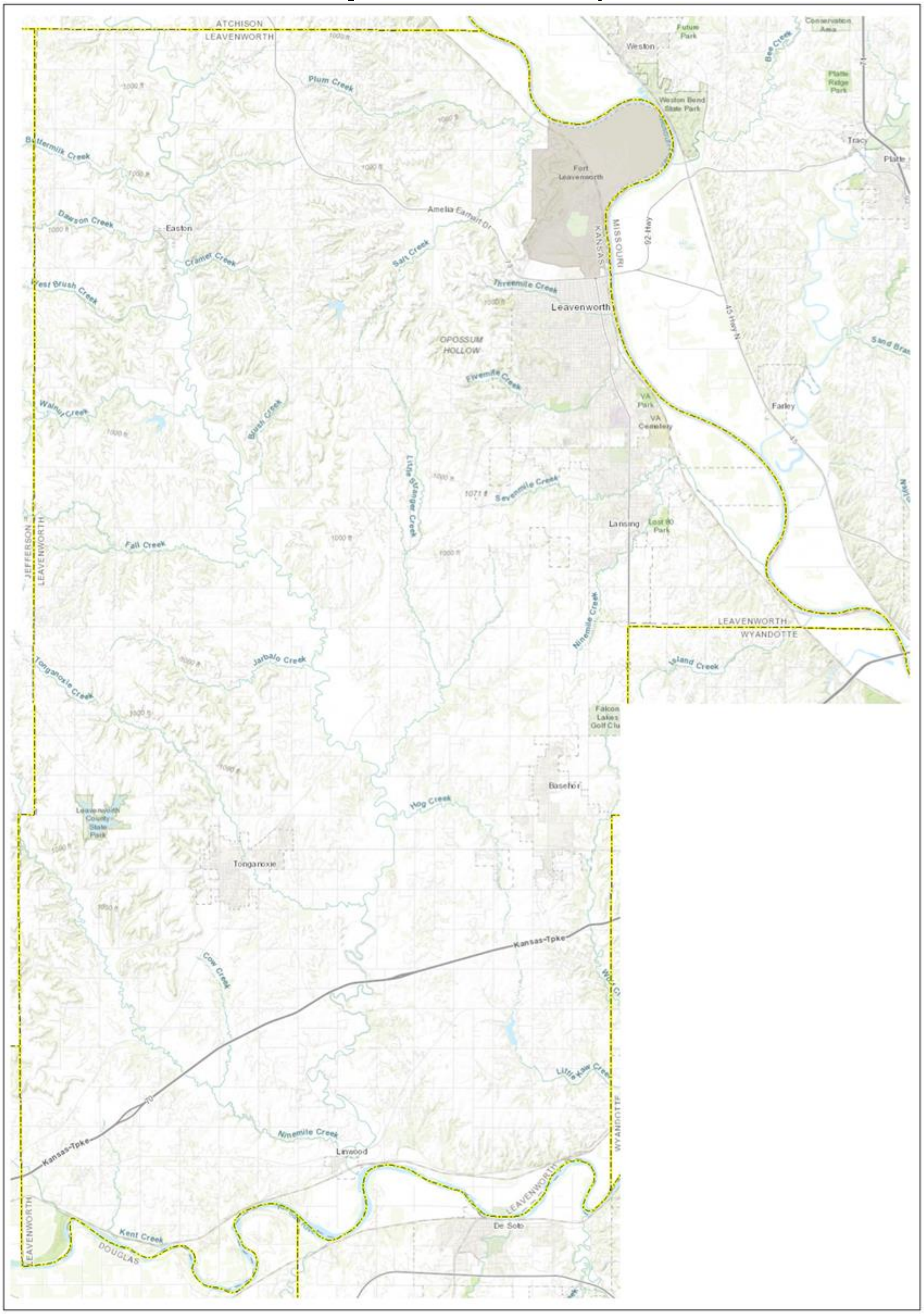
The following maps, provided by the Kansas Department of Transportation, provide county level detail**:**

Map 2: Johnson County



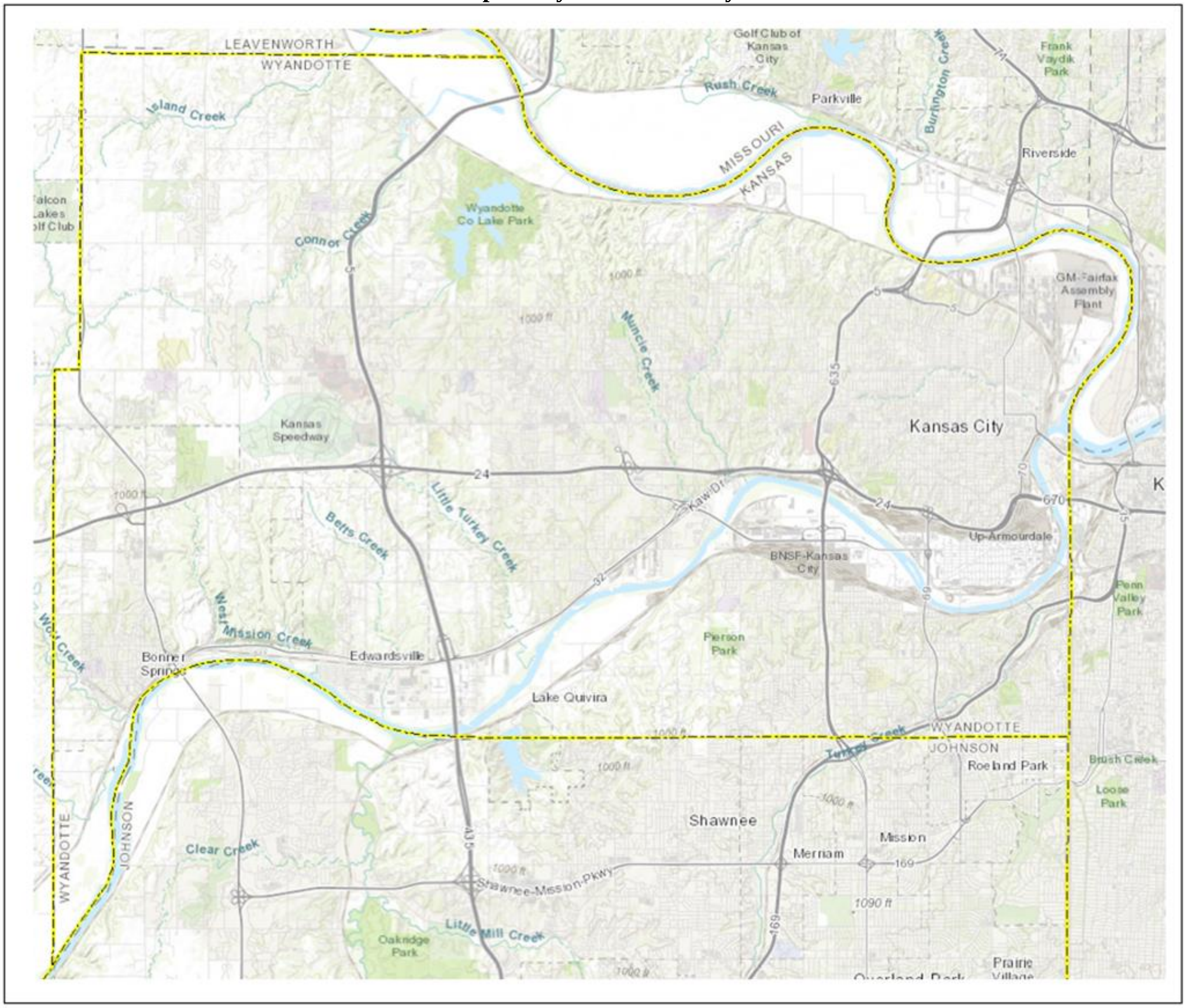
Source: Kansas Department of Transportation

Map 3: Leavenworth County



Source: Kansas Department of Transportation

Map 4: Wyandotte County



Source: Kansas Department of Transportation

3.3 Regional Population Trends

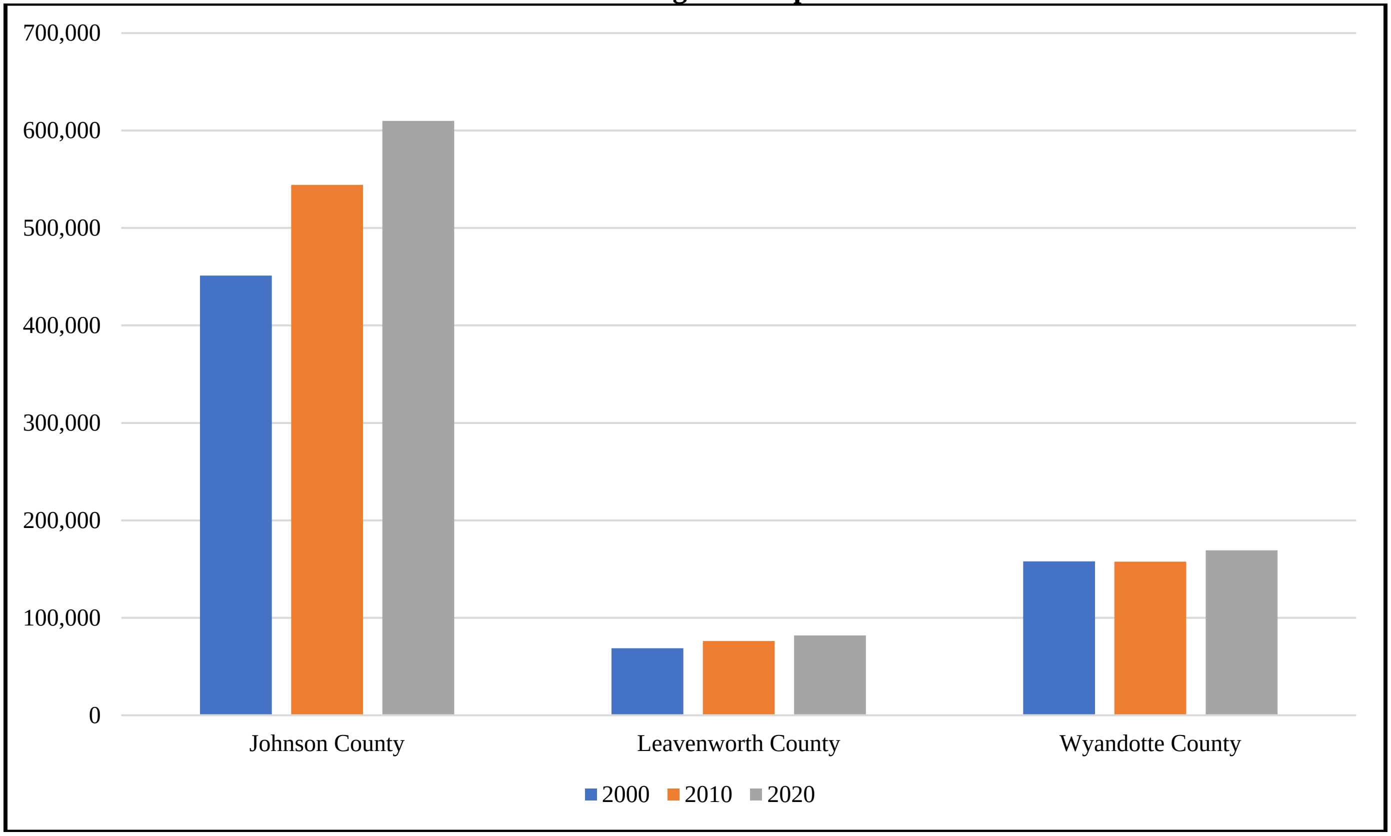
Kansas Region L has seen population growth in all counties over the 20-year period from 2000 to 2020, as indicated by data collected from the United State Census Bureau. The following table, and associated chart, presents population data for the Kansas Region L counties.

Table 3: Kansas Region L Population Data

County	Population			Percentage Population Change 2000-2020	Total Land Area (Sq. Mi.)	Population Density
	2000	2010	2020			
Johnson County	451,086	544,179	609,863	35.2%	473.6	1,288
Leavenworth County	68,691	76,227	81,881	19.2%	463.0	177
Wyandotte County	157,882	157,505	169,245	7.2%	151.6	1,116

Source: US Census Bureau

Chart 2: Kansas Region L Population Data



Source: US Census Bureau

The following tables present population data on a city level, broken down by county.

Table 4: Johnson Population Data

County	Population			Percentage Population Change 2000-2020	Total Land Area (Sq. Mi.)	Population Density
	2000	2010	2020			
Johnson County	**451,086**	**544,179**	**609,863**	**35.2%**	**473.6**	**1,288**
City of De Soto	5,732	5,720	6,118	6.7%	11.3	541
City of Edgerton	1,440	1,671	1,894	31.5%	7.4	256
City of Fairway	3,952	3,882	4,170	5.5%	1.1	3,791
City of Gardner	9,396	19,123	23,331	148.3%	11.7	1,994
City of Lake Quivira	932	906	1,014	8.8%	1.6	634
City of Leawood	27,656	31,867	33,902	22.6%	15.1	2,245
City of Lenexa	40,238	48,190	57,434	42.7%	34.1	1,684
City of Merriam	11,008	11,003	11,098	0.8%	4.3	2,581
City of Mission	9,727	9,323	9,954	2.3%	2.7	3,687
City of Mission Hills	3,593	3,498	3,594	0.0%	2.0	1,797
City of Mission Woods	152	178	185	21.7%	0.1	1,850
City of Olathe	92,962	125,872	141,290	52.0%	61.9	2,283
City of Overland Park	149,080	173,372	197,238	32.3%	75.2	2,623
City of Prairie Village	22,072	21,447	22,957	4.0%	6.2	3,703

Table 4: Johnson Population Data

County	Population			Percentage Population Change 2000-2020	Total Land Area (Sq. Mi.)	Population Density
	2000	2010	2020			
City of Roeland Park	6,817	6,731	6,871	0.8%	1.6	4,294
City of Shawnee	47,996	62,209	67,311	40.2%	42.0	1,603
City of Spring Hill	2,727	5,437	7,952	191.6%	8.8	904
City of Westwood	1,533	1,506	1,829	19.3%	0.4	4,573
City of Westwood Hills	378	359	444	17.5%	0.1	6,343

Source: US Census Bureau

Table 5: Leavenworth County Population Data

County	Population			Percentage Population Change 2000-2020	Total Land Area (Sq. Mi.)	Population Density
	2000	2010	2020			
Leavenworth County	**68,691**	**76,227**	**81,881**	**19.2%**	**463.0**	**177**
City of Basehor	2,238	4,613	6,896	208.1%	7.1	971
City of Easton	362	253	213	-41.2%	0.2	1,331
City of Lansing	9,199	11,265	11,239	22.2%	12.3	914
City of Leavenworth	35,420	35,251	37,351	5.5%	24.2	1,543
City of Linwood	374	375	415	11.0%	0.7	568
City of Tonganoxie	2,728	4,996	5,573	104.3%	4.1	1,359

Source: US Census Bureau

Table 6: Wyandotte County Population Data

County	Population			Percentage Population Change 2000-2020	Total Land Area (Sq. Mi.)	Population Density
	2000	2010	2020			
Wyandotte County	**157,882**	**157,505**	**169,245**	**7.2%**	**151.6**	**1,116**
City of Bonner Springs	6,768	7,314	7,837	15.8%	15.6	502
City of Edwardsville	4,146	4,340	4,717	13.8%	9.4	502
City of Kansas City	146,968	145,851	156,607	6.6%	124.7	1,256

3.4 Vulnerable Population Data

As a subset of the population data, Kansas Region L has socially vulnerable and at-risk populations, populations that 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

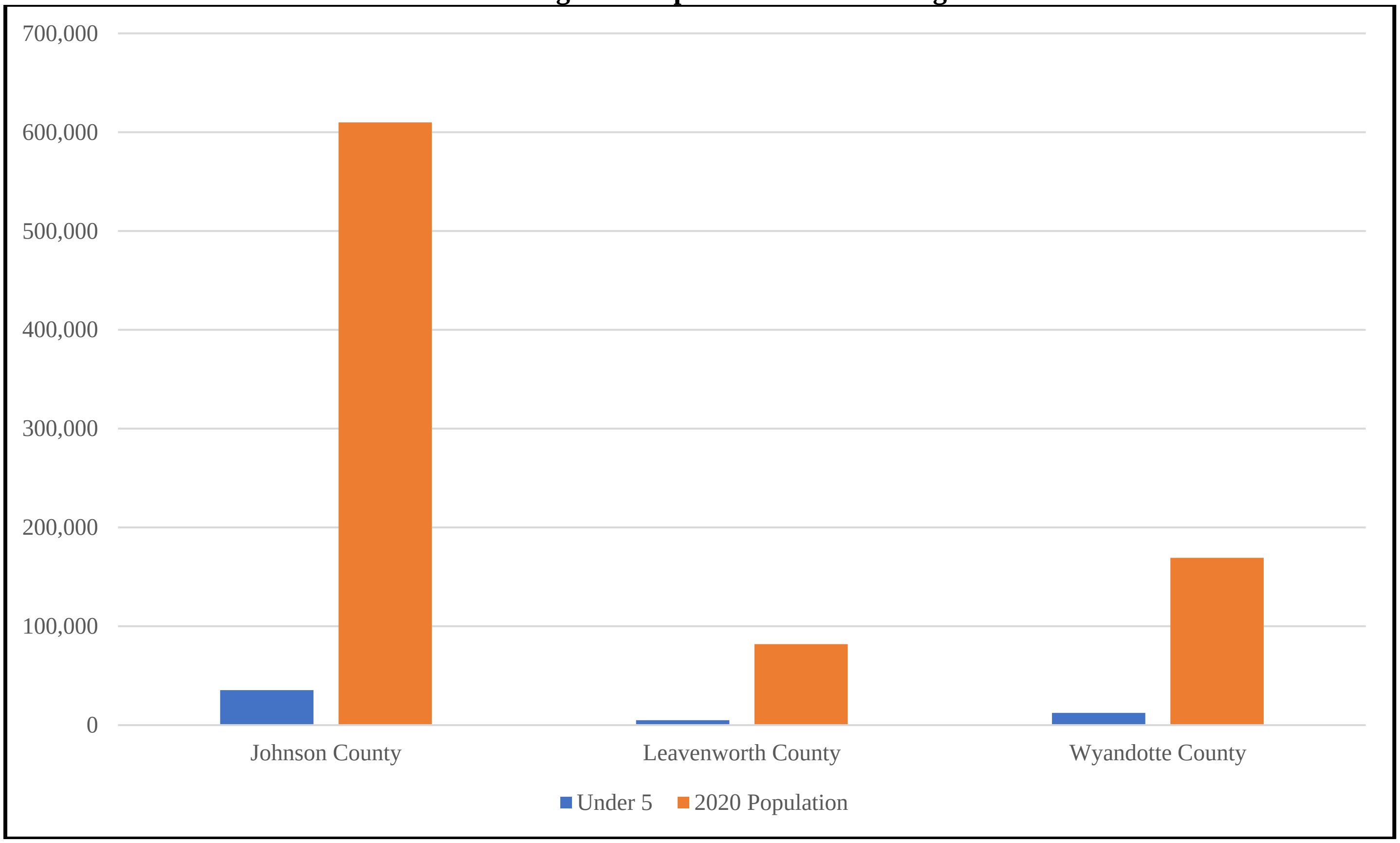
The National Response Framework defines at risk populations as "populations whose members may have additional needs before, during, and after an incident in functional areas, including but not limited to: maintaining independence, communication, transportation, supervision, and medical care." The following table, and associated charts and maps, present information on potentially at-risk populations within Kansas Region L on a county level for 2020.

Table 7: Kansas Region L 2020 Vulnerable Populations

Jurisdiction	Under 5	Over 65	Speaking Language Other than English	Below Poverty Level	Persons Under 65 with a Disability
Johnson County	35,372	98,798	71,964	32,933	35,982
Leavenworth County	4,913	13,101	4,503	7,779	8,434
Wyandotte County	12,355	23,356	49,250	26,571	17,432

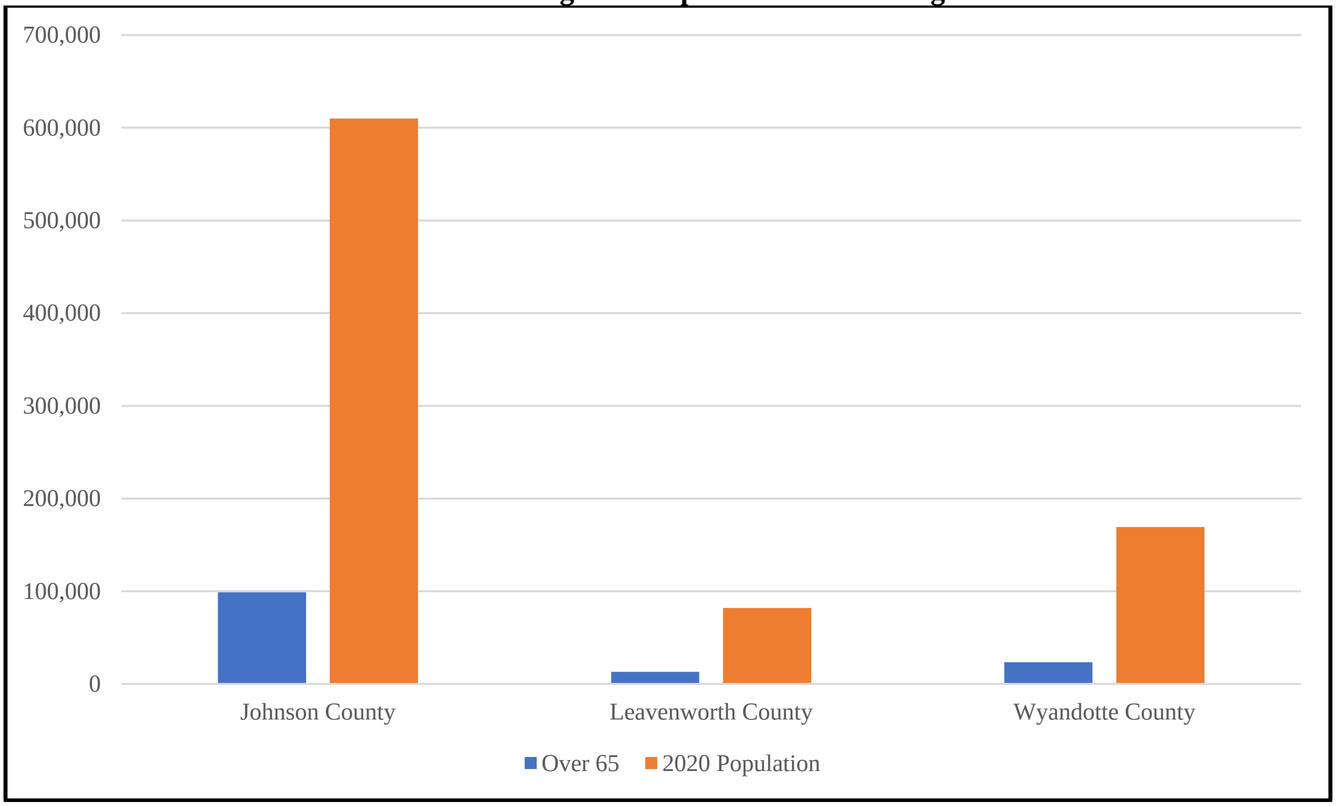
Source: US Census Bureau

Chart 3: Kansas Region L Population Under the Age of Five



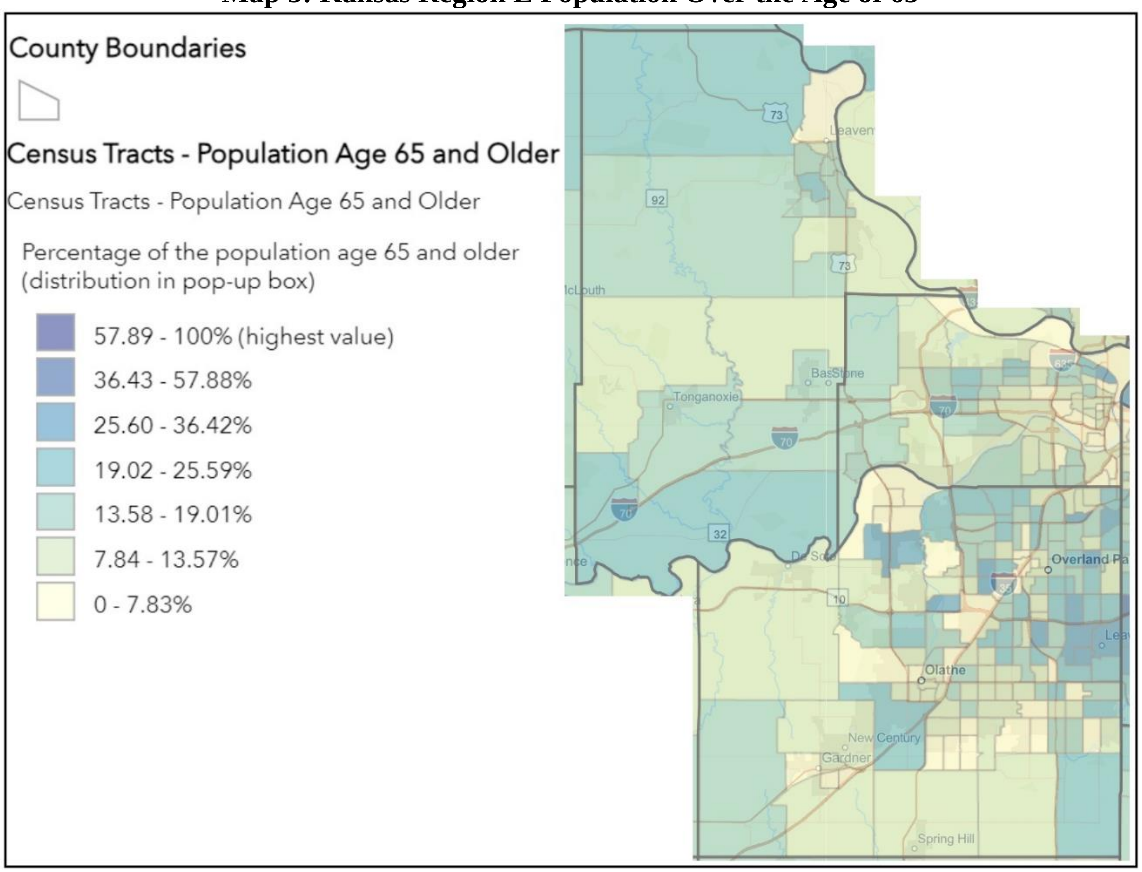
Source: US Census Bureau

Chart 4: Kansas Region L Population Over the Age of 65



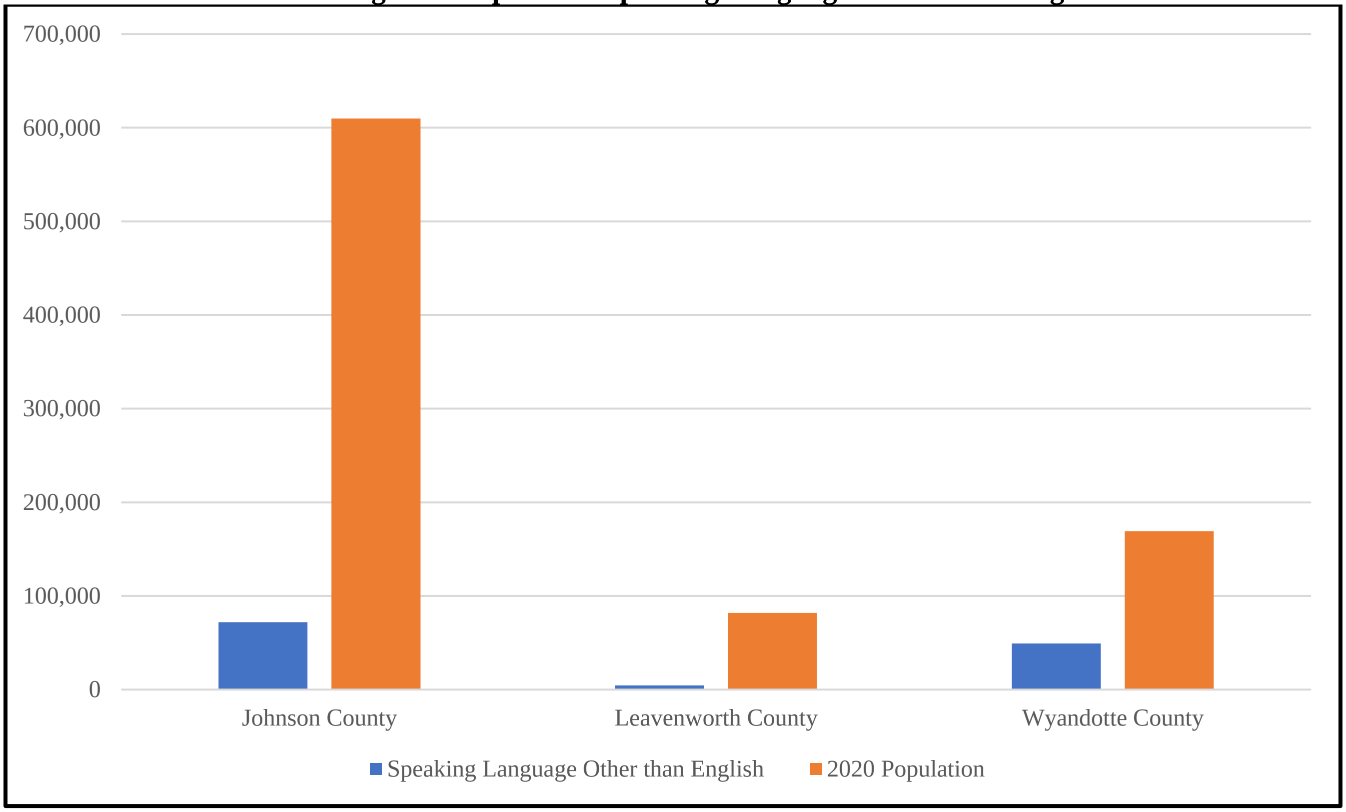
Source: US Census Bureau

Map 5: Kansas Region L Population Over the Age of 65



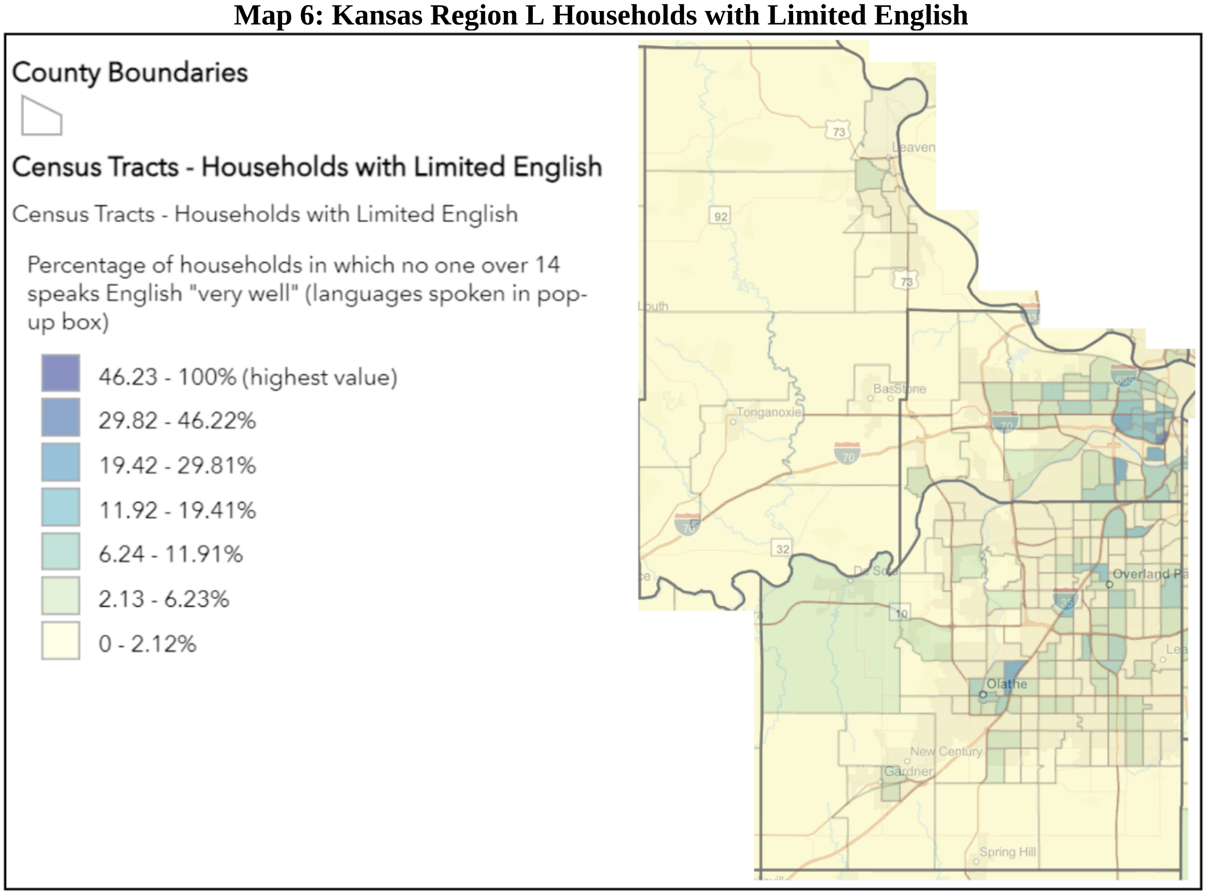
Source: FEMA RAPT

Chart 5: Kansas Region L Population Speaking Language Other Than English at Home



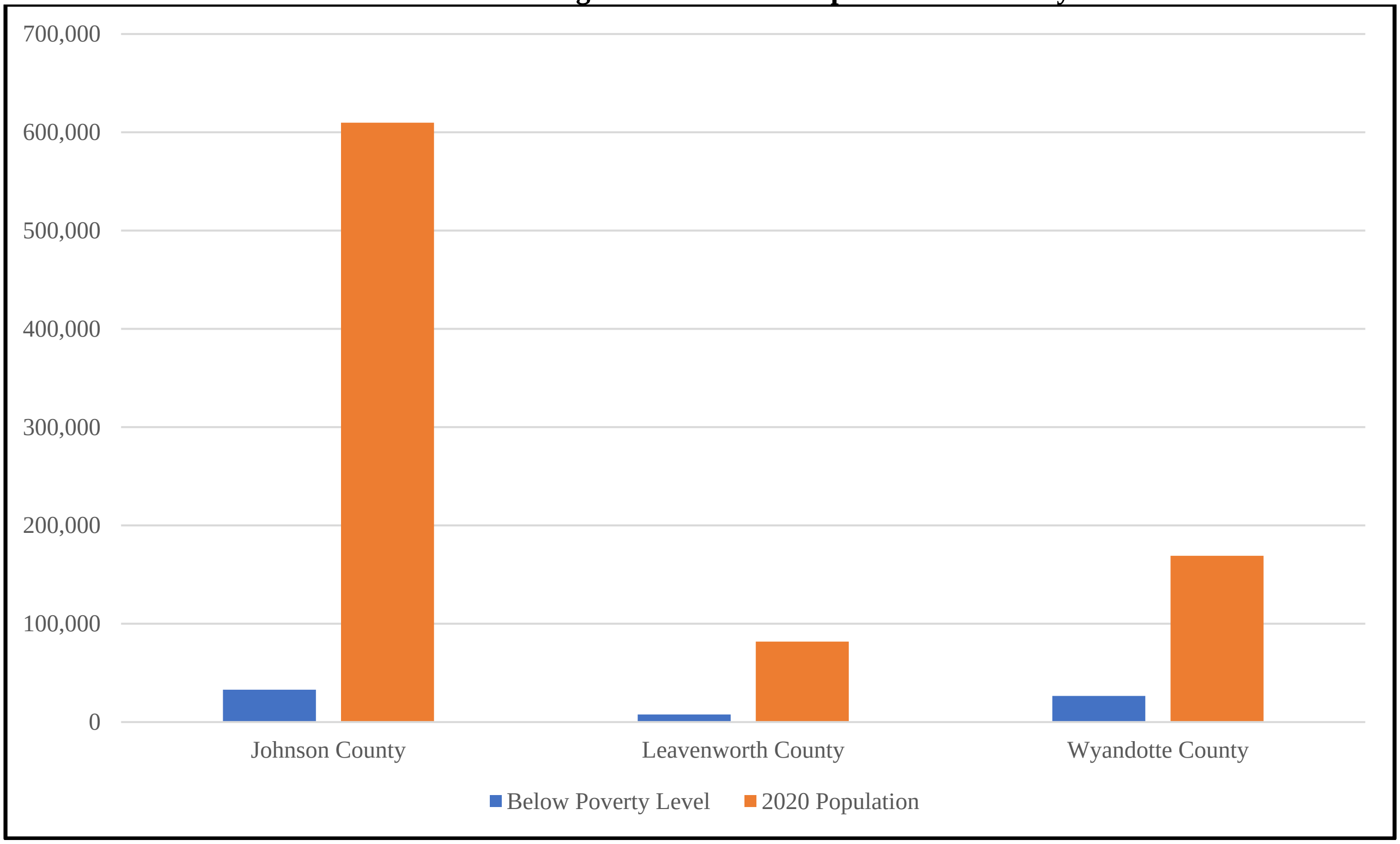
Source: US Census Bureau

Map 6: Kansas Region L Households with Limited English



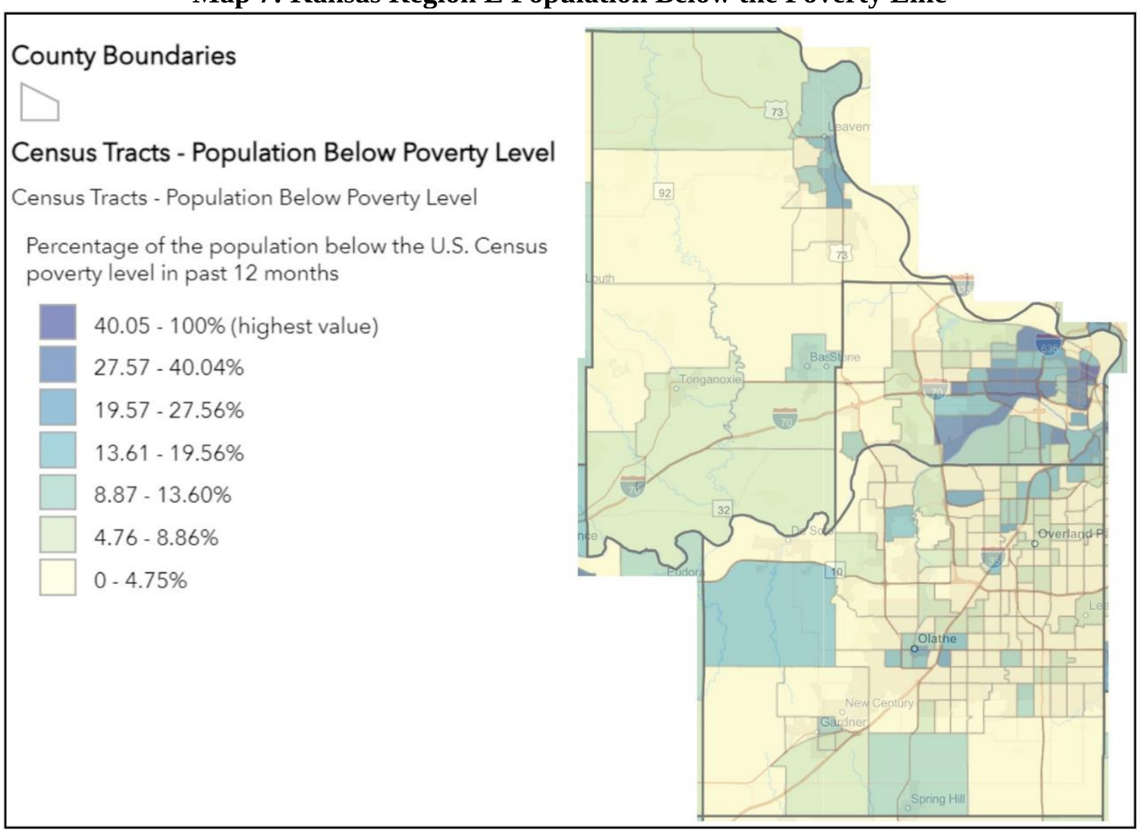
Source: FEMA RAPT

Chart 6: Kansas Region L Estimated Population in Poverty



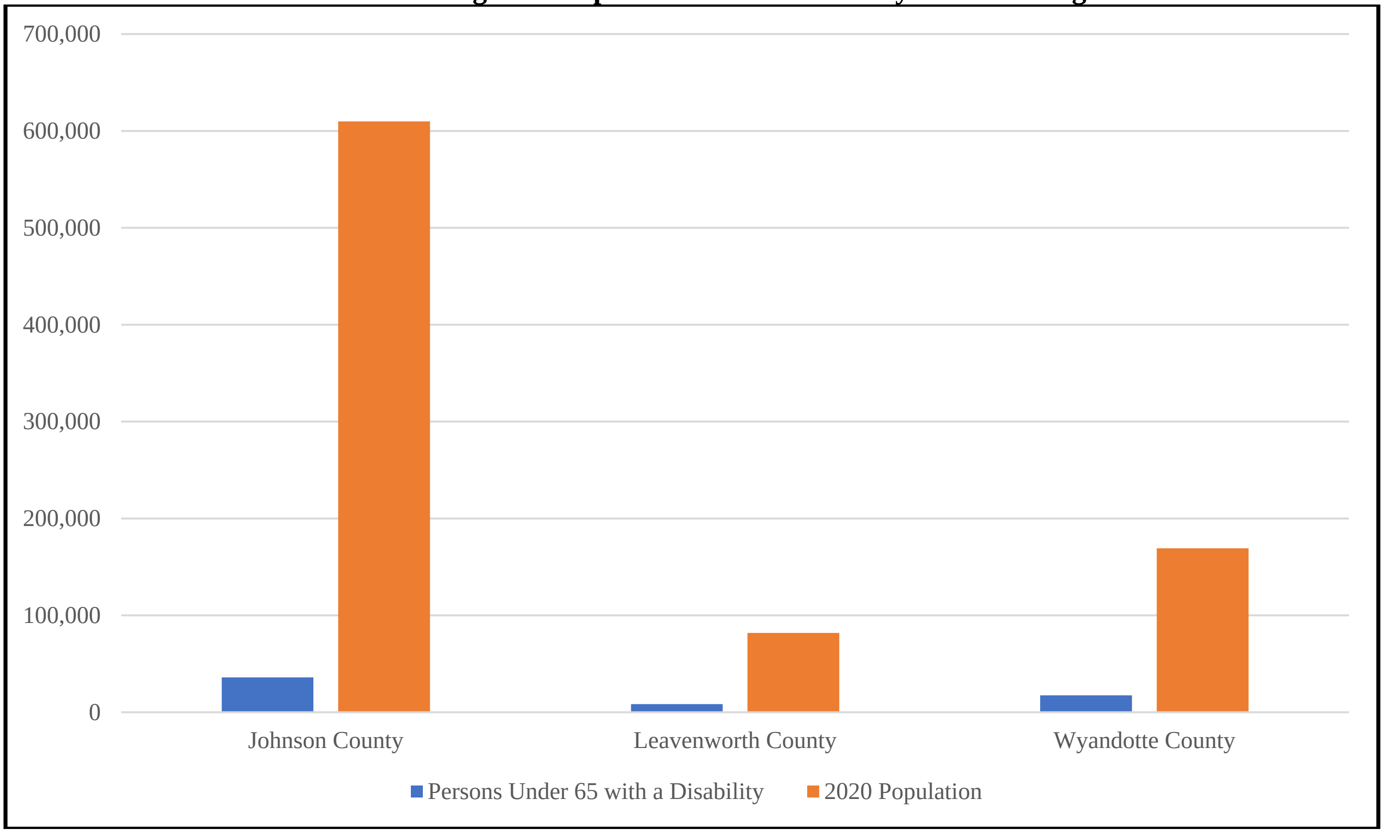
Source: US Census Bureau

Map 7: Kansas Region L Population Below the Poverty Line



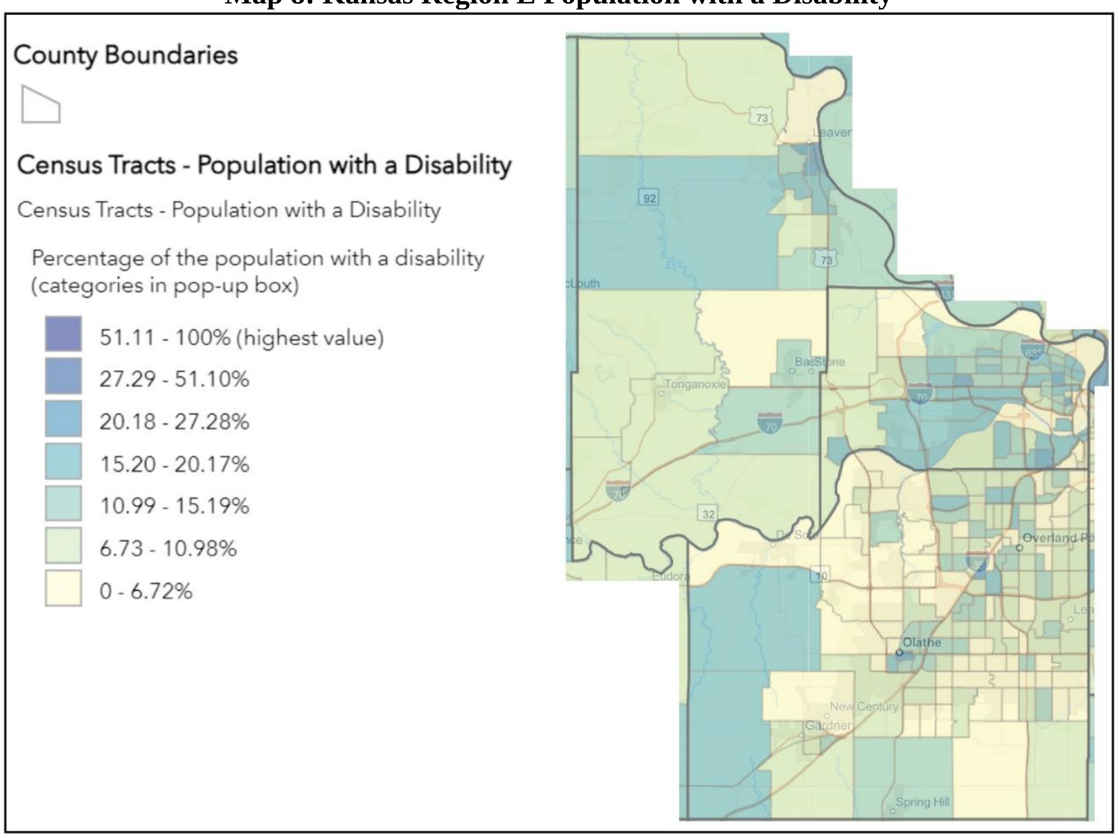
Source: FEMA RAPT

Chart 7: Kansas Region L Population with a Disability Under the Age of 65



Source: US Census Bureau

Map 8: Kansas Region L Population with a Disability

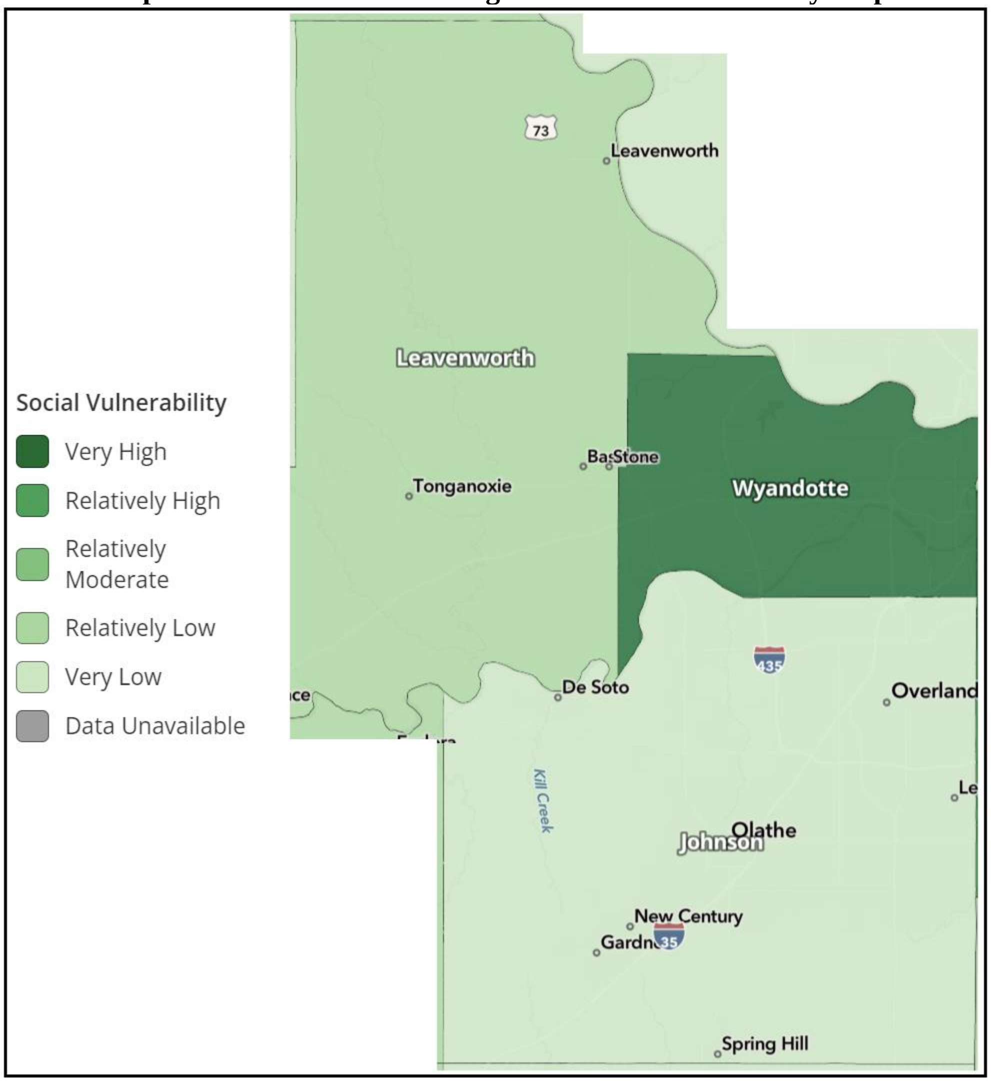


Source: FEMA RAPT

Using data from the Centers for Disease Control and Prevention (CDC)/Agency for Toxic Substances and Disease Registry Social Vulnerability Index FEMA's NRI creates and maps a Social Vulnerability score. In this context, social vulnerability is the susceptibility of social groups to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood. This score represents the relative level of a community's social vulnerability compared to all other communities at the same level. A qualitative rating that describes the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High" is used quantify Social Vulnerability. Census tracts with the social vulnerability score highest qualify for designation as a community disaster resilience zone. Census tracts designated as a community disaster resilience zone may receive special technical assistance, planning assistance, and a 90% federal funding match (as opposed to the standard 75% federal match) for mitigation projects.

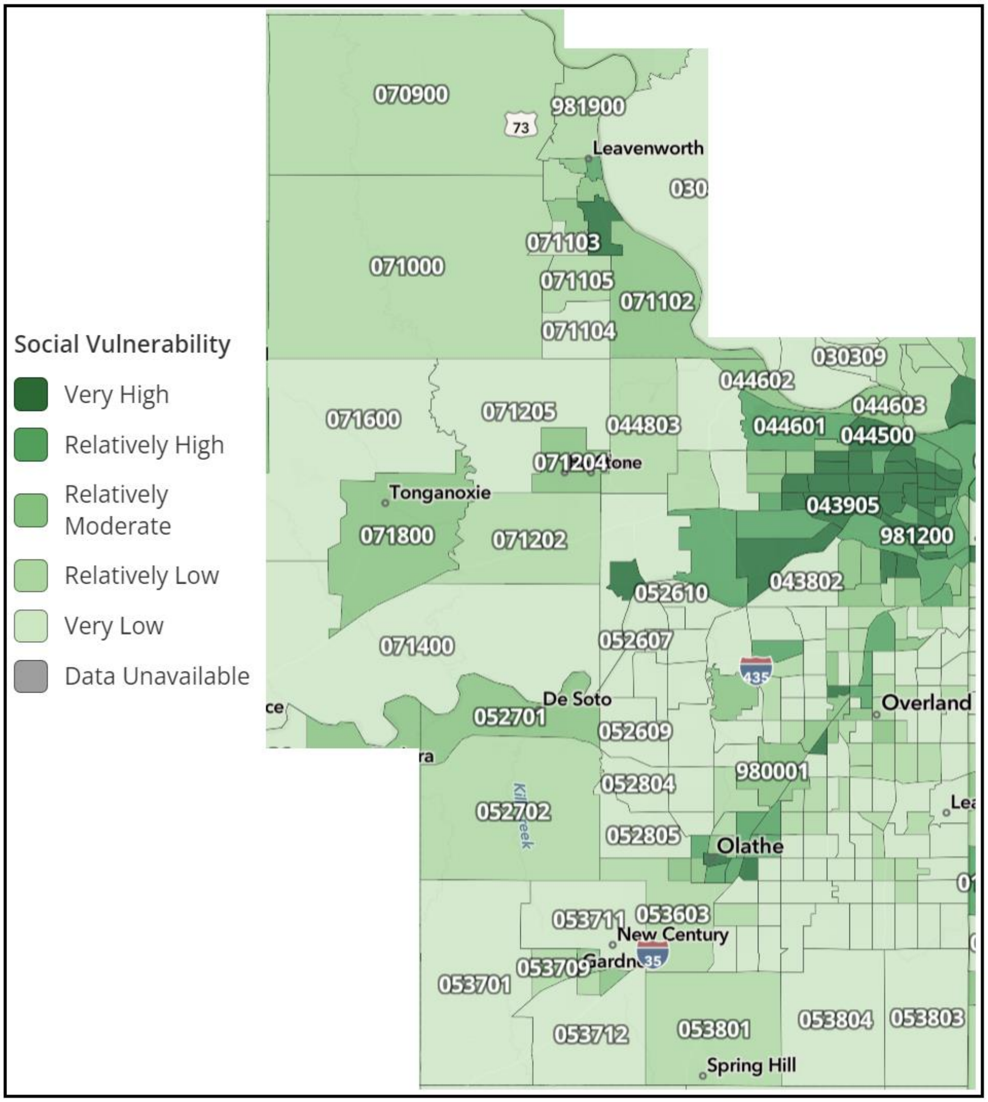
Data concerning social vulnerability is reported by county and by census tract, which can be analogous with jurisdictions. The following maps details the social vulnerability both county and census tract for Kansas Region L:

Map 9: FEMA NRI Kansas Region L Social Vulnerability Map



Source: FEMA

Map 10: FEMA NRI Kansas Region L Social Vulnerability Map



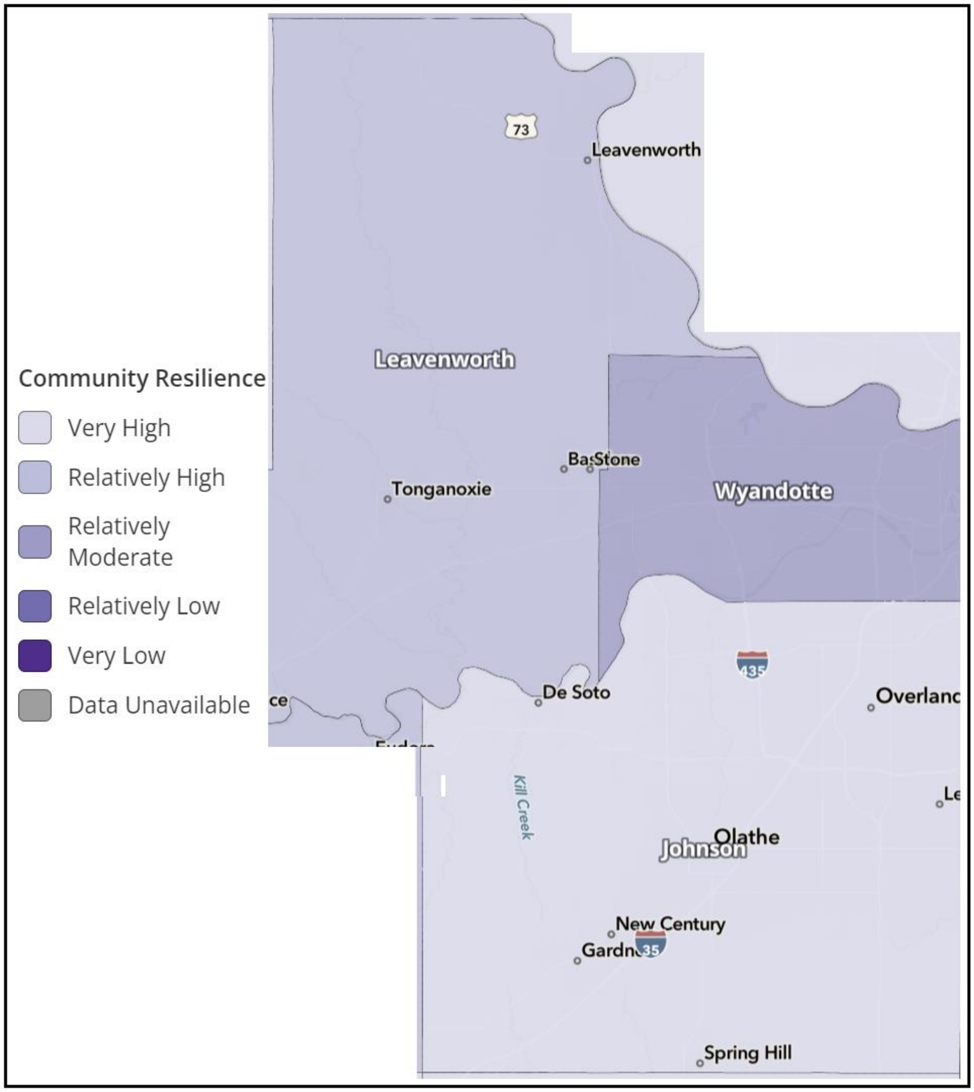
Source: FEMA

Augmenting these maps, full NRI census tract data is available in Appendix C detailing specific information for each census tract in each Kansas Region L county.

Community resilience is the ability of a community to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions. Factors that are considered when calculating community resilience include governance, infrastructure, education, and other capabilities that help communities deal with hazards on their own. As a consequence reduction risk component of the NRI, a community resilience score and rating represent the relative level of a community's resilience compared to all other communities at the same level. A community resilience score is inversely proportional to a community's risk.

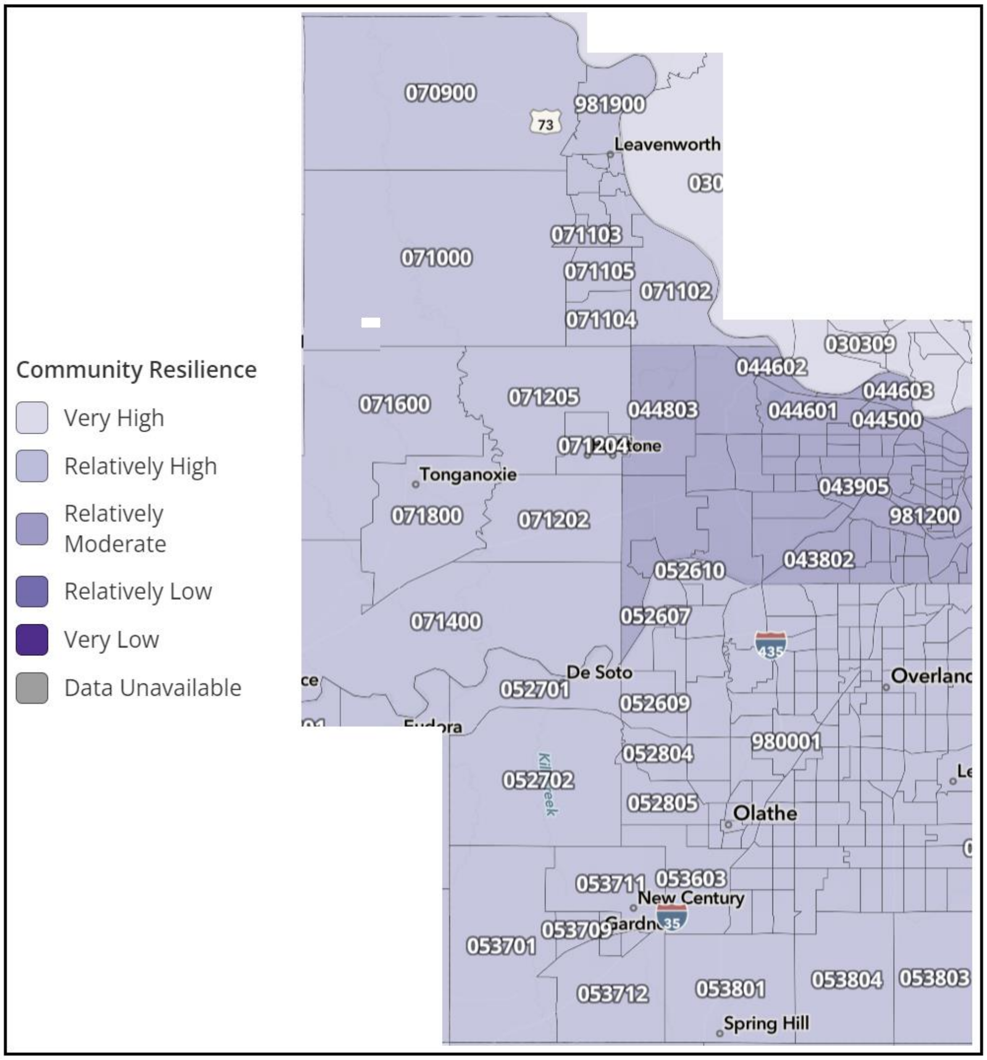
Data concerning community resilience is reported on the county level and by census tract, which can be analogous with jurisdictions. The following maps detail community resilience by both county and census tract for Kansas Region L:

Map 11: FEMA NRI Kansas Region L Community Resilience Map



Source: FEMA

Map 12: FEMA NRI Kansas Region L Community Resilience Map by Census Tract



Source: FEMA

Augmenting these maps, full NRI census tract data is available in Appendix C detailing specific information for each census tract in each Kansas Region L county.

3.5 Regional Population Migration

Kansas Region L is experiencing an intrastate population increase due to the continued migration from rural areas to urban centers. This transformation reflects broader demographic trends witnessed across the United States. Demographic research indicates that this migration is occurring due to the following factors:

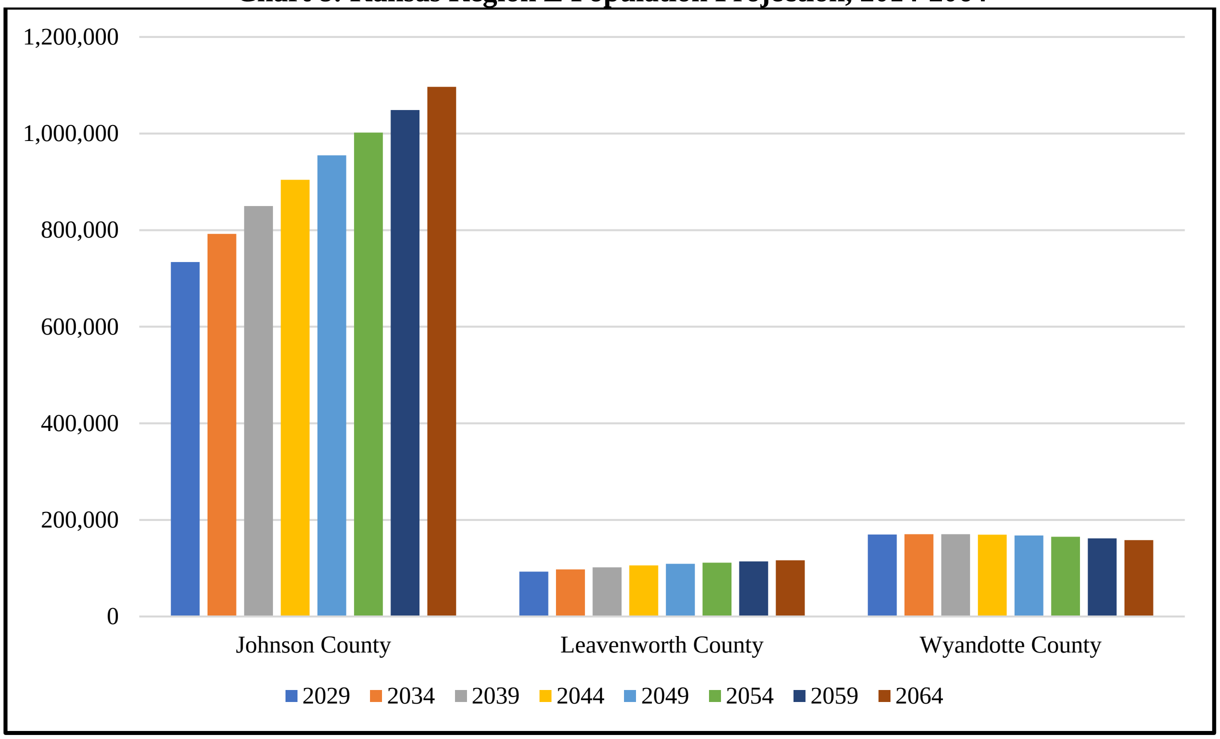
- Economic Opportunity: A primary driver of the population movement from rural to urban areas is the quest for better economic prospects. Urban centers such as Kansas City, the largest city in the region, offer a diverse range of employment opportunities in sectors like manufacturing, healthcare, finance, and technology. These opportunities often come with higher wages and better access to educational and healthcare facilities compared to rural locales.
- Technological Advancements in Agriculture: The modernization of agriculture has led to increased mechanization and efficiency, reducing the demand for manual labor on farms. As a result, rural residents whose livelihoods were traditionally tied to farming are increasingly seeking employment in urban areas.
- Access to Education and Training: Urban centers are often home to educational institutions, including colleges, universities, and vocational schools. Young people from rural areas often migrate to these urban settings to

pursue higher education and vocational training. This educational mobility is a key factor in the rural-to-urban population shift.

The rural-to-urban population movement has significant implications for both rural and urban areas in Kansas Region L. Rural communities may experience declining populations, school closures, and reduced economic activity. Meanwhile, urban centers may undergo growth, requiring increased investment in housing, infrastructure, and public services to accommodate the influx of new residents.

The following chart, using data from the Wichita State University Center for Economic Development and Business Research Kansas Population Forecast, indicates population projections (potentially dur to rural-to-urban migration) for Kansas Region L. As indicated in the report, all counties, with the exception of Miami and Shawnee Counties, are indicated to have either a generally static or decreasing population over the next 40 years.

Chart 8: Kansas Region L Population Projection, 2014-2064



Source: Wichita State University Center for Economic Development and Business Research Kansas Population Forecast

3.6 Regional Housing Trends

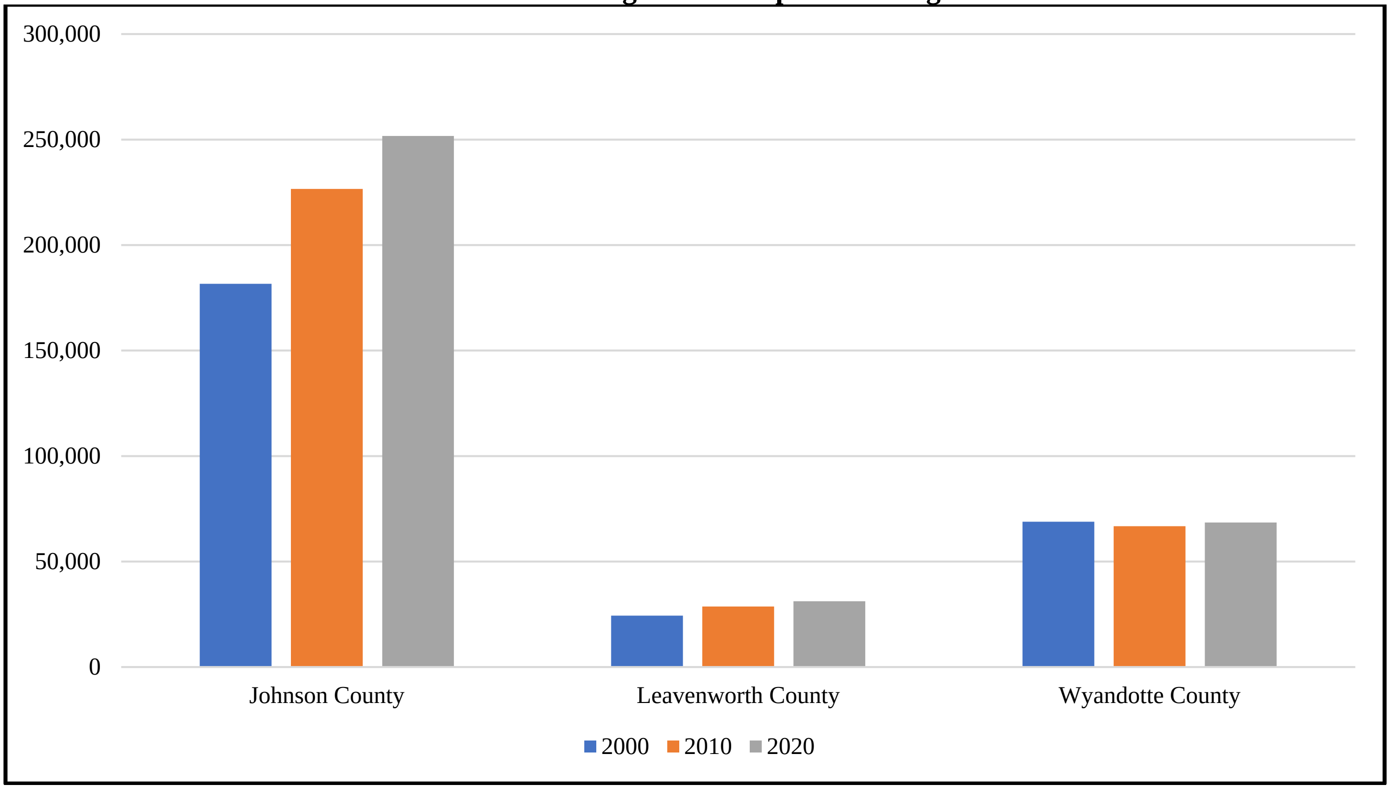
Closely tracking population data, but tending to lag population changes, housing data is a good indicator of changing demographics and growth. The following table and associated chart, using data from the U.S. Census, present occupied housing unit information for Region L counties.

Table 8: Kansas Region L Housing Data

County	Occupied Housing Units			Numeric Change 2000-2020	Percentage Change 2000-2020
	2000	2010	2020		
Johnson County	181,612	226,571	251,681	70,069	38.6%
Leavenworth County	24,401	28,697	31,219	6,818	27.9%
Wyandotte County	68,892	66,747	68,475	-417	-0.6%

Source: US Census Bureau

Chart 9: Kansas Region L Occupied Housing Units



Source: US Census Bureau

FEMA's Hazus is a nationally standardized risk modeling methodology that uses GIS-based data to identify areas with high risk for natural hazards. Hazus also details the number of buildings and the replacement value of those buildings within the defined area. The following data, from Hazus, indicates the total number of buildings, the replacement valuation (excluding contents), and the percentage of buildings identified as residential properties for Kansas Region L:

Table 9: Kansas Region L Hazus Structure Information

Jurisdiction	Number of Buildings	Replacement Value	Percentage Residential
Johnson County	196,950	$83,970,000,000	80.2%
Leavenworth County	27,810	$8,972,000,000	84.1%
Wyandotte County	60,620	$19,039,000,000	70.7%

Source: FEMA Hazus

The following tables present occupied housing unit data on a jurisdictional level, broken down by county.

Table 10: Johnson Occupied Housing Unit Data

Jurisdiction	Occupied Housing Units			Numeric Change 2000-2020	Percentage Change 2000-2020
	2000	2010	2020		
Johnson County	181,612	226,571	251,681	70,069	38.6%
City of DeSoto	1,730	2,204	2,462	732	42.3%
City of Edgerton	500	645	647	147	29.4%
City of Fairway	1,842	1,833	1,822	-20	-1.1%
City of Gardner	3,533	7,300	8,294	4,761	134.8%
City of Lake Quivira	388	395	405	17	4.4%
City of Leawood	10,129	12,384	13,484	3,355	33.1%
City of Lenexa	16,378	20,832	25,308	8,930	54.5%
City of Merriam	5,042	5,224	5,297	255	5.1%
City of Mission	5,329	5,477	5,641	312	5.9%

Table 10: Johnson Occupied Housing Unit Data

Jurisdiction	Occupied Housing Units			Numeric Change 2000-2020	Percentage Change 2000-2020
	2000	2010	2020		
City of Mission Hills	1,318	1,326	1,307	-11	-0.8%
City of Mission Woods	76	74	80	4	5.3%
City of Olathe	33,343	46,851	51,820	18,477	55.4%
City of Overland Park	62,586	76,280	86,539	23,953	38.3%
City of Prairie Village	10,126	10,227	10,619	493	4.9%
City of Roeland Park	3,115	3,282	3,315	200	6.4%
City of Shawnee	19,086	79,140	80,512	61,426	321.8%
City of Spring Hill	873	2,069	2,906	2,033	232.9%
City of Westwood	731	732	825	94	12.9%
City of Westwood Hills	173	177	176	3	1.7%

Source: US Census Bureau

Table 11: Leavenworth County Occupied Housing Unit Data

Jurisdiction	Occupied Housing Units			Numeric Change 2000-2020	Percentage Change 2000-2020
	2000	2010	2020		
Leavenworth County	24,401	28,697	31,219	6,818	27.9%
City of Basehor	848	1,881	2,596	1,748	206.1%
City of Easton	138	100	91	-47	-34.1%
City of Lansing	2,548	3,371	3,612	1,064	41.8%
City of Leavenworth	12,936	13,670	14,756	1,820	14.1%
City of Linwood	156	149	163	7	4.5%
City of Tonganoxie	1,032	1,973	2,172	1,140	110.5%

Source: US Census Bureau

Table 12: Wyandotte County Occupied Housing Unit Data

Jurisdiction	Occupied Housing Units			Numeric Change 2000-2020	Percentage Change 2000-2020
	2000	2010	2020		
Wyandotte County	68,892	66,747	68,475	-417	-0.6%
City of Bonner Springs	2,753	3,025	3,202	449	16.3%
City of Edwardsville	1,651	1,716	1,786	135	8.2%
Kansas City	61,446	61,969	63,446	2,000	3.3%

Source: US Census Bureau

Of particular concern when considering housing data is mobile home residences. Data from the NOAA National Severe Storms Laboratory reports that people living in mobile homes are especially at risk for injury and death as even anchored mobile homes can be seriously damaged when winds gust over 80 miles per hour. Additionally, study data from Michigan State University reported that the two biggest factors related to wind event fatalities were housing quality (measured by mobile homes as a proportion of housing units) and income level. When a tornadic wind 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 indicates the percentage of mobile homes for each Region L county:

Table 13: Kansas Region L Mobile Home Data

Jurisdiction	Number of Mobile Homes	Percentage Of Housing Stock as Mobile Homes
Johnson County	1,510	0.6%
Leavenworth County	343	1.1%
Wyandotte County	1,643	2.4%

Source: United States Census Bureau

3.7 School District Data

Each participating county is served by multiple Unified School Districts (USDs). The following table presents USD enrollment information for 2018 (data compiled from the last plan), and 2023 (the most recent available data):

Table 14: USD Enrollment Information

USD #	District Name	County	2018 Enrollment	2023 Enrollment	2018 -2023 Enrollment Change
229	Blue Valley	Johnson	22,241	22,111	-130
230	Spring Hill	Johnson	2,743	3,706	963
231	Gardner Edgerton	Johnson	5,819	5,848	30
232	De Soto	Johnson	7,085	7,369	284
233	Olathe	Johnson	28,773	28,551	-222
512	Shawnee Mission Pub Sch	Johnson	27,446	26,383	-1,063
207	Fort Leavenworth	Leavenworth	1,762	1,584	-178
449	Easton	Leavenworth	606	640	34
453	Leavenworth	Leavenworth	3,692	3,565	-127
458	Basehor-Linwood	Leavenworth	2,329	2,833	504
464	Tonganoxie	Leavenworth	1,944	1,918	-26
469	Lansing	Leavenworth	2,630	2,610	-20
202	Turner-Kansas City	Wyandotte	4,086	3,824	-262
203	Piper-Kansas City	Wyandotte	2,164	2,656	492
204	Bonner Springs	Wyandotte	2,696	2,393	-303
500	Kansas City	Wyandotte	21,159	21,410	251

Source: Kansas State Department of Education

3.8 Regional Land Use

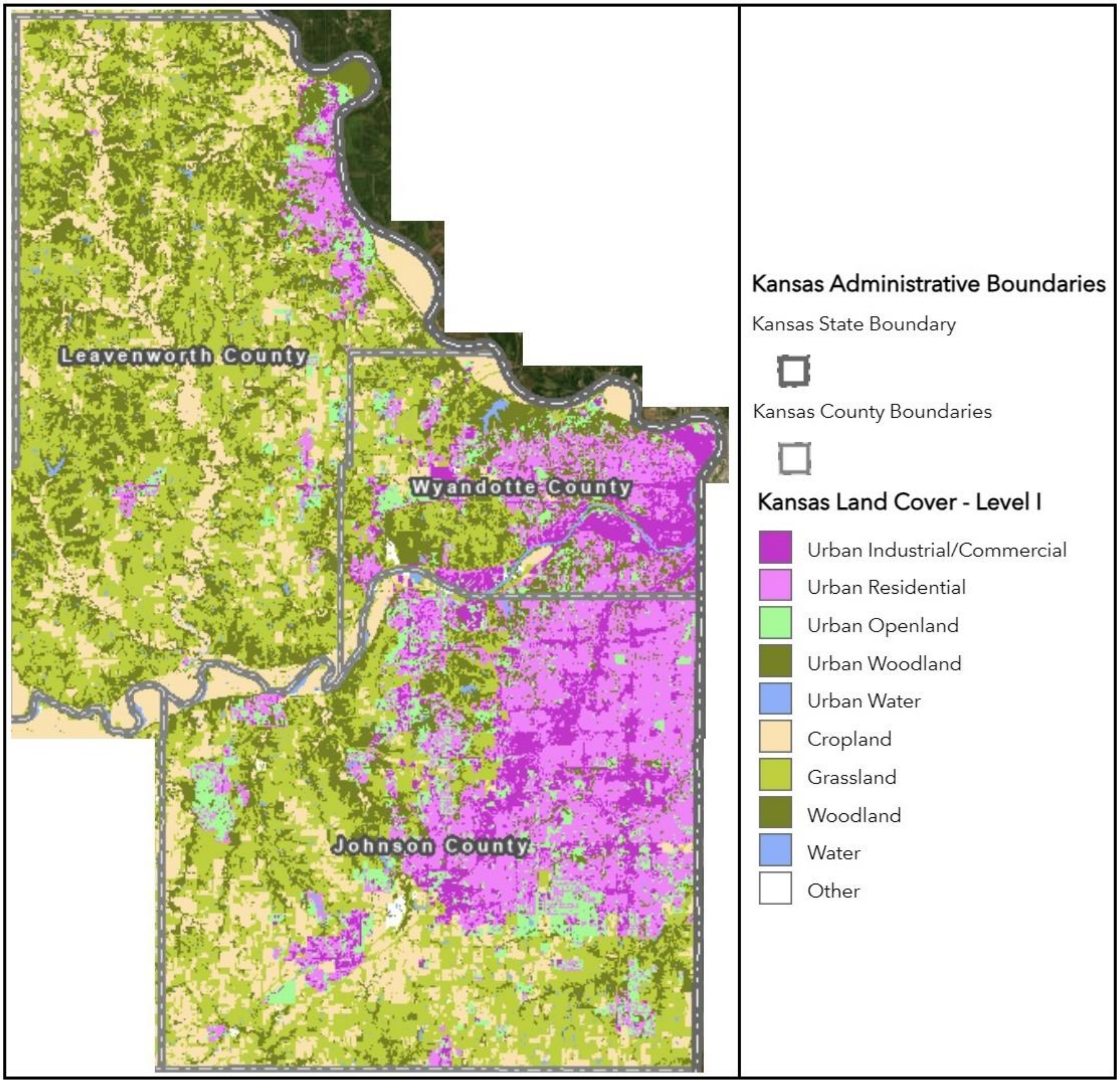
Land use in a region has a profound and lasting impact on future development. The way land is allocated and utilized can shape the economic, social, and environmental aspects of a region for decades. Land use affects that can impact future development include:

- Economic Development: Land use decisions influence the location and type of economic activities in a region. Zoning regulations that encourage the development of industrial zones can attract manufacturing businesses, while zoning for commercial and residential areas can promote retail and housing development. These decisions can have long-term implications for job creation, revenue generation, and the overall economic health.
- Transportation and Infrastructure: Land use planning is closely tied to transportation infrastructure. The location of road and other transportation facilities is determined in part by land use decisions. Well-planned land use can lead to efficient transportation networks, reducing congestion, and improving mobility. Poorly planned land use, on the other hand, can result in traffic congestion and increased infrastructure costs.
- Housing and Urbanization: Land use policies influence the availability and affordability of housing in a region. Zoning regulations, for example, can determine the density of residential areas and the types of housing permitted. Inadequate or restrictive land use policies can lead to housing shortages and higher costs, while well-planned policies can support diverse housing options and affordability.

- Resilience to Climate Change: Land use planning plays a critical role in a region's ability to adapt to climate change. Smart land use decisions can reduce vulnerability to natural disasters, such as flooding and wildfires, by avoiding high-risk areas and implementing resilient building codes and infrastructure.
- Long-Term Costs: Land use decisions can affect the long-term costs of development. Efficient land use planning can reduce the need for costly infrastructure extensions and maintenance, while inefficient or sprawling development can strain municipal budgets.

As indicated by the following map from the University of Kansas, land use in Kansas Region L is largely urban in the eastern portion of the region, trending to rural as you move west:

Map 13: Kansas Region L Land Cover



Source: University of Kansas

Urban areas in Kansas tend to maintain their urban nature, especially when considering the influx of population.

Rural and agricultural areas in Kansas tend to retain their rural and agricultural nature over time, but there are several factors that can influence the evolution of these areas, including:

- Economic Conditions: The economic viability of agriculture can vary significantly over time due to factors like crop prices, weather patterns, and changes in agricultural technology. Economic challenges may lead some farmers to sell their land for non-agricultural uses or to consolidate their operations, potentially affecting the rural landscape.
- Urbanization and Development: In some cases, rural areas in Kansas may experience suburbanization or the expansion of nearby urban centers. This can result in residential and commercial development encroaching on agricultural land. However, the extent of this development depends on local zoning and land use regulations.
- Infrastructure Development: The construction of new transportation infrastructure, such as highways or railroads, can influence land use patterns. Improved infrastructure may make it easier to transport agricultural products to markets or to access rural areas for development.
- Government Policies: Government policies, including agricultural subsidies, land use regulations, and conservation programs, can impact the way rural and agricultural land is used. For example, conservation programs may encourage farmers to preserve land for wildlife habitat rather than development.
- Local Planning and Zoning: Local governments play a key role in land use planning and zoning regulations. These policies can determine whether agricultural land can be converted to non-agricultural uses, such as residential or commercial development. Some areas may have strict zoning that preserves agricultural character, while others may allow more flexibility.
- Population Trends: Demographic trends, including population growth or decline, can influence the demand for land in rural areas. If there is an influx of new residents seeking a rural lifestyle, it can drive demand for residential development in formerly agricultural areas.

3.9 Regional Infrastructure Development

In particular, infrastructure repair can have a significant impact on regional development, both positive and negative. The specific effects depend on the scale of the repair projects, the quality of the infrastructure, and the overall economic and social context of the region, and may include:

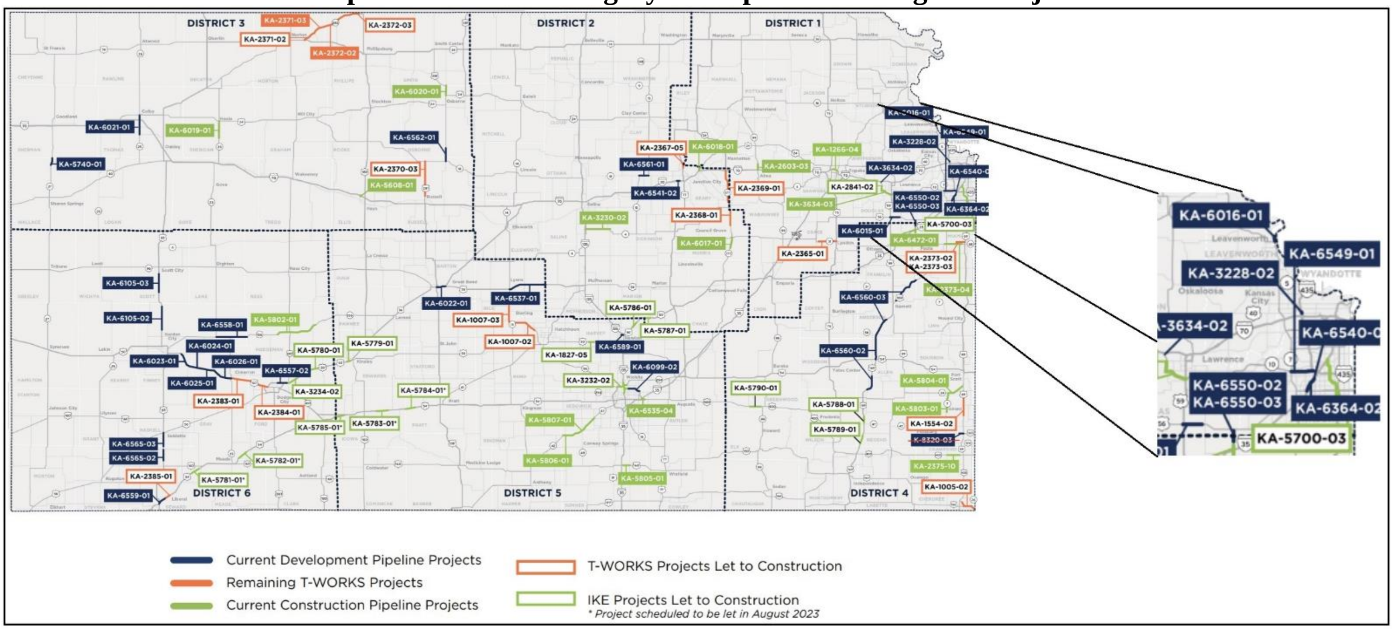
- Improved Connectivity: Repairing and upgrading infrastructure, such as roads, bridges, and ports, can enhance connectivity within and between regions. This improved connectivity can reduce transportation costs, facilitate the movement of goods and people, and attract businesses and investments to the region.
- Economic Growth: Functional infrastructure supports economic activities. When infrastructure is repaired, it can create jobs directly in the construction and maintenance sectors. Additionally, it can indirectly stimulate economic growth by providing a reliable foundation for businesses to operate and expand, leading to increased production and trade.
- Enhanced Productivity: Well-maintained infrastructure can increase productivity by reducing downtime and transportation delays. This, in turn, can make regional industries more competitive and efficient.
- Attracting Investment: Regions with modern and well-maintained infrastructure are often more attractive to investors. Businesses are more likely to invest in regions with reliable transportation, utilities, and communication networks, as it reduces operational risks and costs.
- Quality of Life: Infrastructure repair can enhance the quality of life for residents by providing access to essential services such as clean water, sanitation, healthcare, and education. This can contribute to improved human development indicators and overall well-being.
- Resilience and Disaster Mitigation: Infrastructure repair can include upgrades to make infrastructure more resilient to natural disasters and climate change impacts. This can help protect communities and assets and reduce the long-term costs of recovery and reconstruction.
- Social Equity: Infrastructure repair can address disparities in access to essential services. It can benefit marginalized communities by providing them with equal access to transportation, utilities, and public facilities.

However, it is important to note that there can be negative impacts as well, including:

- Disruption During Construction: Repair projects can disrupt communities and businesses during the construction phase, leading to short-term challenges.
- Costs and Budget Constraints: Large-scale infrastructure repair projects can be costly, and they may strain regional budgets or lead to increased taxes or debt.
- Environmental Concerns: If not done carefully, infrastructure repair projects can have adverse environmental impacts, such as habitat disruption or water pollution.

The Eisenhower Legacy Transportation Program is a 10-year program that addresses highways, bridges, public transit, aviation, short-line rail and bike/pedestrian needs across Kansas. The program and associated projects are focused on making roads safer, supporting economic growth and creating more options and resources for Kansans and their communities. The following map shows planned and completed projects for state highways, local roads, and other modes.

Map 14: Eisenhower Legacy Transportation Program Projects



Source: Kansas Department of Transportation

The following maps represent Eisenhower Legacy Transportation Program filtered by Kansas Region L county

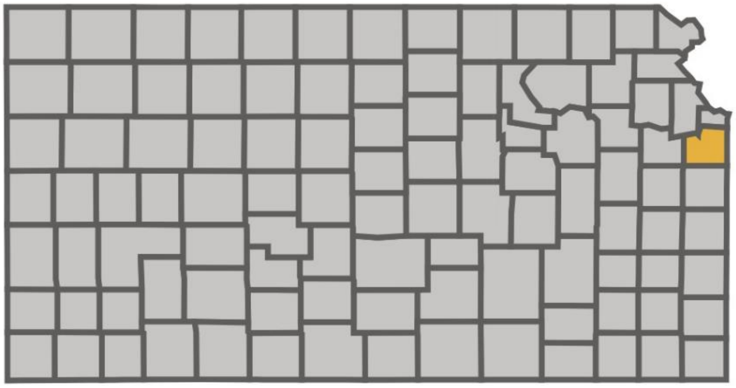
Map 15: Johnson County Eisenhower Legacy Transportation Program Projects

SELECT KDOT DISTRICT: 1

OR

SELECT COUNTY: Johnson

Clear Filters



STATE HIGHWAYS

Project Type	Completed Cost	Scheduled Cost
Preservation	**$50,210,556**	**$80,810,210**
Rehabilitation	$50,210,556	$54,229,210
Reconstruction	$0	$26,581,000
Modernization	**$2,364,463**	**$1,479,770**
Roadways	$2,364,463	$1,479,770
Rail	$0	$0
Expansion	**$0**	**$616,287,197**
Roadways	$0	$616,287,197
Total	**$52,575,019**	**$698,577,177**

MODES

Project Type	Completed Cost	Scheduled Cost
Aviation	$549,713	$4,306,000
Bike and Pedestrian	$544,429	$1,194,538
Public Transit	$1,201,822	$6,322,005
Rail	$365,948	$3,417,348
Total	**$2,661,911**	**$15,239,891**

LOCAL ROADS

Project Type	Completed Cost	Scheduled Cost
Local Roads	$48,387,011	$158,575,066
Local Highways	$6,786,716	$356,188
Rehabilitation	$0	$0
Total	**$55,173,728**	**$158,931,254**

HIGHLIGHTED SET ASIDES

Project Type	Completed Cost	Scheduled Cost
Cost Share Program	$2,716,667	$3,103,500
Economic Development	$1,587,000	$46,488,120
Innovative Technologies	$0	$0
Total	**$4,303,667**	**$49,591,620**

ANNUAL LOCAL PAYMENTS

Fund Type	Completed Cost	Scheduled Cost
City Connecting Link Fund	$233,971	$93,627
Special City County Highway Fund	$84,538,019	$26,123,631
Total	**$84,771,991**	**$26,217,257**

Source: Kansas Department of Transportation

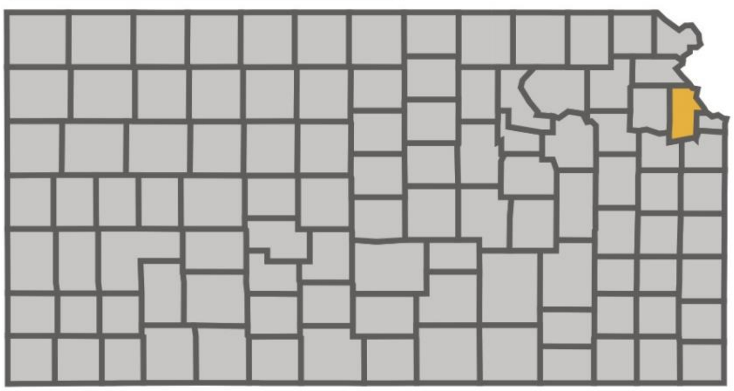
Map 16: Leavenworth County Eisenhower Legacy Transportation Program Projects

SELECT KDOT DISTRICT: 1

OR

SELECT COUNTY: Leavenworth

Clear Filters



STATE HIGHWAYS

Project Type	Completed Cost	Scheduled Cost
Preservation	**$13,041,664**	**$7,620,548**
Rehabilitation	$13,041,664	$6,827,392
Reconstruction	$0	$793,156
Expansion	**$0**	**$0**
Roadways	$0	$0
Modernization	**$0**	**$0**
Rail	$0	$0
Roadways	$0	$0
Total	**$13,041,664**	**$7,620,548**

MODES

Project Type	Completed Cost	Scheduled Cost
Aviation	$0	$39,500
Bike and Pedestrian	$0	$2,106,793
Public Transit	$117,958	$626,139
Rail	$0	$0
Total	**$117,958**	**$2,772,433**

LOCAL ROADS

Project Type	Completed Cost	Scheduled Cost
Local Roads	$5,128,710	$28,893,746
Local Highways	$4,025,493	$19,951,504
Rehabilitation	$0	$0
Total	**$9,154,203**	**$48,845,250**

HIGHLIGHTED SET ASIDES

Project Type	Completed Cost	Scheduled Cost
Cost Share Program	$5,392,882	$4,949,500
Economic Development	$0	$0
Innovative Technologies	$0	$0
Total	**$5,392,882**	**$4,949,500**

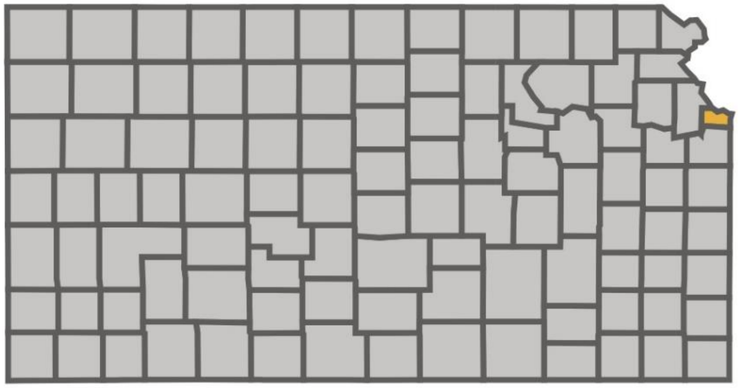
ANNUAL LOCAL PAYMENTS

Fund Type	Completed Cost	Scheduled Cost
City Connecting Link Fund	$176,264	$70,534
Special City County Highway Fund	$9,232,150	$3,101,305
Total	**$9,408,414**	**$3,171,839**

Source: Kansas Department of Transportation

Map 17: Wyandotte County Eisenhower Legacy Transportation Program Projects

SELECT KDOT DISTRICT: 1 OR SELECT COUNTY: Wyandotte — Clear Filters



STATE HIGHWAYS

Project Type	Completed Cost	Scheduled Cost
Preservation	**$101,388,571**	**$179,359,218**
Rehabilitation	$75,543,781	$49,684,630
Reconstruction	$25,844,790	$129,674,588
Modernization	**$4,047,891**	**$2,004,000**
Roadways	$4,047,891	$0
Rail	$0	$2,004,000
Expansion	**$0**	**$0**
Roadways	$0	$0
Total	**$105,436,462**	**$181,363,218**

MODES

Project Type	Completed Cost	Scheduled Cost
Aviation	$0	$0
Bike and Pedestrian	$1,322,614	$187,500
Public Transit	$3,543,760	$1,452,624
Rail	$0	$0
Total	**$4,866,374**	**$1,640,124**

LOCAL ROADS

Project Type	Completed Cost	Scheduled Cost
Local Roads	$20,028,883	$25,284,599
Local Highways	$3,623,990	$14,777,264
Rehabilitation	$0	$4,009,200
Total	**$23,652,874**	**$44,071,063**

HIGHLIGHTED SET ASIDES

Project Type	Completed Cost	Scheduled Cost
Cost Share Program	$554,650	$580,500
Economic Development	$0	$9,647,256
Innovative Technologies	$0	$0
Total	**$554,650**	**$10,227,756**

ANNUAL LOCAL PAYMENTS

Fund Type	Completed Cost	Scheduled Cost
City Connecting Link Fund	$844,661	$338,003
Special City County Highway Fund	$23,192,604	$7,213,715
Total	**$24,037,265**	**$7,551,718**

Source: Kansas Department of Transportation

Detailed information concerning development trends may be found in the Jurisdictional Comprehensive Plans. These plans, and on ground observations suggest that Kansas Region L's development continues to follow development described by planners in the previous HMP, specifically small-scale development projects over small areas. On average, the majority of undeveloped land has remained so over the life of the previous HMP and is expected to do so over the life of this plan. In some of the Regions' developing and growing communities building activity has increased proportionally to match the incoming population. This data is reflected in both the previously presented population and housing data.

Other major infrastructure projects of note include:

- A major infrastructure project is currently underway in Kansas Region L. On October 13, 2021, the KC Levees Program was started, a $529-million investment scheduled to be completed in 2026. The finished project will improve 17 miles of levees along the Kansas and Missouri Rivers and protect 32 square miles of residential, industrial, and commercial areas containing 100,000 jobs, 7,000 structures, and $25 billion in investments.
- The U.S. Environmental Protection Agency announced a $281,000,000 Water Infrastructure Finance and Innovation Act loan to Johnson County to support the Nelson Wastewater Treatment Plant Improvements project. Through this loan, the project is supporting the modernization of critical wastewater infrastructure to be more resilient to climate change while protecting water quality.

All current and future development is potentially vulnerable to the hazards identified in this plan. However, many of the participating jurisdictions of Kansas Region L have taken steps to reduce the potential impacts through the utilization of building codes and comprehensive plans. A comprehensive plan outlines the long-term vision and goals for the development of a city or municipality. It serves as a strategic guide for future growth, land use, infrastructure, and community development. Comprehensive plans are typically created through a collaborative process involving local government officials, city planners, residents, and various stakeholders. A key component of a comprehensive plan is land use planning, which defines how land will be used, including residential, commercial, industrial, recreational, and green spaces.

Finally, there have been no major changes in existing jurisdictional facilities, either through construction or renovation. Additionally, a review of jurisdictional budgets, as possible, does not indicate any future projects related to increasing the resilience of any existing facilities or of construction facilities. As such, it is expected that the vulnerability of jurisdictional facilities is generally the same as during the life of the previous plan and will remain generally the same during the life of this plan.

3.10 Agricultural Data

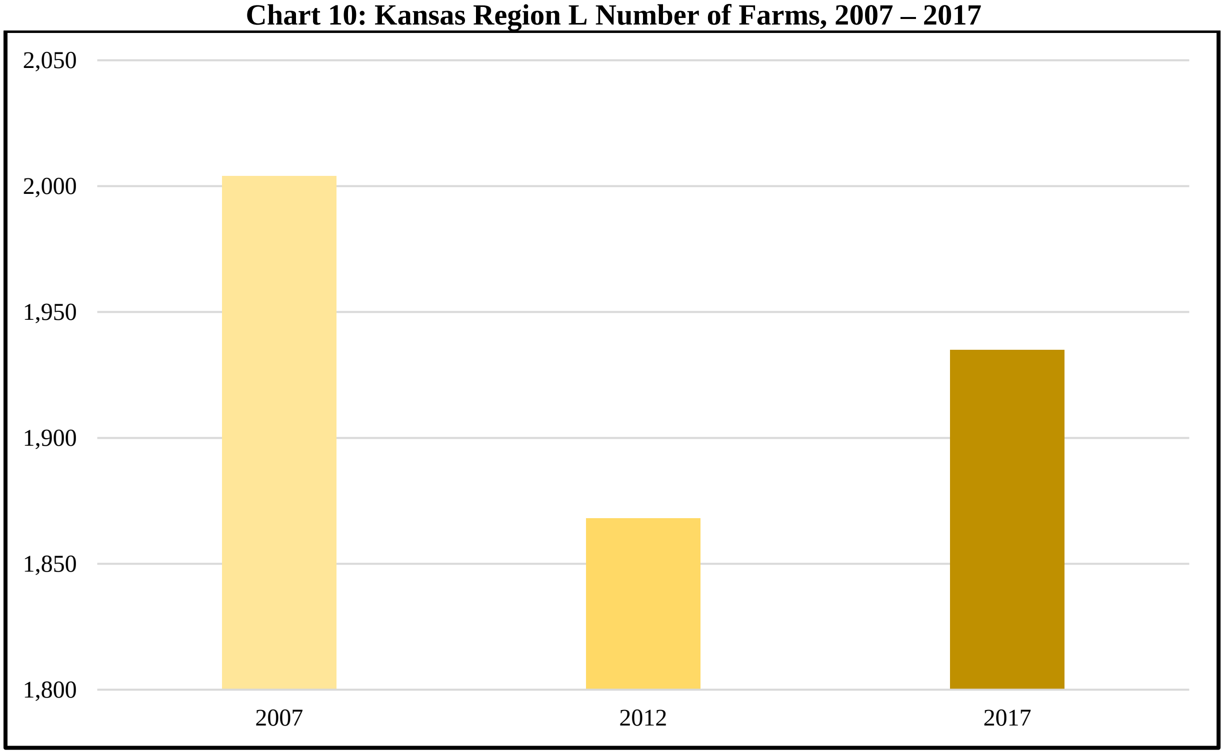
Agriculture forms a very important part of both the economic and social fabric of Kansas Region L. USDA National Agricultural Statistics Service data from 2007, 2012, and 2017 (the latest available data) was used to develop agricultural information for the region, as detailed in the following table and charts:

Table 15: Kansas Region L Regional Agricultural Data

Jurisdiction	Year	Number of Farms	Farm Acreage	Market Value of Products Sold
Kansas Region L	2007	2,004	327,163	$78,900,000
	2012	1,868	295,834	$64,028,000
	2017	1,935	294,152	$79,836,000

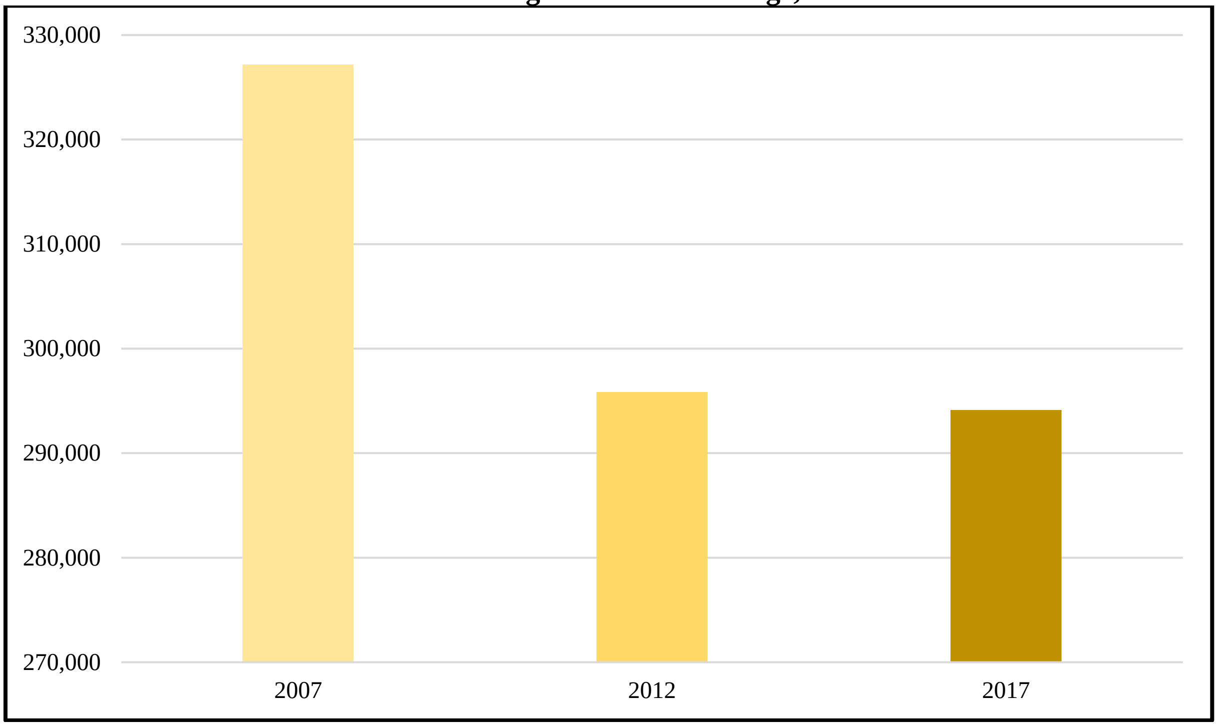
Source: USDA National Agricultural Statistics Service

Chart 10: Kansas Region L Number of Farms, 2007 – 2017



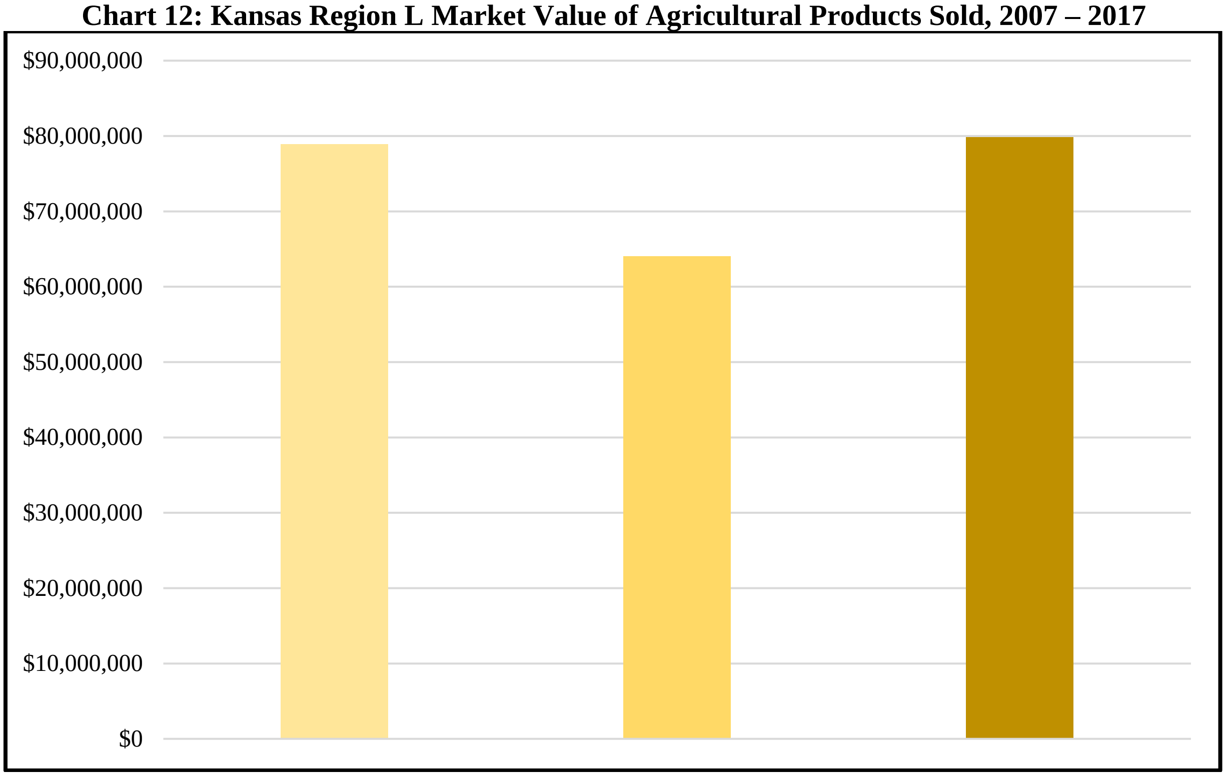
Source: USDA

Chart 11: Kansas Region L Farm Acreage, 2007 – 2017



Source: USDA

Chart 12: Kansas Region L Market Value of Agricultural Products Sold, 2007 – 2017



Source: USDA

The following table breaks down USDA National Agricultural Statistics Service data from 2007, 2012, and 2017 (the latest available data) on a county level:

Table 16: Kansas Region L County Level Agricultural Data

Jurisdiction	Year	Number of Farms	Farm Acreage	Market Value of Products Sold
Johnson County	2007	610	114,202	$40,569,000
	2012	571	99,354	$24,370,000
	2017	564	87,121	$30,608,000
Leavenworth County	2007	1,203	194,854	$33,219,000
	2012	1,133	184,471	$36,367,000
	2017	1,213	194,636	$43,954,000
Wyandotte County	2007	191	18,107	$5,112,000
	2012	164	12,009	$3,291,000
	2017	158	12,395	$5,274,000

Source: USDA National Agricultural Statistics Service

3.11 Potential Impacts of Climate Change

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. Where applicable, and with proper scientific evidence, potential climate change factors will be addressed in subsequent sections for relevant identified hazards.

Data from the NOAA NCEI Kansas 2022 State Climate Summary indicates the following concerning the climate change in the state:

- Temperatures have risen approximately 1.5° Fahrenheit since the beginning of the 20th century.
- Recent multiyear periods have been among some of the warmest on record for Kansas, comparable to the extreme heat of the Dust Bowl era of the 1930s.
- Greater warming has occurred in the winter and spring months.
- The frequency of extreme precipitation events has been highly variable but shows a general increase, with the number of 2-inch precipitation events was well above average during the 2015–2020 period.
- Although projections of overall annual precipitation are uncertain, summer precipitation is projected to decrease across the state while winter precipitation is projected to increase.
- The increase in extreme precipitation events has been more pronounced in the eastern part of the state.
- The intensity of future droughts is projected to increase.
- Drought, combined with the extreme summer heat, is expected to have significant negative impacts on crop yields, livestock production, and pasture conditions.
- The frequency and severity of wildfires is projected to increase.

Section 4 – Hazard Identification and Risk Assessment

4.1 Introduction

The goal of this hazard mitigation is to reduce the future impacts of hazards, including deaths and injuries, property damage, and disruption to local and county economies, and to further reduce the amount of public and private funds spent to assist recovery. To complete this goal, hazard mitigation decision-making in this plan has been based on a robust risk assessment, completed to identify natural, human caused, and technological hazards that represent a risk to Kansas Region L. The following provide a definition of the risk assessment terms used during this assessment:

- **Hazard:** An act or phenomenon that has the potential to produce harm or other undesirable consequences to a person or thing.
- **Exposure:** The people, property, systems, or functions that could be lost to a hazard. Generally, exposure includes what lies in the area the hazard could affect.
- **Vulnerability:** Vulnerability is susceptibility to physical injury, harm, damage, or economic loss. It depends on an asset's construction, contents, and economic value of its functions.
- **Risk:** A function of hazard, vulnerability, and exposure. It refers to the likelihood of an event resulting in an adverse condition that causes injury or damage.

In order to accomplish this assessment, all relevant natural, human caused, and technological hazards, potential vulnerabilities, and exposures were identified. As potential hazards, vulnerabilities, and exposure are identified Kansas Region L can continue to develop a strategy to identify and prioritize mitigation action to defend against these potential risks.

4.2 Declared Federal Disasters

The Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. §§ 5121-5206) provides for the Federal support of State and local governments and their citizens when impacted by an overwhelming disaster. The Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended, establishes the process for requesting a Presidential disaster declaration and defines the type of assistance available.

If it is apparent that a Presidential disaster declaration may be necessary to assist in the recovery of an impacted area, Counties within Kansas Region L and FEMA Region VII will conduct a Preliminary Damage Assessment (PDA). This assessment is used to determine:

- The extent of the event.
- The impact of the event on individuals and public facilities.
- The types of federal assistance that may be needed.

Once the PDA is complete, and if a determination is made that the damages exceed available State of Kansas resources, the Governor may submit through FEMA Region VII a declaration request to the President.

A major disaster declaration provides a wide range of federal assistance programs for individuals and public infrastructure, including funds for both emergency and permanent work. Not all programs, however, are activated for every disaster. The determination of which programs are authorized is based on the types of assistance specified in the Governor's request and the needs identified during the initial and subsequent PDAs. FEMA disaster assistance programs may include:

- Individual Assistance
- Public Assistance
- Hazard Mitigation

To recognize and encourage mitigation, FEMA considers the extent to which mitigation measures contributed to the reduction of disaster damages. This could be especially significant in those disasters where, because of mitigation, the estimated public assistance damages fell below the per capita indicator.

Historical events of significant magnitude or impact can result in a Presidential Disaster Declaration. The MPC reviewed the historical federal disaster declarations to assist in hazard identification. The following table details Disaster Declarations for Kansas Region L:

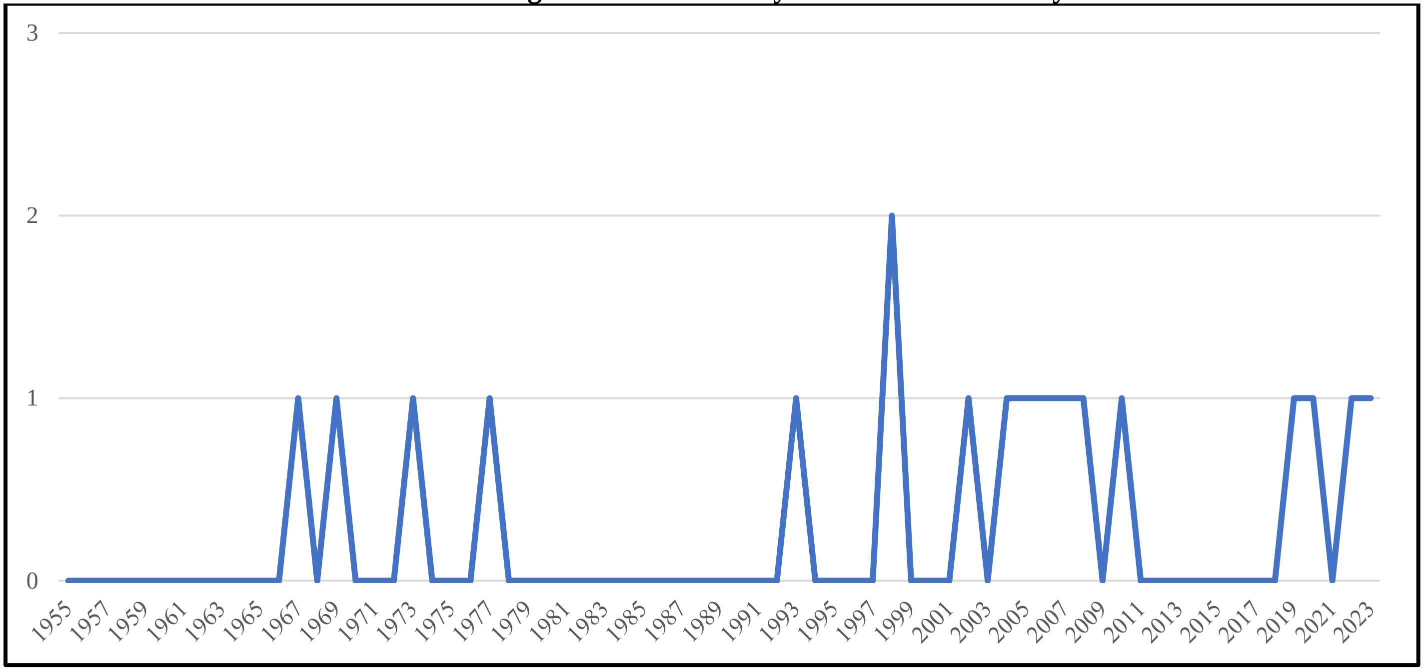
Table 17: Kansas Region L Presidentially Declared Disasters

Designation	Declaration Date	Incident Type	Counties	Assistance	Mitigation Grants
DR-4747-KS	10/26/2023	Severe Storms, Straight-Line Winds, Tornadoes, and Flooding	Johnson, Wyandotte	-	-
DR-4640-KS	3/22/2022	Severe Storms and Straight-Line Winds	Wyandotte	$12,159,785	$79,818
DR-4504-KS	3/29/2020	Covid-19	All Kansas Counties	$447,055,679	$6,948,544
DR-4449-KS	8/14/2019	Severe Storms, Straight-Line Winds, Flooding, Tornadoes, Landslides, and Mudslides	Leavenworth	$51,157,548	$3,331,442
DR-4347-KS	11/7/2017	Severe Storms, Straight-Line Winds, Flooding	Johnson, Wyandotte	$6,195,147.97	-
DR-4035-KS	09/23/2011	Flooding	Leavenworth and Wyandotte	$7,462,881	-
DR-1885-KS	3/9/2010	Severe Winter Storms and Snowstorm	Leavenworth, Wyandotte	$15,069,228	-
DR-1741-KS	2/1/2008	Severe Winter Storms	Leavenworth	$227,086,533	-
DR-1699-KS	5/6/2007	Severe Storms, Tornadoes, and Flooding	Leavenworth	$98,286,095	-
DR-1638-KS	4/13/2006	Severe Storms, Tornadoes, Straight-Line Winds	Wyandotte	$4,911,053	-
DR-1579-KS	2/8/2005	Severe Winter Storm, Heavy Rains, and Flooding	Leavenworth, Wyandotte	$82,381,461	-
DR-1535-KS	8/3/2004	Severe Storms, Flooding, and Tornadoes	Wyandotte	$10,223,840	-
DR-1402-KS	2/6/2002	Ice Storm	Johnson, Leavenworth, Wyandotte	$45,020,240	-
DR-1258-KS	11/5/1998	Severe Storms and Flooding	Johnson, Leavenworth, Wyandotte	$9,574,047	-
DR-1254-KS	10/14/1998	Severe Storms, Flooding and Tornadoes	Johnson, Leavenworth, Wyandotte	$6,640,272	-
DR-1000-KS	7/22/1993	Flooding, Severe Storms	Johnson, Leavenworth, Wyandotte	-	-
DR-539-KS	9/20/1977	Severe Storms, Flooding	Johnson, Leavenworth, Wyandotte	-	-
DR-378-KS	5/2/1973	Severe Storms, Flooding	Leavenworth, Wyandotte	-	-
DR-267-KS	7/15/1969	Tornadoes, Severe Storms, Flooding	Johnson, Leavenworth, Wyandotte	-	-
DR-229-KS	7/18/1967	Tornadoes, Severe Storms, Flooding	Leavenworth	-	-

Source: FEMA
-: Data unavailable

The following chart represents Presidentially Declared Disasters in the Kansas Region L by year, starting in 1955:

Chart 13: Kansas Region L Presidentially Declared Disasters by Year



Source: FEMA

The President can declare an emergency for any occasion or instance when the President determines federal assistance is needed. Emergency Declarations supplement State and local or Indian tribal government efforts in providing emergency services, such as the protection of lives, property, public health, and safety, or to lessen or avert the threat of a catastrophe. The total amount of assistance provided for in a single emergency may not exceed $5,000,000. The following types of assistance are available under an Emergency Declaration:

- Public Assistance, Categories A (debris removal) and B (emergency protective measures)
- Individual Assistance, the Individuals and Households Program

The MPC reviewed the historical federal disaster declarations to assist in hazard identification. The following table details Emergency Declarations for Kansas Region L.

Table 18: Kansas Region L Emergency Declarations

Designation	Declaration Date	Incident Type	Counties	Public Assistance
EM-3481-KS	03/13/2020	Kansas Covid-19	All	-
EM-3412-KS	05/28/2019	Flooding	Leavenworth	-
EM-3282KS	12/12/2007	Kansas Winter Storms	All	-
EM-3236-KS	09/10/2005	Hurricane Katrina Evacuation	All	-

Source: FEMA
Note: -: Data unavailable

The Governor, or the Governor's Authorized Representative, may submit a request for a fire management assistance declaration as required. FEMA will approve declarations for fire management assistance when it is determined that a fire or fire complex on public or private forest land or grassland threatens such destruction as would constitute a major disaster. There have been no fire management declarations for Kansas Region L.

The Governor of the State of Kansas has declared two Kansas Disaster Declarations during the past five years for Region L. On April 20, 2020, a declaration was issued for the COVID-19 pandemic. On January 18, 2019, a declaration was issued for a major winter storm system.

4.3 Identified Potential Hazards

One of the first steps in developing a hazard assessment is to identify the hazards that have a reasonable risk of occurring. Proper identification allows for appropriate and well-planned action in order to mitigate the extent and cascading impacts of an incident. Furthermore, while not all disaster contingencies can be planned for, applying an all-hazards approach to the mitigation process does yield greater awareness and better preparedness for unforeseen hazard incidents overall.

The MPC met to discuss previously identified hazards and deliberate on any changes or additions to the regional hazard profile. A thorough and comprehensive revision of data for each hazard was completed as part of this plan update. Additionally, this plan has worked, as per FEMA recommendations, to merge similar hazards together with the aim of both simplifying the usage of the plan and reducing duplication of effort.

The MPC confirmed the following natural hazards that may impact the Kansas Region L:

Table 19: Kansas Region L Identified Natural Hazards

Hazard	Included in 2019 HMP	Notes
Agricultural Infestation	Yes	-
Dam or Levee Failure	Yes	-
Drought	Yes	-
Extreme Temperatures	Yes	-
Flood	Yes	-
Severe Weather	Yes	Combined hail, lightning, and high and thunderstorm winds
Severe Winter Weather	Yes	Renamed from Winter Storm
Tornado	Yes	-
Wildfire	Yes	Renamed with greater focus on wildfires

The MPC confirmed the following human caused and technological hazards that may impact the Kansas Region L, as listed below:

Table 20: Kansas Region L Identified Human Caused and Technological Hazards

Hazard	Included in 2019 HMP	Notes
Cybersecurity Incident	No	New
Hazardous Materials Incident	Yes	Renamed from chemical incident
Infrastructure Failure	Yes	Renamed from Utility/Infrastructure Failure
Terrorism	Yes	Now includes active shooter
Transmissible Disease	Yes	Renamed from Major Disease Outbreak

Based on discussion with the MPC, a lack of identified risk or history, and geographic improbability, numerous FEMA identified hazards such as coastal erosion and hurricane were not included in the scope of this plan. Additionally, the following natural hazards included in the State of Kansas HMP were not included for the enumerated reasons:

- **Earthquake:** Information from the Kansas Geological Society indicates that Kansas Region L has had no recorded earthquake above Richter Scale Magnitude 3.1, with effects resembling vibrations caused by heavy traffic. Additionally, FEMA seismic risk maps indicate that the region is in the low-risk category. As such, the MPC opted to not allocate potential resources or funding to mitigate against this hazard in favor of prioritizing other hazards.
- **Expansive Soils:** Information from the United States Geological Service (USGS) Swelling Clays Map of the Conterminous United States indicates that the majority of Kansas Region L has soils with little or no clay, and thus no swelling potential. As such, the MPC opted to not allocate potential resources or funding to mitigate against this hazard in favor of prioritizing other hazards.
- **Land Subsidence:** There have been no recorded incidences of subsidence events in Kansas Region L. Additionally, geologic maps indicate that the region has minimal Karst topography, a known contributor to

subsidence. Due to a lack of documented history and indicated risk, the MPC opted to not allocate potential resources or funding to mitigate against this hazard in favor of prioritizing other hazards.

- **Landslide:** On notable landslide event was recorded in Region L during the past 10 years. A slide occurred to the west of the City of Leavenworth in May of 2016 resulting in road damage and closure. Repairs were estimated to be $139,500. However, due to the lack of repeated occurrences, and the generally lower risk of occurrence, the MPC opted to not allocate potential resources or funding to mitigate against this hazard in favor of prioritizing other hazards.
- **Soil Erosion and Dust:** The larger concern of soil erosion, and the associated dust caused by this erosion, is an issue that is managed by the Kansas Department of Agriculture on a statewide basis. As such, the MPC elected to remove this hazard from the plan.

4.4 Hazard Planning Significance

For the purposes of this plan, hazard planning significance refers to the relevance of the identified hazard to the jurisdictions of Kansas Region L when calculating risk and vulnerability. In order to help quantify the planning significance for a hazard, data was reviewed on two levels, federal (National Risk Index data) and local (researched plan data relevant to occurrence and vulnerability on a county and local level). This allowed for a comparison between data sets for each hazard type and allowed for a summation at the county level. It is recognized that inconsistencies in methodologies and data make it difficult to make a direct comparison across all data levels. However, as possible, collected data was translated into a unified model that accounted for any variability in data and methodologies.

The result of this assessment provides a larger scale snapshot of how the Kansas Region L jurisdictions view risk and allowed for integration of hazard data into the HMP.

For natural hazards, data from this plan was vetted by local Emergency Managers and participating jurisdictions to ensure it matched local conditions. Additionally, the Kansas Region L utilized FEMA’s National Risk Index (NRI) which provides a method of understating high and local level jurisdictional vulnerability. FEMA’s NRI dataset and online tool was used to help determine local community risk for identified natural hazards in this HMP.

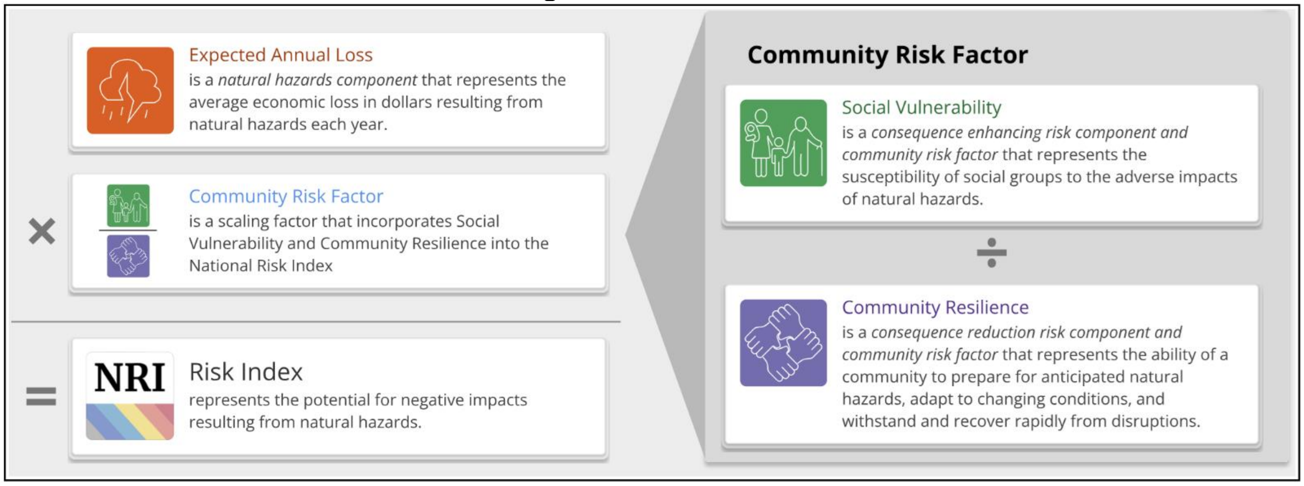
The risk equation behind the Risk Index includes three components, Expected Annual Loss (EAL), social vulnerability (previously discussed), and community resilience (previously discussed). The dataset supporting EAL provides estimates measured in 2022 U.S. dollars. The datasets supporting the social vulnerability and community resilience components have been standardized using a minimum-maximum normalization approach prior to being incorporated into the NRI risk calculation.

As part of the NRI, EAL represents the average economic loss in dollars resulting from a hazard each year. It quantifies loss for relevant consequence types, buildings, people, and agriculture. An EAL score and rating represent a community's relative level of expected losses each year when compared to all other communities at the same level. EAL is calculated using an equation that includes exposure, annualized frequency, and historic loss ratio risk factors. Exposure is a factor that measures the building value, population, and agriculture value potentially exposed to a natural hazard occurrence. Annualized frequency is a factor that measures the expected frequency or probability of a hazard occurrence per year. Historic loss ratio is a factor that measures the percentage of the exposed consequence type value (building, population, or agriculture) expected to be lost due to an occurrence. EAL represents the average economic loss in dollars resulting from natural hazards each year and is proportional to a community’s risk.

To calculate Risk Index values, the NRI generates a Community Risk Adjustment to scale EAL values up or down, depending on their community risk factors, increasing with social vulnerability and decreases with community resilience. For a jurisdiction, a higher social vulnerability results in a higher Risk Index value while higher community resilience results in a lower Risk Index value.

Using these three components, Risk Index values are calculated for each jurisdiction (county and Census tract). The calculated Risk Index values form an absolute basis for measuring Risk within the NRI, and they are used to generate Risk Index percentiles and ratings across communities. The risk equation behind the NRI is as follows:

Figure 1: FEMA NRI



Source: FEMA

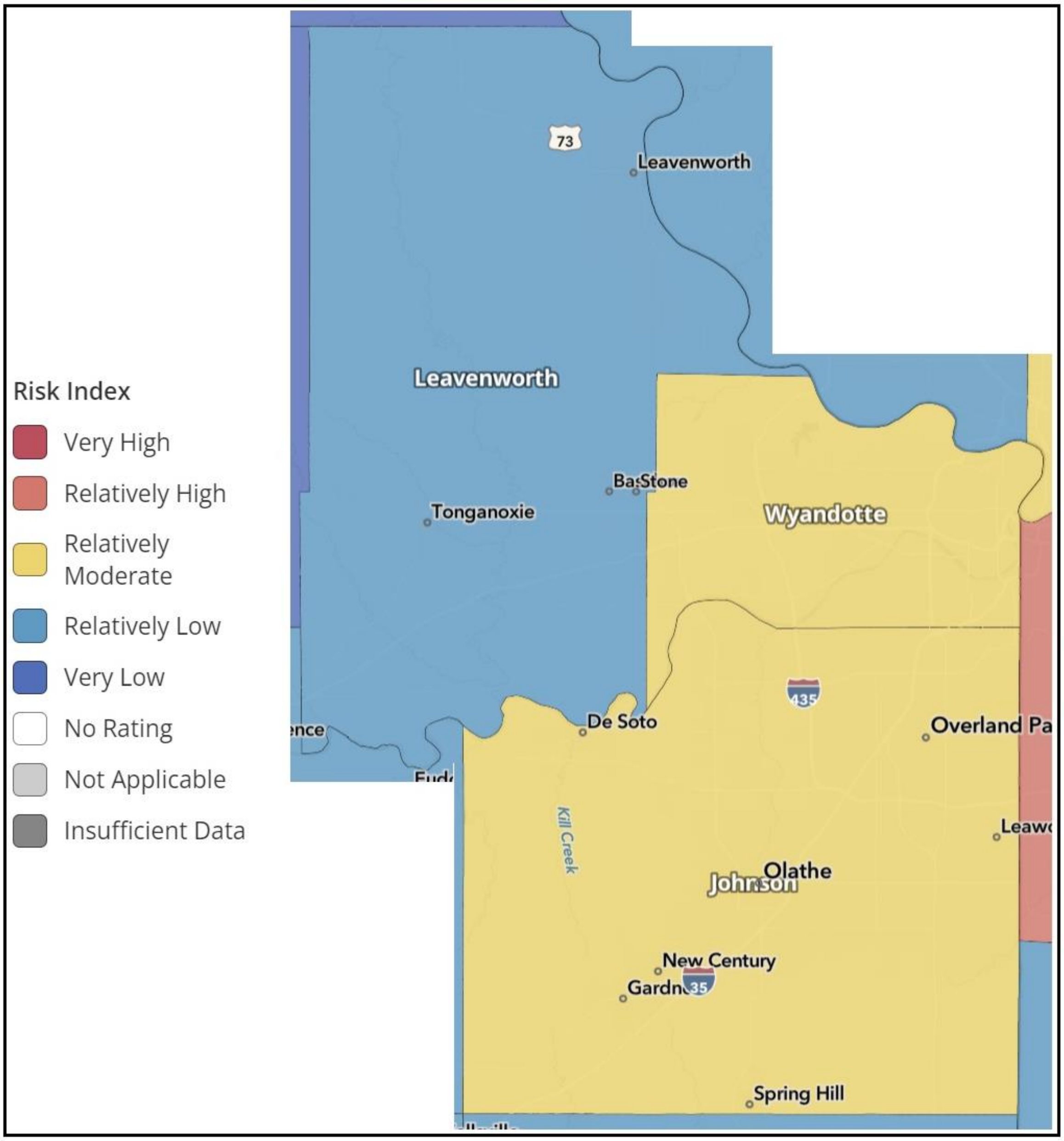
For both the Risk Index and EAL there is a qualitative rating that describes the nature of a community's score in comparison to all other communities at the same level, ranging from "Very Low" to "Very High." Because all ratings are relative, there are no specific numeric values that determine the rating.

The National Risk Index provides relative Risk Index percentiles and ratings based on data for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience. Separate percentiles and ratings are also provided for each component: Expected Annual Loss, Social Vulnerability, and Community Resilience. For the Risk Index and Expected Annual Loss, percentiles and ratings can be viewed as a composite score for all hazards or individually for each of the 18 hazard types.

A community's score is represented by its percentile ranking among all other communities at the same level for Risk, Expected Annual Loss, Social Vulnerability and Community Resilience. For example, if a given Census tract's Risk Index percentile for a hazard type is 84.32 then its Risk Index value is greater than 84.32% of all US Census tracts. These scores are then assigned a qualitative rating that describes the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High." To determine Risk and Expected Annual Loss ratings, a methodology known as k-means clustering or natural breaks is applied to each value. This approach divides all communities into five groups such that the communities within each group are as similar as possible (minimized variance) while the groups are as different as possible (maximized variance). A cubed root transformation is applied to both Risk and Expected Annual Loss values before k-means clustering. Without the transformation, these values are heavily skewed by an extreme range of population and building value densities between urban and rural communities. By applying a cube root transformation, the National Risk Index controls for this characteristic and provides ratings with greater differentiation and usefulness.

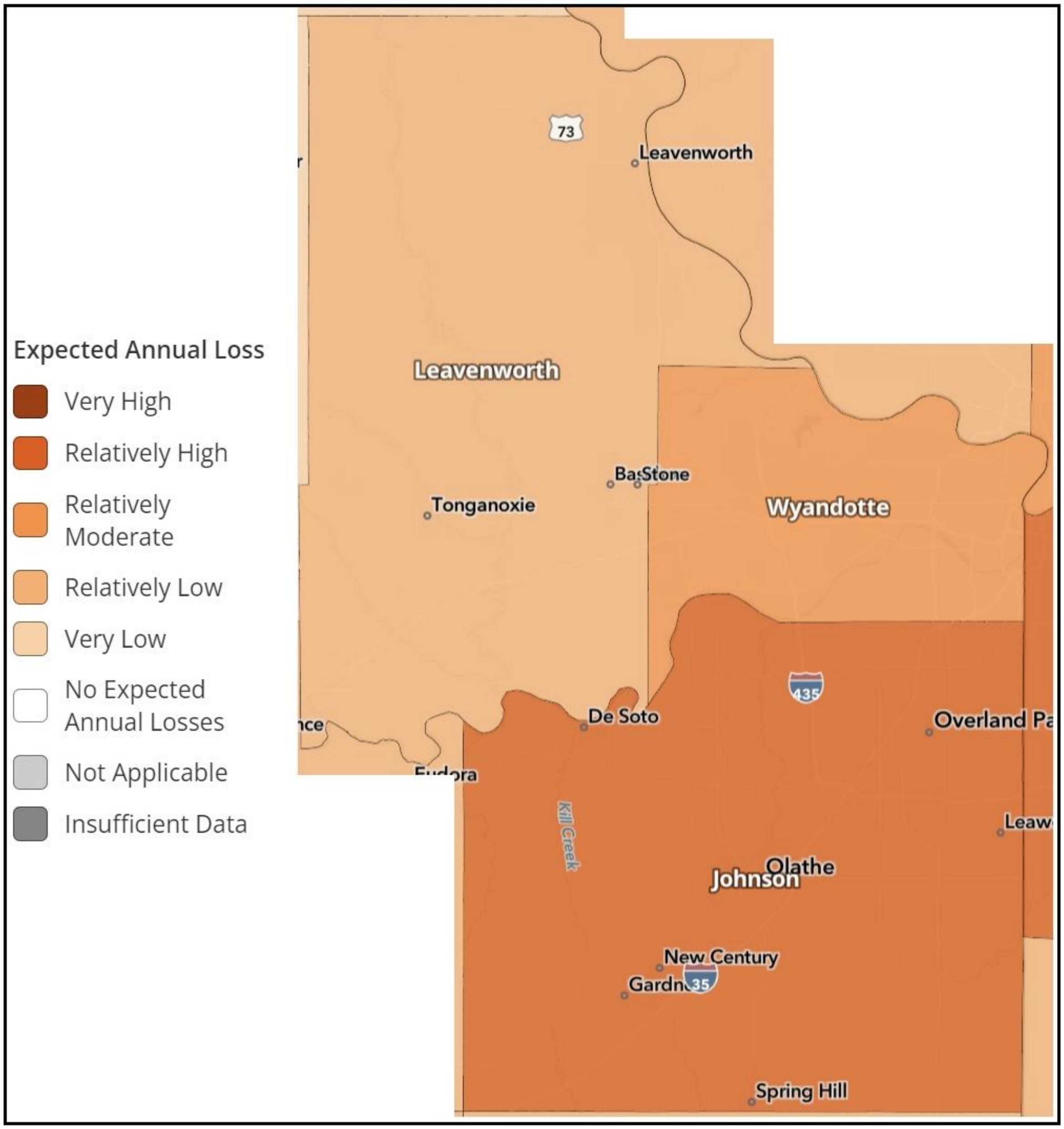
The following maps indicate the natural hazard composite NRI and EAL for Kansas Region L counties:

Map 18: Kansas Region L FEMA NRI



Source: FEMA NRI

Map 19: Kansas Region L FEMA EAL



Source: FEMA NRI

The following table indicates the FEMA NRI and EAL analysis for each participating Kansas Region L county for all identified natural hazards:

Table 21: Kansas Region L FEMA NRI and EAL for All Natural Hazards

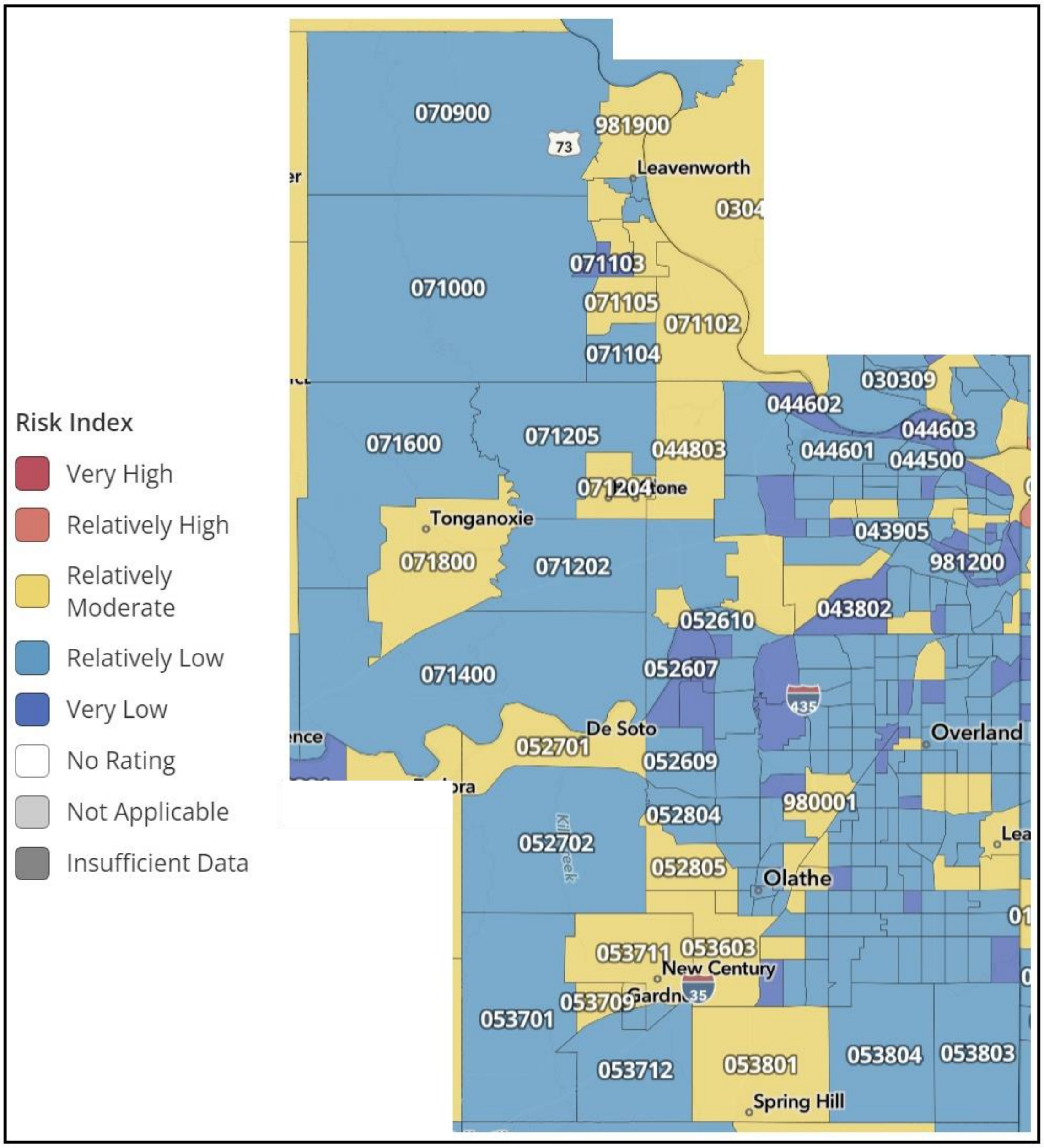
County	Risk Index	EAL
Johnson	Relatively Low	Relatively High
Leavenworth	Relatively Moderate	Relatively Low
Wyandotte	Relatively Moderate	Relatively Moderate

Source: FEMA NRI

To help understand the risk and vulnerability to the identified hazards in this HMP for participating jurisdictions, risk index and EAL mapping from the FEMA NRI was run on a census tract level. As the NRI does not generate mapping for individual jurisdictions, census tract analysis is the closest analogue available to understand individual jurisdiction conditions.

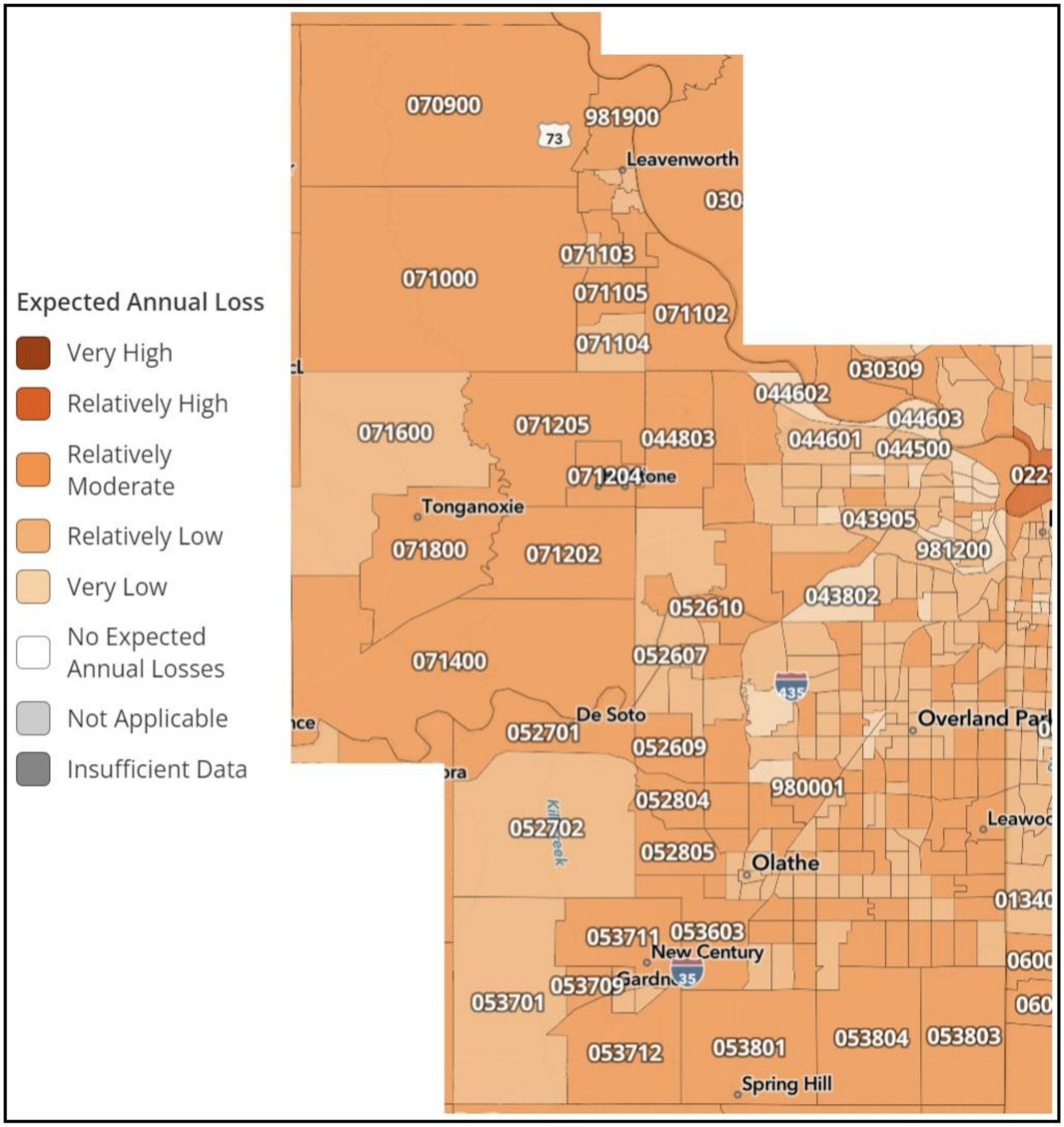
The following maps indicate the composite NRI and EAL for Kansas Region L census tracts:

Map 20: Kansas Region L Jurisdiction FEMA NRI



Source: FEMA NRI

Map 21: Kansas Region L Jurisdiction FEMA NRI



Source: FEMA NRI

To further help determine risk and vulnerability, social vulnerability, community resilience, risk index, and EAL data is presented in the following sections for each identified hazard by both county and jurisdiction. Additionally, FEMA NRI data tables, by census tract, are included in Appendix C. These data tables also contain the total building valuation and agricultural valuation of each census tract, allowing for an understanding of potential structural and agricultural vulnerability. Where appropriate, differences in vulnerability to identified hazards are noted in each individual hazard section.

As the FEMA NRI does not provide data concerning human caused and technological caused hazards the hazard rating methodology used on the 2019 Kansas Region L HMP was followed to help determine hazard planning significance for the county level. A standardized methodology, which allows for greater flexibility and room for subject matter expertise, was developed to compare different hazards' risk. Where possible, this method prioritizes hazard risk based on a blend of quantitative factors extracted from available data sources. These factors include:

- Probability of occurrence (expected frequency)
- Probable magnitude of impact (estimated strength, magnitude, onset, duration, and damage potential)

- Warning time of hazard occurrence (what type of warning can be expected)
- Duration of event (how long will hazard conditions exist)

The scores for the four hazard rating factors (probability of hazard occurrence, magnitude, warning time, and duration) were given a criticality rating from one to four (four being the highest concern or impact) and summed at a county level for each natural hazard using the following formula:

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

The numerical result of the formula for each hazard allowed for an assignment of a planning significance. The following table details planning significance ranges.

Table 22: Planning Significance Rating Range

	Score Range	
Planning Significance	**Low Score**	**High Score**
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 result of this assessment provides a larger scale snapshot of how participating counties view risk and allowed for integration of hazard data into this HMP. This allowed for a comparison between counties for each human caused and technological hazard type. It is recognized that inconsistencies in methodologies and data make it difficult to make a direct comparison, however, as possible, collected data was translated into a unified model that accounted for any variability in data and methodologies.

The following tables show the hazard planning significance of natural hazards and technological and human caused hazards for Kansas Region L.

Table 23: Kansas Region L Technical and Human Caused Hazard Planning Significance

County	Cybersecurity Incident	Hazardous Materials Incident	Infrastructure Failure	Terrorism	Transmissible Disease
Johnson	High	High	Moderate	Low	High
Leavenworth	High	High	Moderate	Low	Moderate
Wyandotte	High	High	Moderate	Low	High

Calculations for the planning significance for each human caused and technological hazard on a county basis are presented in the corresponding hazard section.

4.5 Hazard Occurrence and Assessment Data

NOAA's NCEI Storm Events Database was used as the primary source of information for previous occurrences of storm events. Fully available data sets, from 1950 to present, were used, where applicable, for hazard occurrence and impact data. Where data sets were unavailable for a hazard, local reporting from participating jurisdictions was relied upon.

It is worth noting that damage estimates indicated by the NCEI are often artificially low. This underreporting is a result of the way the events are reported to the NCEI, often by the local and/or National Weather Service (NWS) office. When reporting an event oftentimes the NWS office does not have access to the actual damage assessment resulting from that event. As such, the report often details a very low amount or zero-dollar amount for damages. Most of the events from NCEI are not associated with a federal emergency or disaster. If the event occurred at the same time as an event that was later determined to be a federal emergency or disaster, it is included with the NCEI data even if it occurred in a county not included in the federal declaration.

Data was also obtained and utilized using Hazus-MH, Version 2.2 SP1, a program administered by the FEMA used to model losses. Modelling for hazards uses Hazus analysis to estimate losses and projected impacts from historical and annualized hazard events. Hazus default data was used in the analysis, including the 2020 Census and other State and Federal government facility databases.

4.6 Jurisdictional Critical Facilities and Assets and Community Lifelines

Certain facilities and assets such as infrastructure and community lifelines, have a net positive value on the community as they contribute to the public good by facilitating the basic functions of society. These facilities maintain order, public health, education, and help the economy function. Additionally, there are infrastructure and facilities integral to disaster response and recovery operations. Conversely, some infrastructure and facilities are of extreme importance due to the negative externalities created when they are impacted by a disaster. What fits these definitions will vary slightly from community to community, but the definitions remain as a guideline for identifying critical facilities and infrastructure. Kansas Region L maintains critical facility details under separate cover for security purposes. For this HMP, it is assumed that all critical facilities are at equal risk to non-point hazard occurrence but may have varying risk to point hazard occurrence (dam and levee failure and flood). Data concerning critical facilities potentially impacted by these point hazards, as available, is detailed under the respective hazard section.

Each hazard section provides a discussion on potentially vulnerable community lifelines. Community lifelines enable the continuous operation of critical government and business functions and are essential to human health and safety or economic security, and include safety, health, energy, communication, transportation, and water systems.

4.7 Hazard Profiles

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. For hazards that have a higher chance of occurrence for specific jurisdictions throughout Kansas Region L, a discussion is provided as to the differing levels of potential vulnerability. All other hazards have been determined to have an equal chance of occurrence for all participating jurisdictions.

The following hazards are presented in alphabetical order, and not by planning significance, for ease of reference. Please note that natural hazards are presented in order first, followed by human caused and technological hazards.

4.8 Agricultural Infestation

4.8.1 Hazard Description

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.

The 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.

4.8.2 Location & Extent

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 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.

Of particular concern are Confined Animal Feeding Operations (CAFOs) facilities, defined as facilities with 300 or more animal units. The CAFO facilities are regulated by the Kansas Department of Health & Environment, 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 L:

- Johnson County: 36
- Leavenworth County: 48
- Wyandotte County: 9

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.

Kansas Region L is also susceptible to various forms of crop infestations and disease. The following major crops are particularly susceptible to infestation:

- Wheat: Kansas Region L is part of the Great Plains Wheat Belt. Wheat is susceptible to infestations by pests including insects like the Hessian fly, aphids, and wheat stem sawflies, as well as diseases like wheat rust.
- Corn and Sorghum: Staple crops, they are susceptible to infestations by pests such as corn rootworms, corn borers, and aphids. Sorghum may also be affected by sugarcane aphids.
- Cotton: Can be susceptible to infestations by pests like cotton bollworms and spider mites.
- Soybeans: Susceptible to infestations by pests such as soybean aphids, soybean cyst nematodes, and various caterpillar species.

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.

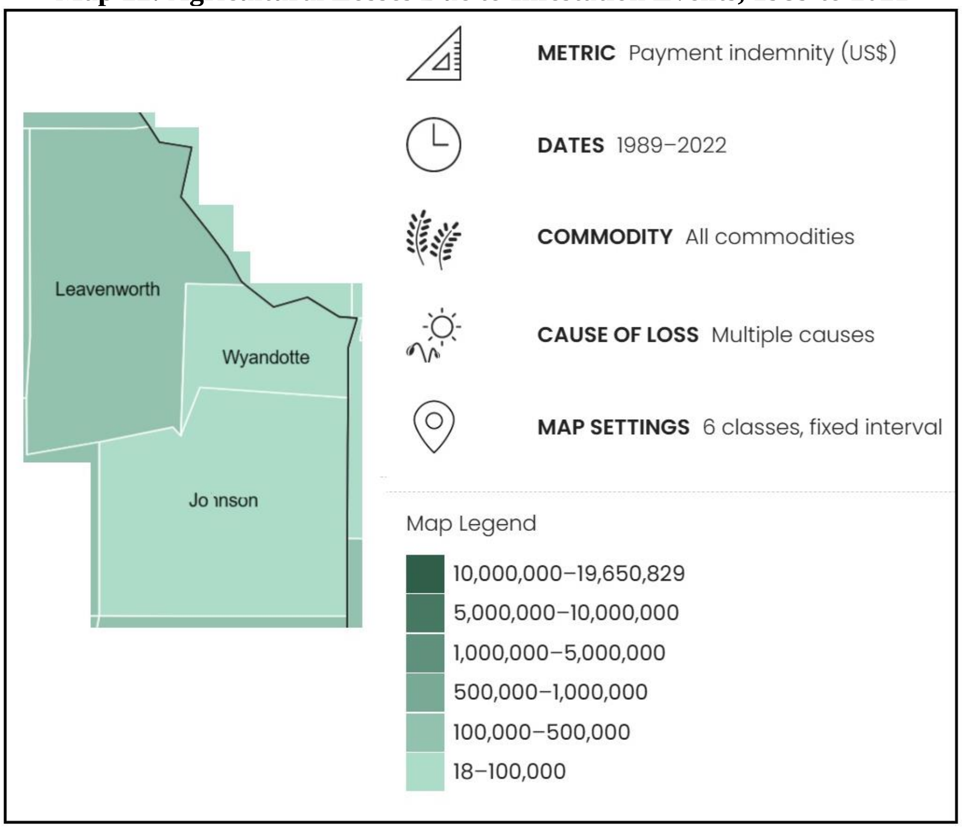
Trees within Kansas Region L are also susceptible to a variety pest and disease including:

- Emerald Ash Borer
- Pine Wilt
- Oak Wilt
- Dutch Elm Disease

4.8.3 Previous Occurrences

Infestation events can cause significant agricultural impacts. The following map from the United States Department of Agriculture details total agricultural losses, by county, due to infestation conditions from 1989 to 2021:

Map 22: Agricultural Losses Due to Infestation Events, 1989 to 2021



Source: USDA

4.8.4 Probability of Future Incidents

The probability of agricultural infestation in Kansas Region L can vary depending on a variety of factors. These factors include:

- Crop Types: The types of crops grown in Southeast Kansas play a significant role in determining the probability of infestation. Different crops are susceptible to different pests and diseases.
- Climate: Climate conditions, including temperature and humidity, can influence the prevalence of pests and diseases. Warmer and wetter conditions may be more conducive to certain infestations, while dry conditions may reduce the risk.
- Geography: Geographic features, such as proximity to bodies of water, forests, or neighboring agricultural regions, can affect the likelihood of infestations. Certain pests and diseases may be more prevalent in specific geographical areas.

- Crop Management Practices: The adoption of pest management practices, including crop rotation, the use of resistant crop varieties, and the application of pesticides, can impact the probability of infestation. Sustainable and integrated pest management practices can help mitigate infestation risks.
- Seasonal Variability: Infestation risks can vary from season to season. Some years may see higher infestation levels due to factors like weather patterns or the cyclical nature of pest populations.
- Migration of Pests: The movement of pests from other regions or neighboring states can introduce infestation risks. Monitoring and surveillance are essential to detect and respond to potential threats.
- Disease Vectors: The presence of disease vectors, such as certain insects or animals that can transmit diseases to crops or livestock, can increase the likelihood of infestations.
- Biosecurity Measures: Measures taken to prevent the introduction and spread of pests and diseases, such as quarantine procedures and biosecurity protocols, can help reduce the probability of infestation.

The Kansas Forest Service and Kansas Department of Agriculture have identified the following as emerging agricultural infestation threats:

- Thousand Cankers Disease of Walnut: Caused by a combination of a fungus (Geosmithia morbida) and the walnut twig beetle (Pityophthorus juglandis). The walnut twig beetles carry fungal spores, and when they tunnel through the outer bark into the tree the fungus is transmitted during gallery construction. The fungus kills an area under the bark and the areas of dead tissue are called cankers. When the walnut twig beetles are abundant, numerous cankers can form and coalesce to girdle twigs and branches, restricting movement of water and nutrients. Black walnut (Juglans nigra), the most valuable native species to the state, is the most susceptible of the Juglans species to this disease.
- Asian Longhorned Beetle: Feeds on a wide variety of hardwood tree species that are native or planted in Kansas. It kills trees by creating large tunnels as larvae causing branches or stems to break and eventually lead to tree death. Because this beetle is not native to North America, it has no known natural enemies, and Kansas trees have low resistance to this pest. It has not been detected in Kansas. It has been stated that if the beetle were to become established in the US, it could become one of the most destructive and costly pests ever to industry, urban neighborhoods, and natural forests.
- Gypsy Moth: Moth has been infested the northeast, resulting in massive defoliation of shade, fruit, and ornamental trees as well as hardwood forests. Caterpillars devour the leaves of many hardwood tree species and shrubs that can turn a usually lush summer scene into one of winter.
- Asian Gypsy Moth: A native species of Asia, first detected in Washington in 1991. Ongoing and completed eradication of various sites in the U.S. have so far prevented the establishment of this generalist feeder. This moth is much more destructive if it became established and spread east because of its broad host range and the females are active fliers due to their larger wingspan.
- Sudden Oak Death: In June 2019, the causal agent of Sudden Oak Death, Phytophthora ramorum, was detected in rhododendrons originating from Park Hill Plants nursery in Oklahoma, and plants from that nursery were shipped to 60 Walmart stores across Kansas and one Home Depot store in Pittsburg, Kansas. Sudden Oak Death is caused by Phytophthora ramorum, a water mold pathogen. The pathogen is also the cause of the Ramorum Leaf Blight, Ramorum Dieback and Phytophthora Canker Diseases. This pathogen is considered especially dangerous because it affects a wide variety of trees, shrubs and plants and there is no known cure.
- Tomato Brown Rugose Fruit Virus: Tomato Brown Rugose Fruit Virus is a newly discovered tobamovirus that has been found, but not yet established, in the United States. Its two main hosts are tomatoes and peppers, causing concern for growers of these plants. The virus is mechanically transmitted, meaning it can be transmitted from one plant to the next on contaminated tools and equipment, and workers handling many plants in a greenhouse.

It's important to note that agricultural infestations are a dynamic and complex issue, and the probability of infestation can vary from year to year. Farmers and agricultural professionals in Kansas Region L typically rely on agricultural extension services, research institutions, and government agencies to provide information, guidance, and resources for managing and mitigating infestation risks. Proactive pest monitoring and management practices are essential for minimizing the impact of infestations on crop yields and agricultural productivity in the region.

4.8.5 Projected Changes in Hazard Location, Intensity, Frequency, and Duration

Climate change can have several impacts on agricultural infestation in Kansas Region L, affecting the types and prevalence of pests and diseases that farmers face, and can include:

- Increased Pest Populations: Warmer temperatures and milder winters can promote the survival and reproduction of certain pests. In Kansas Region L, this may include insects like aphids, corn borers, and various types of beetles. Higher pest populations can lead to more frequent and severe infestations, potentially reducing crop yields.
- Altered Pest Behavior: Changes in temperature and climate patterns can influence the behavior and life cycles of pests. Some insects may emerge earlier in the season or have more generations per year, increasing the likelihood of damage to crops.
- Extended Growing Seasons: Longer growing seasons, a consequence of warming temperatures, can provide pests with additional time to feed on crops. This extension can lead to greater crop damage if effective pest management strategies are not in place.
- Shifts in Pest Distribution: Climate change can result in shifts in the geographic distribution of pests. Pests that were once uncommon in Kansas Region L may become more prevalent as temperatures become more suitable for their survival and reproduction.
- Altered Disease Dynamics: Climate change can influence the prevalence and distribution of plant diseases. Warmer and wetter conditions can create favorable environments for certain pathogens, such as fungi and bacteria, increasing the risk of disease outbreaks in crops.
- Increased Risk of Invasive Species: Changes in temperature and climate patterns can facilitate the introduction and establishment of invasive species. These species may outcompete native pests and diseases, posing new challenges for farmers.
- Water Stress: Climate change can result in more variable precipitation patterns, including more frequent droughts. Water-stressed crops may be more susceptible to pest infestations, as their natural defenses may be compromised.
- Pesticide Resistance: As pest populations adapt to changing conditions, they may develop resistance to pesticides more rapidly. This can reduce the effectiveness of chemical pest control methods.
- Impact on Beneficial Organisms: Climate change can also affect the populations and behaviors of beneficial organisms, such as natural predators and parasites of pests. Disruptions in these natural control mechanisms can exacerbate infestation problems.

4.8.6 Vulnerability and Impact

As illustrated by the following table from the USDA 2017 Census of Agriculture, Kansas Region L has a large agricultural base susceptible to disease and pest infestation:

Table 24: Kansas Region L County Level Agricultural Data

County	Year	Number of Farms	Land (Acres) in Farms	Market Value of Agricultural Products Sold
Johnson County	2017	2,004	327,163	$78,900,000
Leavenworth County	2017	1,868	295,834	$64,028,000
Wyandotte County	2017	1,935	294,152	$79,836,000
Change		**-69**	**-33,011**	**$936,000**

Source: USDA National Agricultural Statistics Service

Agricultural vulnerabilities can vary depending on the type of infestation, the crops or livestock affected, and instituted control measures, and include:

- Crop and Livestock Losses: One of the most immediate and significant vulnerabilities is the potential for crop and livestock losses. Pests, diseases, and invasive species can cause substantial damage to crops, resulting in reduced yields and economic losses.

- Financial Losses: Infestations can lead to increased production costs, including expenses for pest control measures, pesticides, and treatments. These added costs can strain the financial resources of farmers and agricultural businesses.
- Food Insecurity: Crop and livestock losses due to infestations can threaten food security by reducing the availability of food products.
- Economic Instability: Agricultural infestations can lead to economic instability in rural communities heavily dependent on farming. Reduced incomes for farmers can have cascading effects on local economies, impacting businesses and jobs in related industries.

Potential impacts on the agricultural community include:

- Reduced Crop Yields: One of the most direct impacts of infestation is a decrease in crop yields. Pests, diseases, and invasive species can damage or destroy plants, resulting in smaller harvests.
- Crop Quality Reduction: Infestations can also reduce the quality of crops by causing physical damage, deformities, or contamination. This can affect the marketability and value of agricultural products.
- Livestock Health Issues: Infestations can lead to health problems in livestock, including weight loss, reduced productivity, and increased susceptibility to diseases. Livestock infestations can also impact meat and dairy quality.
- Trade Barriers: Agricultural infestations can lead to trade restrictions and barriers. Countries may impose import bans or stringent regulations on products from regions affected by certain pests or diseases to prevent their spread.
- Increased Chemical Use: To combat infestations, farmers may resort to increased pesticide or chemical use. This can have adverse effects on the environment and human health, as well as contribute to pesticide resistance.
- Disruption of Farming Practices: Infestations can disrupt normal farming practices, leading to delays in planting or harvesting, increased labor requirements, and a need for specialized pest management.

Efforts to mitigate the vulnerabilities and impacts of infestations include integrated pest management strategies, research and monitoring, early detection systems, education and training for farmers, and sustainable farming practices. Addressing infestations requires a multi-faceted approach that considers economic, environmental, and food security factors.

In addition, an agricultural infestation can have significant impacts on the people in an impacted agricultural community, affecting their livelihoods, health, and well-being, and include:

- Reduced Income: For farmers and agricultural workers, the most immediate impact of infestations is often reduced income due to crop or livestock losses.
- Increased Health Risks: Infestations involving disease vectors can increase the risk of vector-borne diseases.
- Migration: In some cases, people may be forced to migrate in search of better economic opportunities due to infestation-related job losses.
- Increased Healthcare Costs: Infestations that result in human health issues can lead to increased healthcare costs for individuals and communities, putting additional financial strain on affected populations.
- Psychological Stress: Infestations can cause psychological stress and anxiety, particularly for farmers and agricultural workers who face uncertainty and financial pressures due to crop or livestock losses.

Agricultural infestations can have several environmental impacts, often interconnected with agricultural practices, and can include:

- Pesticide Use: To combat infestations, farmers may resort to increased pesticide use. The application of pesticides can result in chemical runoff into nearby water bodies, leading to water pollution. This pollution can harm aquatic ecosystems, affecting fish and other aquatic species.

- Loss of Biodiversity: Infestations can alter the composition of plant and animal species in agricultural areas. The introduction of invasive species or the suppression of native vegetation can lead to reduced biodiversity, impacting the health of ecosystems.
- Soil Erosion: In some cases, infestations can weaken or kill plants, leaving soil exposed to erosion by wind and water. Soil erosion can degrade soil quality, reduce agricultural productivity, and contribute to sedimentation in water bodies.
- Habitat Changes: Changes in land use and agricultural practices prompted by infestations can lead to alterations in habitat structure and availability. These changes can affect wildlife populations, including species that rely on specific habitats within agricultural landscapes.
- Water Quality Impacts: Infestations can indirectly affect water quality through their influence on land management. Runoff from infested areas, along with pesticide residues and sediment, can compromise water quality and lead to issues such as algal blooms and oxygen depletion in water bodies.
- Impact on Pollinators: Some agricultural pests and diseases can have detrimental effects on pollinators, including bees and butterflies. Reduced pollinator populations can harm the reproduction of flowering plants, including many agricultural crops.
- Secondary Effects on Non-Target Species: Pest control measures, such as the use of pesticides, may have unintended consequences by affecting non-target species, including beneficial insects, birds, and mammals.
- Impact on Natural Pest Control: Some infestations can disrupt natural pest control mechanisms by altering the populations and behaviors of beneficial organisms, such as predators and parasitoids. This can lead to increased reliance on chemical pest control.

Potentially Vulnerable Community Lifelines

Agricultural infestation, whether caused by pests, diseases, or invasive species, would likely have minimal impact on community lifelines, such as safety, health, energy, communication, transportation, and water systems. It is possible that reduced crop yields could contribute to short term food shortages, affecting the overall food security of a community. This can lead to higher temporary dependence on external sources for food, which would likely be unimpacted by an infestation event.

Consequence Analysis

This consequence analysis lists the potential impacts of a hazard on various elements of community and state infrastructure. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Kansas Region L residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

Table 25: Agricultural Infestation Consequence Analysis

Subject	Potential Impacts
Health and Safety of the Public	Infestations involving disease vectors can increase the risk of disease transmission to humans.
Health and Safety of Responders	Impact would be minimal as no first response effort is anticipated.
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary based on the situation. Agricultural infestation is not expected to require a plan activation.
Property, Facilities, and Infrastructure	Impact would be minimal.
Impact on Environment	Loss of biodiversity, habitat changes water quality degradation, loss of pollinators, and secondary effects on non-target species from increased pesticide usage.
Economic Conditions	Impacts to the economy will depend on the severity of the infestation. The potential for economic loss to the community could be if the infestation is hard to contain, eliminate, or reduce. Impact could be minimized from crop insurance payments.
Public Confidence in Governance	Confidence could be in question depending on timeliness and steps taken to warn the producers and public and treat/eradicate the infestation.

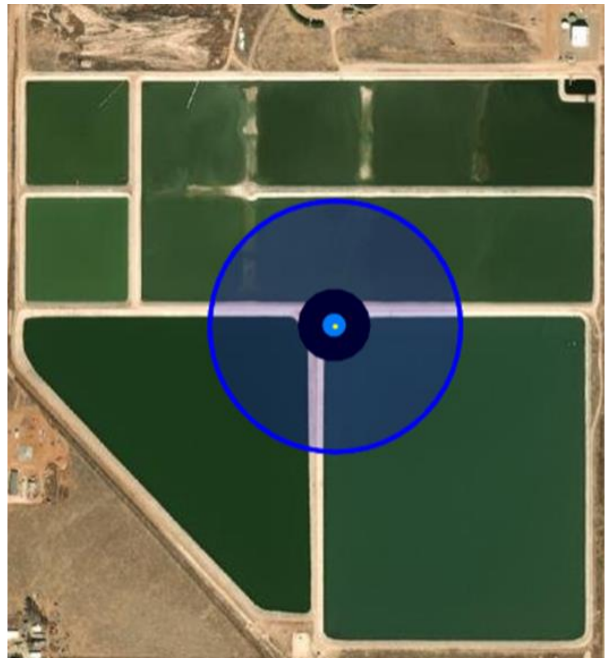
4.8.7 Jurisdictional Risk and Vulnerability

In Kansas, agricultural infestation is considered a state concern due to the heavily agricultural nature of the economy. Data assessing agricultural infestation risk is often presented at the county or state level, and not by individual jurisdictions. As such, a local jurisdiction risk assessment could not be completed. It is worth noting that no jurisdictional critical facilities or assets are vulnerable to agricultural infestation, and no future facility or asset losses are expected from this hazard.

4.9 Dam or Levee Failure

4.9.1 Hazard Description

A dam is a barrier across flowing water that obstructs, directs, or slows down the flow, often creating a reservoir, lake, or impoundment. Most dams have a section called a spillway or weir, over or through, which water flows, either intermittently or continuously. Dams commonly come in two types, embankment (the most common) and concrete (gravity, buttress, and arch), as well as sizes. They also serve a number of purposes and provide essential benefits, including drinking water, irrigation, hydropower, flood control, and recreation.



Large or small, dams have a powerful presence that is frequently overlooked until a failure occurs. Dams fail in two ways, a controlled spillway release done to prevent full failure, or the partial or complete collapse of the dam itself. In each instance, an overwhelming amount of water, and potentially debris, is released. Dam failures are rare, but when they do occur, they can cause loss of life and immense damage to property, critical infrastructure, and the environment.

Possible reasons for dam failure include but are not limited to:

- 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
- Terrorism

There are three classifications of dam failure, hydraulic, seepage, and structural. The following is an explanation of each these failure classifications:

- **Hydraulic:** This failure is a result of an uncontrolled flow of water over and around the dam structure as well as the erosive action on the dam and its foundation. The uncontrolled flow causing the failure is often classified as wave action, toe erosion, or gullying. Earthen dams are particularly susceptible to hydraulic failure because earthen materials erode more quickly than other materials, such as concrete and steel. This type of failure constitutes approximately 40% of all dam failures.
- **Seepage:** Seepage is the velocity of an amount of water controlled to prevent failure. This occurs when the seepage occurs through the structure to its foundation, where it begins to erode within. This type of failure accounts for approximately 4% of all dam failures.
- **Structural:** A failure that involves the rupture of the dam or the foundation by water movement, earthquake, or sabotage. When weak materials construct dams (large, earthen dams) are the primary cause of this failure. Structural failure occurs with approximately 30% of dam failures.

A levee is a man-made structure built to control or prevent the overflow of water from rivers, lakes, or other bodies of water. Levees are typically earthen embankments or walls constructed along the banks of water bodies to provide protection against flooding. They serve as barriers to keep water within its natural or artificial channels, protecting adjacent land areas from inundation. Levees typically have a sloping side that faces the water (riverside) and a steeper side facing away from the water (landside). They may also include features like berms, floodwalls, and floodgates to enhance their effectiveness in flood control. Levee failures can occur in various ways, and they are typically classified into different types based on the mechanism or cause of the failure, and include:

- **Overtopping:** Occurs when floodwaters rise above the crest or top of the levee. This can happen when the floodwater volume exceeds the levee's design capacity or when the levee has been poorly maintained or constructed. Overtopping can erode the levee's surface and eventually lead to breaches.
- **Erosion:** Occurs when the flowing water erodes the soil or materials comprising the levee. Erosion can result from the force of the water or from seepage of water through the levee's foundation, which can carry soil particles away and weaken the structure.
- **Seepage:** Occurs when water infiltrates the levee through the soil or the levee's foundation. Over time, seeping water can weaken the structural integrity of the levee. Piping, a type of seepage failure, is particularly concerning, as it involves the formation of tunnels or pipes within the levee through which water flows, further eroding the structure.
- **Slumping or Landslide:** Occurs when a portion of the levee's embankment or slope collapses. This can result from saturated soils, unstable materials, or rapid changes in water levels. Slumping or landslides can lead to breaches in the levee.
- **Breach:** A complete failure of the levee, resulting in a significant opening or hole through which floodwaters can freely flow into protected areas. Breaches can occur due to any combination of failure mechanisms, and they can be sudden and catastrophic.
- **Design or Construction Errors:** Levee failures can also occur due to inadequate height or width, poor materials, or improper compaction during construction. These errors may not become apparent until the levee is put to the test by a flood event.

4.9.2 Location & Extent

The KDA Division of Water Resources (KDA-DWR) is responsible for the review and approval of plans for constructing new dams and for modifying existing dams, ensuring quality control during construction, and monitoring dams that, if they failed, could cause loss of life, or interrupt public utilities or services. The KDA-DWR regulates the construction, operation, and maintenance of all dams or other water obstructions, with the exception of federal reservoirs.

The Obstructions in Streams Act (K.S.A 82a-303b) requires owners of high hazard (class C) and significant hazard dams (class B) dams to have a qualified engineer conduct periodic dam inspections. For high hazard dams, the inspection must be done every three years. For significant hazard dams, an inspection must be done every five years. Dam Hazard Classifications are detailed in the following table:

Table 26: Dam Hazard Potential Classification

Hazard Potential	Class	Definition	Inspection Timeline	Number of Regional Dams in Category
High	C	Failure or mis-operation will result in probable loss of life.	Three Years	44
Significant	B	Failure or mis-operation results in no probable loss of life but can cause major economic loss, disruption of lifeline facilities or impact the public's health, safety, or welfare.	Five Years	22
Low	A	Failure or mis-operation results in no probable loss of human life and low economic losses.	Not inspected, downstream conditions are reassessed to determine if conditions have changed to necessitate reclassification	571

Source: KDA-DWR

The following table details dams by county by hazard potential:

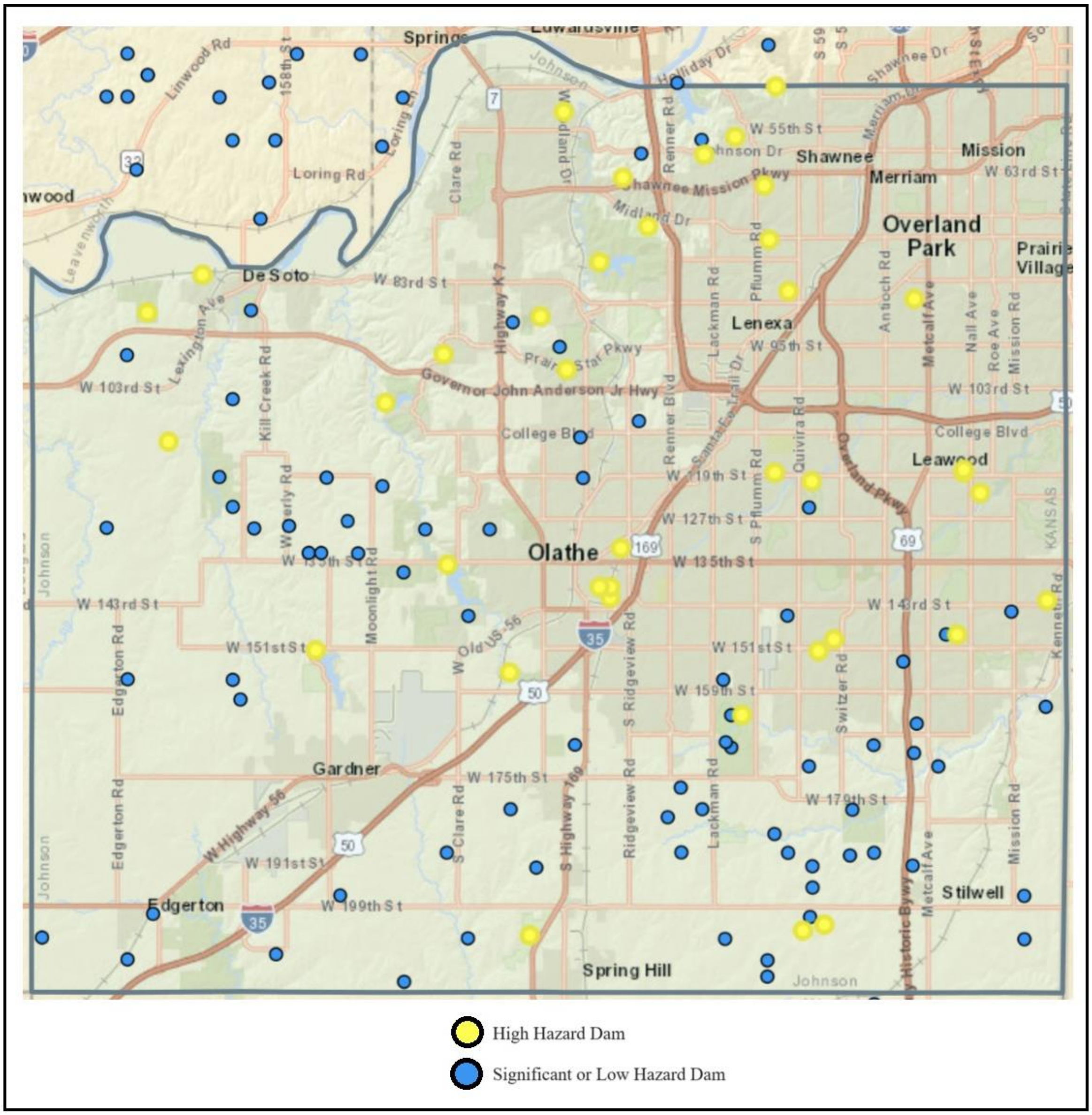
Table 27: Kansas Region L Significant and High Hazard Dams by County

County	Low	Significant	High
Johnson	75	8	40
Leavenworth	163	4	11
Wyandotte	32	4	15

Source: KDA-DWR

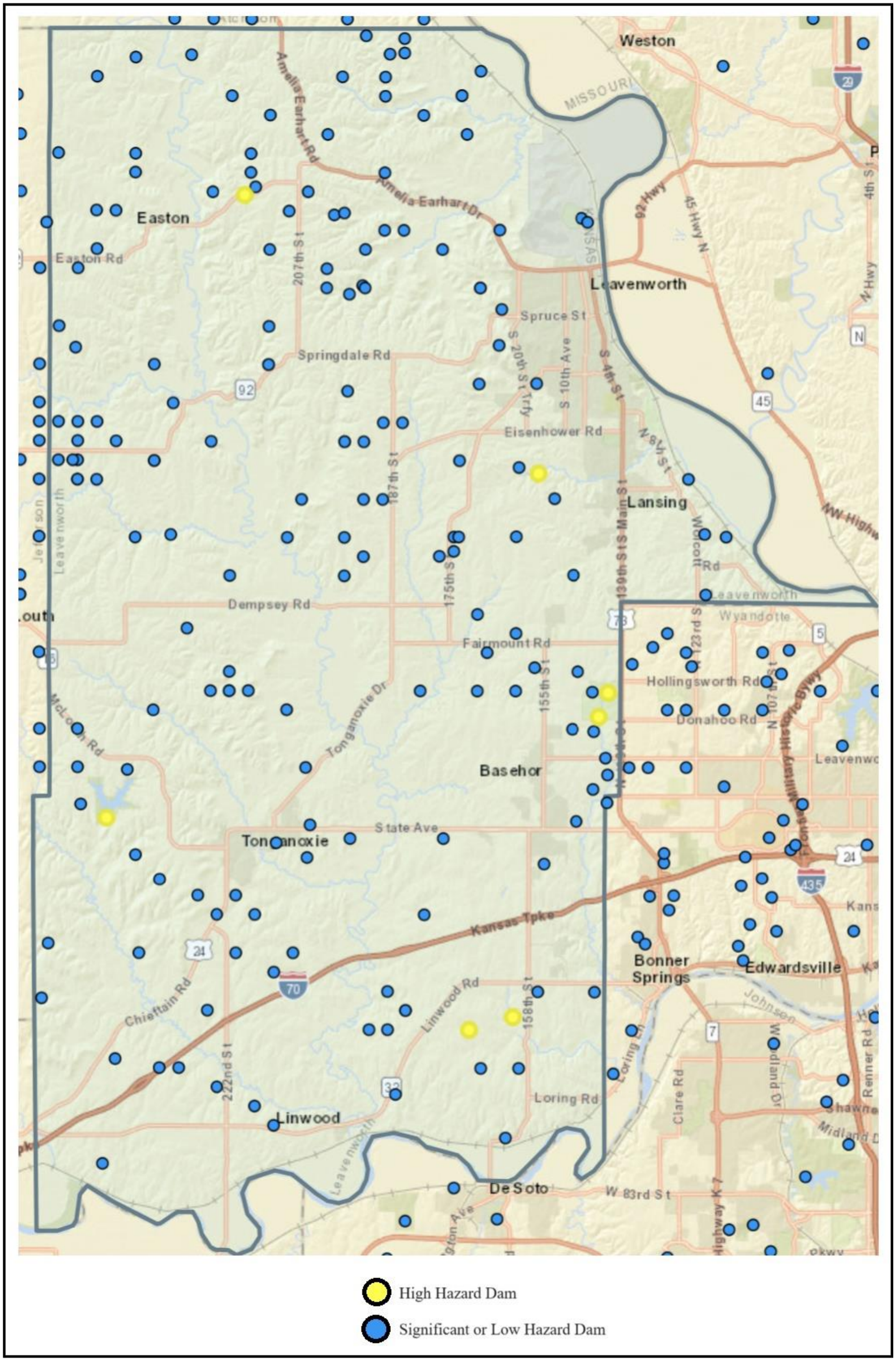
The following maps, from the National Inventory of Dams, indicates the location of dams within Kansas Region L:

Map 23: Johnson County Dams



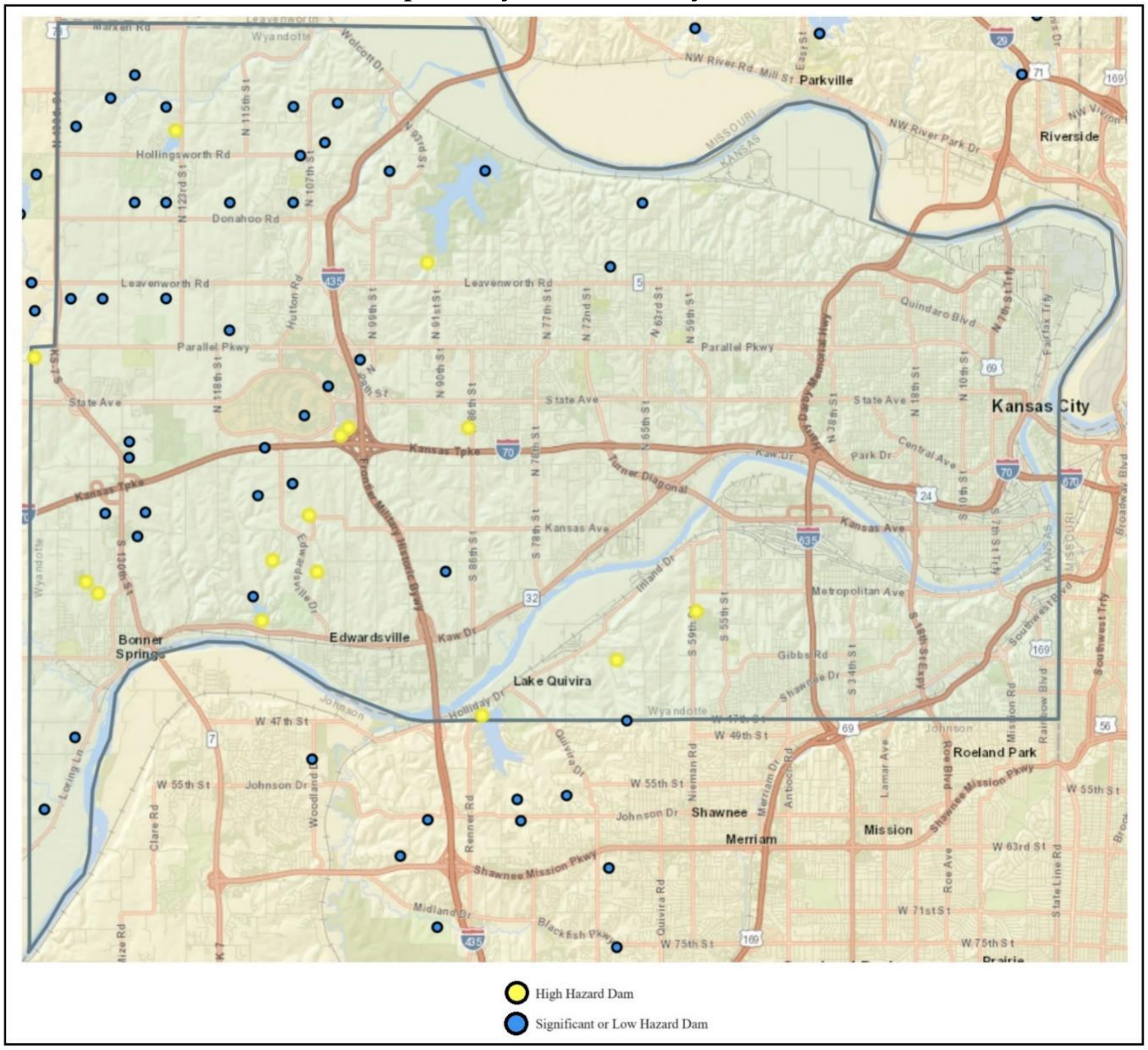
Source: National Inventory of Dams

Map 24: Leavenworth County Dams



Source: National Inventory of Dams

Map 25: Wyandotte County Dams



Source: National Inventory of Dams

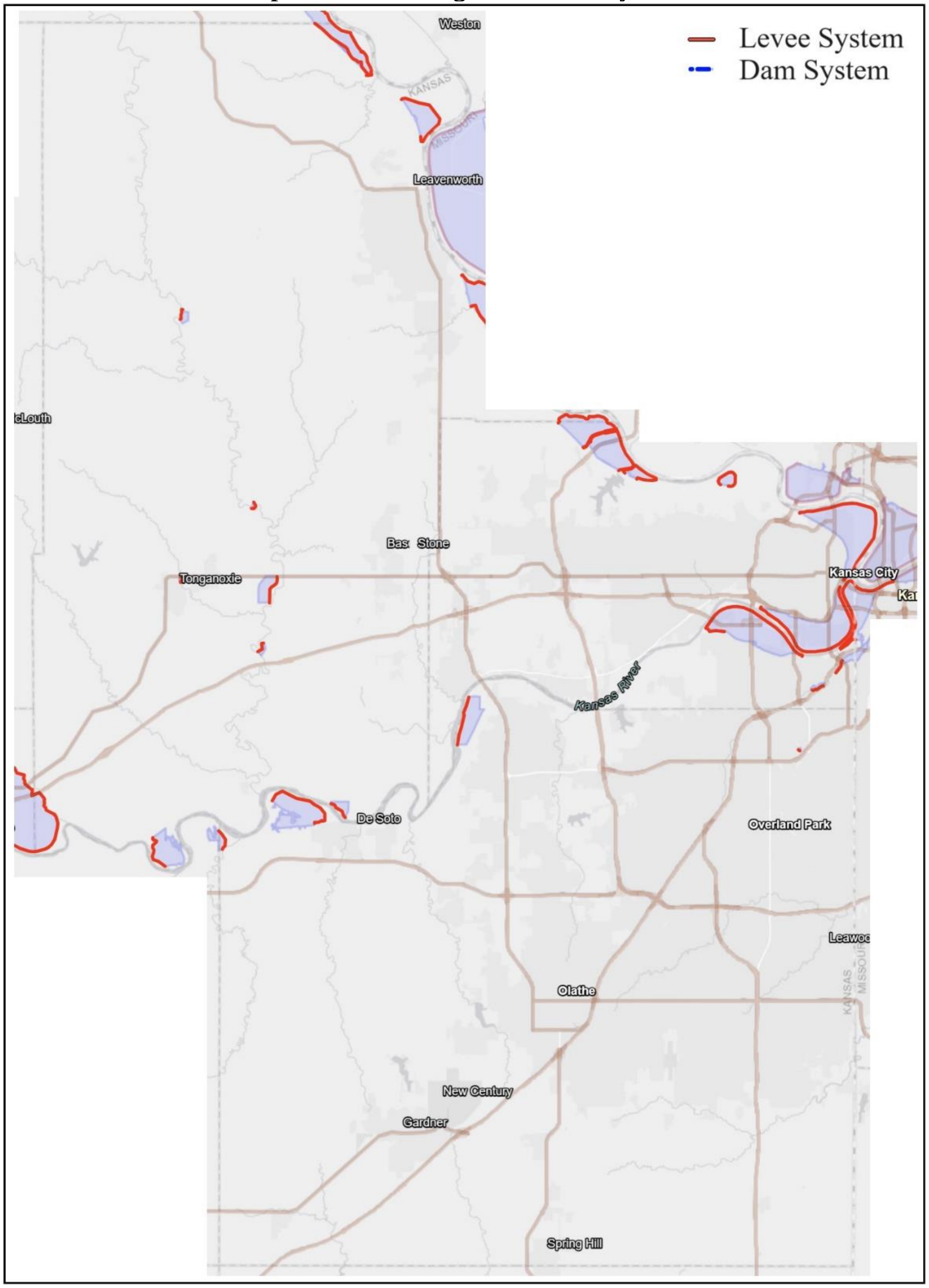
Regulation of levees in the United States involves multiple entities at different levels of government: These entities include:

- **Local Levee Districts:** In many cases, local levee districts or authorities are responsible for the construction, maintenance, and operation of levees. These districts are often formed by communities or landowners in areas prone to flooding, and they assess taxes or fees to fund levee projects.
- **Local Governments:** Local governments, such as city or county governments, may also have roles in regulating and overseeing levees. They may work in coordination with state and federal agencies to ensure that levees comply with applicable regulations and standards.
- **State Agencies**: State agencies play a role in regulating and overseeing levees within their jurisdiction. They may establish standards, guidelines, and regulations for levee construction, maintenance, and inspection. State agencies may also provide technical assistance to local levee districts.
- **Federal Agencies:** The U.S. Army Corps of Engineers (USACE) is a major federal agency involved in levee regulation. The USACE is responsible for evaluating and accrediting levees through the National Levee Safety Program. FEMA also plays a role in floodplain management and mapping. Levees that are accredited by the USACE may influence floodplain mapping and impact flood insurance requirements for communities.

The regulation of levees involves a combination of engineering standards, safety evaluations, and adherence to local, state, and federal regulations. Levee safety is a critical aspect of flood risk management, and ongoing inspection, maintenance, and potential upgrades are essential to their effectiveness.

The following map, from the USACE National Levee Database, details the location of major levee systems in Kansas Region L:

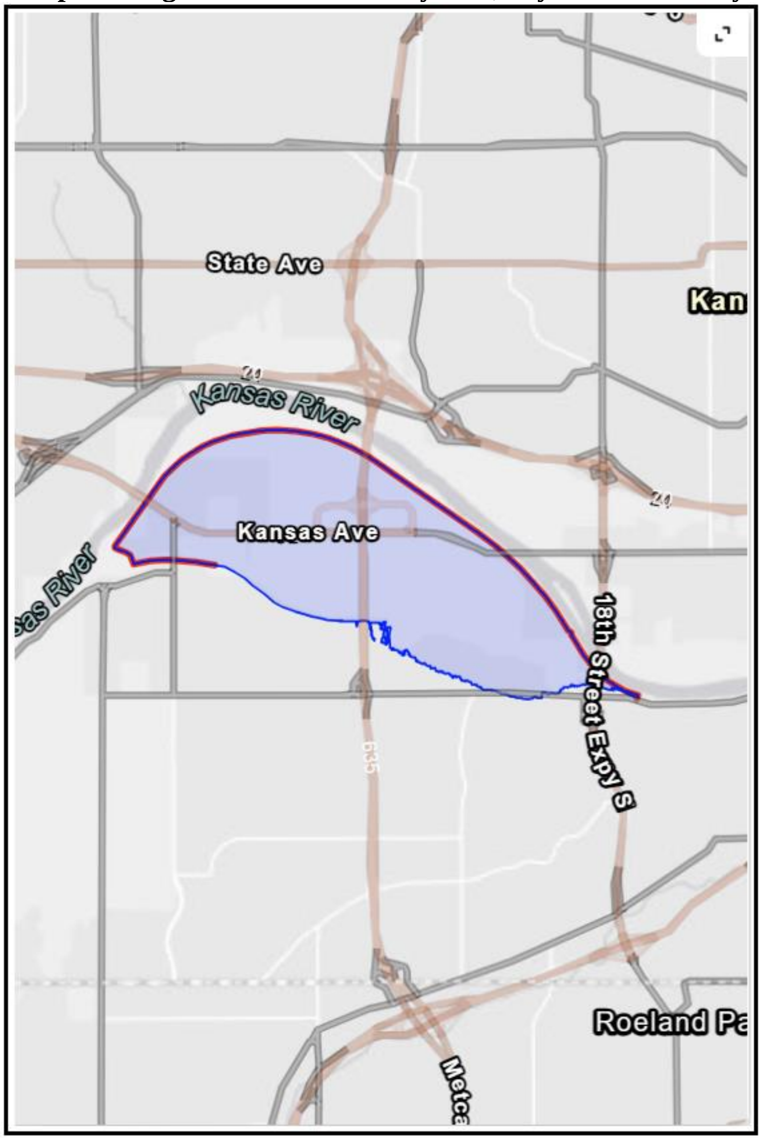
Map 26: Kansas Region L Levee Systems



Source: National Levee Database

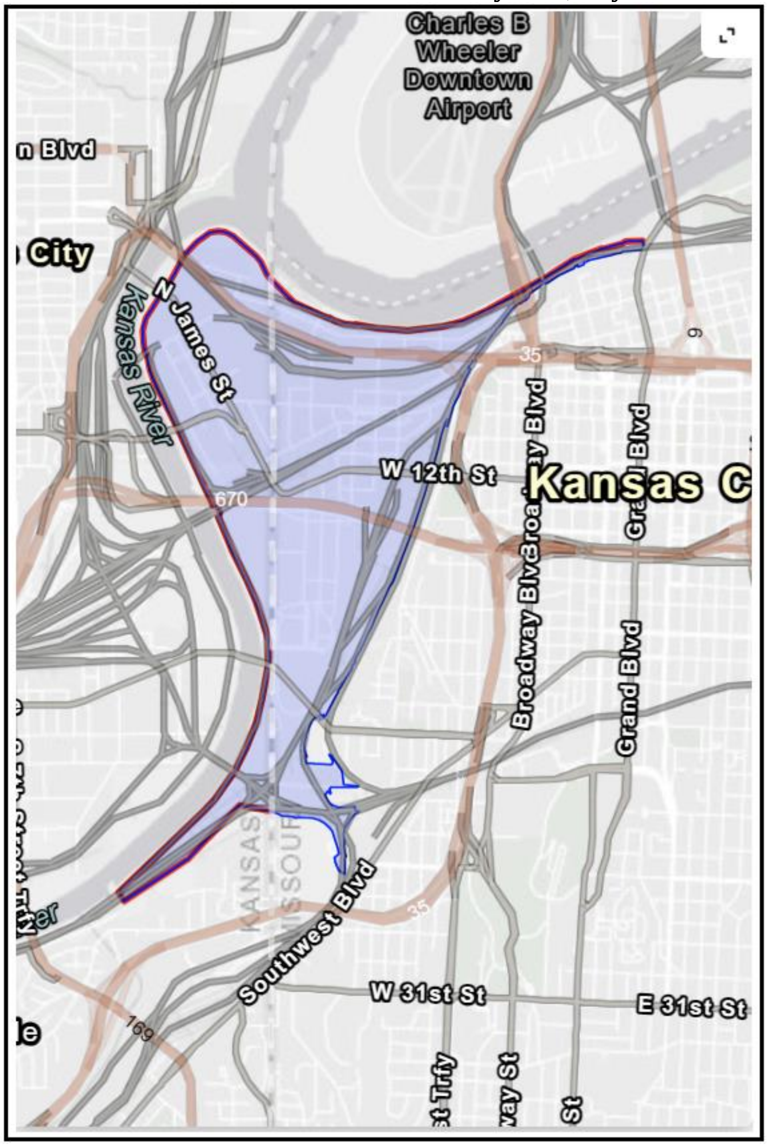
Of particular concern are the levee systems around Kansas City in Wyandotte County. The following map details the locations of theses levees, and areas protected by these levees:

Map 27: Argentine Unit Levee System, Wyandotte County



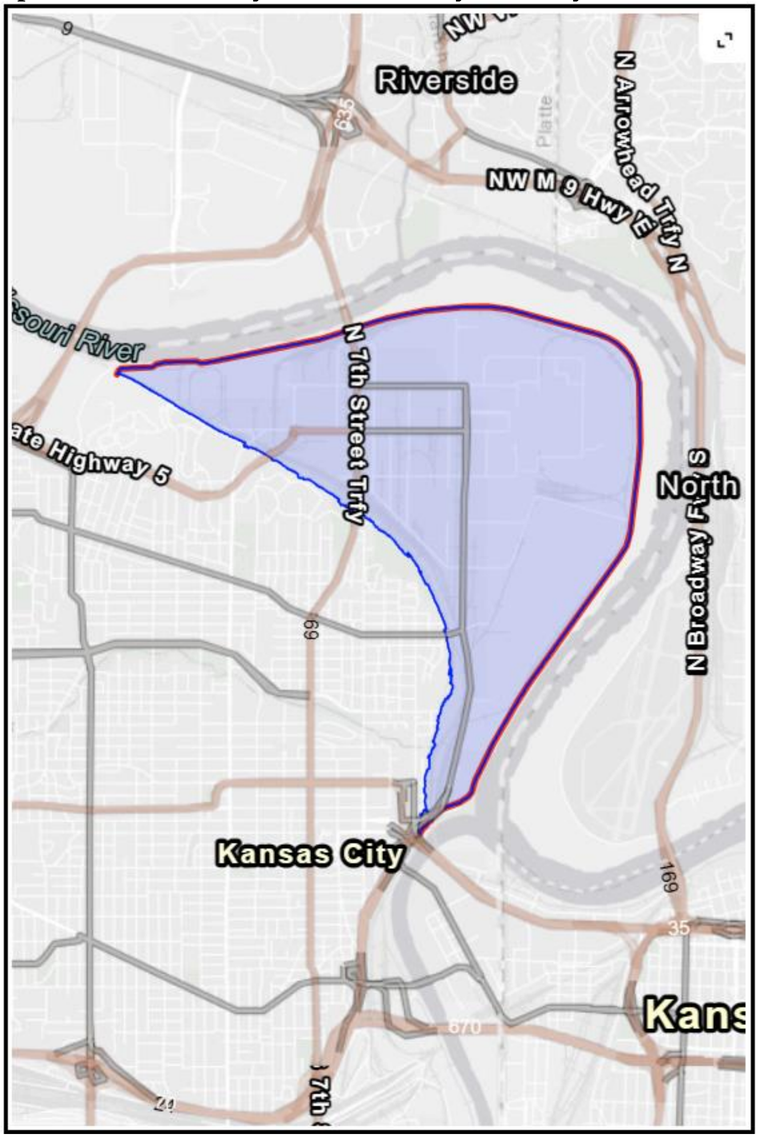
Source: State of Kansas

Map 28: Central Industrial District Levee System, Wyandotte County



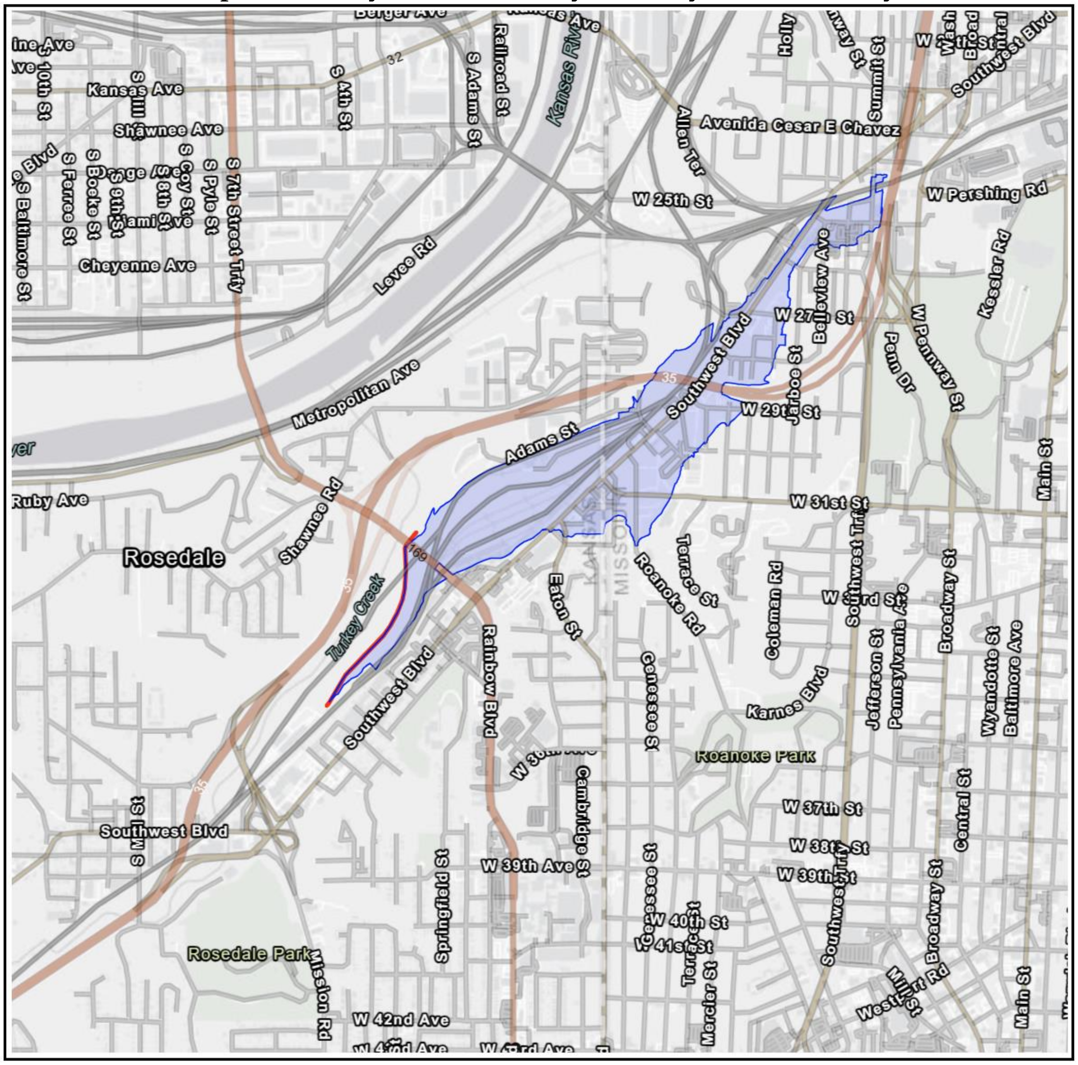
Source: State of Kansas

Map 29: Fairfax Jersey Creek Levee System, Wyandotte County



Source: USACE National Levee Database

Map 30: Turkey Creek Levee System, Wyandotte County



Source: USACE National Levee Database

As a subset of data, the following table details known information concerning levees within Kansas Region L identified as providing protection to a populations or structures:

Table 28: Kansas Region L Levee Systems Protecting People and/or Properties

County	Nearest Jurisdiction	Name	Waterway	Levee Miles
Johnson	Johnson County	Johnson Kansas River 2	Kansas River	1.88
	Shawnee	LJF-0228	Kansas River	3.14
	Mission	Rock Creek Stream Restoration Floodwall	Not identified	0.64
Leavenworth	Leavenworth County	Fall Leaf Drainage District	Kansas River	0.80
	Leavenworth (city)	Ft. Leavenworth, Kansas	Missouri River	1.06
	Leavenworth County	Grape Bollin-Schwartz levee	Missouri River	0.38
	Leavenworth County, Lansing, Leavenworth (city)	Kansas Department of Corrections	Missouri River	9.44
	Tonganoxie	LLV-0055	Tonganoxie Creek	0.30
	DeSoto	LLV-0125, LJOO-0002, LLV-0003	Kansas River	0.80
Wyandotte	Kansas City	Wolcott Drainage District Section 1	Missouri River	4.33
	Kansas City, KS	Argentine Unit	Kansas River	5.21
	Kansas City, KS	Armourdale Unit	Kansas River	5.07
	Kansas City, KS	Fairfax-Jersey Creek	Missouri River	5.25

Table 28: Kansas Region L Levee Systems Protecting People and/or Properties

County	Nearest Jurisdiction	Name	Waterway	Levee Miles
	Kansas City, KS	Turkey Creek LB Levee and Restored Channel	Turkey Creek	0.50
	Kansas City, KS	Turkey Creek RB Levee, Tunnel and Walled Channel	Turkey Creek	0.54
	Jackson County	CID, Central Industrial District	Kansas River, Missouri River	1.84

Source: National Levee Database

4.9.3 Previous Occurrences

Data from the National Performance of Dams Program at Stanford University indicates Kansas Region L has had reported dam incidents as detailed below:

Table 29: Kansas Region L Incidents

County	Dam Name	Incident Type	Failure	Incident Date	Deaths
Leavenworth	Sarcoxie Lake Dam	Seepage. Headcut in the emergency spillway.	No	7/25/2001	None Reported
Leavenworth	Johnson/ Tadlock Dam	Piping, seepage	No	4/5/2001	None Reported
Wyandotte	Canaan Lake	Seepage	No	3/6/2002	None Reported
Wyandotte	Canaan Lake	Seepage, piping	No	5/14/1997	None Reported

Source: National Performance of Dams Program

The following details notable or reported levee failures in Kansas Region L in the past 20 years.

- **2019 Flood Levee System Failures:** Eleven levees failed in March of 2019 during catastrophic flooding along the Missouri River, including the Grape Bollin Schwartz in Leavenworth County.
- **2011 Levee System Failures:** The USACE reported that every non-federal levee from Rulo to Wolcott in the State of Kansas was either overtopped or breached as a result of a large flood. Specifically, the following levees along the Missouri River and tributaries in Leavenworth County were breached:
  - Grape Bollin-Schwartz levee
  - Sherman Airfield Levee (federal levee): Water reached the hangars which had been evacuated.
  - Ft. Leavenworth levee
  - Kansas Department of Corrections Levee
- **2009 Wolcott Levee Section 1 and Wolcott Levee Section 2 Failure:** In 2009, these two non-federal levees in Leavenworth and Wyandotte counties were damaged as a result of large floods.
- **1993 Levee System Failures:** During the spring floods of 1993, which covered nine Midwest states, nine of the 15 units in the federally constructed Missouri River Levee System and virtually all the nonfederal farm levees in the district were overtopped.

4.9.4 Probability of Future Incidents

Despite the infrequent historical occurrences of dam failure resulting in an uncontrolled release of the reservoir, there remains a significant concern due to the large number of significant and high hazard dams throughout the region. The probability of dam failure events is not easily measured, but may aligned with:

- The probability of future flood events
- Preventative measure taken by dam owners and operators, maintenance and repair
- Frequent condition inspections
- Proper operating procedures

KDA-DWR conducts routine monitoring and inspection of dams within the state on the previously identified schedule, with priority placed on those dams which pose the greatest potential threat. However, to fully determine the probability of a future event, a full engineering inspection would need to be completed on each dam, something beyond the scope of this plan.

Dams undergoing repair and/or reconstruction are required to be designed to pass at least the 1%-annual-chance rainfall event with one foot of freeboard. The most critical and hazardous dams are required to meet a spillway design standard much higher than passing the runoff from a 1%-annual-chance rainfall event. Although not all the dams have been shown to withstand the 1%-annual-chance rainfall event, most of the dams meet this standard due to original design requirements or recent spillway upgrades.

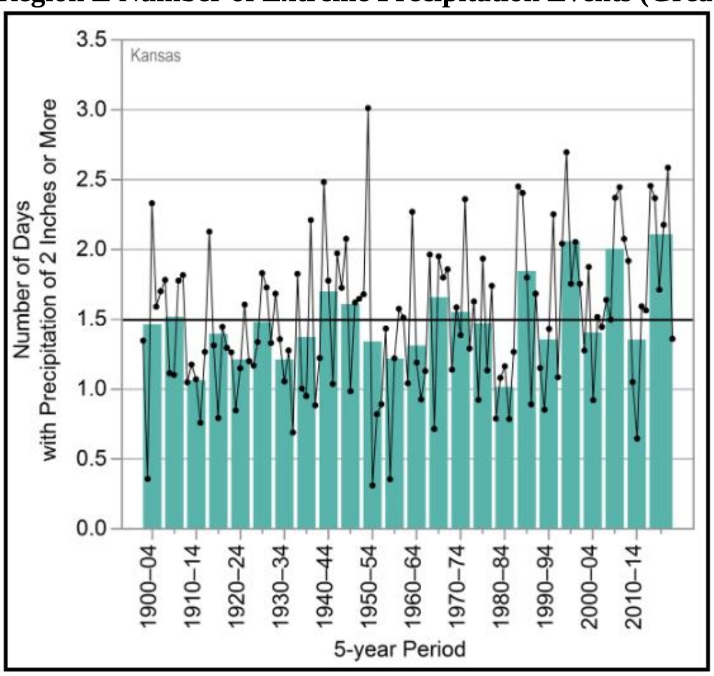
4.9.5 Projected Changes in Hazard Location, Intensity, Frequency, and Duration

The 2018 National Climate Assessment report indicates that much of the water infrastructure in the central portion of the United States, including dams, is nearing the end of its planned life expectancy. As indicated in the report: "Aging and deteriorating dams and levees also represent an increasing hazard when exposed to extreme or, in some cases, even moderate rainfall. Several recent heavy rainfall events have led to dam, levee, or critical infrastructure failures, including the Oroville emergency spillway in California in 2017, Missouri River levees in 2017, 50 dams in South Carolina in October 2015 and 25 more dams in the state in October 2016, and New Orleans levees in 2005 and 2015. The national exposure to this risk has not yet been fully assessed."

A potential outcome of changing climate in Kansas Region L is an increase in extreme precipitation events which may lead to more severe floods and a greater risk of dam failure. Additional projected greater periods of drought conditions and high heat may result in ground cracking, a reduction of soil strength, erosion, and subsidence in earthen dams.

The NOAA NCEI State Climate Summary 2022 for Kansas suggests that the number of extreme precipitation events are projected to increase. These extreme events will likely place increased stress on dams within the State.

Chart 14: Kansas Region L Number of Extreme Precipitation Events (Greater Than 2 Inches)



Source: NOAA NCEI State Climate Summary 2022 for Kansas

At present there is no comprehensive assessment of the climate-related vulnerability and risks to existing dams. Additionally, there are no common design standards concerning the repair or modification of existing dams nor for the designed and construction of new dams operated in the face of changing climate risk.

Land use trends can significantly impact a community's vulnerability to dam or levee failure. The way land is developed and used in proximity to dams and levees can influence the potential consequences of failure, affecting the safety of residents and infrastructure.

Development in flood-prone areas or behind levees without adequate consideration for flood risk increases vulnerability. Increased urbanization and population density near dams and levees can intensify the consequences of failure. Higher population density means more people and assets are at risk, leading to greater potential for loss of life and property damage.

The location of critical infrastructure, such as hospitals, schools, and emergency services, in close proximity to dams or levees can heighten vulnerability. Infrastructure assets may be at risk of damage or disruption, impacting the community's ability to respond effectively to a failure.

4.9.5 Vulnerability and Impact

The National Inventory of Dams documents all known dams in Kansas. The U.S. Army Corps of Engineers (USACE) is responsible for maintaining the National Inventory of Dams and works in close collaboration with federal and State of Kansas dam regulating agencies to obtain accurate and complete information about dams in the database. The database contains information about a dam’s location and condition assessment. The condition assessment describes the condition of the dam based on available information, with the following ratings given:

- **Satisfactory:** No existing or potential dam safety deficiencies are recognized. Acceptable performance is expected under all loading conditions (static, hydrologic, seismic) in accordance with the minimum applicable state or federal regulatory criteria or tolerable risk guidelines.
- **Fair:** No existing dam safety deficiencies are recognized for normal operating conditions. Rare or extreme hydrologic and/or seismic events may result in a dam safety deficiency. Risk may be in the range to take further action.
- **Poor:** A dam safety deficiency is recognized for normal operating conditions which may realistically occur. Remedial action is necessary. Poor may also be used when uncertainties exist as to critical analysis parameters which identify a potential dam safety deficiency. Investigations and studies are necessary.
- **Unsatisfactory**: A dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution.
- **Not Rated:** The dam has not been inspected, is not under state or federal jurisdiction, or has been inspected but, for whatever reason, has not been rated.
- **Not Available:** Dams for which the condition assessment is restricted to approved government users.

The following table details the nearest jurisdiction, dam number, dam names, and condition assessment of all high hazard dams in Region L.

Table 30: Kansas Region L High Hazard Dams

County	Dam Number	Dam Name	Nearest Jurisdiction	Condition Assessment
Johnson	KS04168	North Frisco Dam	Olathe	Satisfactory
	KS01183	Oxford Pointe	Leawood	Satisfactory
	KS01192	Tomahawk Hills Cc Dam	Shawnee	Fair
	KS04169	South Frisco	Olathe	Fair
	KS09554	Nottingham Lake	No Information	Fair
	KS07810	Osborn Pond	No Information	Fair
	KS02490	(New) Olathe Lake	Bonner Springs	Satisfactory
	KS02488	Gardner Lake Dam	Desoto	Fair
	KS07294	Heritage Park Dam	No Information	Satisfactory
	KS02489	Cedar Lake (Old Olathe Lake)	Bonner Springs	Not Rated
	KS09270	Lake Lenexa	Lenexa	Satisfactory
	KS01171	Lexington Lake Park	De Soto	Fair

Table 30: Kansas Region L High Hazard Dams

County	Dam Number	Dam Name	Nearest Jurisdiction	Condition Assessment
	KS01169	Seven Hills Dam	Shawnee	Satisfactory
	KS04171	Lionsgate Dam	Kenneth	Satisfactory
	KS02491	Spring Hill Water Supply Dam	Paola	Satisfactory
	KS03905	Lakeview Estates	Shawnee	Satisfactory
	KS02547	Shawnee Mission Park Dam	Lenexa/Shawnee	Fair
	KS01167	Willow Lake	Martin City	Fair
	KS09269	Mize Lake	Lenexa	Fair
	KS01165	Unknown	Kansas City	Fair
	KS01184	Bluestem Dam (	Leawood	Fair
	KS03904	Black Swan Lake Dam	Shawnee	Satisfactory
	KS07300	Shadow Lake Dam	Kansas City	Fair
	KS09336	East Rodrock Lake	Overland Park	Satisfactory
	KS09355	Enchanted Lake	Shawnee	Satisfactory
	KS07295	Oak Tree Meadows Dam	Kansas City	Not Rated
	KS09010	Dam 1 (Falcon Ridge Golf Course)	Lenexa	Not Rated
	KS00106	Harding Dam	De Soto	Not Rated
	KS07293	South Lake Park Dam	Overland Park	Satisfactory
	KS09031	Kc Roadway Parkland South	Olathe	Fair
	KS03906	Walden Pond Dam	Shawnee	Fair
	KS09034	Unknown	Lenexa	Fair
	KS07297	Hawthorne Valley Lake Dam	Kansas City	Satisfactory
	KS09189	Sprint Campus Lake 2 / 3	Overland Park	Satisfactory
	KS09188	Sprint Campus Lake 1	Overland Park	Not Rated
	KS04495	Waterworks Dam	Olathe	Satisfactory
	KS01166	Carol Maurer	Shawnee	Fair
	KS00016	Sunflower Pond B Dam	Desoto	Fair
Leavenworth	KS00879	Leavenworth State Lake Dam	Linwood	Fair
	KS02840	Wagner Dam	Easton	Fair
	KS01248	Bear Lake	Mahon	Satisfactory
	KS04073	Runnebaum Dam	Lansing	Fair
	KS09074	Bing's Lake	Bonner Springs	Fair
	KS09075	Lake Hope	Bonner Springs	Poor
	KS01251	Johnson/Tadlock Dam	Bonner Springs	Fair
Wyandotte	KS00096	The Woodlands	Kansas City	Satisfactory
	KS04499	Fun Valley Dam	Bonner Springs	Poor
	KS02556	Pierson Park Dam	Kansas City, KS	Satisfactory
	KS02987	Piper Lake A.K.A. Canaan Lake	Kansas City, KS	Not Rated
	KS09013	International Speedway	Kansas City, KS	Poor
	KS04503	Lugar Dam	Bonner Springs	Satisfactory
	KS02974	Lake Quivira Dam	Kansas City, KS	Satisfactory
	KS09014	International Speedway	Groves Center	Fair
	KS02672	Wallace Dam	Groves Center	Fair
	KS02995	Martiny Dam	Kansas City, KS	Fair
	KS02689	Cudney Dam	Kansas City, KS	Fair
	KS02989	Dam No 1	Edwardsville	Satisfactory
	KS09077	Metropolitan Avenue	Bonner Springs	Fair
	KS04502	Castle Parks Dam	Edwardsville	Satisfactory
	KS02990	Name Unavailable	Lake Of the Forest	Not Rated

Source: State of Kansas and National Inventory of Dams

Additionally, there are two federally operated high hazard dams within Kansas Region L. The following table details known information concerning the condition and risk assessment for all federally operated dams:

Table 31: Kansas Region L Federally Operated Dams

County	Jurisdiction	Dam Number	Dam Name	Risk Assessment
Leavenworth	Leavenworth	KS04076	Merritt Lake	Low
Leavenworth	Leavenworth	KS04077	Smith Lake	Low

Source: National Inventory of Dams

For the NFIP, FEMA will only recognize a levee system in its flood risk mapping effort that meets 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

Additionally, each levee is assigned a risk classification to aid in hazard analysis. The following table details these classifications and suggested actions to be taken:

Table 32: Levee Risk Classification Rating Definitions

Class	Risk Characteristics	Suggested Actions
Very High	Likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in very high risk.	Based on risk drivers, take immediate action to implement interim risk reduction measures. Increase frequency of levee monitoring, communicate risk characteristics to the community within an expedited timeframe; verify emergency plans and flood inundation maps are current; ensure community is aware of flood warning systems and evacuation procedures; and recommend purchase of flood insurance. Support risk reduction actions as very high priority.
High	Likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in high risk.	Based on risk drivers, implement interim risk reduction measures. Increase frequency of levee monitoring; communicate risk characteristics to the community within an expedited timeframe; verify emergency plans and flood inundation maps are current; ensure community is aware of flood warning and evacuation procedures; and recommend purchase of flood insurance. Support risk reduction actions as high priority.
Moderate	Likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in moderate risk.	Based on risk drivers, implement interim risk reduction measures as appropriate. Verify risk information is current and implement routine monitoring program; assure operations and maintenance is up to date; communicate risk characteristics to the community in a timely manner; verify emergency plans and flood inundation maps are current; ensure community is aware of flood warning and evacuation procedures; and recommend purchase of flood insurance. Support risk reduction actions as a priority.
Low	Likelihood of inundation due to breach and/or system component malfunction in combination with loss of life,	Verify risk information is current and implement routine monitoring program and interim risk reduction measures if appropriate; assure operations and maintenance is up to date; communicate risk characteristics to the community as appropriate; verify emergency plans

Table 32: Levee Risk Classification Rating Definitions

Class	Risk Characteristics	Suggested Actions
	economic, or environmental consequences results in low risk.	and flood inundation maps are current; ensure community is aware of flood warning and evacuation procedures; and recommend purchase of flood insurance. Support risk reduction actions to further reduce risk to as low as practicable.
Very Low	Likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in very low risk.	Continue to implement routine levee monitoring program, including operation and maintenance, inspections, and monitoring of risk. Communicate risk characteristics to the community as appropriate; verify emergency plans and flood inundation maps are current; ensure community is aware of flood warning and evacuation procedures; and recommend purchase of flood insurance.
No Verdict	-	Not enough information is available to assign Risk.

Source: USACE

The following table details, by county and jurisdiction, information from the USACE concerning levee failure risk:

Table 33: Kansas Region L Levee Systems Protecting People and/or Properties

County	Jurisdiction	Name	People at Risk	Structures at Risk	Property Value
Johnson	Johnson County	Johnson Kansas River 2	13	7	$5,000,000
	Shawnee	LJF-0228	27	14	$10,000,000
	Mission	Rock Creek Stream Restoration Floodwall	30	3	$10,000,000
Leavenworth	Leavenworth County	Fall Leaf Drainage District	2	10	$200,000
	Leavenworth (city)	Ft. Leavenworth, Kansas	0	5	$20,000,000
	Leavenworth County	Grape Bollin-Schwartz levee	13	7	$200,000
	Leavenworth County, Lansing, Leavenworth (city)	Kansas Department of Corrections	1	5	$400,000
	Leavenworth County	LLV-0005	2	1	$400,000
	Tonganoxie	LLV-0055	7	4	$10,000,000
Wyandotte	DeSoto	LLV-0125, LJOO-0002, LLV-0003	4	1	$200,000
	Kansas City	Wolcott Drainage District Section 1	1	10	$1,000,000
	Kansas City	Argentine Unit	10,700	723	$4,000,000,000
	Kansas City	Armourdale Unit	6,700	1,468	$2,000,000,000
	Kansas City	Fairfax-Jersey Creek	9,487	200	$1,000,000,000
	Kansas City	Turkey Creek LB Levee and Restored Channel	221	24	$40,000,000
	Kansas Cit	Turkey Creek RB Levee, Tunnel and Walled Channel	1,179	133	$500,000,000
	Kansas City	CID, Central Industrial District	15,858	341	$2,000,000,000
	Kansas City	Nearman Creek Power Statin Levee	0	2	$50,000,000

Source: National Levee Database

The following table offers a summary of this data for each Kansas Region L county:

Table 34: Kansas Region L Levee Failure Population and Structure Risk

County	People	Structures	Value
Johnson	70	24	$25,000,000
Leavenworth	25	32	$31,200
Wyandotte	44,150	2,902	$9,591,200,000

Source: USACE

A dam or levee failure event can have devastating and wide-ranging impacts on both people and communities. The severity of these impacts depends on the volume of water released and the location of the dam in relation to communities, and may include:

- Loss of Life: The sudden release of a large volume of water can result in flooding downstream, leading to drowning and casualties. The loss of life can be particularly high if a dam failure occurs in highly populated areas or when people are unable to evacuate in time.
- Long Term Displacement: People living downstream may be forced to evacuate their homes leading to displacement and requiring long-term shelter assistance.
- Economic Consequences: Both property damage and the disruption of transportation and utilities could affect local economies.
- Psychological Trauma: Survivors of dam failure events may experience psychological trauma, including post-traumatic stress disorder, anxiety, and depression. Witnessing the loss of lives and property can have long-lasting emotional effects on individuals and communities.

The environmental impact of dam or levee failures depends on the circumstances of the failure. After a failure occurs, the resulting flooding and moving debris can affect wildlife and natural habitats. The spread of pollution and hazardous materials can have negative impacts on the environment. Ecosystems and natural habitats may be destroyed, causing the migration or death of local wildlife. Depending on the timing and location of the failure, it can result in rapid changes in water temperature downstream. This can be harmful to temperature-sensitive aquatic species and ecosystems. Dam failures can disrupt natural ecological processes, such as nutrient cycling, sediment transport, and flow regimes. These disruptions can have cascading effects on ecosystems.

Any jurisdictional facility within an identified inundation zone of a dam or levee failure will be immediately impacted, potentially causing a cessation of all operations at that location. The extent of the impact depends on multiple factors concerning the extent of the failure, and may include:

- Structural Damage: Facilities located downstream could sustain severe structural damage. Floodwaters can inundate buildings, causing structural failures, collapsing walls, and damaging foundations. This can render facilities inoperable or unsafe for use.
- Equipment Damage: Critical facilities often house valuable and sensitive equipment that can be severely damaged or destroyed by floodwaters and debris carried by the flood. This can include electrical systems, machinery, data centers, and communication equipment.
- Disruption of Operations: The flooding caused by a dam failure can disrupt the normal operations of critical facilities, including hospitals, emergency response centers, power plants, and water treatment plants. This disruption can have cascading effects on public services and infrastructure.
- Long-Term Recovery: The recovery process could be lengthy and resource intensive. It may involve rebuilding damaged infrastructure, restoring functionality, and implementing measures to prevent future vulnerabilities.

Government and emergency operations may be immediately impacted, especially if any major or critical facilities are within the inundation area of failure. The extent of the impact depends on multiple factors concerning the extent of the failure, and may include:

- Emergency Response and Management: Jurisdictional response agencies may be called upon to respond to a failure event. They must coordinate rescue operations, evacuations, and disaster response efforts to mitigate the immediate risks to human life and property.
- Public Health and Safety: Jurisdictional public health agencies would provide support for public health needs during and after a dam failure, including responding to injuries, managing emergency shelters, and addressing potential health risks from contaminants or waterborne diseases.
- Financial Impact: A dam failure event can strain state budgets due to the costs associated with emergency response, infrastructure repair, environmental cleanup, and long-term recovery efforts. Local governments may need to allocate additional funds to address these needs.

Potentially Vulnerable Community Lifelines
A dam of levee failure can impact various community lifelines, critical systems and services that communities rely on for their functioning. As an overview, the May 2023 FEMA Benefit-Cost Analysis Sustainment and Enhancements Standard Economic Value Methodology Report indicates the following loss values for community lifelines:

Table 35: Economic Impacts of Loss of Service Per Capita Per Day (in 2022 dollars)

Category	Loss
Loss of Electrical Service	$199
Loss of Wastewater Services	$66
Loss of Water Services	$138
Loss of Communications/Information Technology Services	$141

Source: May 2023 FEMA Benefit-Cost Analysis Sustainment and Enhancements Standard Economic Value Methodology Report

The failure of a dam or levee can have significant and wide-ranging impacts on transportation infrastructure, affecting roads, bridges, railways, and other critical components of transportation systems. However, it is important to note that, as of this plan, neither the State of Kansas or Kansas Region L planning participants have delineated community lifelines and their associated values in dam or levee failure inundation zones. As such, the following discussion does not allow for a determination of specifically vulnerable community lifelines. Potential impacts may include:

- Flooding and Erosion: Dam or levee failures can lead to rapid and extensive flooding, causing erosion of roadways and bridge foundations. This can result in the collapse or significant damage to roads and bridges, disrupting transportation routes.
- Extended Downtime: The repair of transportation infrastructure, especially major roads and bridges, can take a significant amount of time. During this period, transportation networks may be partially or entirely unavailable.

The cost to conduct maintenance on a road can vary significantly depending on the types of work required. However, the average estimate for repairs on a per mile basis in 2019 was $14,750 per mile. The cost to replace a road can vary significantly based on several factors, including the type of road, local labor and material costs, the complexity of the project, and the specific requirements of the replacement. As a rough estimate, road construction costs can range from $1,000,000 to $10,000,000 per mile.

Bridges crossing rivers can pose significant concerns during flooding events due to the increased risk of structural failure. Floodwater can exert powerful hydraulic forces on bridge structures, with the flow of water, debris, and floating objects impacting the bridge's substructure and foundation. Scouring, the removal of soil or sediment around bridge foundations can increase during a flood event increasing the risk of failure. Floodwater can also cause the deformation and misalignment of bridge components. As water levels rise and fall, the structural elements may undergo stress and strain, potentially leading to long-term damage and misalignment. Mapping concerning the locations of bridges with Kansas Region L may be found with the Kansas Department of Transportation.

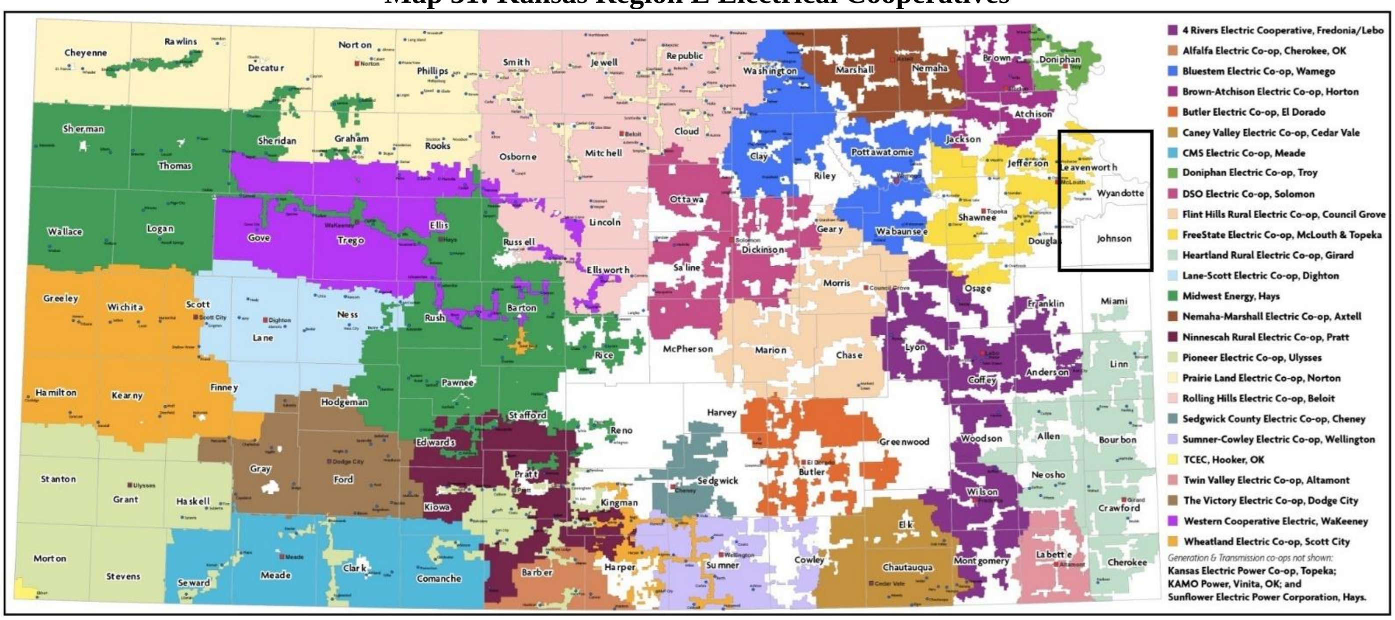
Of particular concern are structurally deficient bridges, which may be at increased risk of failure during an event. A review of data from the Kansas Department of Transportation indicates Kansas Region L has no currently identified structurally deficient bridges. The Kansas Department of Transportation estimates that the cost to repair a structurally deficient bridge is on average $150,000.

The failure of a dam or levee can have significant impacts on power utilities, affecting both the generation and distribution of electrical power. Here are some potential consequences:

- Power Line Disruption: Dam or levee failures can cause flooding and erosion, potentially damaging power lines and transmission towers. This can result in the disruption of electricity transmission from power generation facilities to distribution networks.
- Substation Impact: Substation Flooding: Flooding from a dam or levee failure can impact electrical substations, which play a crucial role in transforming and distributing electricity. Substation failures can lead to widespread power outages.
- Grid Instability: The sudden loss of a significant power source can lead to voltage and frequency fluctuations. This instability can affect the overall reliability of the power grid.
- Emergency Shutdowns: In the event of a dam or levee failure, power utilities may need to implement emergency shutdowns of affected power plants and electrical infrastructure to prevent further damage and ensure the safety of personnel.

Kansas Region L and participating jurisdictions use the following electrical utility providers:

Map 31: Kansas Region L Electrical Cooperatives



Source: State of Kansas

Electricity is generated in Kansas Region L at 13 generation facilities, using biomass, natural gas, petroleum, and wind facilities. The following map, from the U.S. Energy Atlas, details the location of both electrical generating plants and high-capacity transmission lines within Kansas Region L:

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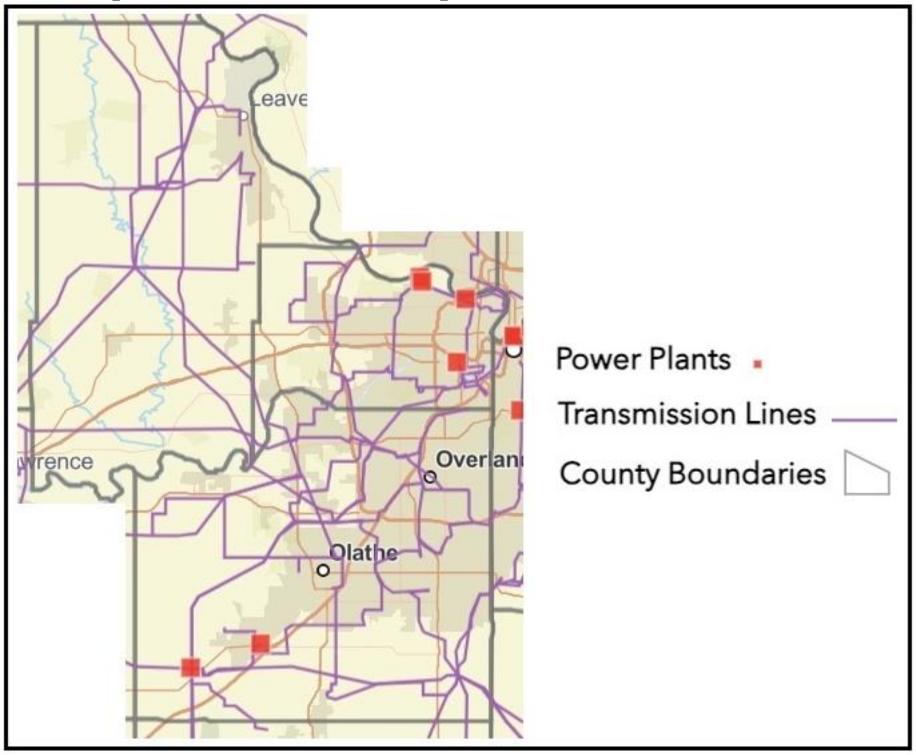
Map 32: Electrical Generating Plants and Transmission Lines

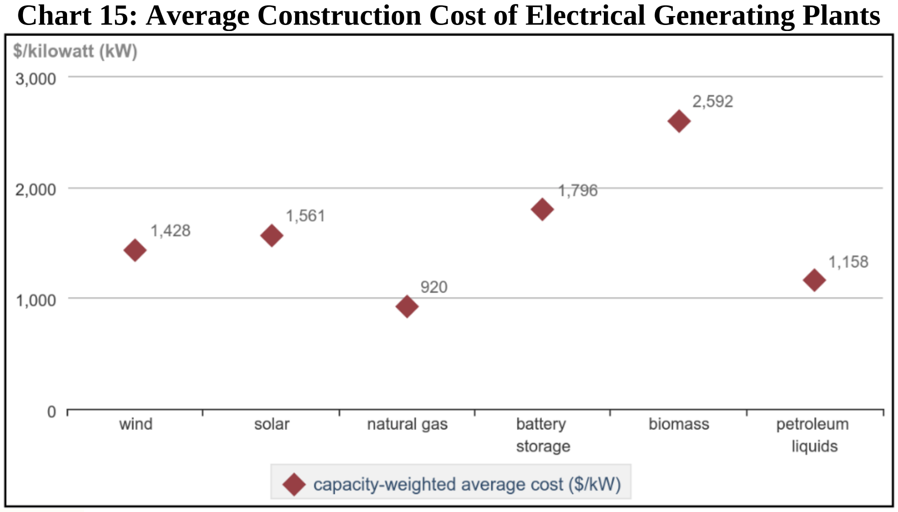


Source: FEMA RAPT

The cost to replace electrical lines can vary widely based on several factors, including the type of electrical lines, the distance of the replacement, local labor and material costs, the complexity of the project, and any specific requirements or challenges involved. Additionally, costs can be significantly different for residential, commercial, or industrial projects. Additionally, urban and rural locations may have varying cost factors. As a rough estimate, the cost to replace electrical lines can range from a few thousand dollars to several thousand dollars per mile.

Data concerning the construction costs of electrical generating plants from the U.S. Energy Information Administration indicates the following average per kW cost, by generating plant type, for new construction:

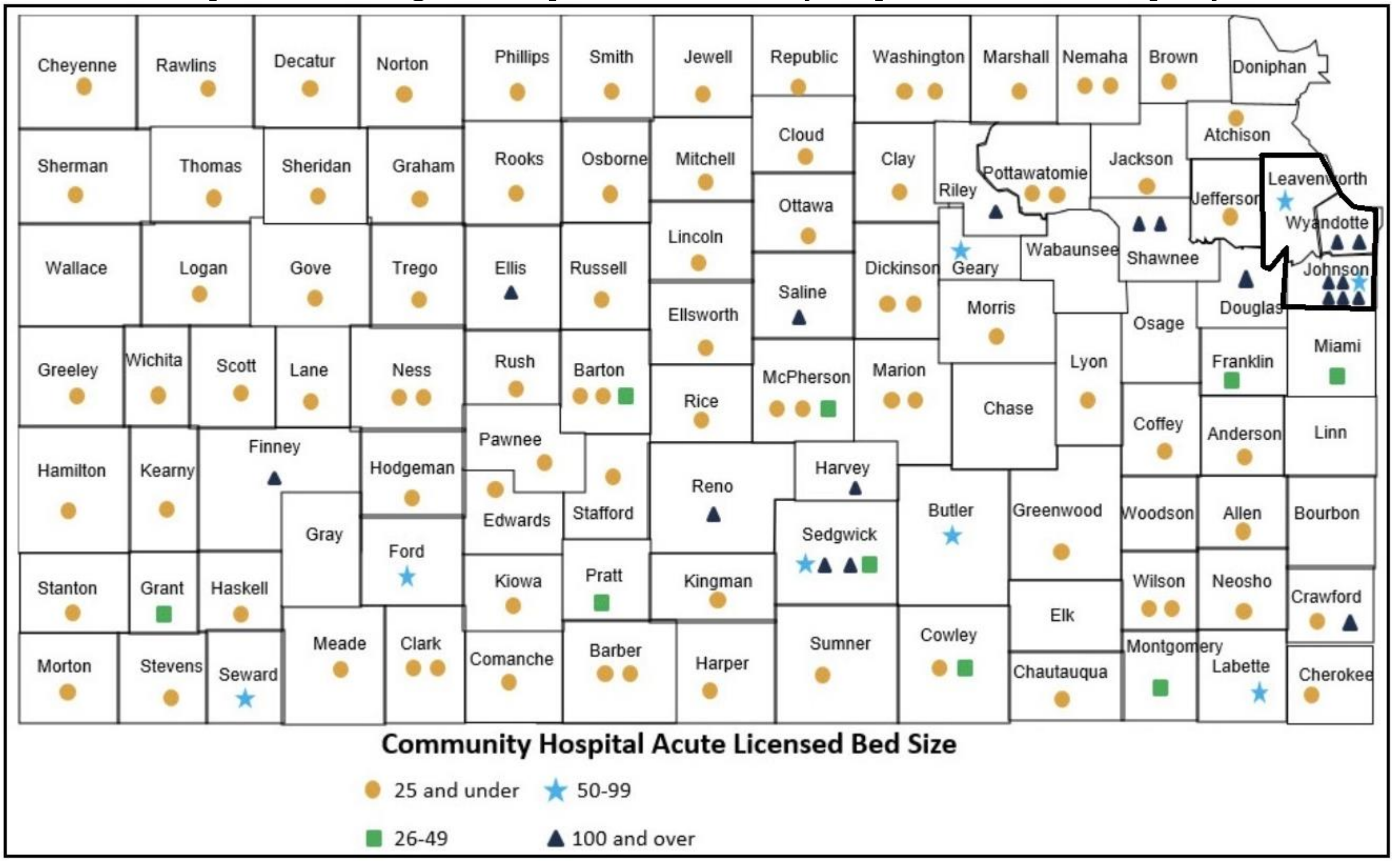
Chart 15: Average Construction Cost of Electrical Generating Plants



Source: U.S. Energy Information Administration

The following map, form the Kansas Hospital Association details the number of hospital beds by county for Kansas Region L:

Map 33: Kansas Region L Hospital Bed Community Hospital Licensed Bed Capacity



Source: Kansas Hospital Association

While these, and other smaller medical facilities, may see a rapid increase in dam or levee failure injuries during an event, it is considered unlikely that this increase will impact or overload the regional capacity except in the case of a catastrophic failure. In the event of a catastrophic failure, patients will need to be transported to adjacent regions to receive treatment.

Consequence Analysis

This consequence analysis lists the potential impacts of a hazard on various elements of community and state infrastructure. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Kansas Region L residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

Table 36: Dam or Levee Failure Consequence Analysis

Subject	Potential Impacts
Impact on the Public	Heavy flooding can cause power loss, property damage, injury, and death, and the displacement of populations. Standing water can also pose a public health risk due to the reproduction of disease vectors such as mosquitos.
Impact on Responders	Heavy flooding may cause inaccessibility of roadways for first responders as well as damage of materials and resources. First responders will also have to facilitate evacuation measures to move people from the flooded area.
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary based on the situation. Flooding caused by dam failure may create power outages, debris damage, and road closures.
Delivery of Services	Delivery of services may be disrupted due to flood-damaged bridges and roadways. Transit systems may face closures due to public safety concerns. The ability to deliver food, drinking water, and services will be heavily disrupted. Flooding may also

Table 36: Dam or Levee Failure Consequence Analysis

Subject	Potential Impacts
	interrupt communications and transportation due to power failure and accessibility changes.
Property, Facilities, and Infrastructure	Flooding from failures impact roads and bridges, businesses, hospitals, and other critical entities. Water and sewer systems may also be damaged. Homes and businesses may be completely destroyed if situated close to the failure point.
Impact on Environment	Flooding and moving debris can affect natural areas and wildlife, spreading pollution and hazardous materials. Ecosystems and natural habitats may be completely destroyed, causing migration or death of wildlife.
Economic Conditions	There is a fiscal impact on the government after a failure due to disruption of travel and commerce routes and employee's ability to travel to work. Recourses at all levels are utilized impacting the ability to access resources long-term.
Public Confidence in Governance	Direct, immediate, and effective actions must be taken in order to maintain public confidence. Response activities must include all levels of government.

4.9.7 Jurisdictional Risk and Vulnerability

To help understand the risk and vulnerability to dam and levee failure events of participating jurisdictions the following tables were developed using available data:

Table 37: Jurisdictional High Hazard Dam Totals

County	Jurisdiction	Number High Hazard Dams	Lowest Rated Condition Assessment
Johnson	Bonner Springs	2	Not Rated
	De Soto	4	Not Rated
	Kansas City (not in Johnson County)	3	Not Rated
	Kenneth (not in Johnson County)	1	Satisfactory
	Lenexa	5	Not Rated
	Martin City (not in Johnson County)	1	Fair
	Olathe	4	Fair
	Overland Park	4	Not Rated
	Paola (not in Johnson County)	1	Satisfactory
	Shawnee	9	Satisfactory
Leavenworth	Bonner Springs	3	Poor
	Easton	1	Fair
	Lansing	1	Fair
	Linwood	1	Fair
	Mahon	1	Satisfactory
Wyandotte	Bonner Springs	3	Poor
	Edwardsville	2	Satisfactory
	Groves Center	2	Fair
	Kansas City	7	Not Rated
	Lake of the Forest	1	Not Rated

Source: National Inventory of Dams

The 2024 State of Kansas Hazard Mitigation Plan does include an addendum of High Hazard dams. However, data concerning inundation areas, the number of people, number of structures, infrastructure, and valuation in identified high hazard dams' inundation areas was not available from either KDA-DWR or KDEM. A process is currently underway to compile this data and is expected to be available with the completion of the 2028 State of Kansas Hazard Mitigation Plan.

The following table details information from the USACE concerning levee failure consequence analysis for jurisdictions within Kansas Region L:

Table 38: Kansas Region L Levee Failure Consequence Analysis

County	Jurisdiction	People at Risk	Structures at Risk	Property Value
Johnson	Mission	30	3	$10,000,000
Johnson	Shawnee	27	14	$10,000,000
Leavenworth	Leavenworth	1	5	$400,000
Leavenworth	Tonganoxie	7	4	$10,000,000
Wyandotte	De Soto	4	1	$200,000
Wyandotte	Kansas City	44,146	2,901	$9,591,000,000

Source: USACE

4.10 Drought

4.10.1 Hazard Description

Drought is defined as 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. It is, however, a normal, seasonal, and recurrent feature of climate that occurs in virtually all climate zones—typically in late spring through early fall. The duration of drought varies widely. There are cases when drought develops relatively quickly and lasts a very short period of time, exacerbated by extreme heat and/or wind, and there are other cases when drought spans multiple years, or even decades. 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

When below average, little or no rain falls, soil can dry out, and plants can die. If unusually dry weather persists and water supply problems develop, the period is defined as a drought. Human activity such as over-farming, excessive irrigation, deforestation, and poor erosion controls can exacerbate a drought's effects. It can take weeks or months before the effects of below average precipitation on bodies of water are observed. Depending upon the region, droughts can happen more quickly, and be noticed sooner, or have their effects naturally mitigated. The more humid and wet an area is, the faster the effects will be realized. A naturally dry region, which typically relies more on subsurface water will take more time to actualize its effects.

Periods of drought can have significant environmental, agricultural, health, economic, and social consequences. The effects vary depending upon vulnerability and regional characteristics. Droughts can also reduce water quality through a decreased ability for natural rivers and streams to dilute pollutants and increase contamination. The most common effects are diminished crop yield, increased erosion, dust storms, ecosystem damage, reduced electricity production due to reduced flow through hydroelectric dams, shortage of water for industrial production, and increased risk of wildland fires.

4.10.2 Location and Extent

All of Kansas Region L is susceptible to drought conditions. However, the specific susceptibility to drought depends on various factors, including climate patterns, land use practices, and water management strategies.

Kansas Region L generally has a semi-arid climate, characterized by relatively lower annual precipitation. This climatic condition makes the region more susceptible to drought, especially during periods of below-average rainfall. The demand for water for agricultural irrigation can also stress water resources in the region.

Kansas Region L is part of the Ogallala Aquifer region, a critical groundwater source. Excessive groundwater pumping during drought conditions can lead to aquifer depletion, posing long-term challenges for water availability. Kansas Region L also relies on reservoirs and rivers for water supply, and prolonged drought can lead to reduced water levels and increased competition for available water resources.

Droughts are regularly monitored by multiple federal agencies using a number of different indices. One of the best indicators of historic drought periods is provided by the U.S. Drought Monitor. The U.S. Drought Monitor provides a summary of drought conditions across the United States, including all Kansas counties. Often described as a blend of art and science, the map is updated weekly by combining a variety of data-based drought indices and indicators, along with local expert input, into a single composite drought indicator. The following table details the U.S. Drought Monitor categories:

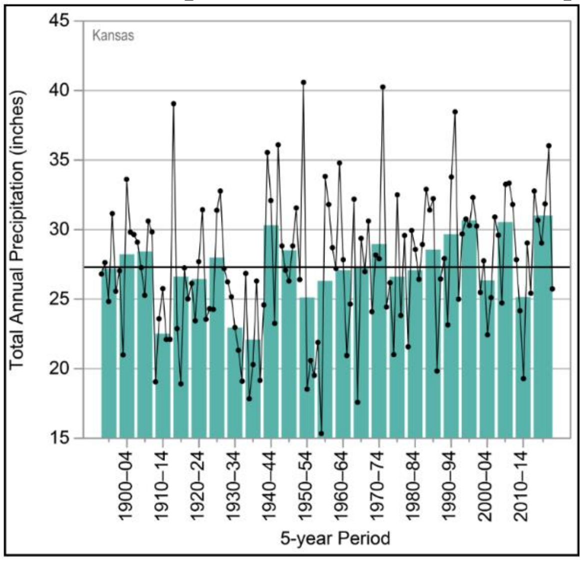
Table 39: U.S. Drought Monitor Categories

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

Precipitation data is collected by the NWS throughout the State of Kansas. Additional rainfall data is also collected by the NWS through citizen weather rainfall sites. The following chart indicates annual precipitation averages for Kansas from 1895 to 2020:

Chart 16: Kansas Region L Observed Annual Precipitation



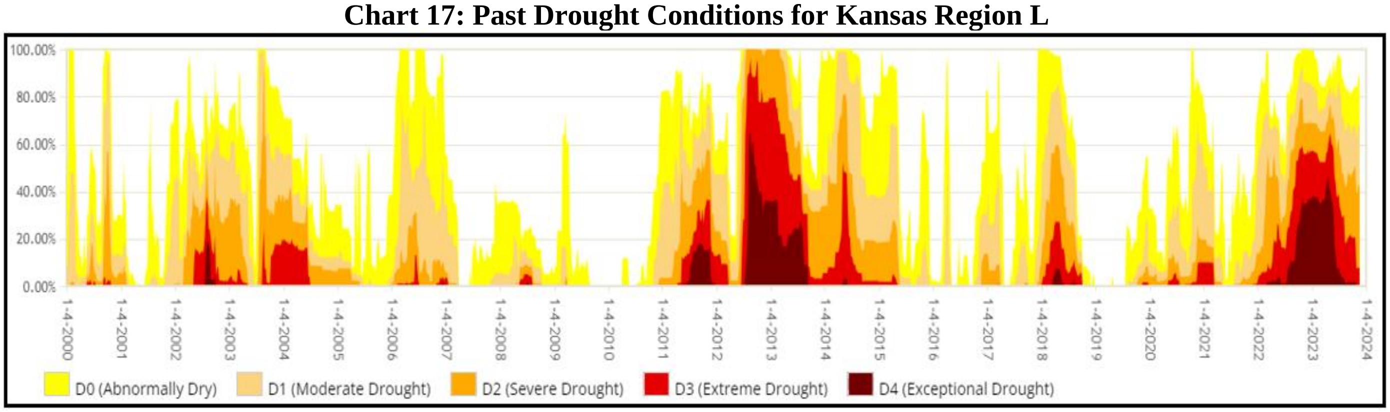
Source: NOAA NCEI State Climate Summary 2022 for Kansas

Current drought conditions, which change weekly basis, may be found on the U.S. Drought Monitor website.

4.10.3 Previous Occurrences

Drought is a normal climate pattern that has occurred in varying degrees of length, severity, and size. The following chart, from the U.S. Drought Monitor shows past drought conditions for Kansas Region L:

Chart 17: Past Drought Conditions for Kansas Region L



Source: U.S. Drought Monitor
Note: Represents averaged conditions

Comprehensive data on droughts, drought impacts, and drought forecasting is extremely limited and often inaccurate. Due to the complexity of drought monitoring and the large areas droughts impact, agencies have difficulty quantifying and standardizing drought data.

Historical data was gathered from the U.S. Drought Monitor weekly reports for the 10-year period between 2014 and 2023 (with the years 2014 and 2023 being full dataset years). This data was compiled and aggregated to provide a yearly estimate of the percentage of Kansas Region L in each Drought Monitor category.

Table 40: Percentage Area in U.S. Drought Monitor Category

Year	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
2023	35.3%	64.6%2	36.5%	8.58%	0%	0%
2022	54.3%	45.6%	28.6%	9.96%	0.616%	0%
2021	83.8%	16.1%	1.58%	0%	0%	0%
2020	73.2%	26.7%	11.5%	0%	0%	0%
2019	98.7%	0.29%	0%	0%	0%	0%
2018	8.3%	91.6%	49.3%	26.4%	17.4%	5.88%
2017	63.7%	36.2%	9.08%	0%	0%	0%
2016	86.6%	15.2%	0%	0%	0%	0%
2015	65.2%	32.8%	1.53%	0%	0%	0%
2014	47.5%	52.4%	10.7%	0%	0%	0%

Source: U.S. Drought Monitor

The Secretary of Agriculture is authorized to designate counties as disaster areas to make emergency loans available to producers suffering losses in those counties and in counties that are contiguous to a designated county. USDA Secretarial disaster designations must be requested of the Secretary of Agriculture by a governor or the governor's authorized representative, and there is an expedited process for drought. The following table represents the total number of Secretarial Disaster Declarations, by county, for the Kansas Region L:

Table 41: Secretarial Drought Disaster Declarations, 2019 -2022

County	2022	2021	2020	2019
Johnson	4	0	0	0
Leavenworth	3	0	0	0
Wyandotte	5	0	0	0

Source: USDA Farm Service Agency

4.10.4 Probability of Future Events

Historically, drought has affected Kansas Region L on a reoccurring basis. In reviewing historical data from the U.S. Drought Monitor weekly reports for Kansas Region L from 2013 through 2022 a weekly average can be created indicating the percentage time in each Drought Monitor category. This average can be used to extrapolate the potential likelihood of future drought conditions.

Table 42: Estimated Weekly Probability of Kansas Region L Being in U.S. Drought Monitor Category

None	D0-D4	D1-D4	D2-D4	D3-D4	D4
62.0%	38.2%	14.9%	4.5%	1.81%	0.59%

Data: U.S. Drought Monitor

Kansas Region L can experience rapid droughts, with a sudden onset of intense dry periods following a period of normal precipitation. While these conditions may last only a few months, they can result in agricultural losses, water supplies shortages, and low stream and river volume.

While predicting drought provides many challenges, NOAA's National Integrated Drought Information System provides the Northeast Drought Early Warning System to improve drought early warning capacity. The system is a network of regional and national partners that share information and coordinate actions to help communities in the region cope with drought. Developing and implementing the system allows Kansas to quickly respond to emerging drought conditions Through developing regional systems, the National Integrated Drought Information System is building the foundation for a nationwide system to improve drought forecasting.

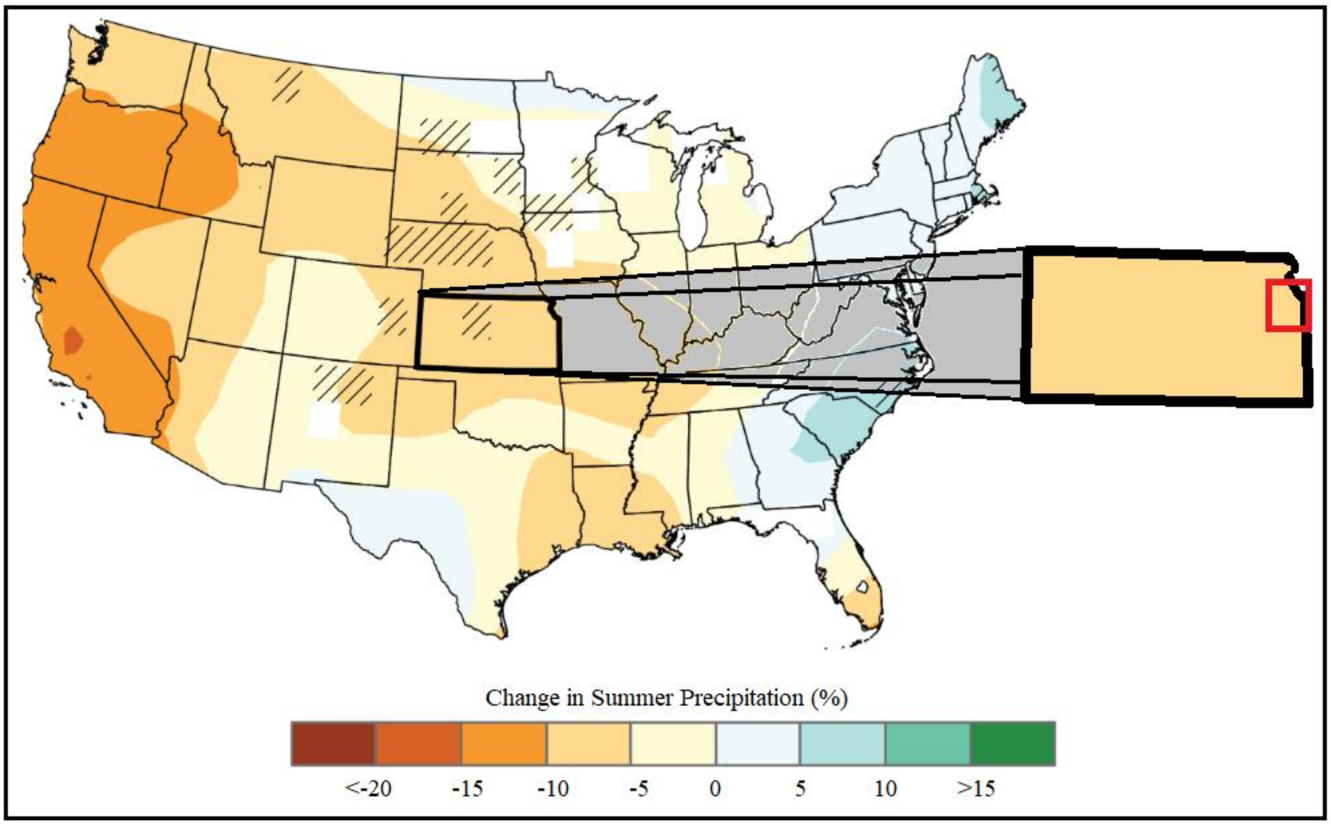
4.10.5 Projected Changes in Hazard Location, Intensity, Frequency, and Duration

According to the National Institutes of Health National Center for Biotechnology Information publication Global Drought Trends and Future Projections "Drought is one of the most difficult natural hazards to quantify and is divided into categories (meteorological, agricultural, ecological and hydrological), which makes assessing recent changes and future scenarios extremely difficult." However, using long term data estimates of future drought conditions can be determined through a combination of climate modeling, historical data analysis, and scientific assessments. This modelling takes into account factors such as temperature, precipitation, soil moisture, and other relevant variables.

Current modelling from the NOAA State Climate Summary 2022 for Kansas suggests that projections of overall annual precipitation are uncertain, summer precipitation is projected to decrease across the state, while winter precipitation is projected to increase. Winter precipitation increases could benefit winter wheat production, but summer drying would have negative impacts on rain-fed summer crops and rangeland. Although increased precipitation is projected, naturally occurring droughts are projected to be more intense because higher temperatures will increase evaporation rates.

The following map indicates the expected annual increase in precipitation for Kansas Region L:

Map 34: Kansas Region L Change in Annual Precipitation



Source: NOAA NCEI State Climate Summary 2022 for Kansas

The NOAA NCEI State Climate Summary 2022 for Kansas indicates that the intensity of future droughts is projected to increase. Although projections of overall precipitation are uncertain, higher temperatures will increase the rate of soil moisture loss during dry spells, leading to more serious conditions during future naturally occurring droughts, including an increase in the occurrence and severity of wildfires.

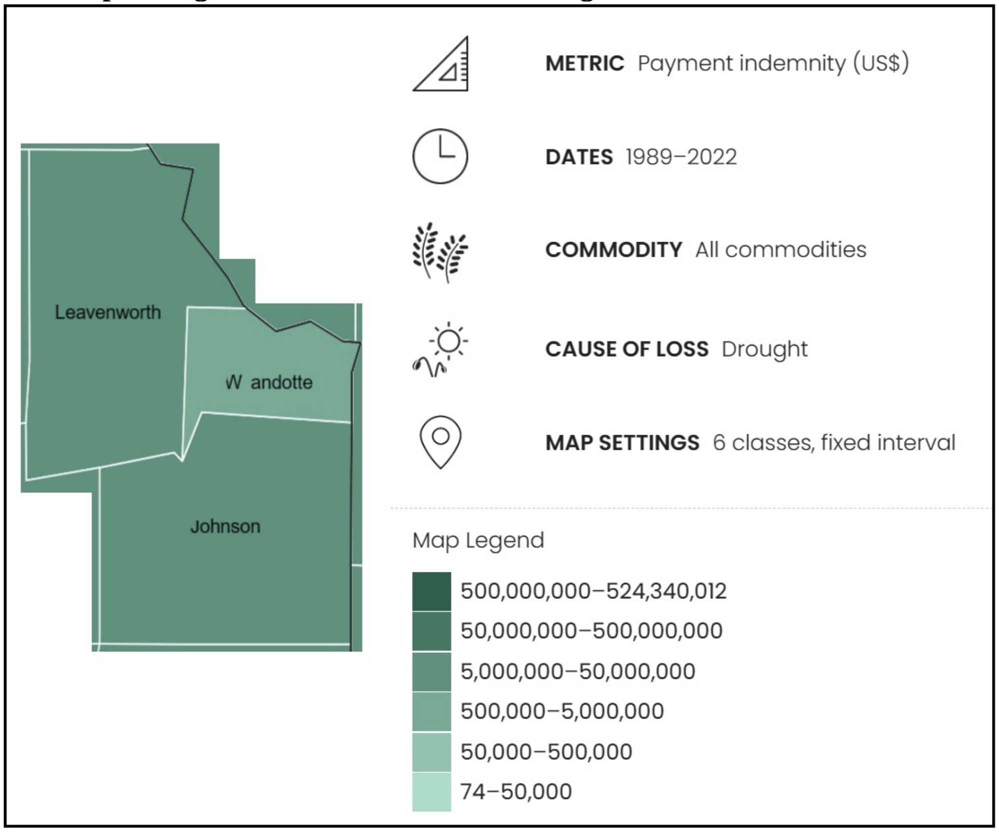
4.10.6 Vulnerability and Impact

Droughts are rarely a direct cause of death, though the associated heat, dust, and stress can all contribute to increased mortality.

In general, critical facilities and infrastructure are not directly vulnerable to losses as a result of drought. However, there is a potential that operations could be impacted by power failures caused by either increased utility demand or damaged power delivery infrastructure. In addition, drinking water infrastructure may be specifically vulnerable to the impacts of drought. Any decrease in groundwater supplies would stress this infrastructure and may cause shortages or rationing.

Drought conditions can cause significant agricultural impacts. In addition to obvious losses in yields in both crop and livestock production, drought is associated with increases in insect infestations, plant disease, and wind erosion. Droughts also bring increased problems with insects and disease to forests and reduce growth. The incidence of wildfires increases substantially during extended droughts, which in turn places both human and wildlife populations at higher levels of risk. The following map from the United States Department of Agriculture details total agricultural losses, by county, due to drought conditions from 1989 to 2021:

Map 35: Agricultural Losses Due to Drought Conditions, 1989 to 2021



Source: USDA

Although environmental losses are difficult to quantify, increasing public awareness and concern for environmental quality has forced public officials to focus greater attention and resources on these effects. Environmental losses are the result of damage to plant and animal species, wildlife habitat, and air and water quality, wildfires, degradation of landscape quality, loss of biodiversity, and soil erosion. Some of the effects are short-term and conditions quickly return to normal following the end of the drought. Other environmental effects linger for some time or may even become permanent. Wildlife habitat, for example, may be degraded through the loss of wetlands, lakes, and vegetation. However, many species will eventually recover from it if it is a temporary aberration. However, the degradation of landscape quality, with increased soil erosion, may lead to a more permanent loss of biological productivity of the landscape.

Governmental operations, facilities, and assets will likely experience no impacts from drought conditions, unless there is substantial power, communications, or water outages. However, reduced water availability would likely have an immediate impact on firefighting efforts in urban and suburban areas as fire suppression equipment requires a minimum level of water pressure to activate.

Potentially Vulnerable Community Lifelines

Water utilities are particularly vulnerable to drought conditions due to the direct impact on water availability and supply. The May 2023 FEMA Benefit-Cost Analysis Sustainment and Enhancements Standard Economic Value Methodology Report indicates the following loss values for community lifelines:

Table 43: Economic Impacts of Loss of Service Per Capita Per Day (in 2022 dollars)

Category	Loss
Loss of Wastewater Services	$66
Loss of Water Services	$138

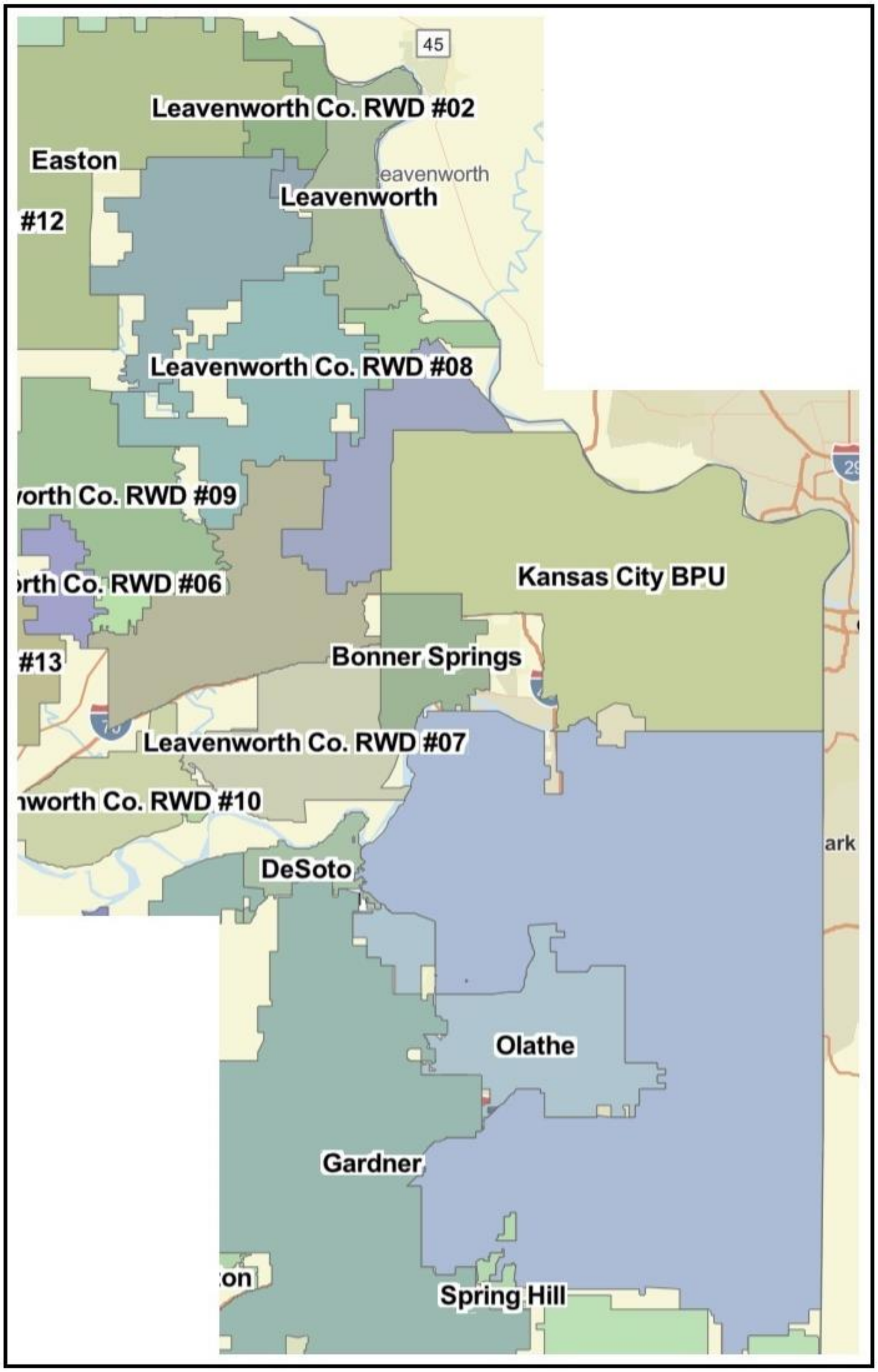
Source: May 2023 FEMA Benefit-Cost Analysis Sustainment and Enhancements Standard Economic Value Methodology Report

Water utilities can be affected by drought through:

- Reduced Water Availability: The reduction in water availability directly impacts the amount of water that water utilities can draw from local sources.
- Lower Reservoir Levels: Lower reservoir levels can affect the ability to meet water demand during periods of high usage.
- Declining Groundwater Levels: Lower groundwater levels make it more changing for utilities to extract water.
- Water Quality Challenges: Lower water levels can lead to higher concentrations of contaminants, minerals, and sediments in the available water sources, requiring more extensive and costly treatment processes.
- Increased Treatment Costs: Treating water from depleted or lower-quality sources during drought conditions may require additional treatment steps, technologies, or chemicals, leading to increased operational costs for water utilities.
- Competition for Water Resources: During droughts, there is increased competition for limited water resources among various users, including agriculture, industry, and households. Water utilities may face challenges in securing sufficient water supplies amid this heightened competition.
- Impact on Water Infrastructure: Reduced water flow in rivers and streams can expose water infrastructure, such as pipelines, to the risk of corrosion.
- Water Use Restrictions: To conserve water during droughts, authorities may implement water use restrictions and conservation measures. These restrictions can impact water utilities' revenue and their ability to meet customer demand.

In Kansas Region L, a public water supply system is defined by Kansas Statutes Annotated (K.S.A.) 65-162a and Kansas Administrative Regulations (K.A.R.) 28-15a-2 as a "system for delivery to the public of piped water for human consumption that has at least 10 service connections or regularly serves at least 25 individuals daily at least 60 days out of the year." These systems are regulated by the Kansas Department of Health and Environment. Private domestic groundwater wells are not considered public water supply systems. Kansas Region L and participating jurisdictions are covered by the following domestic water suppliers:

Map 36: Kansas Region L Public Water Supply System Boundaries



Source: State of Kansas

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. Water supply planning is the key to minimizing the effects of drought on the population. Public water suppliers should continue to work to identify vulnerabilities and develop infrastructure, conservation plans, and partnerships to reduce the likelihood of running out of water during a drought.

Communities and citizens served by private wells rather than water supply districts may be at higher risk to drought conditions, and may see the following impacts:

- Lowering of Water Table: Drought conditions can lead to a lowering of the water table, which is the level at which groundwater is located. Private wells that rely on groundwater may experience reduced yields or, in extreme cases, may run dry.
- Decreased Well Recharge: Drought reduces the amount of precipitation, leading to decreased recharge of groundwater. Private wells depend on a sustainable recharge rate to maintain a consistent and reliable water supply.
- Increased Competing Demands: During a drought, increased water demand for agricultural irrigation, municipal water supply, and other uses can create competition for the available groundwater. Private wells may face challenges due to this increased demand.
- Water Quality Concerns: Lower groundwater levels during droughts can lead to changes in water quality. Concentrations of minerals, contaminants, and pollutants may increase, affecting the suitability of water for drinking and other uses.

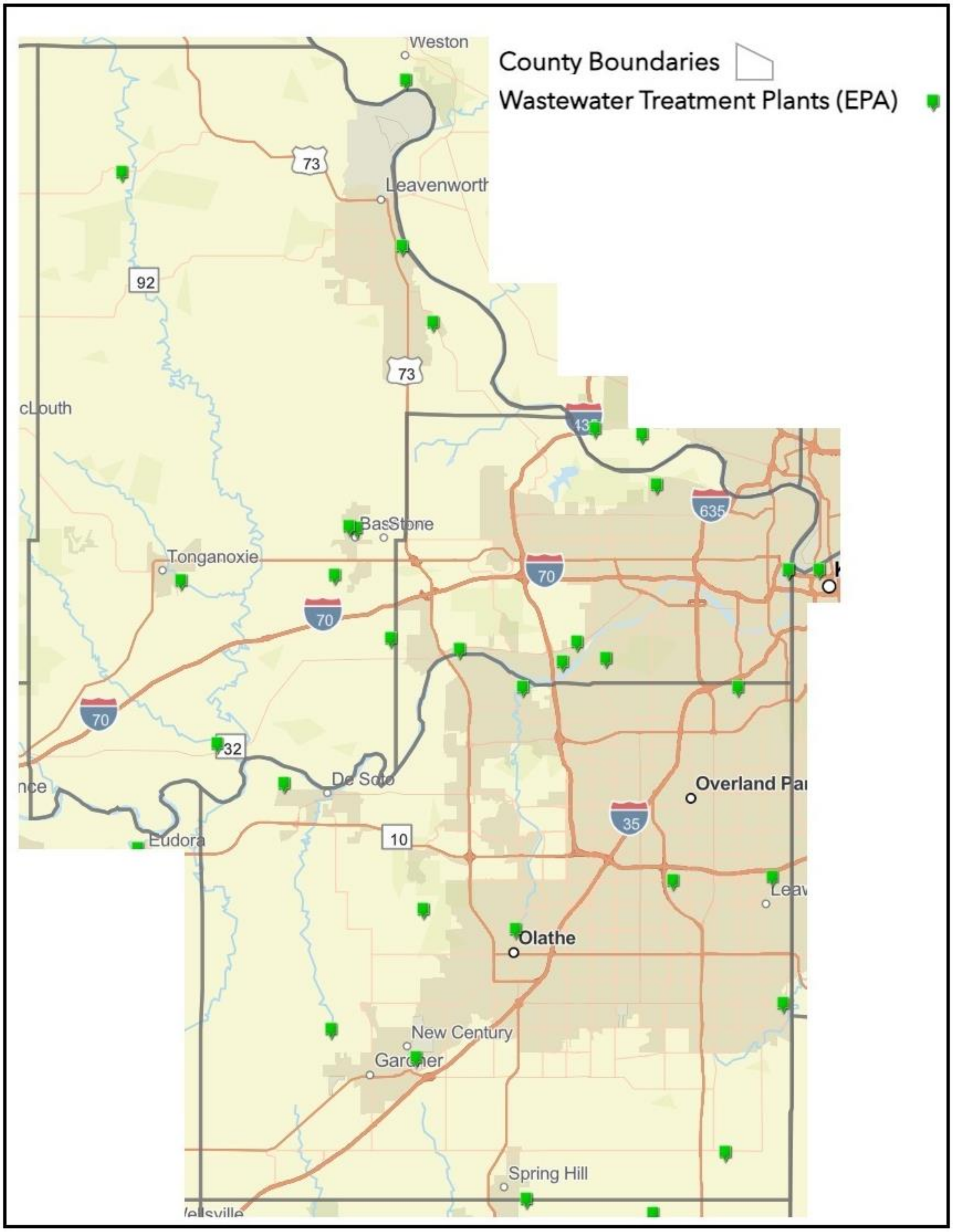
Should it be required to drill a private well deeper to accommodate for drought conditions impacting the level of the water table, on average, the cost to drill a private water well in the United States can range from $15 to $45 per foot. However, it's important to note that this is a general estimate, and actual costs can vary based on geological and hydrogeological conditions and well depth.

Drought can significantly impact wastewater treatment plants in several ways. These can include:

- Reduced Influent Flow: During a drought, water consumption decreases as people conserve water. As a result, the volume of wastewater entering treatment plants decreases. This reduction in influent flow can affect the efficiency of treatment processes designed to handle a certain volume of wastewater.
- Increased Concentration of Pollutants: With less water entering the treatment plant, the concentration of pollutants in the wastewater increases. This can include contaminants like organic matter, nutrients (such as nitrogen and phosphorus), and chemicals. Higher pollutant concentrations can challenge the treatment processes and may require adjustments or additional treatment steps to maintain compliance with regulatory standards.
- Altered Wastewater Characteristics: Drought conditions can change the composition of wastewater. For example, in urban areas, reduced water usage can lead to an increase in the concentration of industrial or commercial waste relative to residential waste. This change in wastewater characteristics may necessitate modifications to treatment processes to effectively treat the altered influent.
- Water Supply for Treatment Processes: Many wastewater treatment processes require water for various purposes, such as dilution, washing, and cooling. During a drought, the availability of water for these purposes may be limited, potentially impacting the efficiency and effectiveness of treatment processes.

The following map identifies wastewater treatment plants in Kansas Region L:

Map 37: Kansas Region L Wastewater Treatment Plants

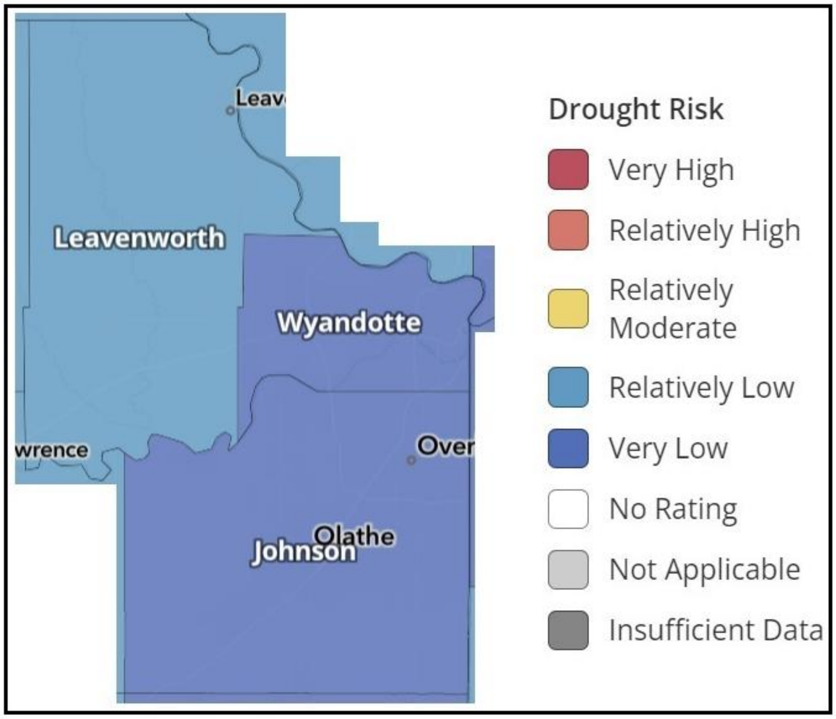


Source: FEMA RAPT

FEMA NRI

Using the FEMA NRI, and consisting of three input components (expected annual loss, social vulnerability, and community resilience), the following map was created indicating the potential risk to participating counties from drought:

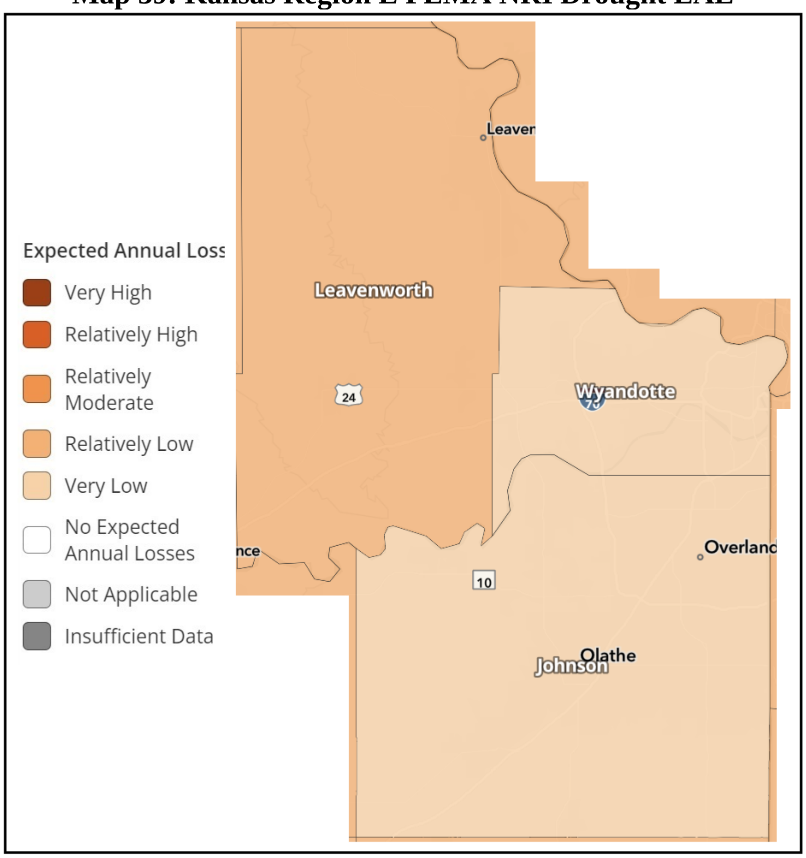
Map 38: Kansas Region L FEMA NRI Drought Risk



Source: FEMA NRI

As part of the NRI, EAL represents the average economic loss in dollars resulting from natural hazards each year and is proportional to a community's risk. The following map indicates the EAL for drought for participating counties within Kansas Region L:

Map 39: Kansas Region L FEMA NRI Drought EAL



Source: FEMA NRI

The following table indicates the FEMA NRI and EAL analysis for each participating Kansas Region L county for drought:

Table 44: Kansas Region L FEMA NRI and EAL for Drought by County

County	Risk Index	EAL
Johnson	Very Low	Very Low
Leavenworth	Relatively Low	Relatively Low
Wyandotte	Very Low	Very Low

Source: FEMA NRI

Consequence Analysis

This consequence analysis lists the potential impacts of a hazard on various elements of community and state infrastructure. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Kansas Region L residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

Table 45: Drought Consequence Analysis

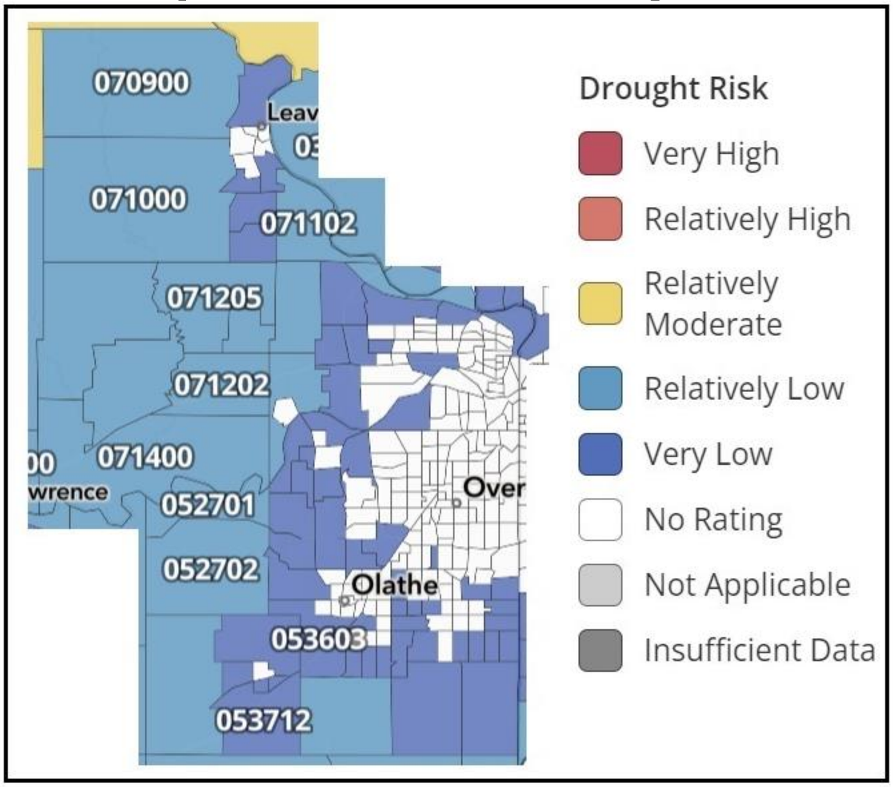
Subject	Potential Impacts
Impact on the Public	If the drought coincides with warmer months, vulnerable populations may face an increased risk of dehydration, death, heat-related illness, heat stroke. Lower quantities of water may also increase the likelihood of contamination due to higher concentrations of bacteria. During droughts, dry soils and wildfires increase the number of airborne particles, such as pollen and smoke, which can worsen chronic respiratory illnesses.
Impact on Responders	Reduced water availability would likely complicate firefighting efforts in urban and suburban areas where wildfire-fighting tactics such as chemical retardants and controlled burns are less suitable. Some fire suppression equipment requires a minimum level of water pressure to activate. If the drought coincides with warm months, first responders may face increased risk of heat-related injuries or death.
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary based on the situation. While the expectation is minimal, this threat may impact an agency’s ability to implement their continuity plan based on the hazard’s potential to impact power, communications, or water outages. Critical life-saving activities and fire suppression will be directly impacted by these outages.
Delivery of Services	Droughts may impact the delivery of goods and services if there are shortages of raw materials.
Property, Facilities, and Infrastructure	Drought conditions may threaten levels or quality of municipal public water supplies or impact small communities and/or private potable water wells.
Impact on Environment	The potential of drought-related impacts could have significant impacts on supplies of animal feed, livestock, meat and dairy products, and processed grain products, and on crop production. Drought conditions may also increase the potential for fires. Drought is also associated with insect infestations, plant disease, wind erosion of soil, and decrease in levels of water produced by natural aquifers.
Economic Conditions	The economic impacts from a drought could be significant. Droughts have the potential to drain state, and local resources, which will have a significant fiscal impact on the local government.
Public Confidence in Governance	Droughts can adversely affect the public, first responders, infrastructure, agriculture, economy, and overall operations. Direct, effective, and timely response by all levels of government is required for public confidence in the state’s governance, especially in recognizing and mitigating economic impacts of the drought.

4.10.7 Jurisdictional Risk and Vulnerability

To help understand the risk and vulnerability to drought conditions of participating jurisdictions mapping from the FEMA NRI was run on a census tract level. As the NRI does not generate mapping for individual jurisdictions, census tract analysis is the closest analogue available to understand individual jurisdiction conditions.

Using the FEMA NRI, and consisting of three input components (expected annual loss, social vulnerability, and community resilience), the following map was created indicating the potential risk to participating jurisdictions (as indicated by census tract) from drought:

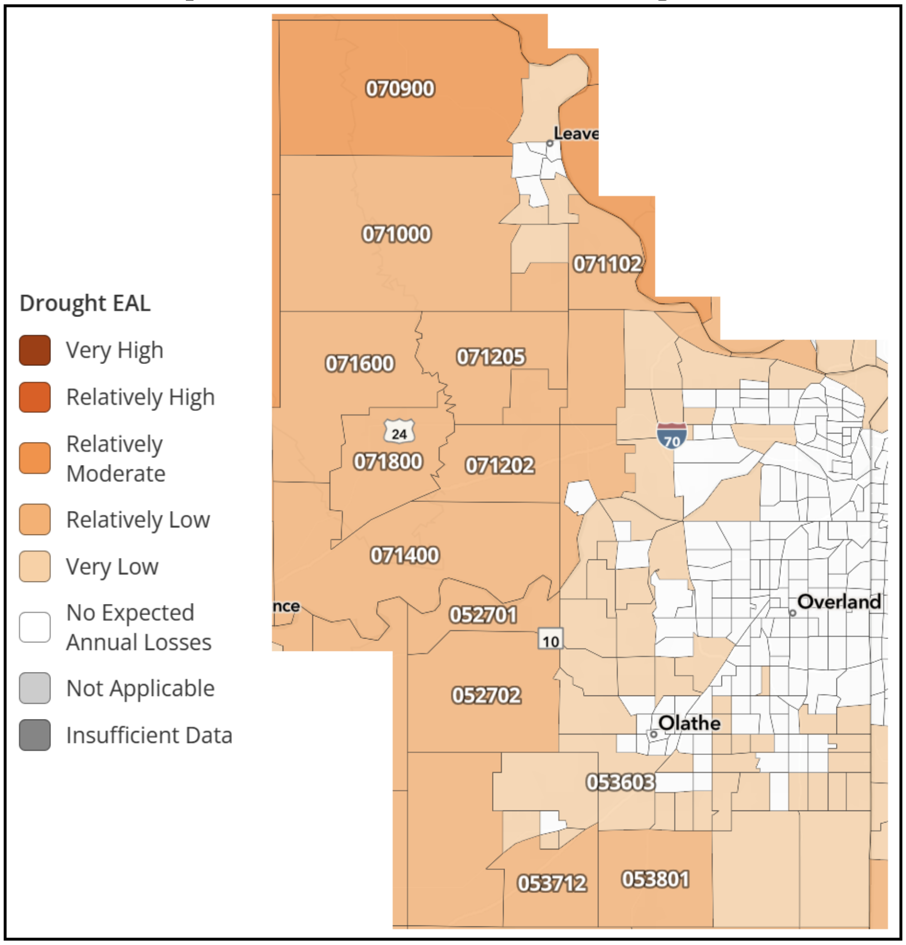
Map 40: FEMA NRI Jurisdictional Drought Risk



Source: FEMA NRI

As part of the NRI, EAL represents the average economic loss in dollars resulting from natural hazards each year and is proportional to a community's risk. The following map indicates the EAL for drought for participating jurisdictions (as indicated by census tract) within Kansas Region L:

Map 41: FEMA NRI Jurisdictional Drought EAL

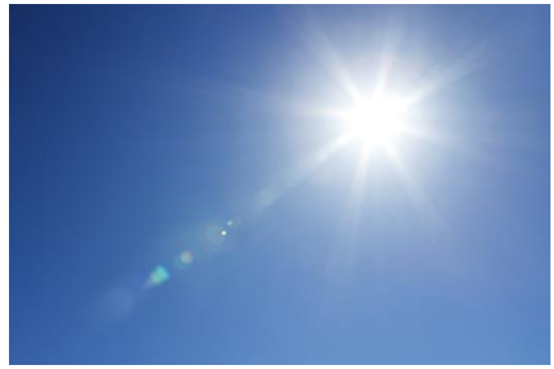


Source: FEMA NRI

FEMA NRI data tables, by census tract, are included in Appendix C. These data tables contain the risk index and EAL along with total building valuation and agricultural valuation allowing for an understanding of potential structural and agricultural vulnerability on a jurisdictional basis.

At greater risk may be the vulnerable populations, including the especially young, the elderly, and those below the poverty level. Hazard occurrences can exacerbate existing vulnerabilities and create new challenges. Vulnerable populations may have pre-existing health conditions that make them more susceptible to heat-related illnesses and dehydration, both of which can be exacerbated during droughts. Persons on fixed incomes and with limited resources may face difficulties in adapting their homes to withstand hazard conditions or may lack financial resources to cope with the increased costs of food, water, and energy. Please see Section 3 for information concerning potentially vulnerable populations.

4.11 Extreme Temperatures



4.11.1 Hazard Description

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.

The Centers for Disease Control and Prevention (CDC) identifies the following six groups as being especially vulnerable to extreme temperatures:

- Older Adults (aged 65)
- Infants and Children
- Individuals with Chronic Conditions
- Low-income Individuals
- Athletes
- Outdoor workers

4.11.2 Location & 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 L is vulnerable to both extreme heat and extreme cold, defined as follows.

- **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 temperature norms.

Table 46: Johnson County Average Temperatures

Month	Mean Max Temperature Normal (°F)	Mean Min Temperature Normal (°F)	Mean Avg Temperature Normal (°F)
January	39.1	21.0	30.1
February	44.5	25.1	34.8
March	55.3	34.5	44.9
April	65.2	45.0	55.1
May	74.4	55.0	64.7
June	82.8	63.8	73.3
July	87.7	68.8	78.3
August	87.4	67.9	77.6

Table 46: Johnson County Average Temperatures

Month	Mean Max Temperature Normal (°F)	Mean Min Temperature Normal (°F)	Mean Avg Temperature Normal (°F)
September	78.7	58.5	68.6
October	66.9	47.1	57.0
November	53.4	34.6	44.0
December	41.0	23.8	32.4

Source: High Plains Regional Climate Center

Table 47: Leavenworth County Average Temperatures

Month	Mean Max Temperature Normal (°F)	Mean Min Temperature Normal (°F)	Mean Avg Temperature Normal (°F)
January	38.9	19.4	29.2
February	44.5	23.6	34.1
March	55.7	32.7	44.2
April	66.8	43.3	55.1
May	76.4	54.2	65.3
June	84.9	63.4	74.1
July	89.8	68.5	79.2
August	88.4	66.5	77.4
September	79.6	56.7	68.2
October	68.1	45.7	56.9
November	53.8	33.3	43.5
December	41.1	22.6	31.8

Source: High Plains Regional Climate Center

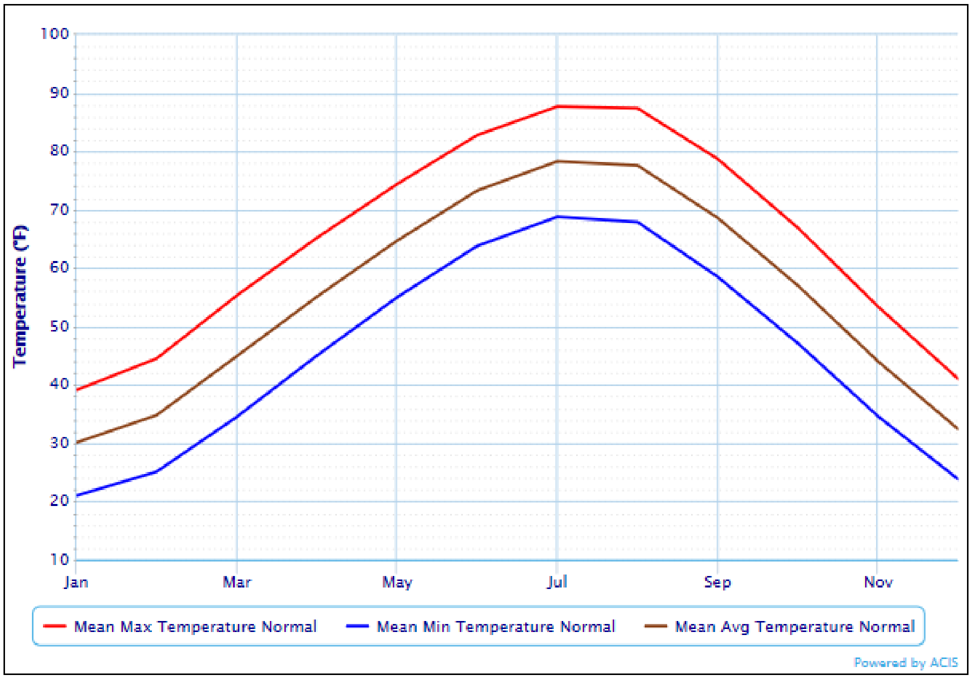
Table 48: Wyandotte County Average Temperatures

Month	Mean Max Temperature Normal (°F)	Mean Min Temperature Normal (°F)	Mean Avg Temperature Normal (°F)
January	39.3	16.6	28.0
February	44.6	21.2	32.9
March	55.1	31.3	43.2
April	65.2	41.0	53.1
May	74.5	52.6	63.6
June	82.7	62.2	72.5
July	88.1	67.2	77.6
August	87.1	65.2	76.1
September	79.1	56.0	67.6
October	67.3	43.0	55.2
November	54.4	31.7	43.1
December	41.2	20.6	30.9

Source: High Plains Regional Climate Center

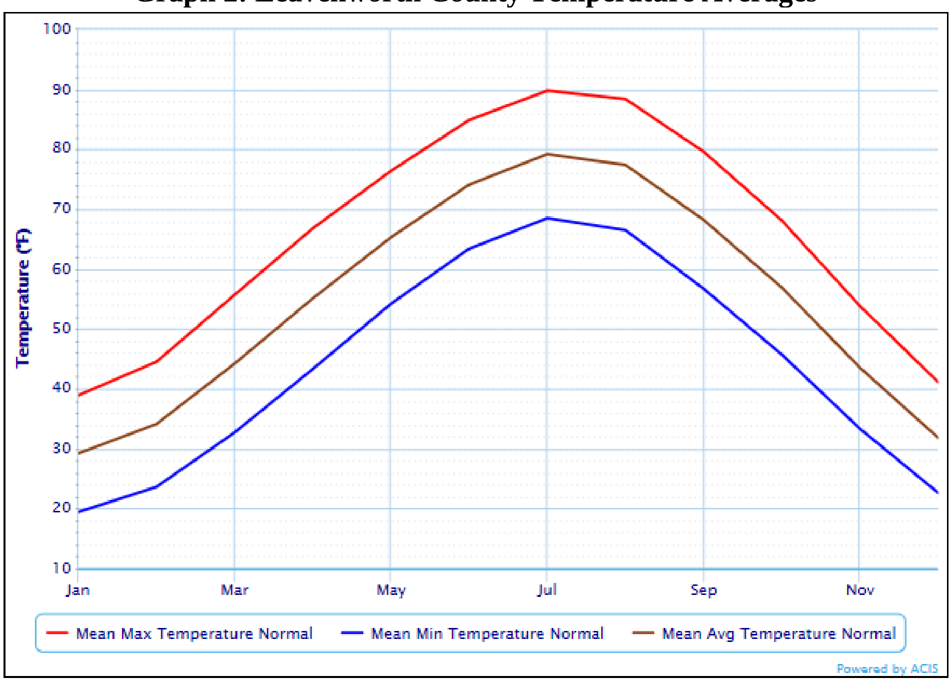
The following graphs illustrate the above data.

Graph 1: Johnson County Temperature Averages



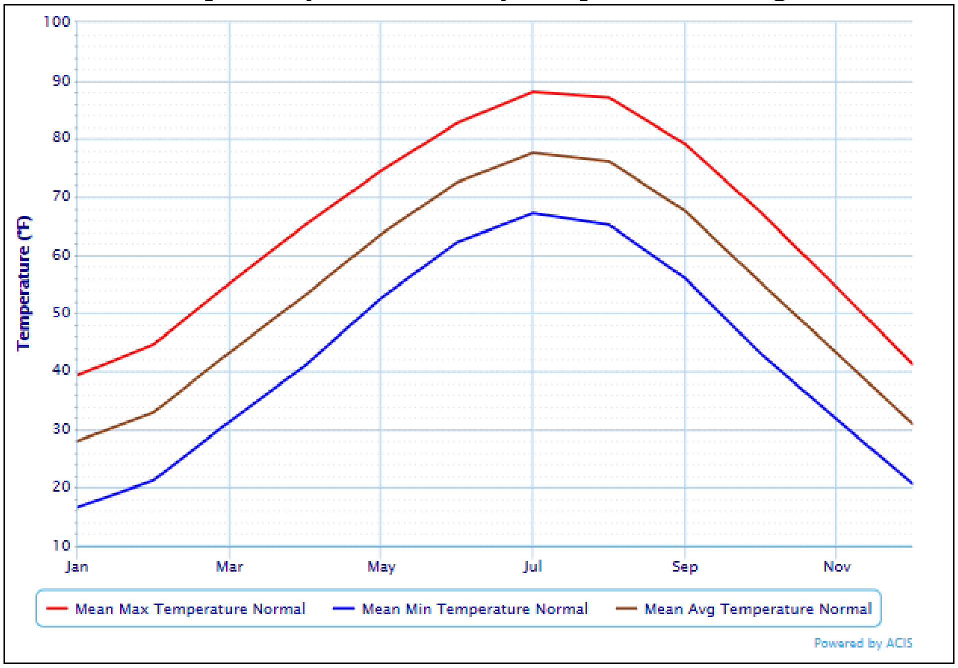
Source: High Plains Regional Climate Center

Graph 2: Leavenworth County Temperature Averages



Source: High Plains Regional Climate Center

Graph 3: Wyandotte County Temperature Averages

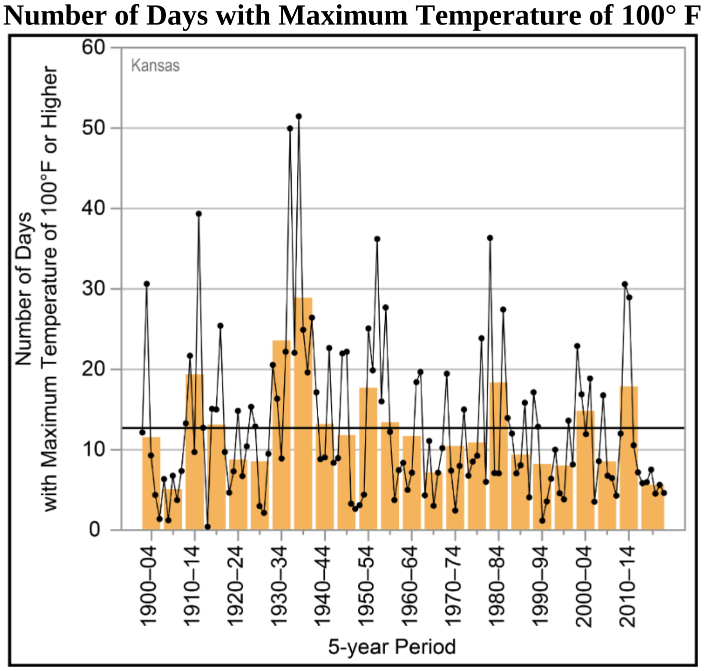


Source: High Plains Regional Climate Center

4.11.3 Previous Occurrences

The following chart details the annual number of hot days (maximum temperature of 100°F or higher) for Kansas from 1900 to 2020. Data indicates that since 2000, Kansas has experienced some of the highest springtime temperatures on record, while summer temperatures have been near to above average. The warmest summers on record were 1934 and 1936.

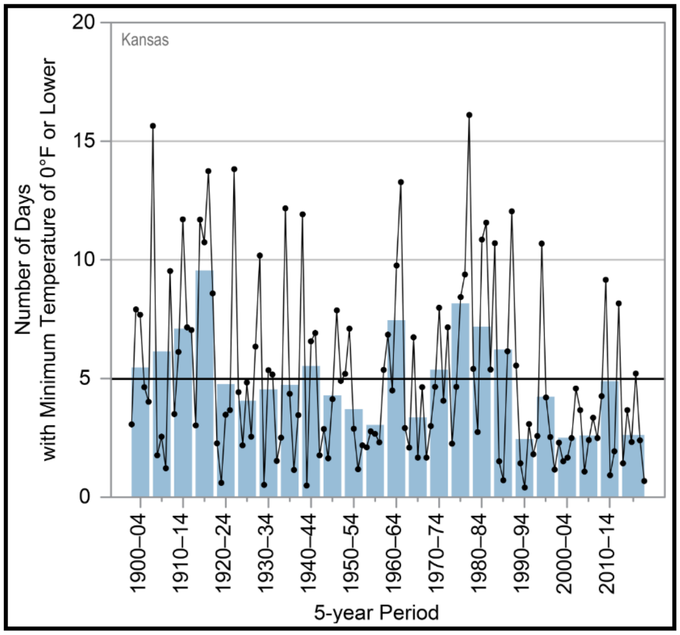
Chart 18: Number of Days with Maximum Temperature of 100° F or Higher



Source: NOAA NCEI State Climate Summary 2022 for Kansas

The following chart details the annual number of very cold days (minimum temperature of 0°F or lower) for Kansas from 1900 to 2020. Since 1990, Kansas has experienced a near to below average number of very cold nights, indicative of overall winter warming in the region,

Chart 19: Number of Days with Minimum Temperature of 0° F or Less



Source: NOAA NCEI State Climate Summary 2022 for Kansas

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

Table 49: Kansas Region L Historic Temperatures

County	Historic Low Temperature (F)	Historic High Temperature (F)
Johnson	-29	114
Leavenworth	-14	105
Wyandotte	-22	108

Source: High Plains Regional Climate Center

Additionally, data from the NCEI from 2009 through 2023 indicates the following recorded extreme temperature events. As these events tend to cover large areas, they are reported as regional:

Table 50: Kansas Region L NCEI Extreme Temperature Events, 2009 - 2023

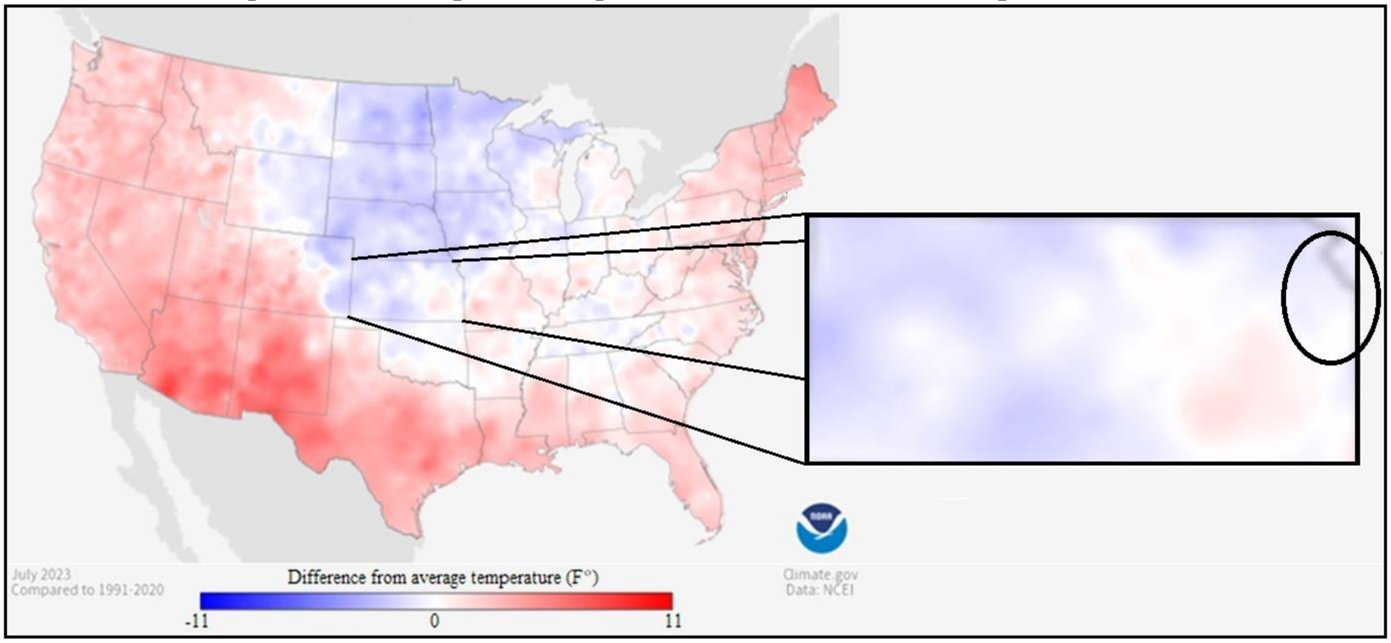
County	Event Type	Number of Events	Property Damage	Deaths	Injuries
Kansas Region L	Cold	6	$0	0	0
	Heat	3	$0	0	0

Source: NOAA NCEI

4.11.4 Probability of Future Events

Predicting the probability of extreme temperature occurrences is tremendously changing due to the large number of factors involved. Available data suggests that both the average high temperatures and the record high temperature will likely increase over the coming years as indicated by the following map:

Map 42: Kansas Region L Temperature Difference from Average, 1990 – 2020



Source: NOAA

Temperatures in Kansas Region L have risen by 1.5° F since the early 1900s, with the number of hot days above the long-term average since the 1990s. There is no long-term trend in very warm nights or extremely hot days, although both were slightly above average during the 2010–2014 period. number of very cold nights has been mostly below average since 1990.

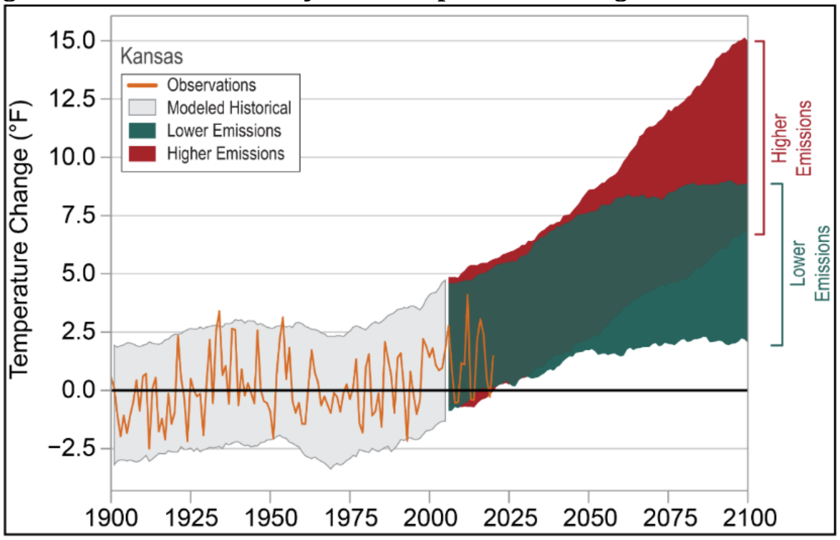
4.11.5 Projected Changes in Location, Intensity, Frequency, and Duration

When discussing extreme temperatures, climate change should be considered as it may markedly change future events. Recent climate modeling results indicate that extreme temperature events may become more common for Kansas Region L, especially heat. Recent multiyear periods have been among some of the warmest on record for Kansas, comparable to the extreme heat of the 1930s, when intense drought exacerbated hot summer conditions. Recent spring temperatures have been above average, which may have implications for crop planting. Summer temperatures have been near or above average since 2000, but there is no long-term trend in very warm nights or extremely hot days, although both are trending slightly above average. The number of very cold nights has been mostly below average since 1990, and the freeze-free season has also lengthened, averaging about nine days longer in this century than the 20th century average.

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. Additionally, rising temperatures can harm air quality and amplify existing threats to human health. Warmer weather can increase the production of ground-level ozone, a pollutant that causes lung and heart problems. Heat stress is expected to increase as climate change brings hotter summer temperatures and more humidity. Certain people are especially vulnerable, including children, the elderly, the sick, and those living below the poverty line.

The following chart indicates the projected temperature change for Kansas Region L utilizing two global climate models. One model utilizes information in which greenhouse gas emissions continue to increase (higher emissions), with the other model utilizing information in which greenhouse gas emissions increase at a slower rate (lower emissions). Temperatures in, detailed by the orange line, have risen 1.5° F since the beginning of the early 1900s. Based on both the higher emission and lower emission models, continued warming is projected throughout this century.

Chart 20: Kansas Region L Observed and Projected Temperature Change Based on Greenhouse Gas Emissions



Source: NOAA NCEI State Climate Summary 2022 for Kansas

4.11.6 Vulnerability and Impact

While difficult to quantify, the impacts of future extreme temperature may have far reaching impacts. The incidence of wildfires increases substantially during extended periods of extreme heat, which in turn places both human and wildlife populations at higher levels of risk. Although environmental impacts are difficult to quantify, losses to plant and animal species, wildlife habitat, and air and water quality, wildfires, degradation of landscape quality, loss of biodiversity, and soil erosion may result from extended periods of extreme temperatures.

A primary concern with this hazard is human health safety issues, as extreme temperatures can be a direct cause of death. Specific at-risk groups include outdoor workers, farmers, young children, and senior citizens. Compounding these concerns is the potential loss of electric power due to increased strain on power generation and distribution due to increased air conditioning or heating needs.

Extreme temperature impacts on humans can be measured for both heat and cold. The following table discusses potential impacts on human health related to excessive heat.

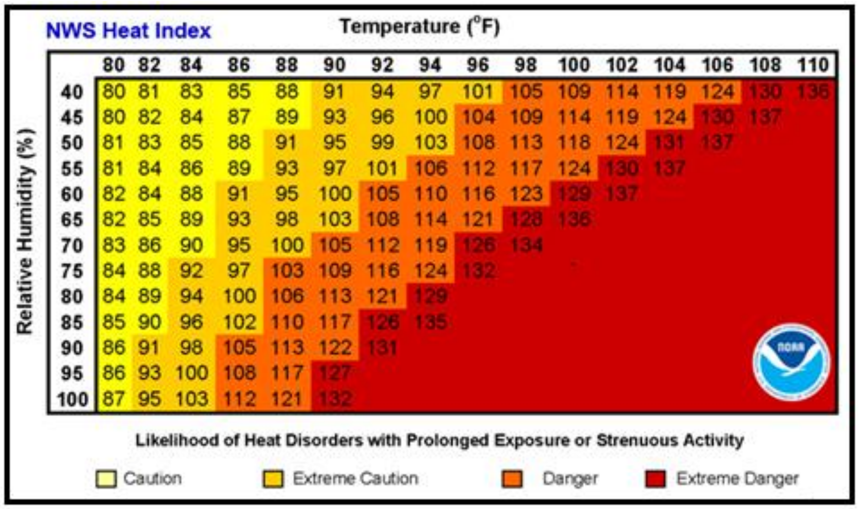
Table 51: Extreme Heat Impacts on Human Health

Heat Index 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
105-130° F	Heatstroke/sunstroke highly likely with continued exposure

Source: National Weather Service Heat Index Program

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 graph, from the NWS, indicates Heat Index values.

Chart 21: Heat Index



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

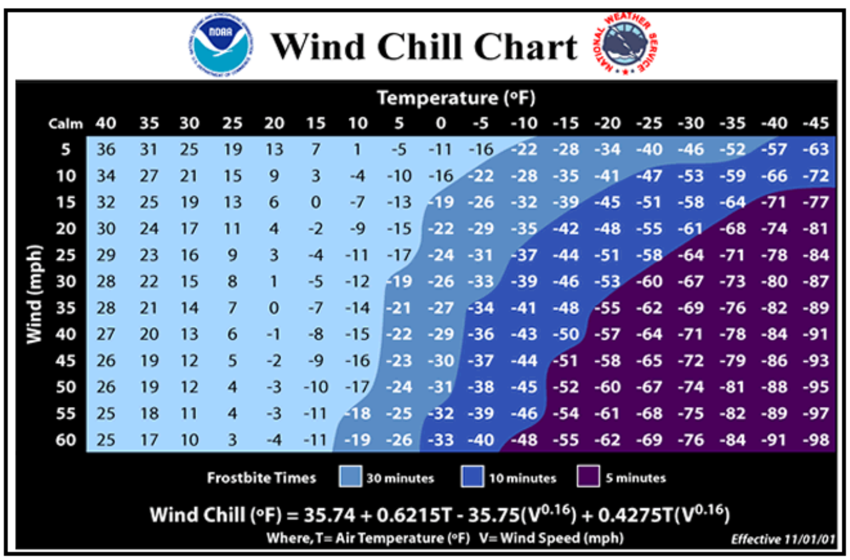
Source: NWS

Extreme cold temperatures can result in a variety of concerns, including:

- Frostbite: The freezing of skin and the body tissue just beneath it
- Hypothermia: Dangerously low body temperature (and the most common winter weather killer)

When extremely cold temperatures are accompanied by strong winds the result can be potentially lethal wind chills. Wind chill is the temperature your body feels when the air temperature is combined with the wind speed and is based on the rate of heat loss from exposed skin caused by the effects of wind and cold. As the speed of the wind increases, it can carry heat away from your body much more quickly, causing skin temperature to drop. The wind chill chart shows the difference between the actual air temperature and the perceived temperature due to wind, and amount of time until frostbite occurs.

Chart 22: Wind Chill Chart



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

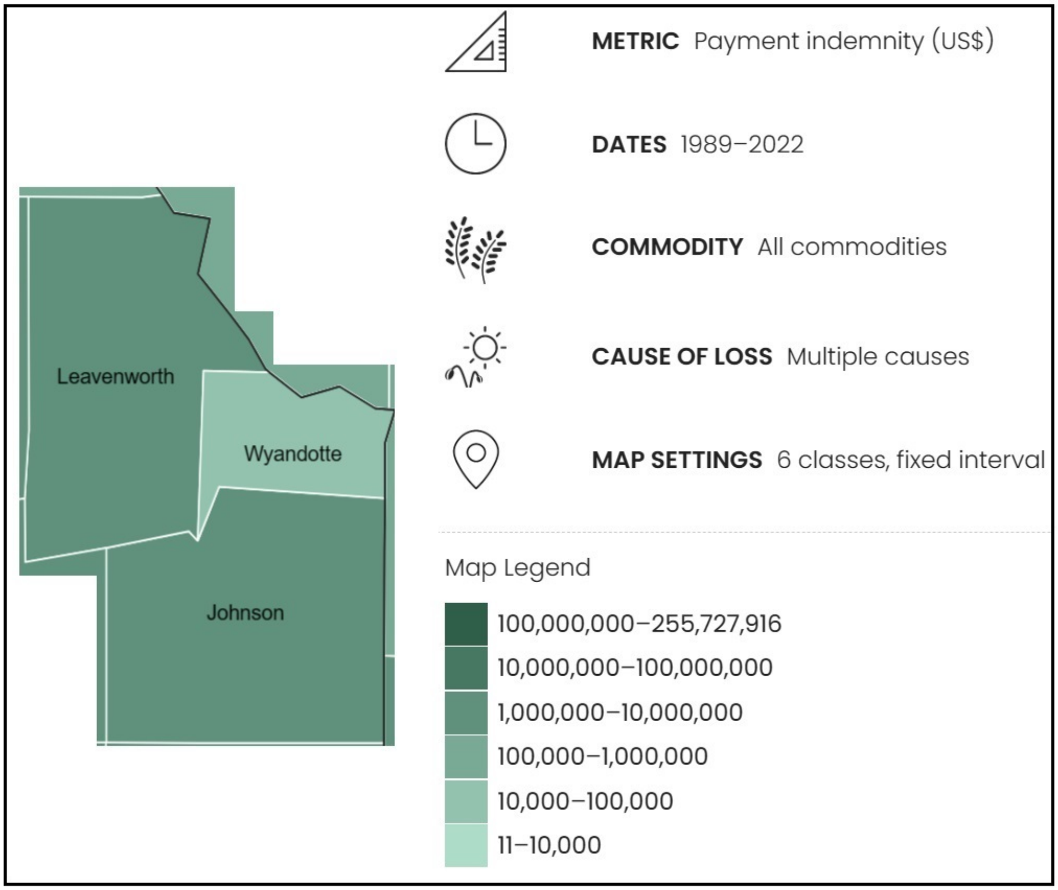
Source: NOAA

Extreme heat can cause significant damage to the local environment by dehydrating vegetation and wildlife, which may result in cascading effects to the surrounding environment, such as drought, wildfires, mudslides, or landslides. Extreme temperatures may severely decrease the yield of the agricultural sector. The yield of cash crops may be reduced, livestock may be adversely impacted by extreme heat, or grazing losses may be incurred by farmers or ranchers;

potentially resulting in decreased food security. In the event of significant agricultural losses caused by extreme heat or drought, some assistance may be available to impacted farms or ranches.

Extreme heat conditions can cause significant agricultural impacts. The following map from the United States Department of Agriculture details total agricultural losses, by county, due to extreme conditions from 1989 to 2021:

Map 43: Agricultural Losses Due to Extreme Heat Conditions, 1989 to 2021



Source: USDA

Extreme temperatures can pose various risks to local and county operations, and may include:

- Health and Safety Risks: High temperatures, especially during heatwaves, can pose significant health risks to government employees. Heat-related illnesses such as heat exhaustion and heatstroke can occur, potentially leading to hospitalizations or fatalities. Cold temperatures can also lead to cold-related illnesses and injuries, such as frostbite and hypothermia.
- Emergency Response: Government agencies may need to respond to extreme weather events, such as providing emergency shelter during heatwaves or responding to weather-related accidents and emergencies. These responses can strain resources and personnel.
- Budgetary Impact: The costs associated with responding to and mitigating the effects of extreme temperatures can strain state budgets. This includes expenses related to emergency response, infrastructure repairs, and healthcare.

Potentially Vulnerable Community Lifelines

Extreme temperatures, whether excessively hot or cold, can impact various community lifelines, critical systems and services that communities rely on for their functioning. Vulnerabilities arise due to the stress that extreme temperatures place on infrastructure, resources, and operational processes. As an overview, the May 2023 FEMA Benefit-Cost Analysis Sustainment and Enhancements Standard Economic Value Methodology Report indicates the following loss values for community lifelines:

Table 52: Economic Impacts of Loss of Service Per Capita Per Day (in 2022 dollars)

Category	Loss
Loss of Electrical Service	$199
Loss of Wastewater Services	$66
Loss of Water Services	$138
Loss of Communications/Information Technology Services	$141

Source: May 2023 FEMA Benefit-Cost Analysis Sustainment and Enhancements Standard Economic Value Methodology Report

Extreme temperatures, whether excessively hot or cold, can impact various community lifelines, critical systems and services that communities rely on for their functioning. Vulnerabilities arise due to the stress that extreme temperatures place on infrastructure, resources, and operational processes.

Extreme heat and extreme cold can have significant impacts on roads, leading to various issues and challenges. Extreme temperatures can cause the following impacts:

- Softening of Asphalt: High temperatures can cause asphalt to soften and become more susceptible to deformation. This leads to the development of ruts and potholes as the road surface loses its stability.
- Rutting and Raveling: The combination of high temperatures and heavy traffic loads can result in rutting, where depressions or grooves form in the road surface. Raveling, the disintegration of the asphalt surface, may also occur.
- Expansion and Contraction: Materials like concrete and asphalt expand in high temperatures and contract in cooler temperatures. This expansion and contraction can lead to cracking and deterioration of the road surface over time.
- Freeze-Thaw Cycles: Fluctuations between freezing and thawing can lead to the formation of ice within the road structure. The expansion of water as it freezes can result in cracks and damage to the road surface.
- Frost Heaving: During freeze-thaw cycles, moisture in the soil beneath the road can freeze, causing the ground to heave upward. This can result in uneven surfaces and damage to the road structure.

The following table, from the Kansas Department of Transportation, indicates the total road miles by county for Kansas Region L:

Table 53: Kansas Region L Road Mileage by County

County	Total Road Miles
Johnson	3,352
Leavenworth	1,158
Wyandotte	1,146

Source: Kansas Department of Transportation

The cost to conduct maintenance on a road can vary significantly depending on the types of work required. However, the average estimate for repairs on a per mile basis in 2019 was $14,750 per mile. The cost to replace a road can vary significantly based on several factors, including the type of road, local labor and material costs, the complexity of the project, and the specific requirements of the replacement. As a rough estimate, road construction costs can range from $1,000,000 to $10,000,000 per mile.

Extreme heat and extreme cold can impact electrical utilities in various ways, potentially leading to disruptions in service. These impacts include:

- Power Outages: High temperatures can strain electrical systems, leading to increased demand for cooling systems like air conditioners. This heightened demand can overload power grids, resulting in power outages.
- Transformer Overheating: Transformers, which are crucial components in power distribution, can overheat in extreme temperatures. This can lead to malfunctions, reduced efficiency, or even failures, causing power disruptions.

- Equipment Failure: Electrical equipment, such as cables and switches, may experience higher resistance and increased stress during extreme heat, increasing the likelihood of equipment failures.
- Reduced Efficiency in Power Plants: Power generation facilities may experience reduced efficiency during heatwaves due to elevated ambient temperatures. This can affect the output of power plants and potentially lead to supply shortages.
- Icing on Power Lines: Ice accumulation on power lines can lead to increased weight, potentially causing lines to sag or break. This can result in power outages and safety hazards.
- Communication Disruptions: Both extreme heat and cold can impact communication infrastructure. For example, extreme cold can affect the performance of fiber optic cables, while extreme heat can lead to equipment failures in communication systems.

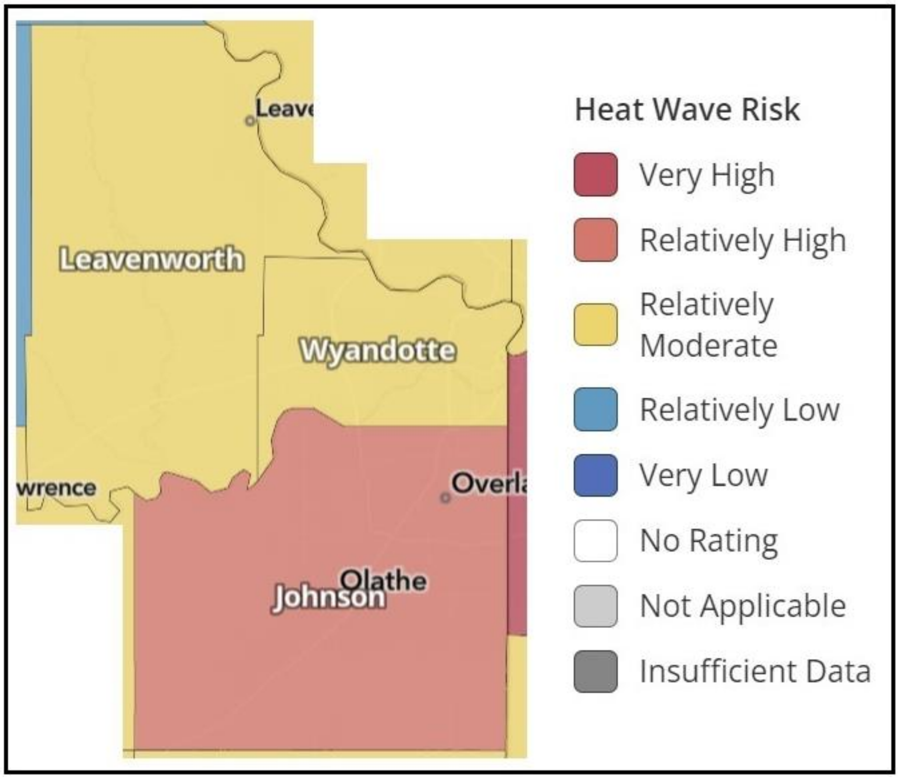
In order to reduce plan duplication, mapping concerning electrical generation plants, high-capacity transmission lines, and electrical utility providers as well as utility repair and replacement cost estimation provides may be found in Maps 31 and 32, pages 75 and 76, and Chart 15, page 76.

Hospitals and other smaller medical facilities may see an increase in heat or cold related illness during an extreme temperature event, but it is considered unlikely that this increase will impact or overload capacity. Hospital capacity mapping may be found in Map 33, page 77. However, extreme temperatures can increase the demand for emergency shelters, particularly in cases of widespread power outages. Setting up and managing these shelters can strain resources.

FEMA NRI

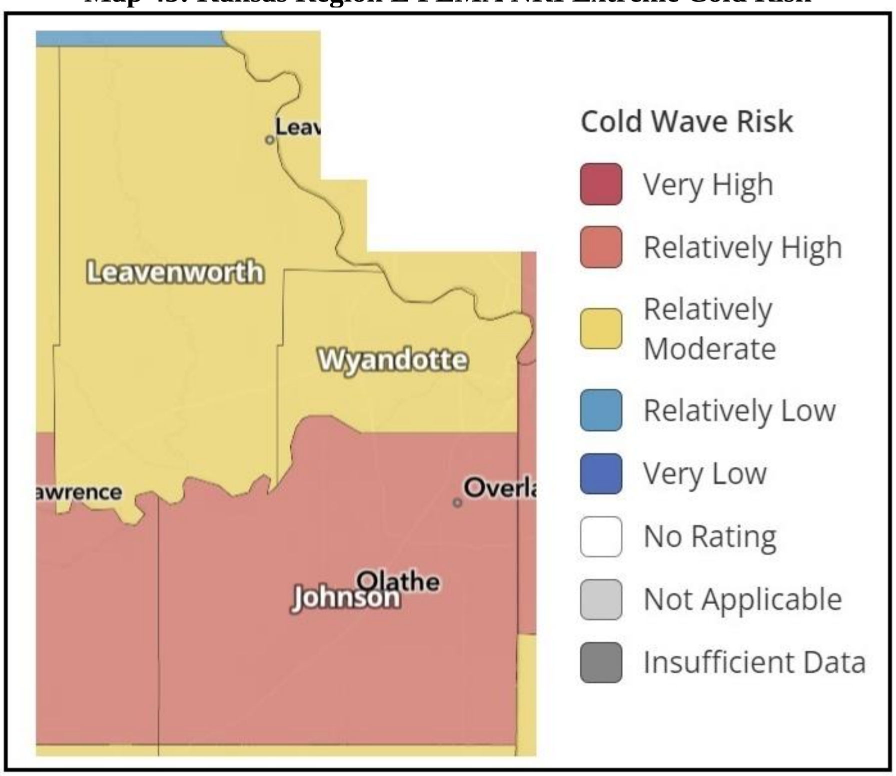
Using the FEMA NRI, and consisting of three input components (expected annual loss, social vulnerability, and community resilience), the following map was created indicating the potential risk to participating counties from extreme heat and extreme cold:

Map 44: Kansas Region L FEMA NRI Extreme Heat Risk



Source: FEMA NRI

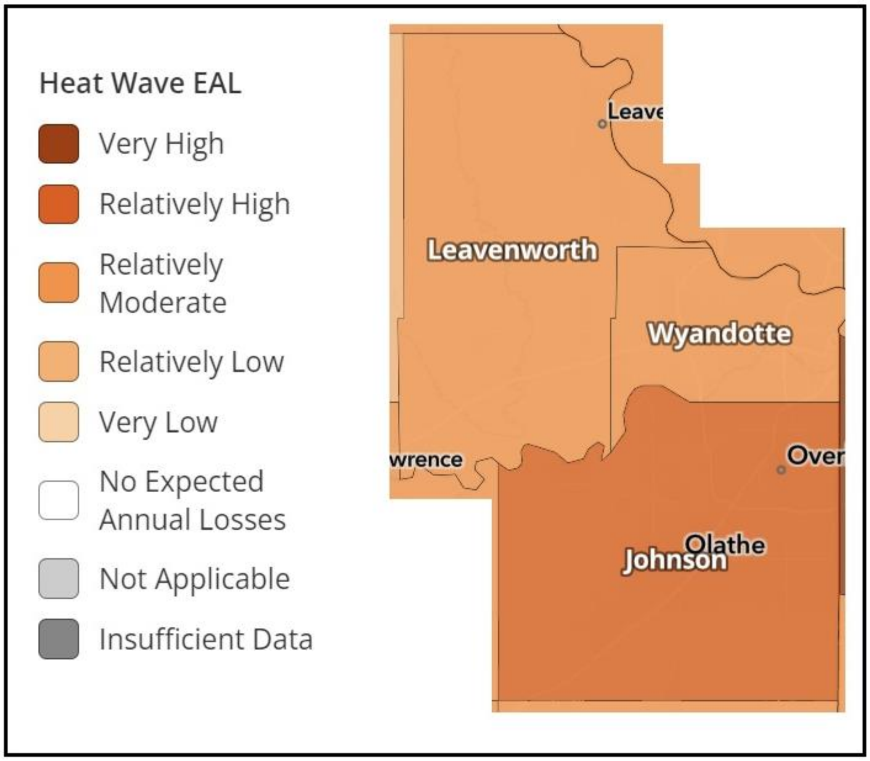
Map 45: Kansas Region L FEMA NRI Extreme Cold Risk



Source: FEMA NRI

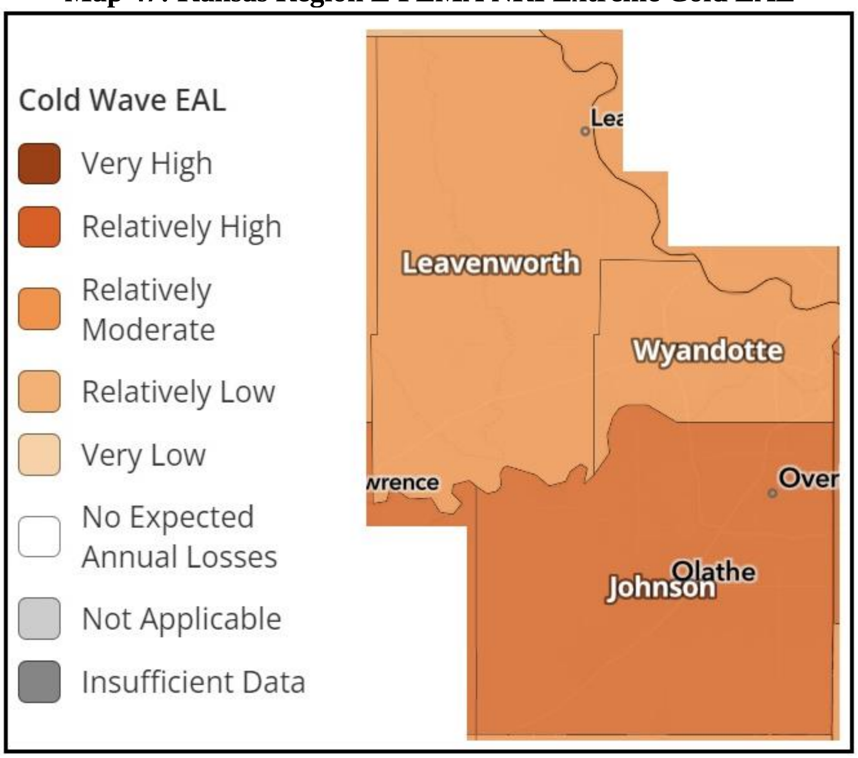
As part of the NRI, EAL represents the average economic loss in dollars resulting from natural hazards each year and is proportional to a community's risk. The following map indicates the EAL for extreme heat and extreme cold for participating counties within Kansas Region L:

Map 46: Kansas Region L FEMA NRI Extreme Heat EAL



Source: FEMA NRI

Map 47: Kansas Region L FEMA NRI Extreme Cold EAL



Source: FEMA NRI

The following tables indicates the FEMA NRI and EAL analysis for each participating Kansas Region L county for extreme heat and extreme cold:

Table 54: Kansas Region L FEMA NRI and EAL for Extreme Heat by County

County	Risk Index	EAL
Johnson	Relatively High	Relatively High
Leavenworth	Relatively Moderate	Relatively Moderate
Wyandotte	Relatively Moderate	Relatively Moderate

Source: FEMA NRI

Table 55: Kansas Region L FEMA NRI and EAL for Extreme Cold by County

County	Risk Index	EAL
Johnson	Relatively High	Relatively High
Leavenworth	Relatively Moderate	Relatively Moderate
Wyandotte	Relatively Moderate	Relatively Moderate

Source: FEMA NRI

Consequence Analysis

This consequence analysis lists the potential impacts of a hazard on various elements of community and state infrastructure. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Kansas Region L residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

Table 56: Extreme Temperature Consequence Analysis

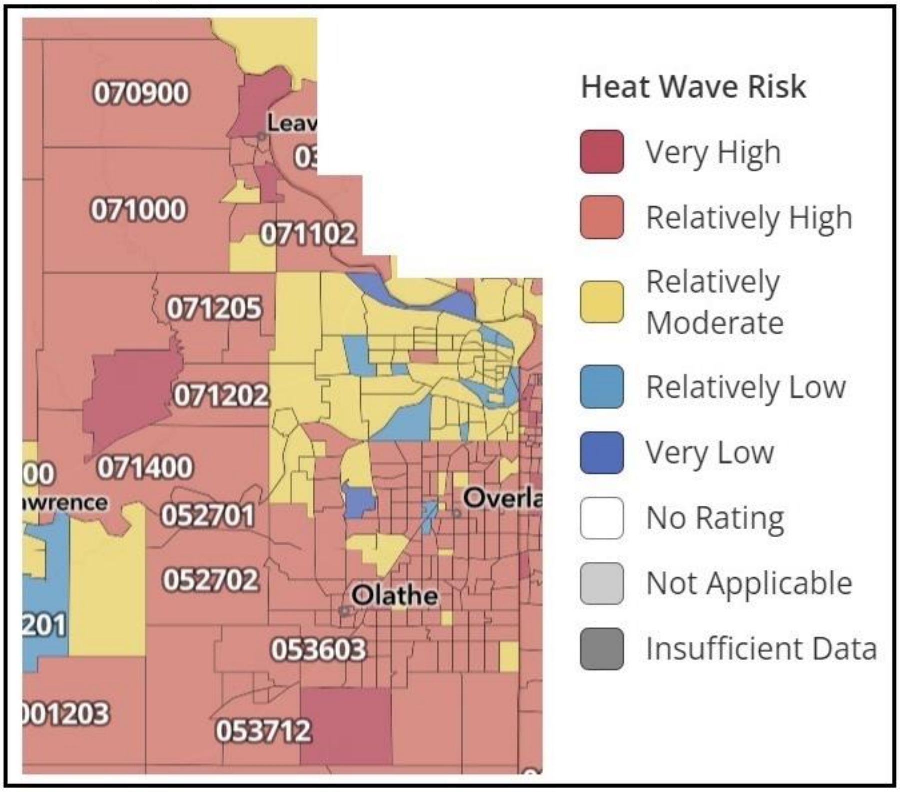
Subject	Potential Impacts
Impact on the Public	Extreme temperatures can have severe consequences for health, particularly for the elderly and young. Loss of electricity may impact heating or air conditioning leading to poorly tolerated indoor temperatures. Physical effects of extreme temperatures can cause major health problems and may lead to injury or death.
Impact on Responders	Without proper mitigation efforts, responders may be susceptible to temperature related illness. Extreme temperatures may also damage instruments or equipment necessary for response activities. First responders may face dangerous road conditions leading to accidents and prolonged response times.
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary based on the situation. This hazard may impact an agency’s ability to implement continuity operations due to power outages. If the activation of alternate facilities was required, continuity of operations may be difficult due to lack of computer/network access during power outages.
Delivery of Services	Extreme temperatures can impact efficient delivery or inability of goods or services due to potential health impacts on workers. Equipment and vehicles may be damaged, and the delivery of services may be delayed due to poor travel conditions
Property, Facilities, and Infrastructure	Facility integrity is at risk with regards to power cables and stations being overused and limiting operations. This could lead to limits on facility heating or cooling.
Impact on Environment	Extreme temperatures can cause significant damage to the local environment and result in habitat loss, invasive species, and changes in migration. Extreme temperatures may severely decrease the yield of cash crops. Livestock are adversely affected by extreme temperatures and may suffer medical problems or death. A significant impact on water supply caused by elevated temperatures is increase in frequency and impact of harmful algal blooms and occurrence of cyanobacteria.
Economic Conditions	Extreme temperatures may drain local resources. Under some conditions, some of the costs can be recouped through federal grant reimbursements.
Public Confidence in Governance	Governmental response, on all levels, requires direct actions that must be immediate and effective to maintain public confidence.

4.11.7 Jurisdictional Risk and Vulnerability

To help understand the risk and vulnerability to extreme temperatures of participating jurisdictions mapping from the FEMA NRI was run on a census tract level. As the NRI does not generate mapping for individual jurisdictions, census tract analysis is the closest analogue available to understand individual jurisdiction conditions.

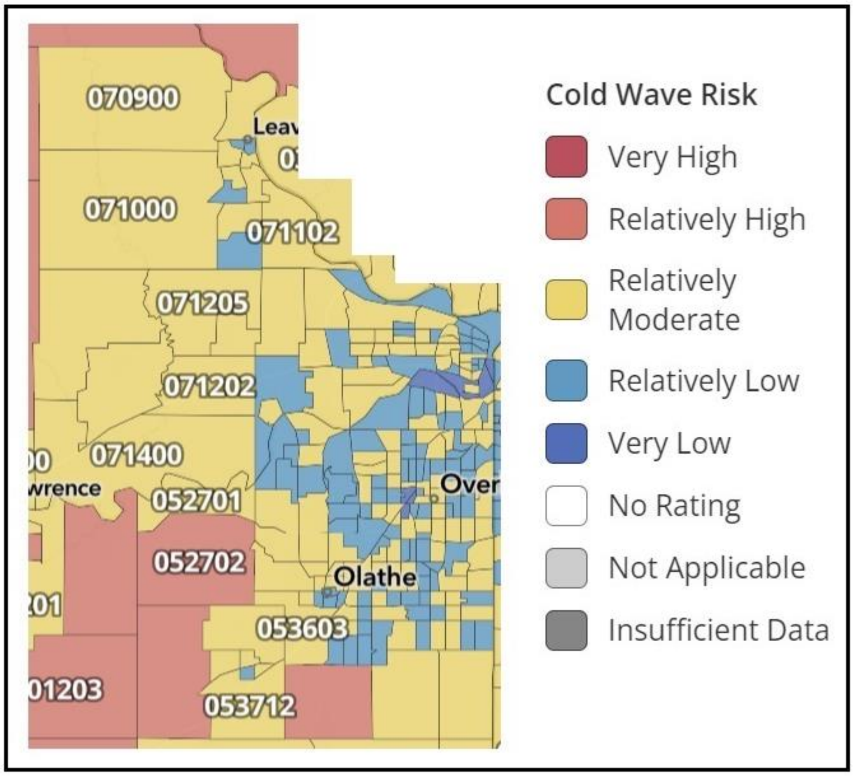
Using the FEMA NRI, and consisting of three input components (expected annual loss, social vulnerability, and community resilience), the following map was created indicating the potential risk to participating jurisdictions (as indicated by census tract) from extreme heat and extreme cold events:

Map 48: FEMA NRI Jurisdictional Extreme Heat Risk



Source: FEMA NRI

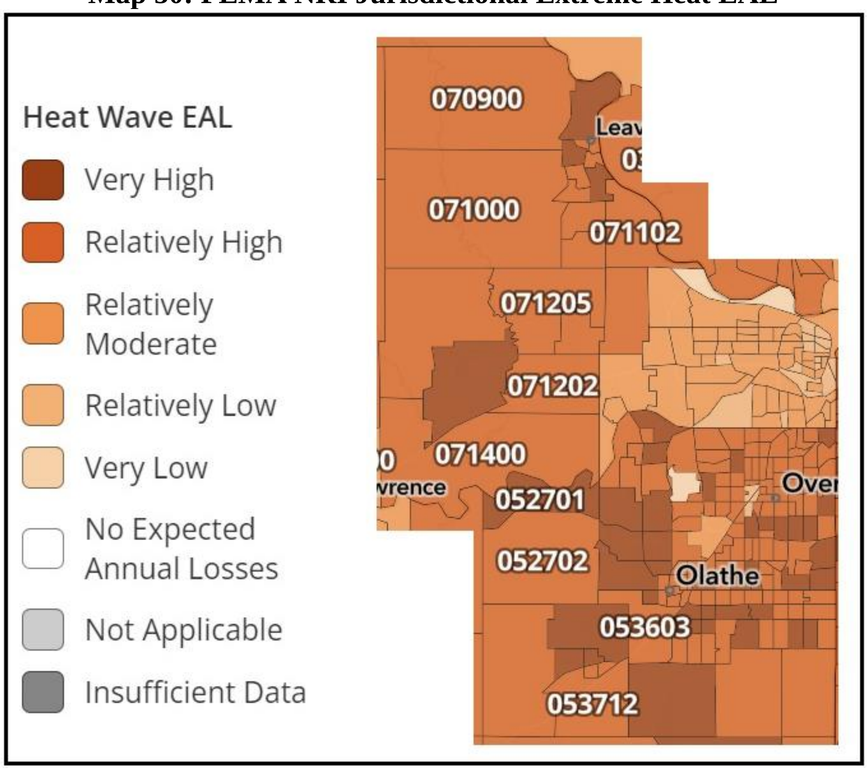
Map 49: FEMA NRI Jurisdictional Extreme Cold Risk



Source: FEMA NRI

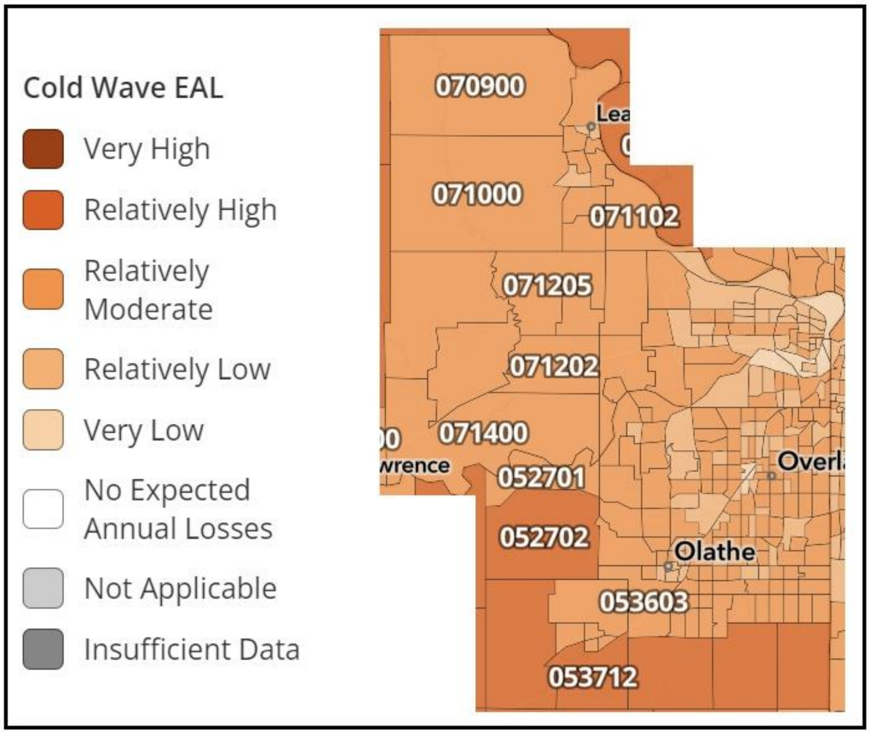
As part of the NRI, EAL represents the average economic loss in dollars resulting from natural hazards each year and is proportional to a community's risk. The following map indicates the EAL for extreme heat and extreme cold for participating jurisdictions (as indicated by census tract) within Kansas Region L:

Map 50: FEMA NRI Jurisdictional Extreme Heat EAL



Source: FEMA NRI

Map 51: FEMA NRI Jurisdictional Extreme Cold EAL



Source: FEMA NRI

FEMA NRI data tables, by census tract, are included in Appendix C. These data tables contain the risk index and EAL along with total building valuation and agricultural valuation allowing for an understanding of potential structural and agricultural vulnerability on a jurisdictional basis.

Socially vulnerable populations may be more vulnerable to the effects of extreme temperature events due to extremes in age or the inability to heat and cool homes during an event. Please see Section 3 for details on vulnerable populations.

4.12 Flood

4.12.1 Hazard Description

Flooding is the overflow or accumulation of water on normally dry land, often caused by heavy rainfall, snowmelt, or the failure of natural or artificial barriers. Flooding can lead to the inundation of homes, roads, farmland, and other areas, causing damage to property, disruption of daily life, and potential threats to human safety and the environment.

A floodplain is a flat or gently sloping area adjacent to a river, stream, or other water body. These areas act as a buffer during periods of heavy rainfall or snowmelt, absorbing excess water and preventing it from rushing downstream too quickly. In its common usage, a floodplain refers to areas inundated by the 100-year flood, the flood that has a 1% chance of being equaled or exceeded in any given year, and the 500-year flood, the flood that has a 0.2% chance of being equaled or exceeded in any given year. The 100-year flood is the national minimum standard to which communities regulate their floodplains through the NFIP.

4.12.2 Location and Extent

A variety of factors affect the severity of flooding within Kansas Region L. These include topography, weather characteristics, development, and geology. Intense flooding will create havoc in any jurisdiction affected.

Flash Flooding

Flash flooding occurs during heavy or extended periods of rain, generally when the ground is unable to rapidly absorb the water. Most flash flooding in Kansas Region L is caused by intense and stationary thunderstorms. Heavy sustained rain can create rapid flooding very quickly, and flooding can occur miles away from where the rain fell. Factors that can contribute to the severity of flash flooding include rainfall intensity, duration, drainage condition, and ground conditions (paved or unpaved). Flash floods are particularly dangerous to people and property, as six inches of moving water can knock a person down and two feet can lift a vehicle. As there is often little warning of a flash flood event, they are the cause of most flood fatalities.

Riverine Flooding

Riverine flooding refers to the overflow of water from a river or a stream onto adjacent land areas. This type of flooding occurs when the water level in a river or stream rises significantly and exceeds its banks, inundating the surrounding areas. The severity of riverine flooding can be influenced by the amount and intensity of rainfall in the watershed, the size, shape, and slope of the river or stream channel, and the presence of dams on the river system.

Urban Flooding

FEMA defines urban flooding as 'the inundation of property in a built environment, particularly in more densely populated areas, caused by rain falling on increased amounts of impervious surfaces and overwhelming the capacity of drainage systems." In Kansas Region L, urban flooding has consistently increased due to a number of factors, including the filling for development of natural wetlands and waterways, the reduction of permeable surfaces, and the aging and insufficient capacity of stormwater systems.

To establish floodplains, FEMA adopted the Base Flood Elevation (BFE), which is the computed elevation that floodwater is anticipated to rise during a flood that has a1% chance of occurring in any given year. The BFE establishes the regulatory requirement for the elevation or floodproofing of structures, and the relationship between the BFE and a given structure's elevation determines the flood insurance premium through the NFIP.

FEMA, through the Risk Mapping, Assessment, and Planning (Risk MAP) program, works with partners to assess and map these flood risks producing Flood Insurance Rate Maps (FIRMs). As an additional benefit, the FIRMs serve as the basis for NFIP regulations and flood insurance purchase requirements.

SFHAs are defined as the area that will be inundated by the flood event having a 1% chance of being equaled or exceeded in any given year. The 1% annual chance flood is also referred to as the base flood or 100-year flood. The FIRM depicts the SFHA, including the 1%-annual-chance flood. These areas are labeled on the map as zone, as explained in the following table:

The following table details FEMA's FIRM flood zone classifications.

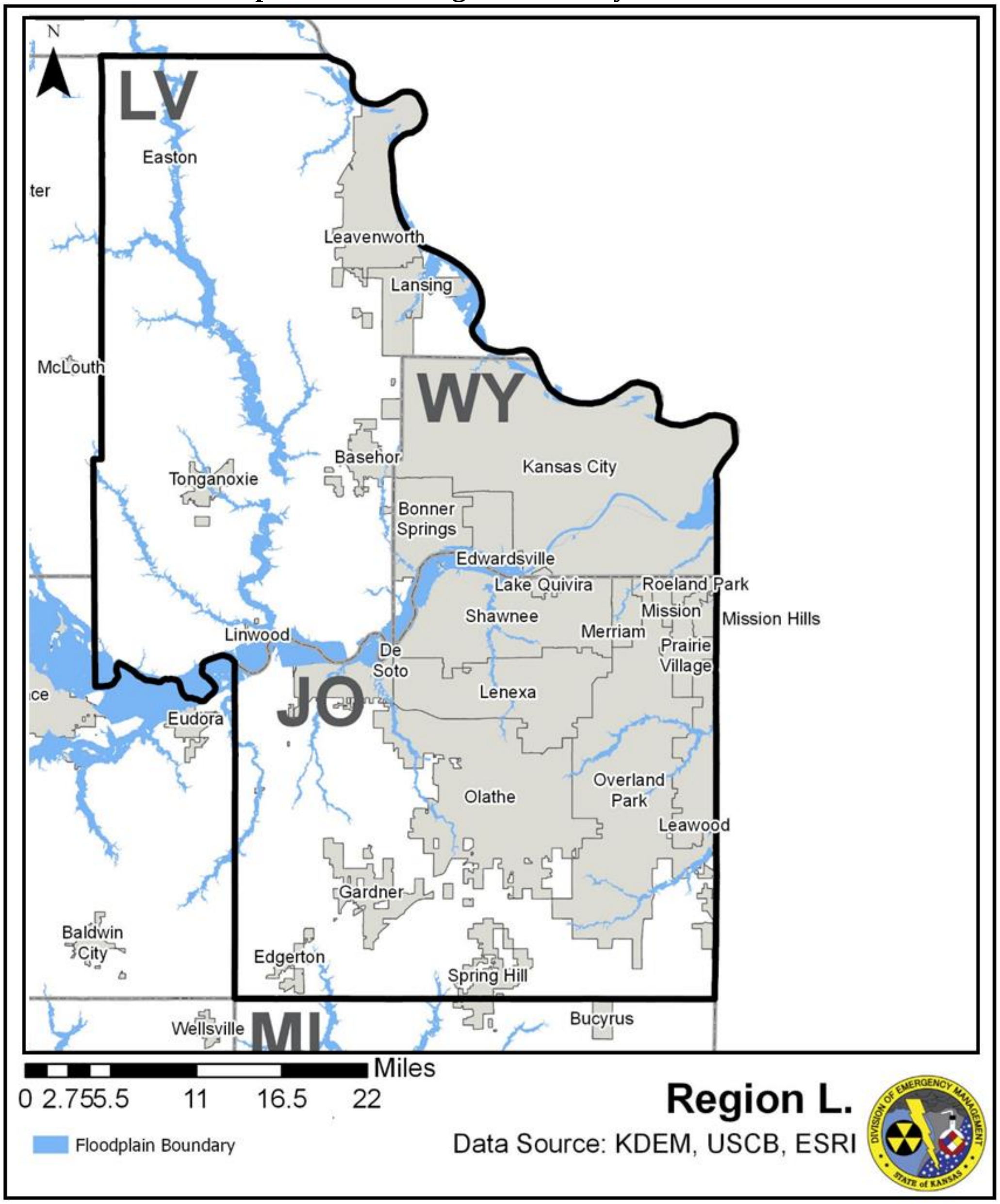
Table 57: Flood Zone Classifications

Zone	Description
A	The 1%-annual-chance or base floodplain. There are six (6) types of A Zones.
AE	The base floodplain where base flood elevations are provided.
AH	Shallow flooding base floodplain. BFEs are provided.
AO	The base floodplain with sheet flow, ponding, or shallow flooding. Base flood depths (feet above ground) are provided.
AR	The base floodplain that results from the decertification of a previously accredited flood protection system that is in the process of being restored to provide a 1%-annual-chance or greater level of flood protection.
A99	Area to be protected from base flood by levees or Federal Flood Protection Systems under construction. BFEs are not determined.
B or Shaded X	Areas between the limits of the base flood and the 0.2% annual-chance (or 500-year) flood.
C or Unshaded X	Areas of minimal flood hazard, which are the areas outside the SFHA and higher than the elevation of the 0.2% annual-chance flood

Source: FEMA

The following map uses FEMA FIRM data to depict the location of identified flood zones within Kansas Region L.

Map 52: Kansas Region L County Flood Zones



Source: KDEM

4.12.3 Previous Occurrences

Historical events of significant magnitude or impact can result in a Presidential Disaster Declaration. Kansas Region L has experienced three Presidential Disaster Declarations related to flooding in the past 10 years reflected in the following table.

Table 58: State of Kansas Region L Presidentially Declared Disasters, Flood

Designation	Declaration Date	Incident Type	Counties	Assistance
DR-4747-KS	10/26/2023	Severe Storms, Straight-Line Winds, Tornadoes, and Flooding	Johnson, Wyandotte	-
DR-4449-KS	8/14/2019	Severe Storms, Straight-Line Winds, Flooding, Tornadoes, Landslides, and Mudslides	Leavenworth	$51,157,548
DR-4347-KS	11/7/2017	Severe Storms, Straight-Line Winds, Flooding	Johnson, Wyandotte	$6,195,147.97

Source: FEMA
Note: -: Data unavailable

In addition to the Presidentially Declared Disasters, the following table presents NCEI identified flood events in Kansas from 1950 to 2023:

Table 59: Kansas Region L NCEI Flood Events, 1950 - 2023

County	Event Type	Number of Days with Events	Property Damage	Deaths and Injuries
Johnson	Flood	21	0	$75,000
	Flash Flood	59	3	$9,000,500
Leavenworth	Flood	60	0	$5,635,000
	Flash Flood	49	0	$4,452,000
Wyandotte	Flood	21	0	$125,000
	Flash Flood	23	0	$4,535,000

Source: NCEI

It is worth noting that damage estimates indicated by the NCEI are often artificially low. This underreporting is a result of the way the events are reported to the NCEI, often by the local and/or NWS office. When reporting an event oftentimes the NWS office does not have access to the actual damage assessment resulting from that event. As such, the report often details a very low amount or zero-dollar amount for damages.

The Secretary of Agriculture is authorized to designate counties as disaster areas to make emergency loans available to producers suffering losses in those counties and in counties that are contiguous to a designated county. USDA Secretarial disaster designations must be requested of the Secretary of Agriculture by a governor or the governor's authorized representative, and there is an expedited process for drought. The following table represents the total number of Secretarial Disaster Declarations, by county, for the Kansas Region L:

Table 60: Secretarial Flood Disaster Declarations, 2019 -2023

County	2022	2021	2020	2019
Johnson	0	0	0	1
Leavenworth	0	0	0	1
Wyandotte	0	0	0	1

Source: USDA Farm Service Agency

4.12.4 Probability of Future Incidents

Based on historical occurrences, Kansas Region L will continue to experience flood events on an annual basis. The definition of each flood zone's classification is used for the purpose of calculating the yearly probability of a riverine flood. Jurisdictions with property in a 100-year floodplain can expect a 1% annual chance of flooding within the designated areas. Jurisdictions with property in a 500-year floodplain can expect a 0.2% annual chance of flooding within the designated areas. FEMA FIRMs can be consulted to provide assistance in determining flooding probability for jurisdictions within Kansas Region L.

The following tables, using data from the NCEI, indicate the yearly probability of a flood or flash flood event, the number of deaths or injuries, and estimated property damage for each county in Kansas Region L.

Table 61: Kansas Region L NCEI Flood Event Probability Summary

County	Days with Event	Average Events per Year	Deaths / Injuries	Average Deaths / Injuries per Year	Property Damage	Average Property Damage per Year
Johnson	21	0	0	0	$75,000	$1,415
Leavenworth	60	1	0	0	$5,635,000	$106,321
Wyandotte	21	<1	0	0	$125,000	$2,358

Source: NCEI

Table 62: Kansas Region L NCEI Flash Flood Event Probability Summary

County	Days with Event	Average Events per Year	Deaths / Injuries	Average Deaths / Injuries per Year	Property Damage	Average Property Damage per Year
Johnson	59	1	3	<1	$9,000,500	$169,821
Leavenworth	49	1	0	0	$4,452,000	$84,000
Wyandotte	23	<1	0	0	$4,535,000	$85,566

Source: NCEI

4.12.5 Projected Changes in Location, Intensity, Frequency, and Duration

The location, intensity, frequency, and duration of flooding are influenced by a combination of natural and human-induced factors.

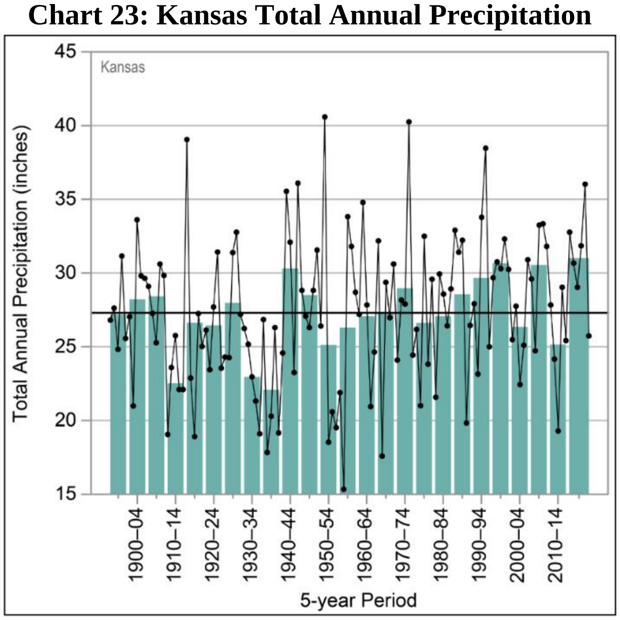
Continued urbanization, deforestation, and changes in land use can alter natural drainage patterns. The conversion of natural landscapes to impervious surfaces, such as roads and buildings, reduces the ability of the land to absorb water, leading to increased runoff and the potential for urban flooding. Alterations to river channels, including channelization and dam construction, can influence the flow of water. Modifications may lead to changes in river behavior, affecting the potential for both upstream and downstream flooding. Poorly planned infrastructure, inadequate stormwater management, and the lack of effective drainage systems in urban areas can contribute to localized flooding. The increase in impervious surfaces reduces natural infiltration, leading to more runoff during rainfall events.

Potentially impacting the future of flood events, **t**he NOAA NCEI State Climate Summary 2022 for Kansas indicates:

- Precipitation is highly variable from year to year.
- The majority of precipitation falls during the warm-season months.
- Throughout the period of record (1895–2020), total annual precipitation has generally been above average since 1985.
- The wettest consecutive 5-year interval was 2015–2019.
- The frequency of extreme precipitation events has been highly variable but shows a general increase.
- The number of 2-inch precipitation events was well above average during the 2015–2020 period.
- The increase in extreme precipitation events has been more pronounced in the eastern part of the state.

The flowing charts detail the annual precipitation and extreme precipitation events for Kansas Region L:

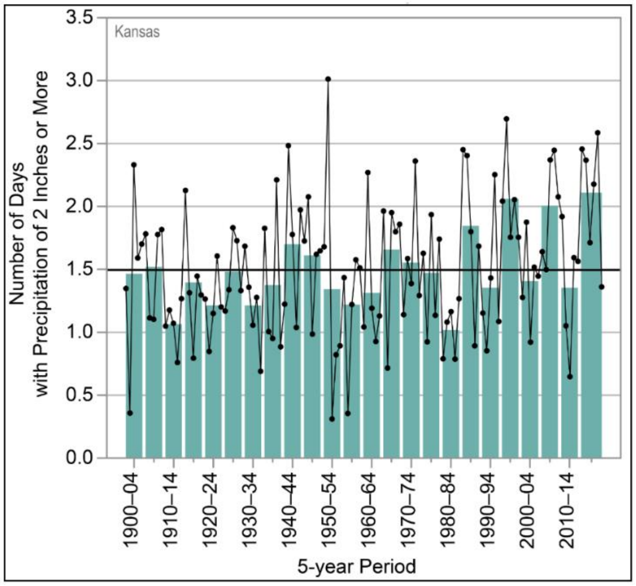
Chart 23: Kansas Total Annual Precipitation



Source: NOAA NCEI Summary 2022 for Kansas

Additionally, the NOAA NCEI State Climate Summary 2022 for Kansas suggests that the number of extreme precipitation events are projected to increase. These extreme events will likely increase the incidence of flooding within Kansas Region L.

Chart 24: Kansas Region L Number of Extreme Precipitation Events (Greater Than 2 Inches)



Source: NOAA NCEI State Climate Summary 2022 for Kansas

4.12.6 Vulnerability and Impact

The results of the Hazus analysis were utilized to estimate potential losses for flooding. The intent of this analysis was to enable Kansas Region L 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 ten square miles or more.

Hazus determines the displaced population based on the inundation area, not necessarily impacted buildings. As a result, there may be a 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 takes into account 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% increments up to 50%. Buildings that sustain more than 50% damage are considered to be substantially damaged.

The Hazus analysis also provides an estimate of 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 displaced households, damaged buildings, destroyed buildings, and total economic loss for Kansas Region L:

Table 63: Kansas Region L Hazus Flood Scenario Displaced Population Building Damages

County	Displaced Households	Damaged Buildings	Destroyed Buildings	Total Economic Loss
Johnson	2,931	1,661	398	$1,092,360,000
Leavenworth	332	55	3	$82,690,000
Wyandotte	135	48	9	$182,810,000

Source: FEMA Hazus

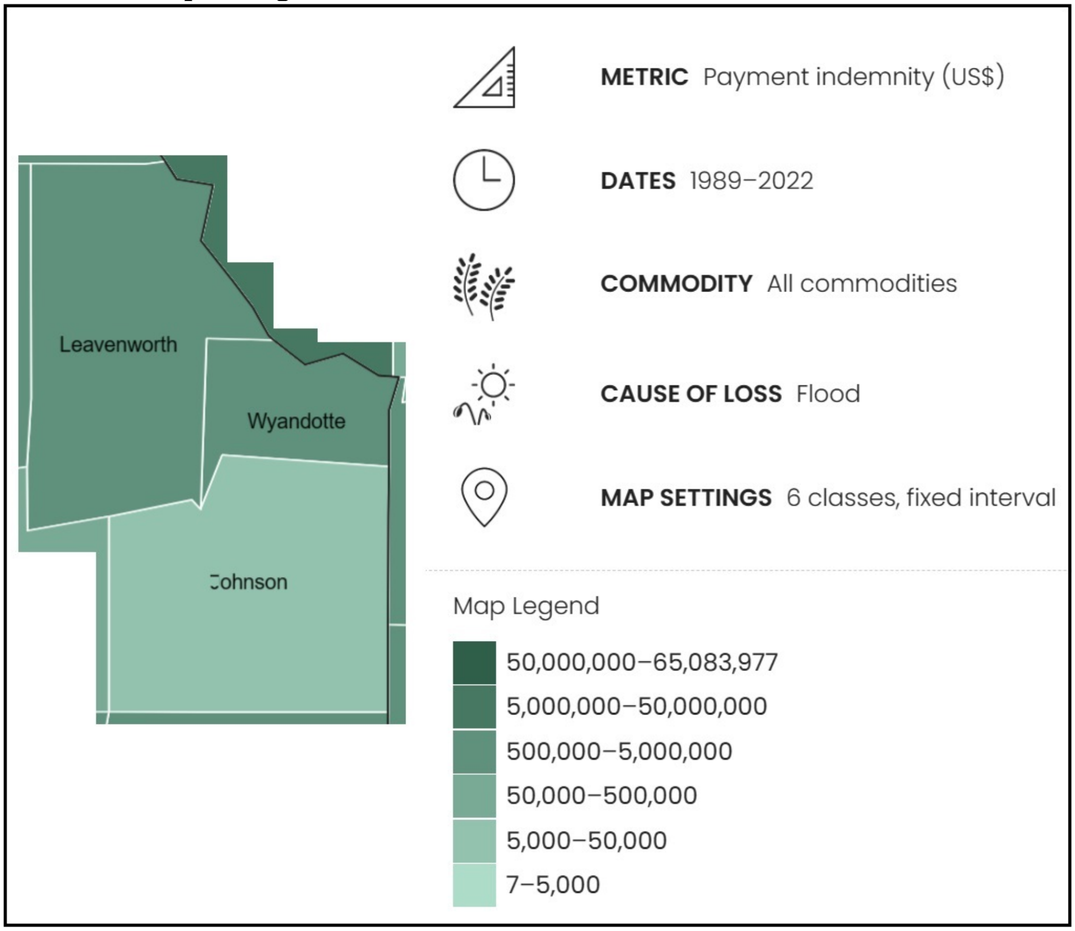
Especially critical is timely evacuation orders, and adherence to those orders. If evacuation is not heeded, or flood waters rise quickly enough, citizens could drown or become trapped for extended periods of time with no access to services or medical care. Of special concern are long term care and medical facilities where it can take longer to evacuate, or evacuation may be impossible. Additionally, lower income citizens may not have the means to relocate, whether it be lack of transportation or lack of resources to afford temporary shelter. Expected impacts of flooding on citizens may include:

- Loss of Life: Flooding is one of the leading causes of weather-related fatalities worldwide. Fast-rising floodwaters can lead to drowning and other water-related accidents, resulting in the tragic loss of lives.
- Injuries: Floods can cause injuries due to waterborne diseases, contaminated floodwaters, debris, and accidents during evacuation or rescue operations.
- Displacement: Many people may be forced to evacuate their homes during floods and will require emergency shelter or temporary housing. Prolonged displacement can be emotionally and economically changing.
- Health Risks: Floodwaters often contain pollutants, sewage, and hazardous materials. Exposure to contaminated water can lead to waterborne diseases, infections, and other health risks.
- Mental Health Effects: Survivors of floods may experience a range of emotional and psychological challenges, including post-traumatic stress disorder, anxiety, depression, and grief.
- Food and Water Shortages: Floods can contaminate water supplies and disrupt the distribution of food. This can lead to shortages of clean drinking water and essential food items.
- Impact on Vulnerable Populations: Vulnerable populations, including the elderly, children, people with disabilities, and those living in poverty, are often disproportionately affected by floods due to limited resources and mobility challenges.
- Long-Term Consequences: Some flood impacts, such as mold growth, structural damage, and land degradation, can have long-term consequences that persist even after the floodwaters recede.

Environmental impacts from flooding can be far reaching. Of particular concern is flood related runoff, potentially carrying sewage, pesticides, or hazardous chemicals, which can cause long lasting environmental harm. Expected negative outcomes could include changes in habitat, a decrease of available food, and an increase in the spread of vector-associated disease due to standing water.

Flood events can cause significant agricultural impacts. The following map from the United States Department of Agriculture details total agricultural losses, by county, due to flood conditions from 1989 to 2021:

Map 53: Agricultural Losses Due to Flood Events, 1989 to 2021



Source: USDA

Floods can pose significant risks to local operations, as they can result in a wide range of immediate and long-term consequences including:

- Emergency Response and Management: Multiple counties and local jurisdictions may be mobilized to respond to floods. They would coordinate rescue operations, evacuations, and disaster response efforts to mitigate immediate risks to human life and property.
- Infrastructure Damage and Maintenance: Transportation and public works departments may need to assess and repair damage to roads, bridges, and other critical infrastructure affected by floodwaters and debris. This can strain resources and disrupt transportation networks.
- Environmental Oversight and Regulation: Health departments mat be responsible for assessing the environmental impact of floods, monitoring water quality, and coordinating cleanup efforts. They may also be involved in addressing long-term environmental consequences.
- Water Resource Management: Water resource agencies may need to manage and allocate water resources differently in the aftermath of floods, especially if the flood affects water supplies, water quality, or flood control systems.
- Public Health and Safety: Public health departments may provide support for public health needs during and after a flood, managing emergency shelters and addressing potential health risks from contaminants or waterborne diseases.

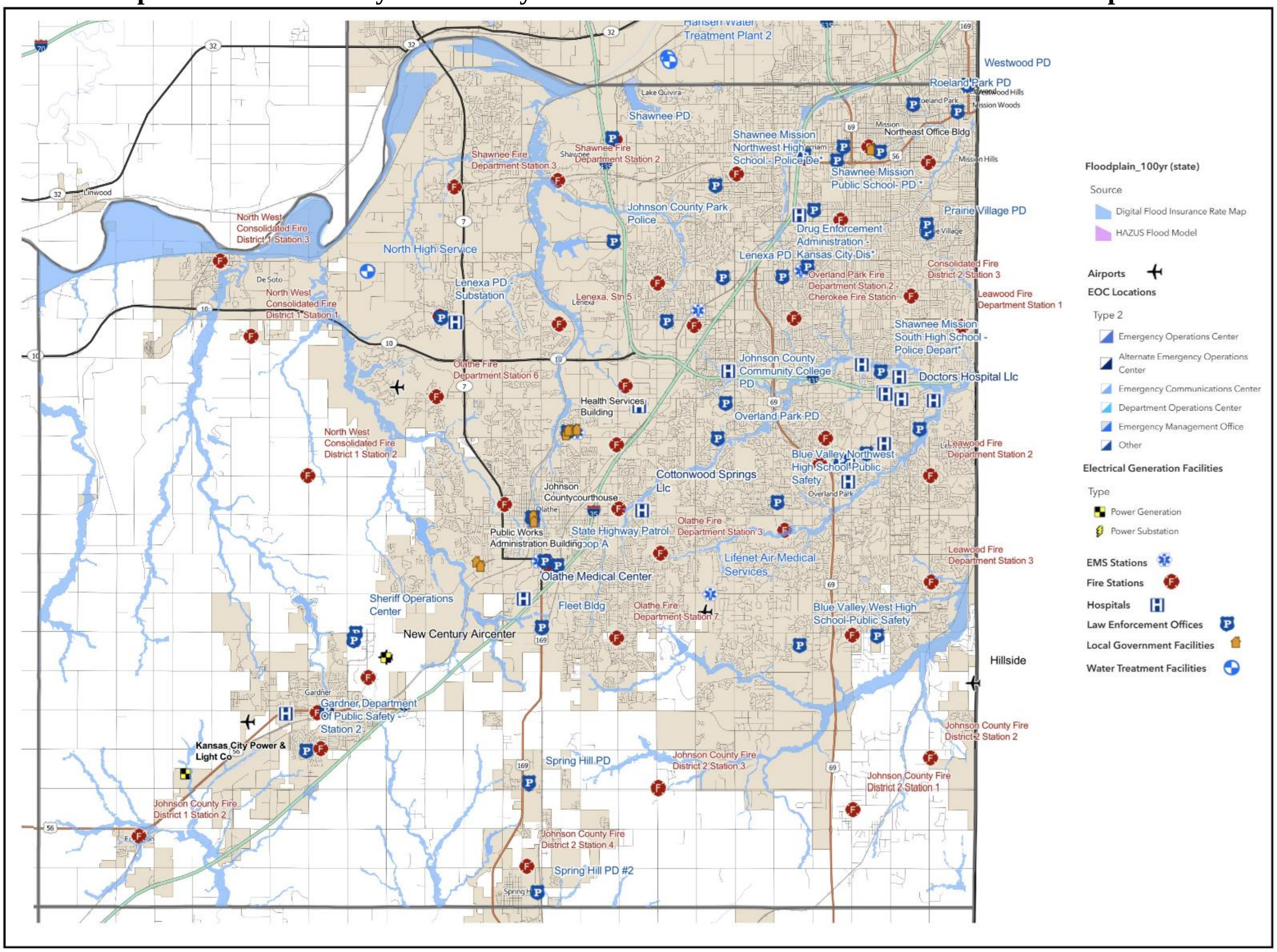
- Long-Term Recovery: County emergency management agencies play a critical role in long-term recovery efforts, including securing federal disaster assistance, providing financial support to affected communities, and helping with the rebuilding and restoration of infrastructure.

Potentially Vulnerable Community Lifelines

Flooding can impact various community lifelines, critical systems and services that communities rely on for their functioning. Vulnerabilities arise due to the stress that flooding can place on infrastructure, resources, and operational processes.

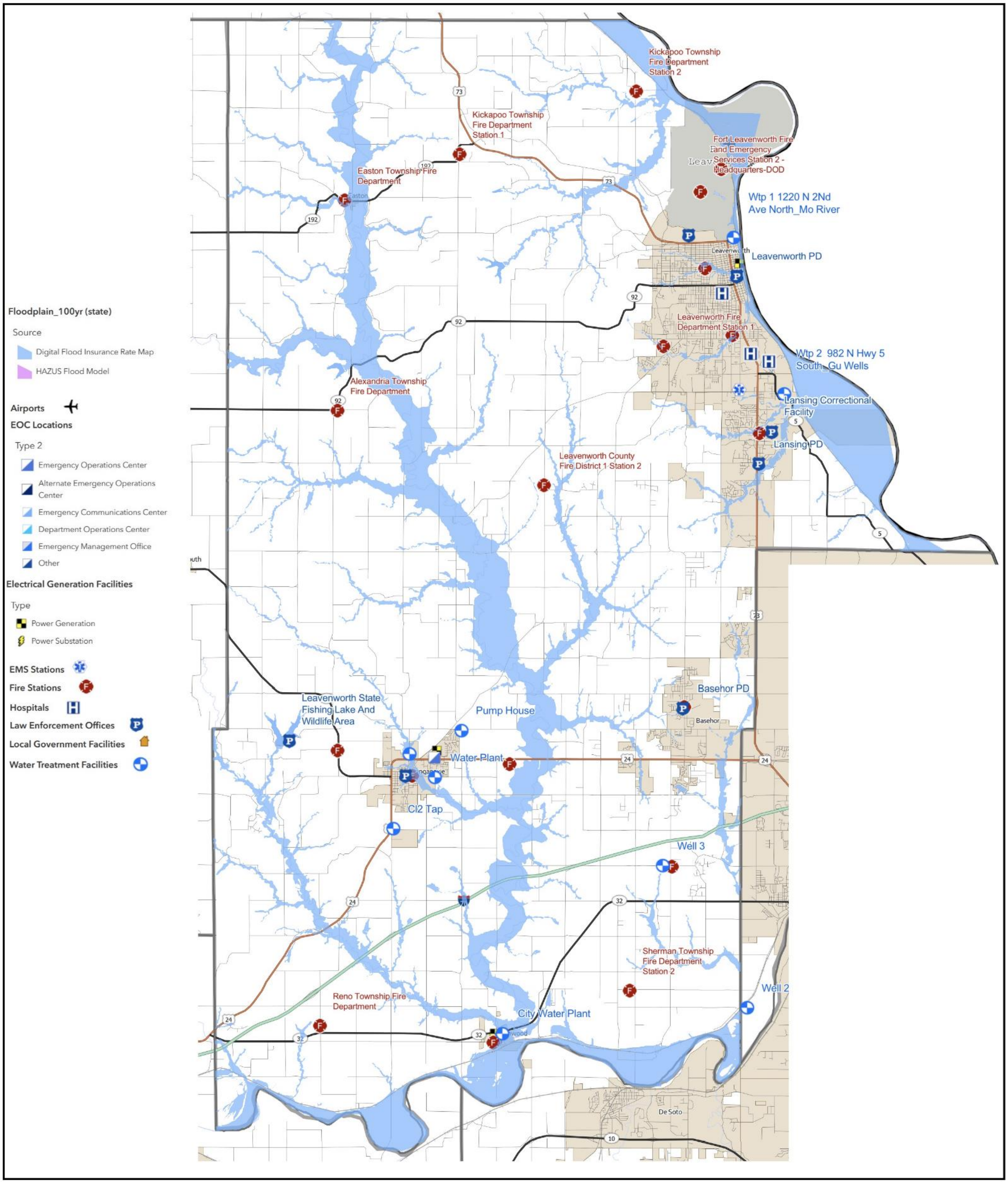
The following maps, generated using the State of Kansas EOPmapper system, detail the location of community lifelines and critical facilities in identified 100-year floodplains:

Map 54: Johnson County Community Lifelines and Critical Facilities in 100-Year Floodplains



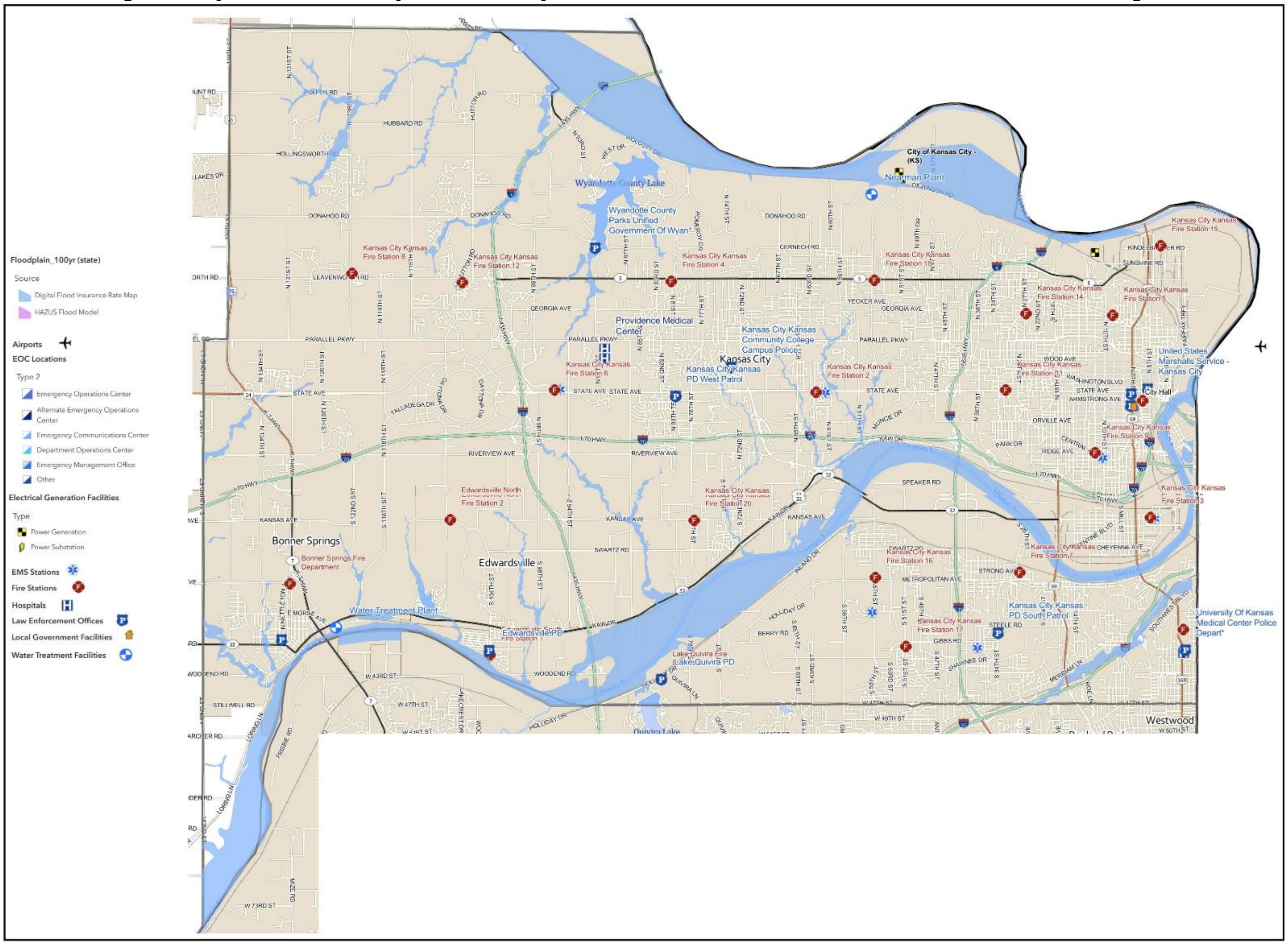
Source: KDEM

Map 55: Leavenworth County Community Lifelines and Critical Facilities in 100-Year Floodplains



Source: KDEM

Map 56: Wyandotte County Community Lifelines and Critical Facilities in 100-Year Floodplains



Source: KDEM

Flooding can have significant and widespread impacts on road infrastructure. The extent of the damage depends on factors such as the severity and duration of the flood, the type of flooding (river overflow, flash flooding), and the design and resilience of the road infrastructure. Impacts may include:

- Structural Damage: Floodwaters can erode road surfaces, weaken foundations, and damage bridges and culverts. The force of flowing water can undermine the structural integrity of roads and cause washouts.
- Road Surface Erosion: The erosion caused by floodwaters can remove the top layer of road surfaces, leading to potholes, cracks, and a general deterioration of the road condition.
- Subsidence and Sinkholes: The infiltration of water into road foundations can cause subsidence or create sinkholes.
- Debris Accumulation: Floodwaters often carry debris such as logs, branches, and sediment. The accumulation of debris on roads can impede drainage systems, block culverts, and hinder the flow of water.
- Road Closures: Flooding can result in the closure of roads due to safety concerns. High water levels, washouts, or structural damage may make roads impassable, leading to disruptions in transportation.
- Loss of Road Markings and Signs: Floodwaters can wash away road markings and signs, reducing visibility and creating safety hazards for motorists.
- Long-Term Damage: Even after floodwaters recede, long-term damage to road infrastructure may persist. Subsurface waterlogging, soil destabilization, and residual structural weaknesses can contribute to ongoing deterioration.

The cost to conduct maintenance on a road can vary significantly depending on the types of work required. However, the average estimate for repairs on a per mile basis in 2019 was $14,750 per mile. The cost to replace a road can vary significantly based on several factors, including the type of road, local labor and material costs, the complexity of the project, and the specific requirements of the replacement. As a rough estimate, road construction costs can range from $1,000,000 to $10,000,000 per mile. Details concerning road mileage may be found in Table 89, page 160.

Flooding can have substantial and often severe impacts on electrical utilities, disrupting power generation, transmission, and distribution systems. The consequences of flooding on electrical utilities can vary depending on factors such as the depth and duration of the flooding and the type of infrastructure affected, and may include:

- Substation and Power Plant Damage: Floodwaters can inundate electrical substations and power plants, damaging critical equipment such as transformers, switchgear, and control systems. Substantial damage to these facilities can lead to prolonged outages.
- Electrical Equipment Short-Circuits: Water infiltration into electrical equipment can cause short-circuits, leading to equipment failure and potentially causing fires. This can result in widespread power outages and safety hazards.
- Transmission Line Disruptions: Floodwaters can impact the stability of transmission towers and lines. Structural damage or collapse of transmission infrastructure can disrupt the flow of electricity over long distances.
- Distribution Network Damage: Localized flooding can damage distribution infrastructure, including power lines, poles, and transformers. This can lead to outages in specific neighborhoods or communities.
- Transformer Submersion: Floodwaters can submerge transformers, which are critical components in power distribution. Submersion can cause these transformers to malfunction or fail, leading to service interruptions.
- Underground Cable Damage: Underground power cables can be damaged by flooding, especially in areas with subterranean infrastructure. Water infiltration can compromise cable insulation, leading to electrical faults and outages.
- Loss of Fuel Supply: Natural gas power plants may face challenges in maintaining a stable fuel supply if transportation routes are disrupted due to flooding.

In order to reduce plan duplication, mapping concerning electrical generation plants, high-capacity transmission lines, and electrical utility providers as well as utility repair and replacement cost estimation provides may be found in Maps 31 and 32, pages 75 and 76, and Chart 15, page 76.

The Hazus model indicated that the following number of critical facilities are estimated to be damaged or suffer loss of use from the flood scenario.

Table 64: Kansas Region L Hazus Flood Scenario Number of Critical Facilities Damaged or Impacted

County	Emergency Operations Centers	Fire Stations	Hospitals	Police Stations	Schools
Johnson	0	0	0	0	0
Leavenworth	0	0	0	0	0
Wyandotte	0	0	0	0	0

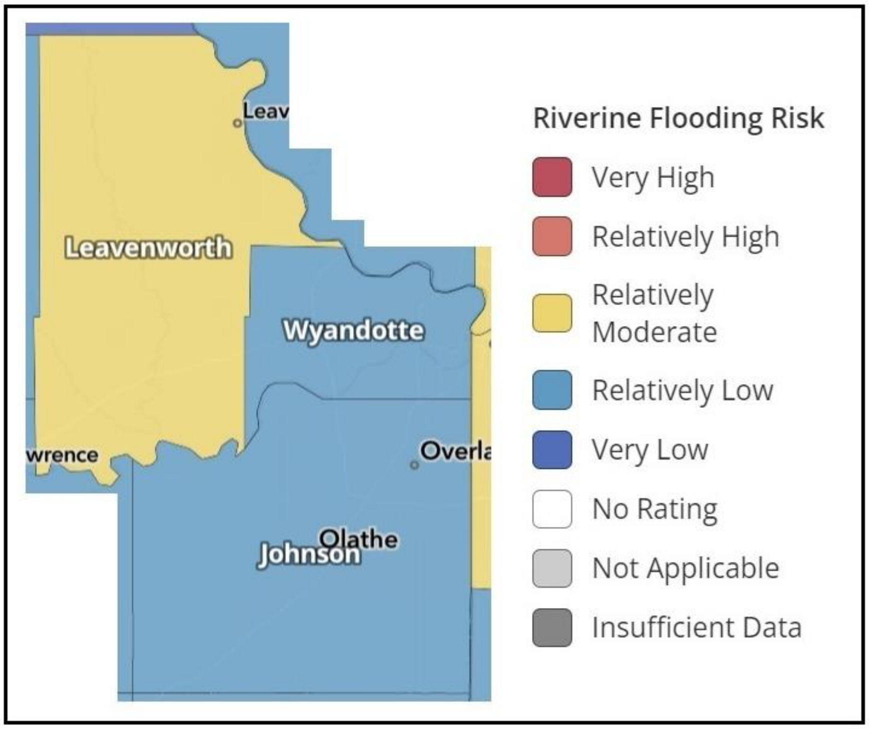
Source: FEMA Hazus

Hospitals and other smaller medical facilities may see an increase in flood related during an event, but it is considered unlikely that this increase will impact or overload capacity. Hospital capacity mapping may be found in Map 33, page 77.

FEMA NRI

Using the FEMA NRI, and consisting of three input components (expected annual loss, social vulnerability, and community resilience), the following map was created indicating the potential risk to participating counties from flood:

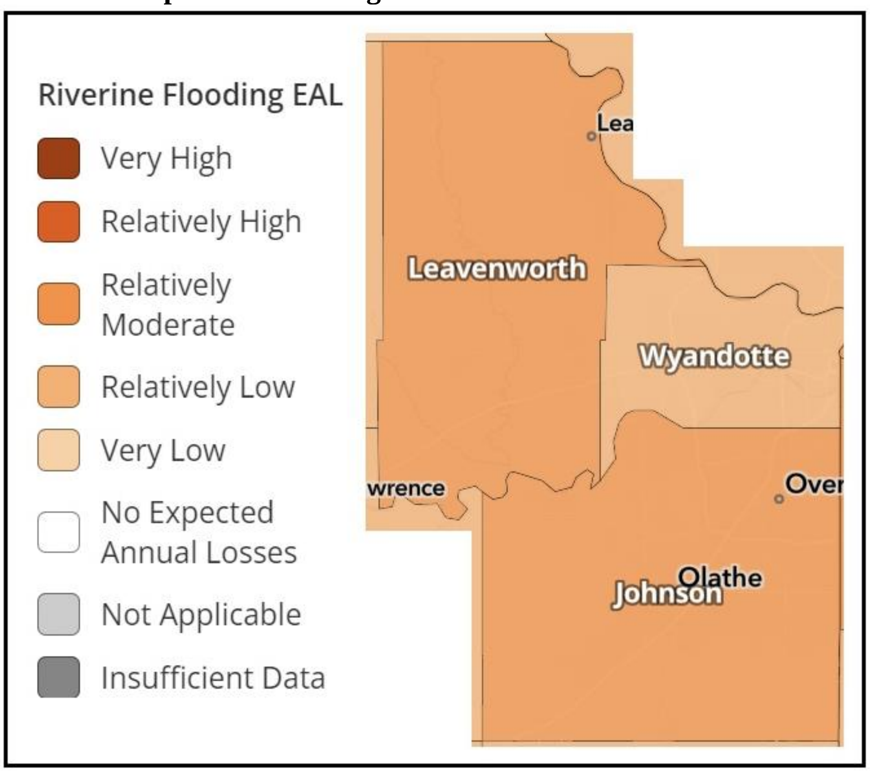
Map 57: Kansas Region L FEMA NRI Flood Risk



Source: FEMA NRI

As part of the NRI, EAL represents the average economic loss in dollars resulting from natural hazards each year and is proportional to a community's risk. The following map indicates the EAL for floods for participating counties within Kansas Region L:

Map 58: Kansas Region L FEMA NRI Flood EAL



Source: FEMA NRI

The following table indicates the FEMA NRI and EAL analysis for each participating Kansas Region L county for flood:

Table 65: Kansas Region L FEMA NRI and EAL for Flood by County

County	Risk Index	EAL
Johnson	Relatively Low	Relatively Moderate
Leavenworth	Relatively Moderate	Relatively Moderate
Wyandotte	Very Low	Relatively Low

Source: FEMA NRI

Consequence Analysis

This consequence analysis lists the potential impacts of a hazard on various elements of community and state infrastructure. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Kansas Region L residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

Table 66: Flood Consequence Analysis

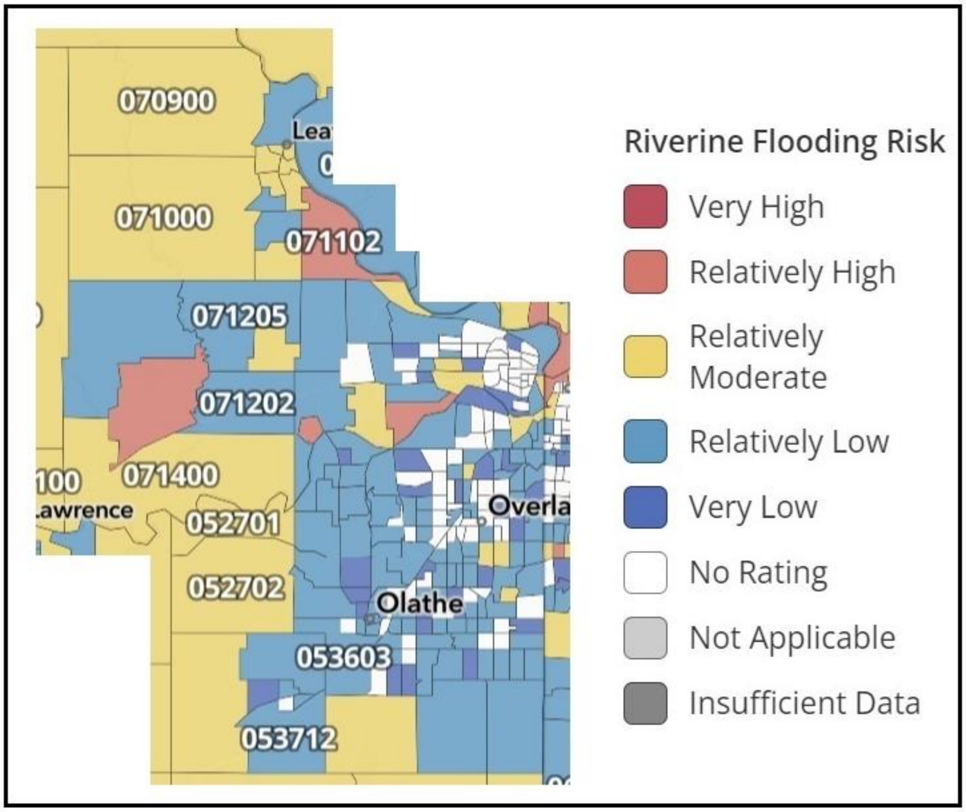
Subject	Potential Impacts
Impact on the Public	Significant flooding events can lead to the damage and loss of homes, property, and businesses. Flash flooding and excessive rainfall may lead to dangerous conditions on roadways. Closures of medical facilities is a major public health concern if flooding damages those facilities. Water sources may become contaminated, and water or sewer systems may be disrupted. Vector-associated disease may increase.
Impact on Responders	Fire, police, and emergency responders may be called on to evacuate people from impacted areas, as well as close roads, attend to the injured, and direct traffic away from the flooded area and roads. First responders may face challenges with transportation and access to a location. Flash floods and mudslides due to heavy rainfall can also injure first responders, as well as delay response operations.
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary based on the situation. Floods which create power outages, debris damage, and road closures are not uncommon. This threat may impact an agency’s ability to maintain continuity of operations based on the incidents impact on power, communications and the potential to damage equipment and records within primary and alternate facilities.
Delivery of Services	Flooding can cause road and bridge closures, as well as disrupt transit services, impacting the ability to deliver goods and services. Exposure to flood waters may also damage or destroy physical goods such as food, clothing, and hygiene products.
Property, Facilities, and Infrastructure	Flooding can cause significant property destruction. Floods can disrupt normal daily activities due to the potential impact on schools, hospitals, and other public infrastructure. Transportation infrastructure can be damaged which could impact the freedom of movement or provision of utilities. Water sources can become contaminated. Water and sewer systems may be disrupted. Solid-waste collection and disposal may also be impacted, causing dangerous public health risks.
Impact on Environment	Rising waters from flooding impact the environment by spreading pollution, inundating water and wastewater treatment plants, and disrupting wildlife. Standing water following a flood event can facilitate the spread of vector-associated diseases.
Economic Conditions	Significant and repeated flooding can lower property value throughout the state, which can have a deleterious effect on the tax base. Furthermore, flooding drains response resources, which can be costly during a large flooding event for disaster reimbursement
Public Confidence in Governance	Ineffective flooding response can decrease the public’s confidence in the ability to respond and govern. Multi-level government response requires direct actions that must be immediate and effective to maintain public confidence. Efficiency in response and recovery operations is critical in keeping public confidence high.

4.12.7 Jurisdictional Risk and Vulnerability

To help understand the risk and vulnerability to flooding of participating jurisdictions, mapping from the FEMA NRI was run on a census tract level. As the NRI does not generate mapping for individual jurisdictions, census tract analysis is the closest analogue available to understand individual jurisdiction conditions.

Using the FEMA NRI, and consisting of three input components (expected annual loss, social vulnerability, and community resilience), the following map was created indicating the potential risk to participating jurisdictions (as indicated by census tract) from floods:

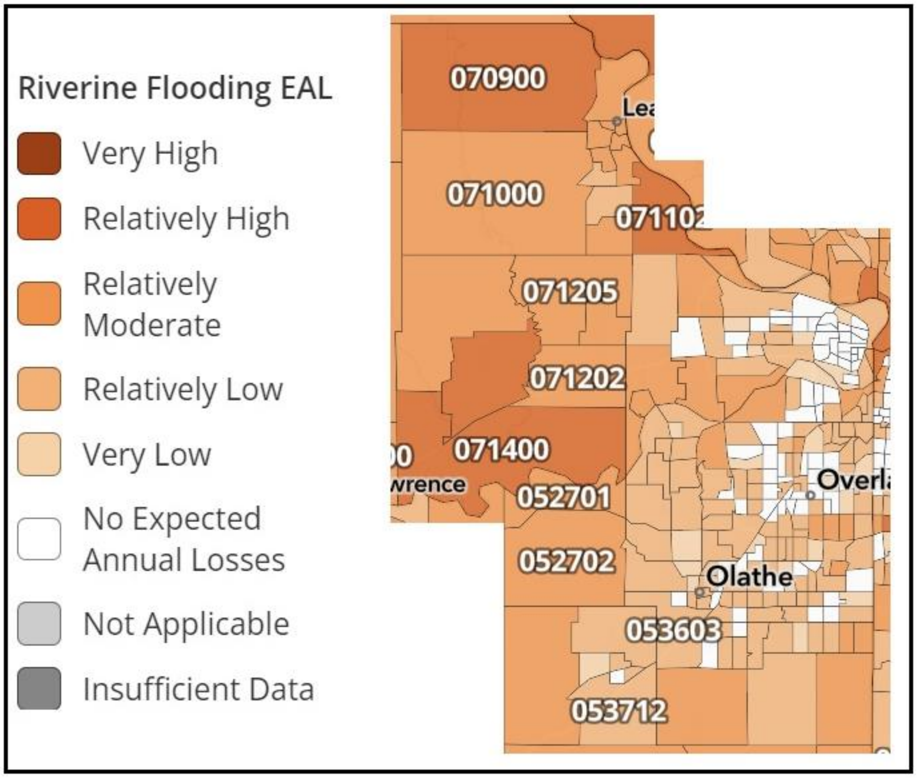
Map 59: FEMA NRI Jurisdictional Flood Risk



Source: FEMA NRI

As part of the NRI, EAL represents the average economic loss in dollars resulting from natural hazards each year and is proportional to a community's risk. The following map indicates the EAL for floods for participating jurisdictions (as indicated by census tract) within Kansas Region L:

Map 60: FEMA NRI Jurisdictional Flood EAL

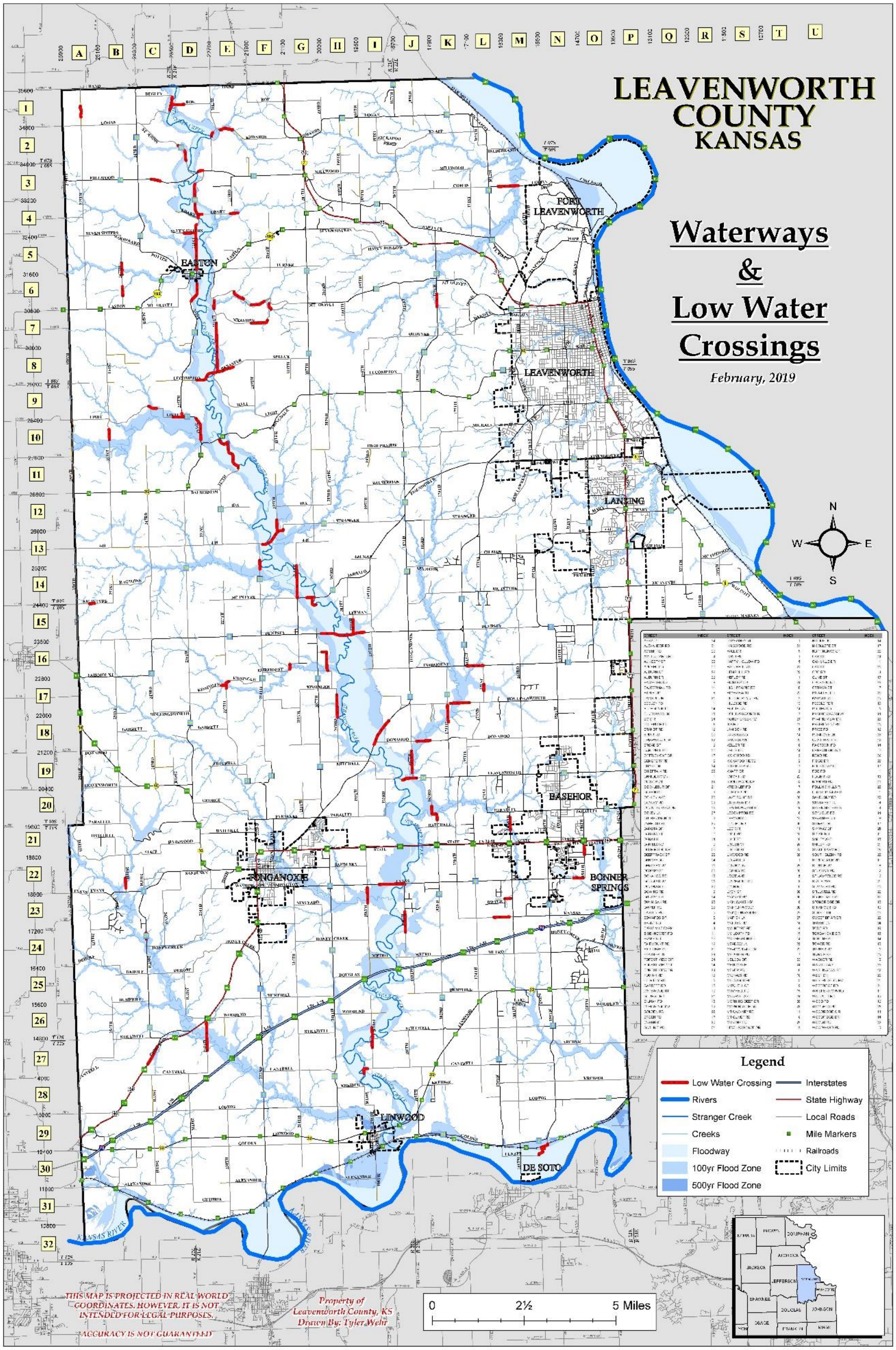


Source: FEMA NRI

FEMA NRI data tables, by census tract, are included in Appendix C. These data tables contain the risk index and EAL along with total building valuation and agricultural valuation allowing for an understanding of potential structural and agricultural vulnerability on a jurisdictional basis.

In an effort to identify repeat flood areas the USACE Silver Jackets has created a mapping system under the Recurring Flood Identification Project to map known flood areas. Three classifications of flooding areas are used, minimal moderate and severe. The following maps indicate identified repeat flood areas within the region.

Map 61: Leavenworth County Low Water Hazard Areas



Source: Leavenworth County

4.12.8 National Flood Insurance Program and Community Rating System Communities

The NFIP is a federal program, managed by FEMA, which 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 NFIP participating communities.

Table 67: Kansas Region L NFIP Communities

Community	Initial Flood Hazard Boundary Map Identified	Initial Flood Insurance Rate Map Identified	Current Effective Map Date
Johnson County			
Johnson County	9/6/1977	8/15/1980	8/3/2009
Desoto	1/4/1974	8/1/1979	8/3/2009
Edgerton	3/8/1974	8/1/1979	8/3/2009
Fairway		6/20/1970	8/3/2009
Gardner	5/3/1974	4/15/1977	8/3/2009
Leawood	5/17/1974	9/30/1977	8/3/2009
Lenexa	2/8/1974	8/1/1977	8/3/2009
Merriam	6/7/1974	5/15/1978	8/3/2009
Mission Hills	6/7/1974	9/29/1978	8/3/2009
Mission Woods	10/1/1976	9/27/1991	8/3/2009
Mission	5/31/1974	5/15/1978	8/3/2009
Olathe	3/1/1974	11/15/1978	8/3/2009
Overland Park	1/3/1975	9/30/1977	8/3/2009
Prairie Village	6/14/1974	9/29/1978	8/3/2009
Roeland Park	5/31/1974	6/30/1976	8/3/2009
Shawnee	6/28/1974	11/15/1978	8/3/2009
Spring Hill	6/28/1974	6/17/2002	8/3/2009
Leavenworth County			
Leavenworth County	8/30/1977	8/15/1980	7/16/2015
Basehor	4/12/1974	12/7/1984	7/16/2015
Easton	7/9/1976	11/1/1979	7/16/2015
Lansing	8/23/1974	8/15/1980	7/16/2015
Leavenworth	11/23/1973	1/5/1978	7/16/2015
Linwood	9/6/1974	8/1/1979	7/16/2015
Tonganoxie	6/7/1974	11/1/1979	7/16/2015
Wyandotte County			
Bonner Springs	12/28/1973	1/3/1979	9/2/2015
Edwardsville	4/5/1974	9/29/1978	9/2/2015
Kansas City	11/1/1974	8/3/1981	9/2/2015

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

The CRS is a voluntary incentive program that recognizes and encourages community floodplain management practices that exceed the minimum requirements of the NFIP. In CRS communities, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community's efforts that address the three goals of the program:

- Reduce and avoid flood damage to insurable property
- Strengthen and support the insurance aspects of the National Flood Insurance Program
- Foster comprehensive floodplain management•

The following Region L jurisdictions are currently participating in the CRS:

Table 68: Kansas Region L CRS Communities

Jurisdiction	County	CRS Entry Date	Current Class	SFHA Discount
Shawnee	Johnson	10/01/1991	6	20%
Bonner Springs	Wyandotte	10/01/2014	7	15%
Kansas City	Wyandotte	05/01/2013	6	20%
Lansing	Leavenworth	05/11/2011	7	15%
Linwood	Leavenworth	10/01/2013	9	5%

Source: FEMA

4.12.9 FEMA Flood Policy and Loss Data

Kansas Region L flood policy information was sourced from FEMA's Flood Insurance Data and Analytics. The number of flood insurance policies in effect may not include all structures at risk of flooding, and it is likely that 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 statistics for Kansas Region L:

Table 69: Kansas Region L NFIP Coverage

Jurisdiction	Number of Policies in Force	Total Coverage
Johnson County		
Johnson County	38	$9,739,100
Bonner Springs	1	$500,000
Desoto	34	$11,203,300
Edgerton	2	$380,000
Fairway	28	$9,469,300
Gardner	4	$1,096,600
Leawood	76	$23,277,000
Lenexa	36	$10,927,500
Merriam	23	$6,300,800
Mission Hills	16	$4,777,400
Mission	9	$3,270,000
Olathe	80	$23,487,800
Overland Park	317	$87,323,500
Prairie Village	27	$10,506,100
Roeland Park	5	$1,082,500
Shawnee	42	$13,904,100
Spring Hill	3	$1,050,000
Unknown	26	$7,214,000
Westwood	1	$105,000
Leavenworth County		
Leavenworth County	30	$7,957,700
Basehor	9	$2,940,000
Easton	23	$3,779,700
Lansing	41	$11,418,300
Leavenworth	59	$17,227,100
Linwood	1	$91,300
Tonganoxie	13	$2,741,700
Unknown	2	$450,000
Shawnee County		
Bonner Springs	25	$3,584,900
Edwardsville	22	$10,277,800
Kansas City	140	$63,397,600

Table 69: Kansas Region L NFIP Coverage

Jurisdiction	Number of Policies in Force	Total Coverage
Unknown	3	$685,000

Source: FEMA Flood Insurance Data and Analytics

The following table details the change in the number of NFIP coverage from 2013 to 2023 for Kansas Region L:

Table 70: Kansas Region L NFIP Coverage Changes

	County	2013	2018	2023	Percentage Change 2013 - 2023
Number of Policies	Johnson	1,005	912	768	-23.6%
	Leavenworth	264	205	178	-32.6%
	Wyandotte	302	222	190	-37.1%
Amount of Coverage	Johnson	$250,485,700	$250,122,600	$225,614,000	-9.9%
	Leavenworth	$53,334,200	$48,715,400	$46,155,800	-13.5%
	Wyandotte	$83,151,500	$76,831,300	$77,945,300	-6.2%

Source: FEMA

4.12.10 Repetitive Loss Structures

A high priority for Kansas Region L is the mitigaion of, and/or 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 information concerning RL and SRL identified properties in Kansas Region L. Please note that information concerning the occupancy nature of these properties was unavailable from the State of Kansas. These The State of Kansas solicited this information from FEMA, however no response was received as of this plan :

Table 71: Kansas Region L RL and SRL Properties

County	Jurisdiction	Mitigated	NFIP Insured	SRL Property	Total Losses	Total Paid
Johnson	Fairway	No	No	No	3	$30,366.49
	Fairway	No	No	No	4	$42,121.80
	Fairway	No	Sdf	Yes	5	$74,824.14
	Fairway	No	Sdf	Yes	5	$324,812.72
	Fairway	No	No	No	3	$13,744.01
	Fairway	No	No	No	3	$27,253.45
	Fairway	No	No	No	2	$7,404.19
	Fairway	No	Yes	No	3	$36,608.39
	Fairway	No	No	No	2	$16,298.09
	Fairway	No	Yes	No	1	$12,653.10

Table 71: Kansas Region L RL and SRL Properties

County	Jurisdiction	Mitigated	NFIP Insured	SRL Property	Total Losses	Total Paid
	Johnson County	No	No	No	2	$75,000.00
	Johnson County	No	Yes	No	3	$14,616.92
	Kansas City	No	No	No	3	$49,910.87
	Leawood	No	No	No	2	$461,534.22
	Leawood	No	No	No	3	$46,139.53
	Leawood	No	No	No	2	$7,405.62
	Leawood	No	No	No	2	$7,162.45
	Leawood	No	Yes	No	2	$2,560.49
	Leawood	No	No	No	3	$456,754.26
	Leawood	No	Yes	No	3	$46,192.96
	Leawood	No	Yes	No	3	$80,777.68
	Leawood	No	Yes	No	2	$23,668.96
	Leawood	No	No	No	2	$9,492.21
	Lenexa	No	Yes	No	3	$50,019.74
	Merriam	No	No	Yes	8	$171,306.13
	Merriam	No	No	No	3	$12,377.53
	Merriam	No	No	No	2	$9,027.96
	Merriam	No	No	No	2	$3,323.28
	Merriam	No	No	No	2	$7,081.64
	Merriam	No	No	No	2	$18,888.16
	Merriam	No	No	No	2	$62,076.81
	Merriam	No	No	No	2	$15,475.09
	Mission Hills	No	No	No	2	$28,793.65
	Mission Hills	No	No	No	2	$8,284.07
	Mission Hills	No	No	No	2	$27,729.40
	Mission Hills	No	No	No	3	$35,249.19
	Mission Hills	No	Sdf	Yes	5	$341,569.30
	Mission Hills	No	No	No	2	$352,087.32
	Mission Hills	No	No	Yes	6	$577,898.37
	Mission Hills	No	Yes	No	3	$218,441.40
	Mission	No	No	No	5	$13,188.69
	Mission	No	No	No	2	$27,803.62
	Mission	No	No	No	3	$16,370.88
	Olathe	No	No	No	3	$38,114.87
	Olathe	No	Yes	No	3	$489,301.61
	Overland Park	No	Yes	No	4	$27,297.05
	Overland Park	No	No	No	3	$12,313.34
	Overland Park	No	Yes	No	2	$36,631.36
	Overland Park	No	No	No	3	$7,328.84
	Overland Park	No	No	No	3	$8,257.27
	Overland Park	No	No	No	2	$9,323.94
	Overland Park	No	No	No	2	$7,680.72
	Overland Park	No	No	No	2	$41,976.75
	Overland Park	No	Yes	No	3	$34,565.36
	Overland Park	No	No	No	2	$10,773.40
	Overland Park	No	No	No	2	$26,012.28
	Overland Park	No	Yes	No	2	$22,002.69
	Overland Park	No	Yes	No	3	$40,900.62
	Overland Park	No	Yes	No	3	$387,038.98

Table 71: Kansas Region L RL and SRL Properties

County	Jurisdiction	Mitigated	NFIP Insured	SRL Property	Total Losses	Total Paid
	Overland Park	No	No	No	2	$32,765.75
	Overland Park	No	No	No	3	$46,655.99
	Overland Park	No	Yes	No	2	$25,879.96
	Overland Park	No	No	No	3	$54,992.91
	Overland Park	No	No	No	2	$23,256.29
	Overland Park	No	No	No	3	$30,093.88
	Overland Park	No	Yes	No	2	$5,535.88
	Overland Park	No	Yes	No	3	$42,799.22
	Overland Park	No	No	No	2	$49,936.19
	Overland Park	No	No	No	2	$27,063.31
	Overland Park	No	Yes	No	2	$23,211.87
	Overland Park	No	Yes	No	2	$19,167.64
	Overland Park	No	No	No	2	$18,245.80
	Overland Park	No	No	No	2	$17,495.87
	Overland Park	No	Yes	No	2	$50,131.89
	Overland Park	No	No	No	2	$5,541.10
	Overland Park	No	No	No	1	$13,115.65
	Prairie Village	No	No	No	3	$12,462.32
	Prairie Village	No	No	No	3	$35,878.11
	Prairie Village	No	No	No	3	$7,982.45
	Prairie Village	No	No	No	4	$22,608.05
	Prairie Village	No	No	No	4	$17,224.89
	Prairie Village	No	No	No	3	$8,855.74
	Prairie Village	No	No	No	3	$22,444.16
	Prairie Village	No	No	No	2	$7,048.15
	Prairie Village	No	No	No	4	$35,556.38
	Prairie Village	No	No	No	3	$7,827.50
	Prairie Village	No	No	No	3	$11,690.48
	Prairie Village	No	No	No	2	$50,078.07
	Prairie Village	No	Sdf	Yes	4	$75,592.63
	Prairie Village	No	Yes	No	3	$148,602.39
	Prairie Village	No	No	No	2	$45,323.40
	Roeland Park	No	No	Yes	15	$97,503.05
	Shawnee	No	No	Yes	5	$177,471.43
	Shawnee	No	No	No	1	$2,273.20
	Westwood Hills	No	No	No	2	$10,147.46
	Westwood	No	No	No	2	$7,862.00
Leavenworth	Easton	No	No	No	4	$163,827.99
	Easton	No	No	No	2	$75,290.22
	Easton	No	Yes	No	2	$61,493.92
	Easton	No	Yes	No	2	$36,640.89
	Easton	No	Yes	Yes	2	$87,707.25
	Easton	No	No	No	2	$89,895.62
	Leavenworth County	No	No	Yes	4	$212,495.10
	Leavenworth County	No	Sdf	Yes	4	$303,109.11
	Leavenworth County	No	No	No	2	$8,600.30
	Leavenworth	No	No	No	3	$88,595.85
	Leavenworth	No	No	No	2	$54,335.69
	Leavenworth	No	No	No	2	$29,473.43

Table 71: Kansas Region L RL and SRL Properties

County	Jurisdiction	Mitigated	NFIP Insured	SRL Property	Total Losses	Total Paid
	Leavenworth	No	No	No	2	$9,779.76
	Leavenworth	No	No	No	2	$21,095.21
	Leavenworth	No	Yes	No	2	$10,630.73
	Leavenworth	No	Yes	No	2	$11,379.19
	Leavenworth	No	No	No	1	$31,300.42
Wyandotte	Bonner Springs	No	No	No	8	$94,518.67
	Bonner Springs	No	Yes	No	6	$40,860.31
	Bonner Springs	No	No	No	4	$52,745.89
	Bonner Springs	No	No	No	2	$36,172.62
	Bonner Springs	No	Yes	No	3	$42,129.52
	Bonner Springs	No	Yes	No	2	$19,834.33
	Bonner Springs	No	No	No	3	$43,835.43
	Edwardsville	No	No	No	3	$111,104.00
	Edwardsville	No	Yes	No	4	$10,523.33
	Kansas City	No	No	Yes	10	$599,429.50
	Kansas City	No	No	No	4	$38,912.88
	Kansas City	No	No	No	2	$9,866.77
	Kansas City	No	Sdf	Yes	7	$830,527.39
	Kansas City	No	No	No	3	$5,602.03
	Kansas City	No	No	No	3	$16,061.50
	Kansas City	No	No	No	3	$41,025.64
	Kansas City	No	No	Yes	8	$1,288,116.37
	Kansas City	No	No	Yes	16	$326,081.25
	Kansas City	No	No	Yes	5	$213,479.49
	Kansas City	No	No	Yes	8	$514,925.96
	Kansas City	No	No	No	3	$28,566.71
	Kansas City	No	No	No	2	$6,614.56
	Kansas City	No	No	No	4	$97,005.55
	Kansas City	No	No	Yes	4	$121,269.14
	Kansas City	No	No	Yes	4	$147,316.76
	Kansas City	No	No	No	3	$101,471.19
	Kansas City	No	No	Yes	4	$98,584.74
	Kansas City	No	No	No	3	$47,224.83
	Kansas City	No	Yes	No	2	$48,407.13
	Kansas City	No	No	No	2	$79,830.55
	Kansas City	No	No	No	2	$26,964.28
	Kansas City	No	No	No	2	$14,632.81
	Kansas City	No	No	No	3	$100,693.33
	Kansas City	No	Yes	No	2	$20,025.58
	Kansas City	No	No	No	3	$843,696.07
	Kansas City	No	No	No	2	$33,207.15
	Kansas City	No	No	No	2	$20,226.32
	Kansas City	No	No	No	2	$47,803.56
	Kansas City	No	No	No	2	$52,309.82

Source: KDEM

4.13 Severe Weather

4.13.1 Hazard Description

Severe weather comprises the hazardous and damaging weather effects often found in violent storm fronts. They can occur together or separate, they are common and usually not hazardous, but on occasion they can pose a threat to life and property.

This plan defines Severe weather as a combination of the following severe weather effects as defined by NOAA and the NWS:

- **Hail:** Precipitation in the form of irregular pellets or balls of ice more than 5 mm in diameter, falling from a cumulonimbus cloud.
- **Lightning:** A visible electrical discharge produced by a thunderstorm. The discharge may occur within or between clouds, between the cloud and air, between a cloud and the ground or between the ground and a cloud.
- **Thunderstorm Winds:** The same classification as high or strong winds but accompanies a thunderstorm. It is also referred to as a straight-line wind to differentiate from rotating or tornado associated wind. Additionally, these winds can rapidly create dust storms that severely impact visibility.

Severe Weather have been so consistent throughout modern history that much of the vulnerability is mitigated. However, this section is not concerned with everyday wind, lightning in the sky, or mild precipitation. This section is concerned with common storm elements when they behave such that they pose a threat to property and life.

4.13.2 – Location and Extent

Severe weather can rapidly descend on an area, but in many cases is predictable. Most weather forecasts focus on more than just temperature but on quickly changing conditions that may lead to the onset of severe storms. All of Kansas Region L is susceptible to severe weather.

The NWS classifies thunderstorms, often the generator of hail, lightning and high winds, using the following categories.

- **Marginal:** Isolated severe weather, 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

In the United States, hail causes billions of dollars in damage to property each year. Vehicles, roofs of buildings and homes, and landscaping are most commonly damaged by hail. Hail has been known to cause injury and the occasional fatality to humans, often associated with traffic accidents.

Based on information provided by the National Weather Service concerning size, the following table describes potential damage impacts of the various sizes of hail.

Table 72: Hail Size Comparison and Damage Descriptions

Diameter (inches)	Size Description	Potential Damage Impacts
1/4	Pea Size	No damage
1/2	Mothball, peanut, USB Plug	Slight damage to vegetation
3/4	Penny Size	Increased damage to crops and vegetation
7/8	Nickel Size	Severe damage to crops and vegetation, damage begins to glass and plastic
1	Quarter Size	Increased glass damage, damage begins to bodies of vehicles

Table 72: Hail Size Comparison and Damage Descriptions

Diameter (inches)	Size Description	Potential Damage Impacts
1 1/4	Half Dollar Size	Large scale glass damage, begin roof damage, risk of injury to exposed persons
1 1/2	Ping Pong Ball Size	Large scale glass damage, begin roof damage, increased risk of injury to exposed persons
1 3/4	Golf Ball Size	Severe roof damage, risk of serious injuries to exposed persons
2	Lime or Medium Sized Hen Egg	Potential structural damage, risk of very severe injuries to exposed persons
2 1/2	Tennis Ball Size	Extensive structural damage, risk of very severe injuries or death to exposed persons

Source: National Weather Service

A recent report by the Insurance Information Institute says lightning strikes caused $1,300,000,000 in damage across the United States in 2021. There is currently no scale to indicate the severity of a lightning strike, but data from NOAA indicates that there approximately 25,000,000 cloud-to-ground lightning strikes per year in the United States.

To measure wind speed and its correlating potential for damage, experts use the Beaufort scale as shown below.

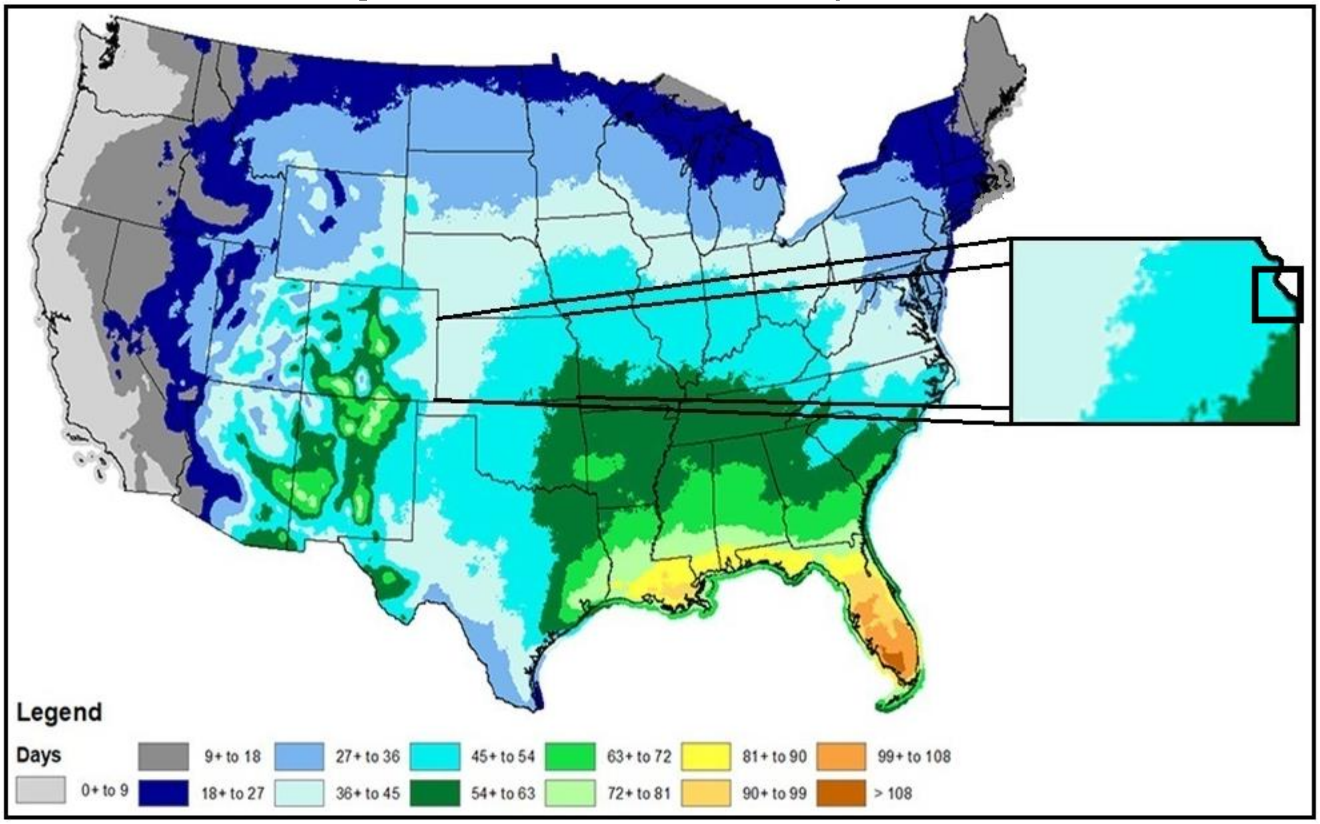
Table 73: Beaufort Scale

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

Source: NOAA

The widespread and frequent nature of thunderstorms makes hail, lightning, and high wind a relatively common occurrence for Kansas Region L. The following map, from NOAA, indicates annual mean thunderstorm days from 1993 to 2018.

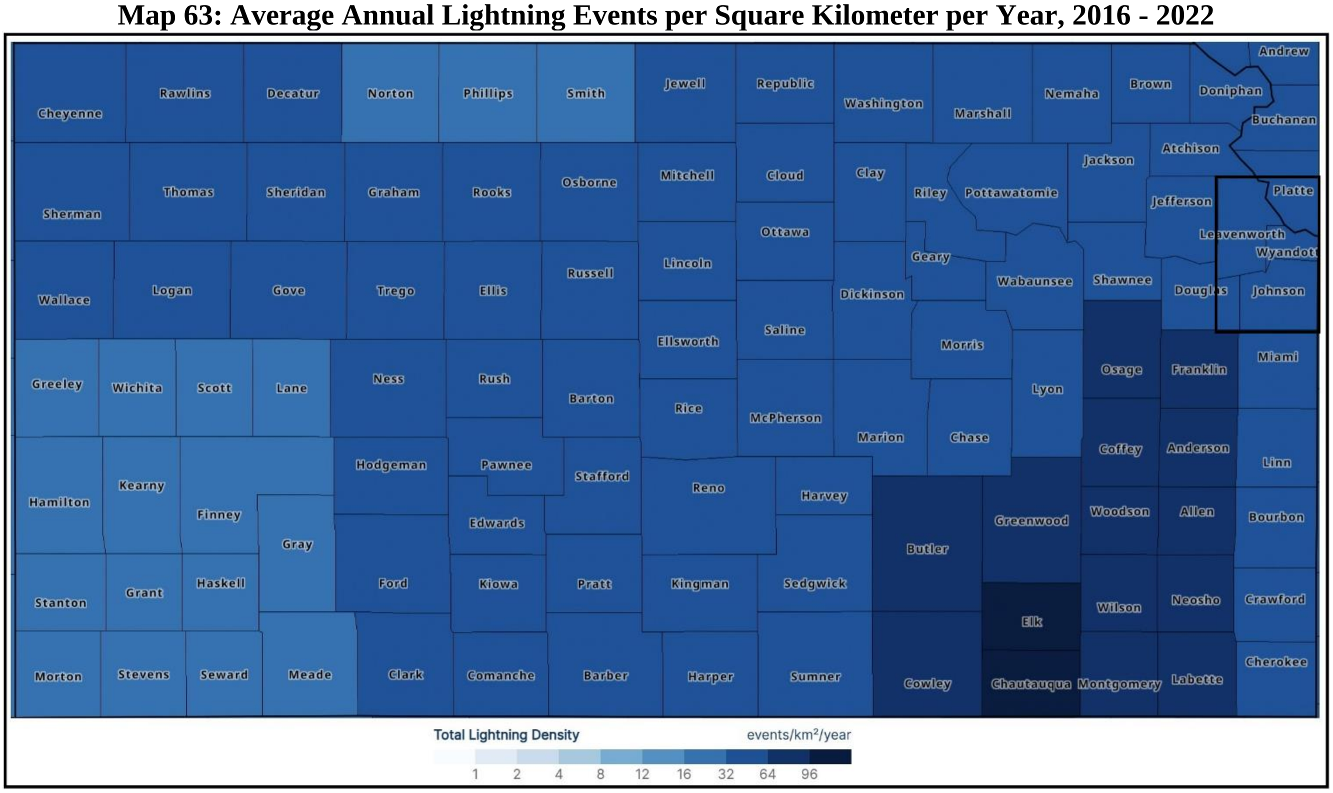
Map 62: Annual Mean Thunderstorm Days, 1993-2018



Source: NOAA

The following map, from Vaisala, indicates the average annual light events per square kilometer per year for Kansas Region L.

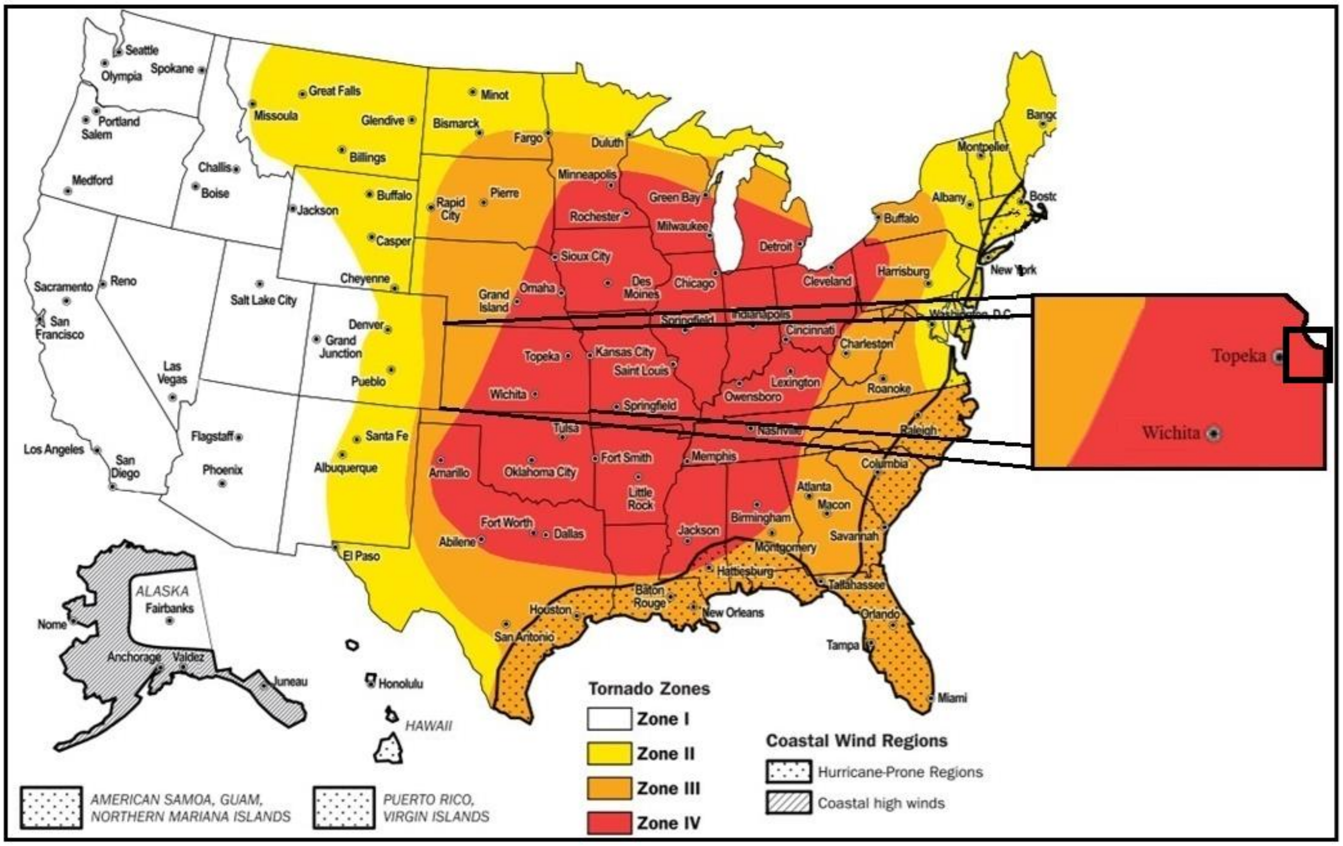
Map 63: Average Annual Lightning Events per Square Kilometer per Year, 2016 - 2022



Source: Vaisala

The following maps from FEMA indicate the highest possible expected wind speeds for Kansas Region L.

Map 64: Wind Zones



Source: FEMA

4.13.3 Previous Occurrences

Historical events of significant magnitude or impact can result in a Presidential Disaster Declaration. Kansas Region L has experienced three Presidential Disaster Declarations related to flooding in the past 10 years reflected in the following table.

Table 74: Kansas Region L Presidentially Declared Disasters

Designation	Declaration Date	Incident Type	Counties	Assistance
DR-4747-KS	10/26/2023	Severe Storms, Straight-Line Winds, Tornadoes, and Flooding	Johnson, Wyandotte	-
DR-4640-KS	3/22/2022	Severe Storms and Straight-Line Winds	Wyandotte	$12,159,785
DR-4449-KS	8/14/2019	Severe Storms, Straight-Line Winds, Flooding, Tornadoes, Landslides, and Mudslides	Leavenworth	$51,157,548
DR-4347-KS	11/7/2017	Severe Storms, Straight-Line Winds, Flooding	Johnson, Wyandotte	$6,195,147.97

In addition to the Presidentially Declared Disasters, the following table presents NCEI identified Severe Weather events and the resulting damage totals in Kansas Region L from 1950 to 2023:

Table 75: NCEI Kansas Region L Severe Weather Events

County	Event Type	Number of Days with Events	Property Damage	Deaths and Injuries
Johnson	216	12	$1,940,000	216
	4	0	$550,000	4
	241	7	$2,639,000	241
Leavenworth	155	0	$1,087,000	155
	2	1	$30,000	2
	173	0	$2,326,000	173
Wyandotte	113	0	$545,500	113
	1	0	$5,000	1
	113	0	$836,000	113

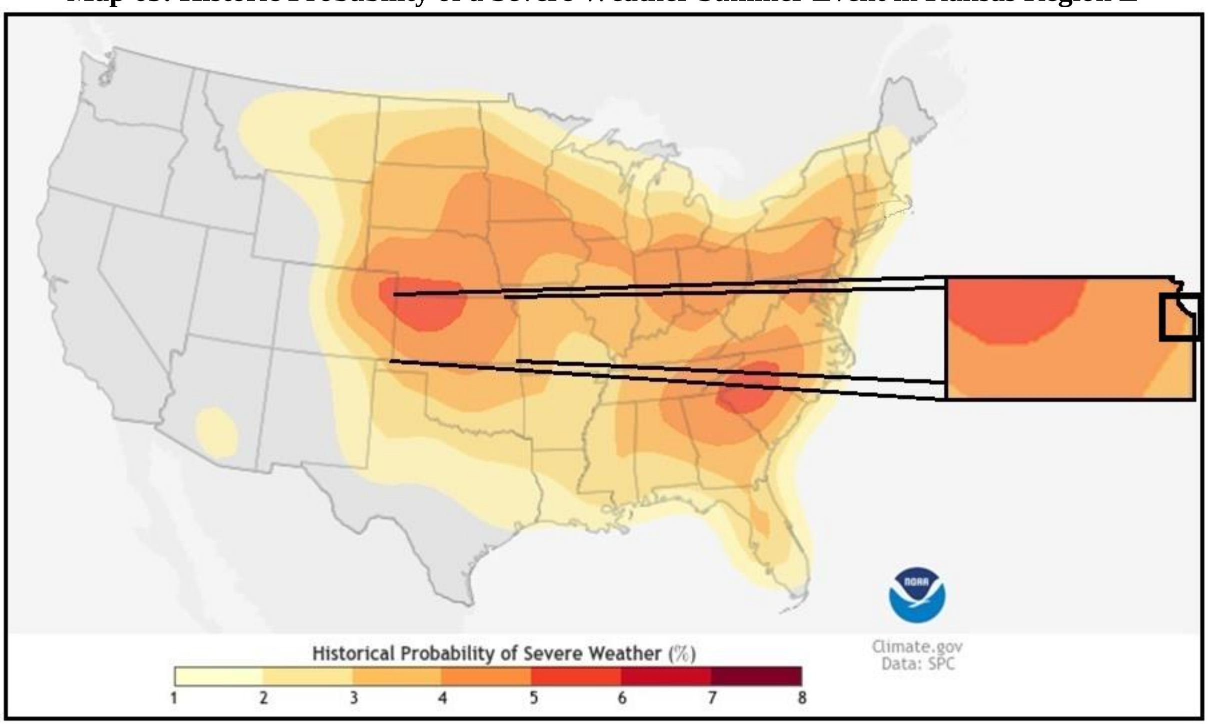
Source: NCEI

It is worth noting that damage estimates indicated by the NCEI are often artificially low. This underreporting is a result of the way the events are reported to the NCEI, often by the local and/or NWS office. When reporting an event oftentimes the NWS office does not have access to the actual damage assessment resulting from that event. As such, the report often details a very low amount or zero-dollar amount for damages. Additionally, deaths and injuries may be underreported as they may be a result of a concurrent event, such as a person driving unsafely during heavy rain and passing away.

4.13.4 Probability of Future Events

Predicting the probability of severe weather occurrences is tremendously changing due to the large number of factors involved and the random nature of formation. Data and mapping from NOAA indicate that Kansas Region L can expect between 27 – 45 severe weather events per year. Additionally, the following map from NOAA provides a snapshot for the probability of a severe weather event on a summer day.

Map 65: Historic Probability of a Severe Weather Summer Event in Kansas Region L



Source: NOAA

Based on historical occurrences, Kansas Region L will continue to experience severe weather events on an annual basis. The following tables, using data from the NCEI, indicate the yearly probability of a severe weather component event, the number of deaths or injuries, and estimated property damage for each county in Kansas Region L.

Table 76: Kansas Region L NCEI Hail Event Probability Summary

County	Days with Event	Average Events per Year	Deaths / Injuries	Average Deaths / Injuries per Year	Property Damage	Average Property Damage per Year
Johnson	216	4	12	<1	$1,940,000	$36,604
Leavenworth	155	3	0	0	$1,087,000	$20,509
Wyandotte	113	2	0	0	$545,500	$10,292

Source: NCEI

Table 77: Kansas Region L NCEI Lightning Event Probability Summary

County	Days with Event	Average Events per Year	Deaths / Injuries	Average Deaths / Injuries per Year	Property Damage	Average Property Damage per Year
Johnson	4	<1	0	0	$550,000	$10,377
Leavenworth	2	<1	1	<1	$30,000	$566
Wyandotte	1	<1	0	0	$5,000	$94

Source: NCEI

Table 78: Kansas Region L NCEI Strong Wind Event Probability Summary

County	Days with Event	Average Events per Year	Deaths / Injuries	Average Deaths / Injuries per Year	Property Damage	Average Property Damage per Year
Johnson	241	5	7	<1	2,639,000	$49,792
Leavenworth	173	3	0	0	$2,326,000	$43,887
Wyandotte	113	2	0	0	$836,000	$15,774

Source: NCEI

4.13.5 Projected Changes in Location, Intensity, Frequency, and Duration

Climate change can have several impacts on severe weather, although the precise details can vary depending on regional climate patterns and other factors. In general, it is believed that climate change can alter the timing and seasonality of Severe Weather. In some cases, this may mean more severe weather events occurring earlier or later in the year.

Climate change can lead to increased temperatures and moisture levels in the atmosphere, which can provide favorable conditions for the development of severe weather. This can result in a higher frequency of severe weather events and an increase in their intensity. As a result of increased temperatures, warmer air can hold more moisture, leading to increased rainfall during severe weather. This can elevate the risk of flash flooding, particularly in areas prone to heavy precipitation. Changes in atmospheric circulation patterns associated with climate change can lead to stronger winds within thunderstorms. This can result in more powerful wind gusts, increasing the risk of wind damage and downed trees and power lines.

Climate change can influence the conditions necessary for hail formation. Warmer temperatures at the surface and greater instability in the atmosphere can contribute to larger and more damaging hailstones. Additionally, changes in atmospheric conditions can affect the frequency and distribution of lightning strikes. More lightning can increase the risk of wildfires in dry regions.

It is important to note that while there is evidence linking climate change to changes in weather patterns that can influence severe weather, predicting specific events remains changing. Climate models provide valuable insights into long-term trends, but individual severe weather events are influenced by a complex interplay of factors.

4.13.6 Vulnerability and Impact

Severe weather can have a wide range of effects on people, often posing significant risks to life, property, and general well-being. In the absence of proper shelter, hail, lightning, and high winds can cause serious injury. In general, if potentially exposed persons take shelter in a solid, well-constructed structure protection from these Severe Weather components would be provided. However, old or poorly constructed facilities may be more prone to damage, potentially increasing the impact on economically disadvantaged populations. Some of the potential effects of severe weather on people may include:

- Death and Injury: Severe weather can produce lightning and strong winds driving debris. Both of these elements can cause injuries or fatalities.
- Power Outages: Lightning strikes, strong winds, and falling trees can lead to power outages, disrupting daily life, and potentially affecting essential services, such as medical equipment and refrigeration.
- Mental Health Impact: Severe weather can be frightening and stressful, leading to anxiety and post-traumatic stress disorder in some individuals. The emotional toll of property damage and loss can also be significant.
- Displacement: People may need to evacuate their homes or be temporarily displaced due to storm damage, requiring emergency shelter and support.
- Economic Costs: Severe weather results in economic costs, including repair and recovery expenses, insurance claims, and potential loss of income due to property damage or work disruptions.
- Public Safety Response: Severe weather can strain public safety resources, including emergency services, law enforcement, and medical facilities.

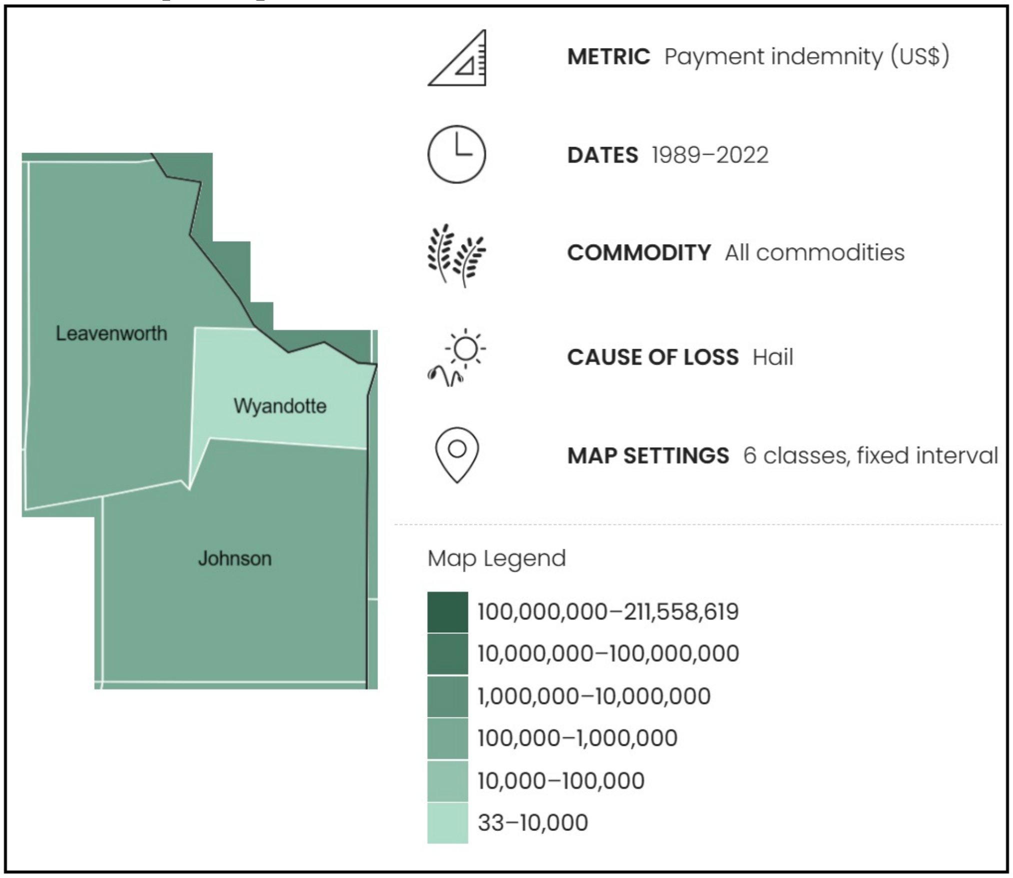
All facilities within Kansas Region L can be impacted by severe weather, including critical facilities. However, the location and construction of the facility will have a significant impact on the vulnerability. In general, older structures would be at higher risk of negative impacts. Some of the potential impacts include:

- Electrical Infrastructure Damage: Severe weather can damage electrical infrastructure, including power lines, transformers, and substations. This can result in widespread power outages, affecting homes, businesses, hospitals, and other critical facilities.
- Communication Disruptions: Severe weather can disrupt telecommunications infrastructure, including cell towers, data centers, and communication networks. This can impact emergency communication and coordination efforts.
- Transportation Disruptions: Heavy rain, strong winds, and flooding can damage roads, bridges, and transportation networks. This can lead to transportation disruptions, accidents, and delays, affecting the movement of goods and people.
- Airport Closures: Severe weather can force the closure of airports due to safety concerns, affecting air travel and cargo shipments.
- Water and Wastewater Systems: Severe storms can overwhelm water treatment plants and wastewater facilities, leading to contamination and water supply disruptions. Flooding can also damage water infrastructure.
- Critical Facilities: Hospitals, emergency response centers, and other critical facilities may be affected by power outages, flooding, and damage to infrastructure. This can impact the ability to provide essential services during and after the storm.
- Energy Generation: Severe weather can disrupt energy generation facilities, such as wind farms and solar installations, and damage conventional power plants. This can affect the availability of electricity.
- Safety Risks: Damage to infrastructure can pose safety risks to workers and the public. Fallen power lines, damaged buildings, and debris can be hazardous.

Severe weather can pose various risks to the environment. These risks can have both short-term and long-term impacts on natural ecosystems. Severe weather can produce heavy rainfall over a short period of time, leading to flash floods and riverine flooding. This can result in soil erosion, damage to aquatic habitats, and the displacement of aquatic organisms. Large hailstones can damage crops, vegetation, and natural habitats. Hail can strip leaves from trees and plants, reducing their ability to photosynthesize and grow. It can also damage wildlife habitats. Severe weather often produces strong straight-line winds. These winds can uproot trees, damage forests, and disrupt animal habitats. They can also scatter debris and cause structural damage to buildings, which can lead to further environmental issues if hazardous materials are released. Lightning is a common occurrence during severe weather and can spark wildfires. These wildfires can have significant ecological impacts, including habitat destruction, loss of wildlife, and changes in the local ecosystem.

Hail events can cause significant agricultural impacts. The following map from the United States Department of Agriculture details total agricultural losses, by county, due to hail events from 1989 to 2021:

Map 66: Agricultural Losses Due to Hail Events, 1989 to 2021



Source: USDA

Severe weather can pose various risks to government operations. These risks can have significant economic and operational consequences, and can include:

- Power Outages: Severe weather can lead to power outages by damaging electrical infrastructure such as power lines and substations. Government buildings may lose power, affecting critical operations and services.
- Flooding: Heavy rainfall during Severe weather can lead to flooding, which can damage government buildings and disrupt operations. Flood damage may require extensive repairs and cleanup.
- Communication Disruptions: Lightning strikes can damage communication equipment, including telephone lines and computer systems. This can hinder communication between government agencies and the public.
- Transportation Disruptions: Severe weather can make roads impassable due to flooding or fallen trees. This can impact the ability of government employees to commute to work and can disrupt the delivery of goods and services.
- Emergency Response: Severe weather may require the activation of emergency response plans. This can strain resources and personnel, especially if the storms lead to widespread damage or evacuations.
- Loss of Records and Data: Flooding or equipment damage can result in the loss of important records and data stored in government buildings. This can have legal and operational implications.

- Budgetary Impact: The costs associated with repairing and restoring government buildings and infrastructure after severe weather can strain budgets.

Potentially Vulnerable Community Lifelines

Severe weather can impact various community lifelines, critical systems and services that communities rely on for their functioning. Vulnerabilities arise due to the stress that severe weather conditions place on infrastructure, resources, and operational processes. As an overview, the May 2023 FEMA Benefit-Cost Analysis Sustainment and Enhancements Standard Economic Value Methodology Report indicates the following loss values for community lifelines:

Table 79: Economic Impacts of Loss of Service Per Capita Per Day (in 2022 dollars)

Category	Loss
Loss of Electrical Service	$199
Loss of Communications/Information Technology Services	$141

Source: May 2023 FEMA Benefit-Cost Analysis Sustainment and Enhancements Standard Economic Value Methodology Report

Severe weather can have significant impacts on electrical utilities, leading to disruptions in power supply and potential damage to infrastructure. Severe weather can affect electrical utilities in the following ways:

- Lightning Strikes: Lightning is a common occurrence during severe weather and poses a substantial risk to electrical infrastructure. Lightning strikes can damage power lines, transformers, substations, and other critical components, leading to power outages.
- Wind Damage: High winds associated with severe weather can cause trees, branches, and other debris to fall onto power lines. This can result in downed power lines, structural damage to utility poles, and disruptions in electrical service.
- Hailstorms: Severe weather may produce hail, which can damage power lines, transformers, and other equipment. Hailstones can also lead to short circuits and insulation damage on electrical components.
- Power Surges: Lightning strikes, strong winds, and other storm-related events can lead to power surges in the electrical grid. These surges can damage electronic devices, appliances, and utility equipment connected to the power supply.

In order to reduce plan duplication, mapping concerning electrical generation plants, high-capacity transmission lines, and electrical utility providers as well as utility repair and replacement cost estimation provides may be found in Maps 31 and 32, pages 75 and 76, and Chart 15, page 76.

Communications systems within Kansas Region L may have an increased vulnerability to severe weather events. Of particular concern are 911 and dispatch systems. All jurisdictions are served by a 911 and dispatch system, providing direct dispatching for:

- Law Enforcement
- Emergency Medical Services
- Fire

Severe storms can disrupt this vital communications system, affecting reliability and functionality. Some of the key vulnerabilities include:

- Physical Infrastructure Damage: High winds, heavy rainfall, and other severe weather conditions can cause physical damage to communication infrastructure such as cell towers, antennas, cables, and data centers. This damage can result in network outages and disruptions.
- Power Outages: Severe storms often lead to power outages, which can affect the operation of communication networks. Without a stable power supply, cell towers, data centers, and other critical components may become non-functional, leading to service interruptions.

- Lightning Strikes: Lightning poses a threat to communication infrastructure. Direct strikes or induced surges can damage electronic equipment, leading to the need for repairs or replacements and causing downtime.
- Signal Interference: Severe storms can create electromagnetic interference that disrupts radio signals used in wireless communication. This interference can lead to poor signal quality, dropped calls, and slower data speeds.
- Loss of Backhaul Connectivity: Severe weather events can damage the backhaul infrastructure that connects various communication nodes. This backbone infrastructure is crucial for transmitting data between local and regional networks, and any disruption can impact overall network performance.
- Communication Tower Instability: High winds and extreme weather conditions can compromise the stability of communication towers. If towers are not designed to withstand severe weather, they may collapse, leading to network outages.
- Network Congestion: In the event of a disaster, communication networks may experience a surge in usage as people attempt to contact emergency services, friends, and family. This increased demand can lead to network congestion, making it difficult for users to connect.

The cost to repair communications networks can vary widely depending on the extent of the damage, the size of the network, and the specific technologies involved. Repair costs may include expenses for labor, equipment replacement or repair, materials, and any additional resources required to restore the network to full functionality. The following data, from the U.S. Department of Homeland Security Cybersecurity and Infrastructure Security Agency, indicates cost ranges for communications system components:

Table 80: Summary of Communication System Component Costs

Components	Examples	Cost	Expected Lifespan
Infrastructure	Towers, shelters, commercial and backup power equipment,	$$$–$$$$$	20–25 years
Fixed Station Equipment	Antennas, repeaters, towers on wheels, consoles, mobile stations, servers, computers, physical and electronic security elements (e.g., fencing, cameras, monitors, environmental conditions)	$$-$$$	3-15 years
Devices	Handheld portable radios, cellular phones, satellite phones, mobile data devices	$-$$	2-10 years
Accessories	Holsters, chargers, speakers, lapel microphone extensions, Bluetooth, vehicle kits, air cards, intercoms	$	2-10 years
Features	Encryption to protect against security risks, ruggedization to ensure reliant services, Over-the-Air-Programming, automatic roaming	$-$$$	-
Software and Data Storage	Global information system, emergency notifications, monitoring, call answering, database access, Automatic Vehicle Locator	$-$$	-

Source: U.S. Department of Homeland Security Cybersecurity and Infrastructure Security Agency

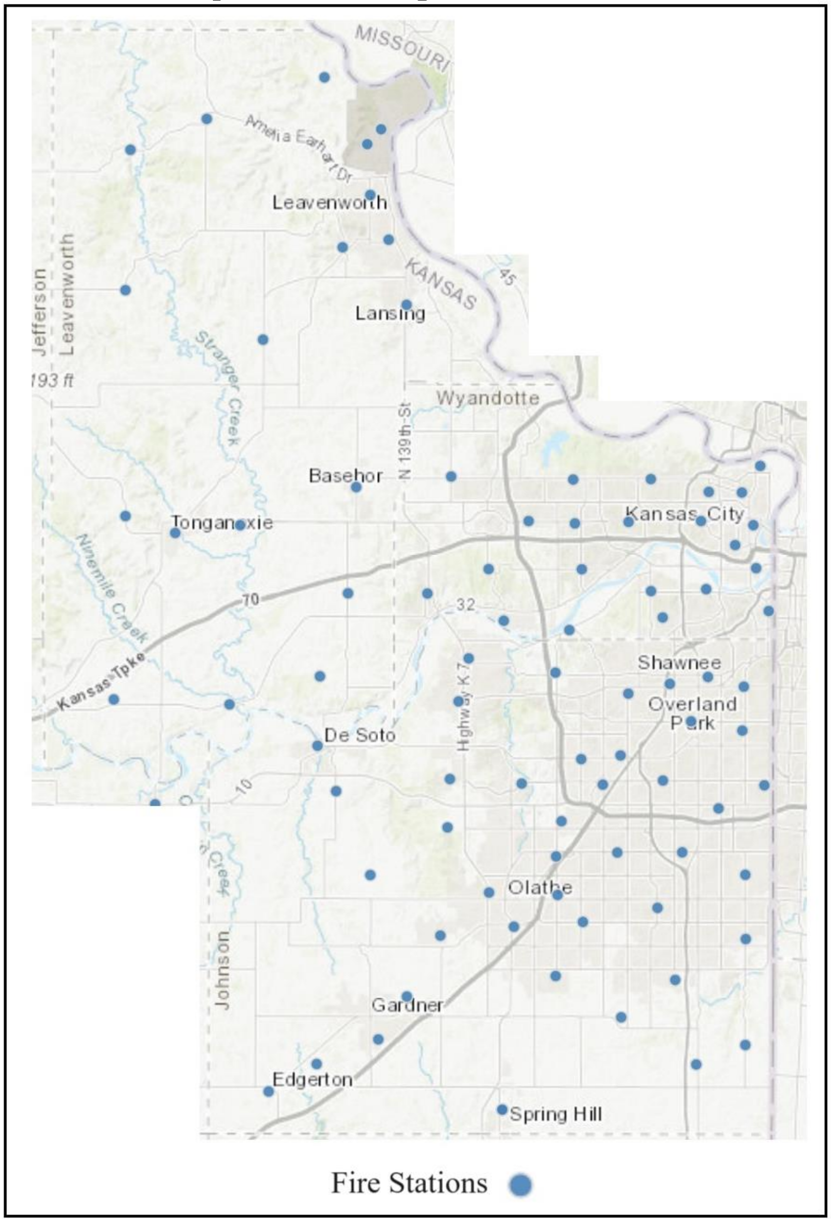
Severe weather can have various impacts on emergency response efforts, affecting the ability of emergency services to effectively manage and address the consequences of the storm. Some potential impacts include:

- Increased Call Volume: Severe weather events typically result in a surge in emergency calls, overwhelming call centers and emergency hotlines. This can lead to delays in response times and increased stress on emergency services.
- Infrastructure Damage: High winds associated with severe weather can cause trees and power lines to fall, leading to road blockages and posing safety hazards. Infrastructure damage may slow down emergency response and increase the complexity of rescue operations.
- Search and Rescue Challenges: Storms can generate debris, making search and rescue operations more changing. Flooded areas may hide hazards beneath the water surface, and strong winds can complicate helicopter or drone operations.

- Evacuations: Severe weather may necessitate evacuations, requiring emergency responders to manage shelters for displaced individuals. Providing adequate shelter, food, and medical care becomes a priority.
- Resource Allocation: Emergency response agencies must strategically allocate resources to address the most urgent needs during and after a severe weather event. This includes deploying personnel, equipment, and supplies to the most affected areas.

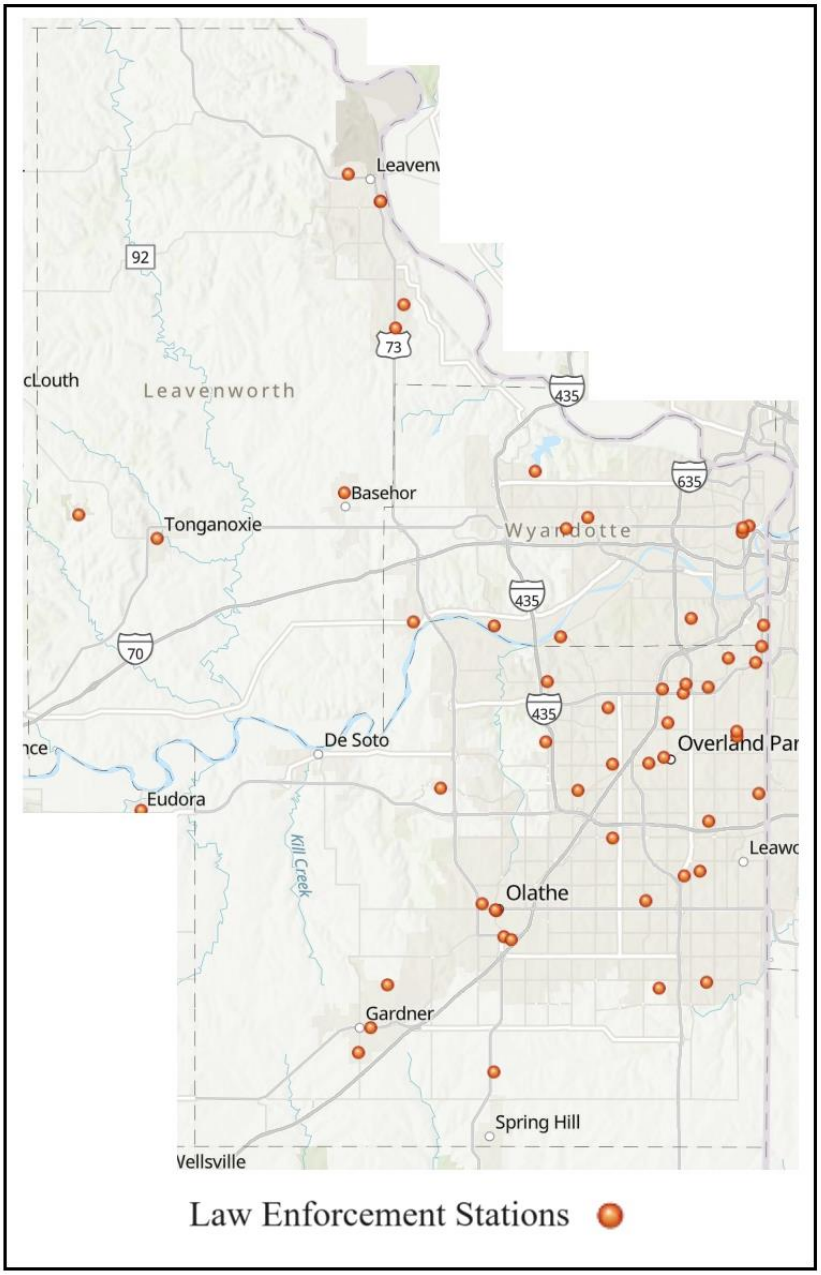
The following map, from the State of Kansas Geoportal, details the location of fire stations throughout Kansas Region L:

Map 67: Kansas Region L Fire Stations



Source: State of Kansas GIS

Map 68: Kansas Region L Law Enforcement Locations



Source: State of Kansas GIS

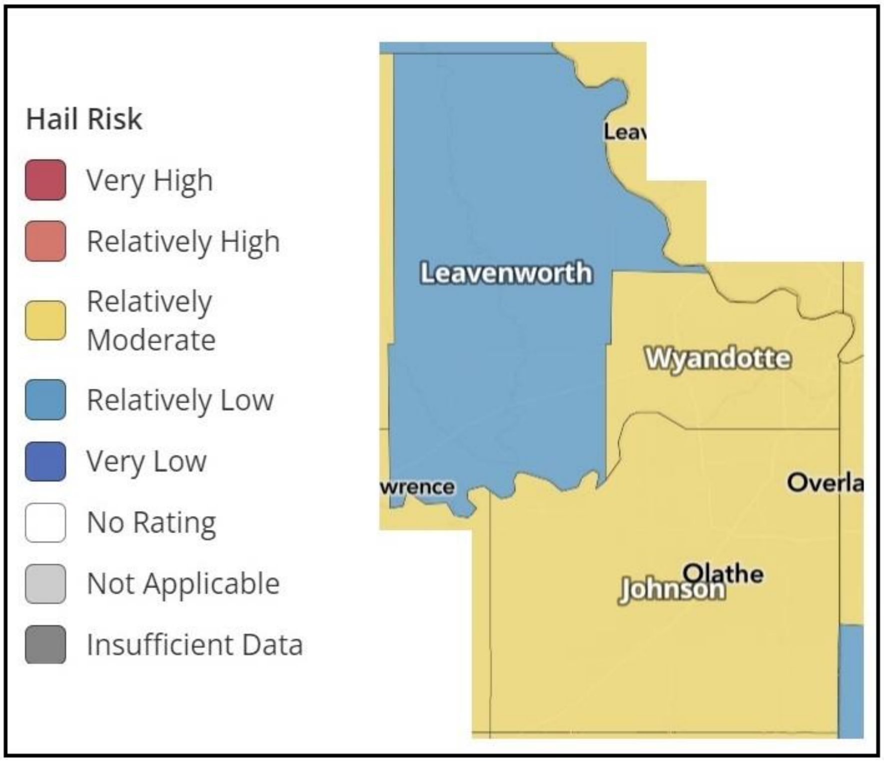
Hospitals and other smaller medical facilities may see an increase in severe weather -related injuries during an event, but it is considered unlikely that this increase will impact or overload capacity. Hospital capacity mapping may be found in Map 33, page77.

Severe weather can increase the demand for emergency shelters, particularly in cases of widespread power outages. Setting up and managing these shelters can strain resources.

FEMA NRI

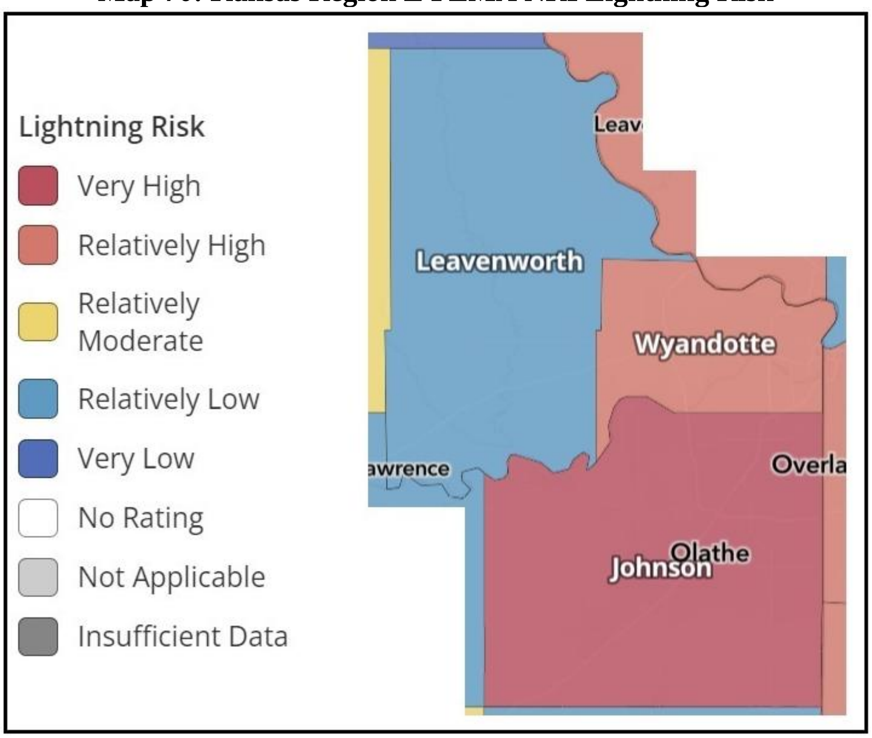
Using the FEMA NRI, and consisting of three input components (expected annual loss, social vulnerability, and community resilience), the following map was created indicating the potential risk to participating counties from the components of Severe Weather (hail, lightning, and strong winds):

Map 69: Kansas Region L FEMA NRI Hail Risk



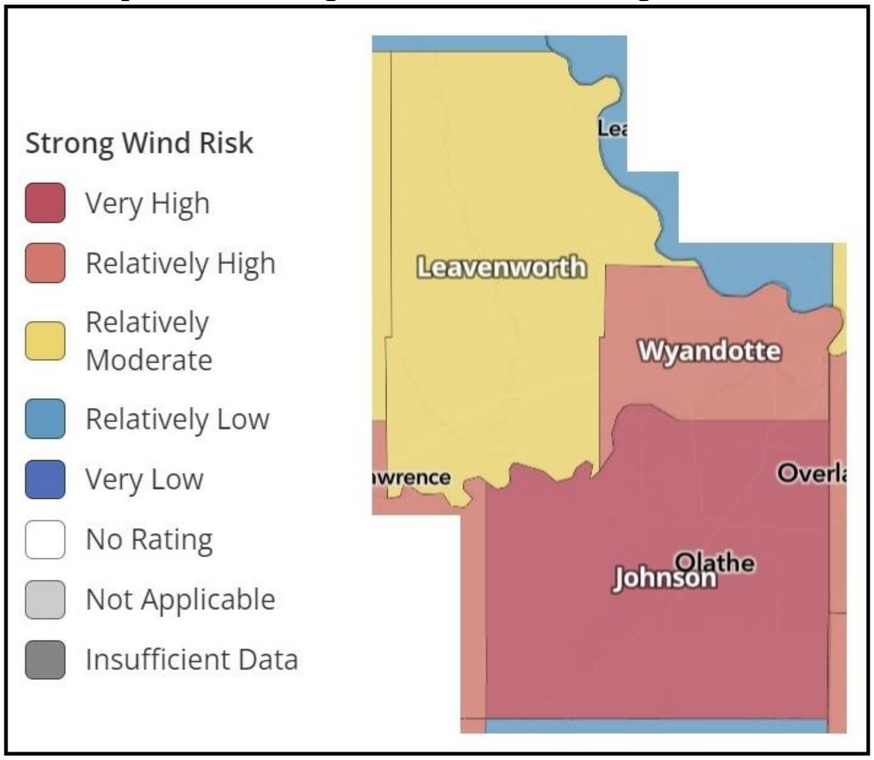
Source: FEMA NRI

Map 70: Kansas Region L FEMA NRI Lightning Risk



Source: FEMA NRI

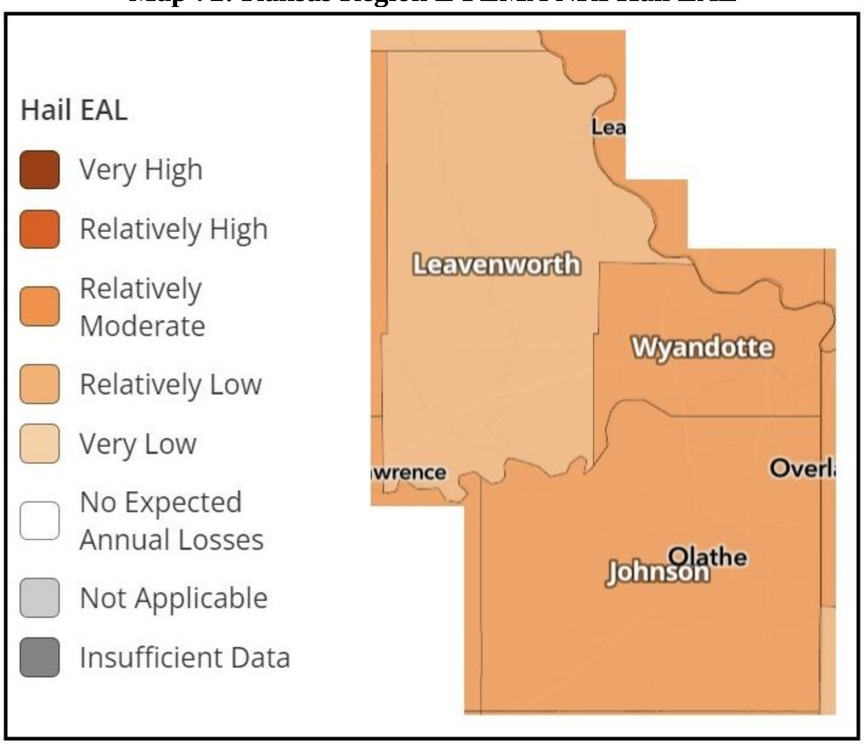
Map 71: Kansas Region L FEMA NRI Strong Wind Risk



Source: FEMA NRI

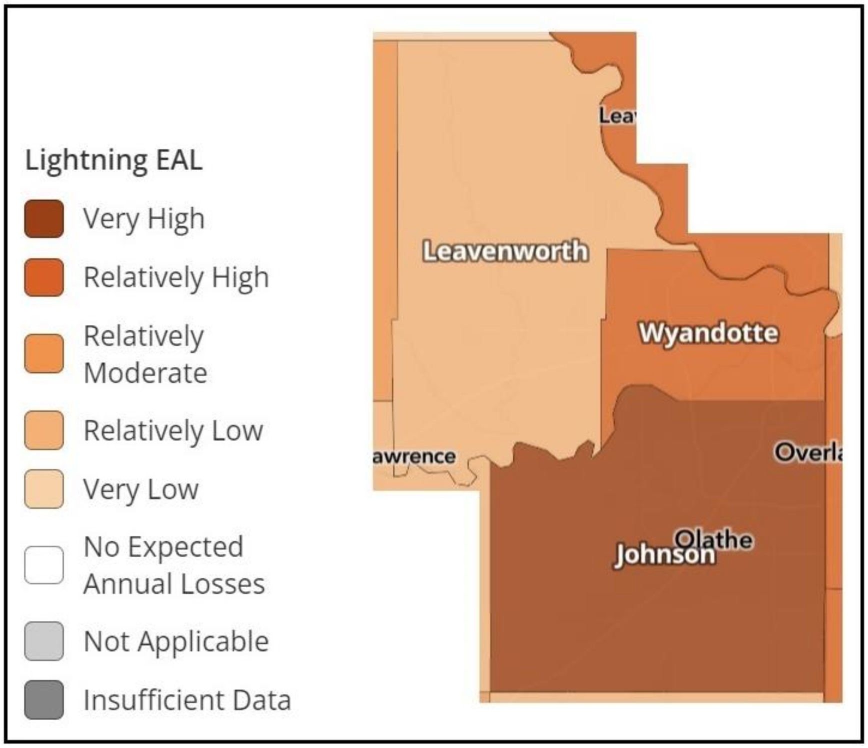
As part of the NRI, EAL represents the average economic loss in dollars resulting from natural hazards each year and is proportional to a community's risk. The following map indicates the EAL for the components of severe weather (hail, lightning, and strong winds) for participating counties within Kansas Region L:

Map 72: Kansas Region L FEMA NRI Hail EAL



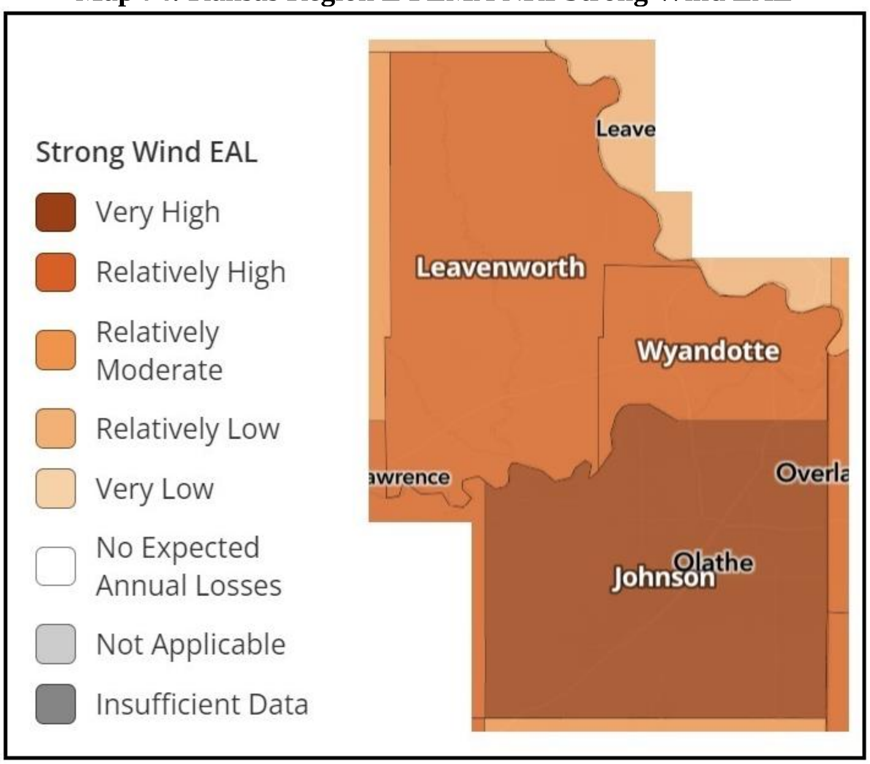
Source: FEMA NRI

Map 73: Kansas Region L FEMA NRI Lightning EAL



Source: FEMA NRI

Map 74: Kansas Region L FEMA NRI Strong Wind EAL



Source: FEMA NRI

The following tables indicates the FEMA NRI and EAL analysis for each participating Kansas Region L county for severe weather events:

Table 81: Kansas Region L FEMA NRI and EAL for Hail by County

County	Risk Index	EAL
Johnson	Relatively Moderate	Relatively Moderate
Leavenworth	Relatively Low	Relatively Low
Wyandotte	Relatively Moderate	Relatively Moderate

Source: FEMA NRI

Table 82: Kansas Region L FEMA NRI and EAL for Lightning by County

County	Risk Index	EAL
Johnson	Very High	Very High
Leavenworth	Relatively Low	Relatively Low
Wyandotte	Relatively High	Relatively High

Source: FEMA NRI

Table 83: Kansas Region L FEMA NRI and EAL for Strong Wind by County

County	Risk Index	EAL
Johnson	Very High	Very High
Leavenworth	Relatively Moderate	Relatively High
Wyandotte	Relatively High	Relatively High

Source: FEMA NRI

Consequence Analysis

This consequence analysis lists the potential impacts of a hazard on various elements of community and state infrastructure. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Kansas Region L residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

Table 84: Severe Weather Consequence Analysis

Subject	Potential Impacts
Impact on the Public	Severe weather can cause extensive property damage, loss of utility service, and injury to the public. Those most at-risk are low-income and homeless individuals without proper shelter.
Impact on Responders	First responders may be unable to access roadways due to flooding, trees, or debris. Exposure to lightning, flooding, and high winds may cause injuries to first responders. Vehicles and resources may be damaged, leading to impaired response activities. In addition, road conditions may become hazardous as a result of the by-products
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary based on the situation. Severe Weather may impact an agency’s ability to maintain continuity of operations due to power outages, flooding, and wind damage. If the activation of alternate facilities was required, travel may be difficult as well as computer/network access due to long-term power outages caused by severe weather.
Delivery of Services	Delivery of services may be impaired by flooding, obstruction, and damage to roadways and resources. The ability to deliver goods and services will be impacted locally, regionally, or statewide depending on the magnitude of the event. Goods, equipment, and vehicles may become damaged during transport.
Property, Facilities, and Infrastructure	Power lines and power generators are most at risk from severe weather and impacts could result in isolated power outages or full-scale blackouts. Building and vehicle damage can occur from hail and other debris created by severe weather. Properties and critical facilities also may face foundational and physical damage due to flooding, lightning strike, or excessive winds, delaying response and recovery operations.
Impact on Environment	Waste and debris from damage treatment infrastructure or hazardous materials facilities could contaminate sources of water and food. Debris can impact and contaminate wildlife and natural areas. Lightning strikes may also ignite fires, leading to destruction of agricultural crops, critical ecosystems, and natural habitats.
Economic Conditions	Flooding, high winds, lightning, and hail can stress state and local resources.

Table 84: Severe Weather Consequence Analysis

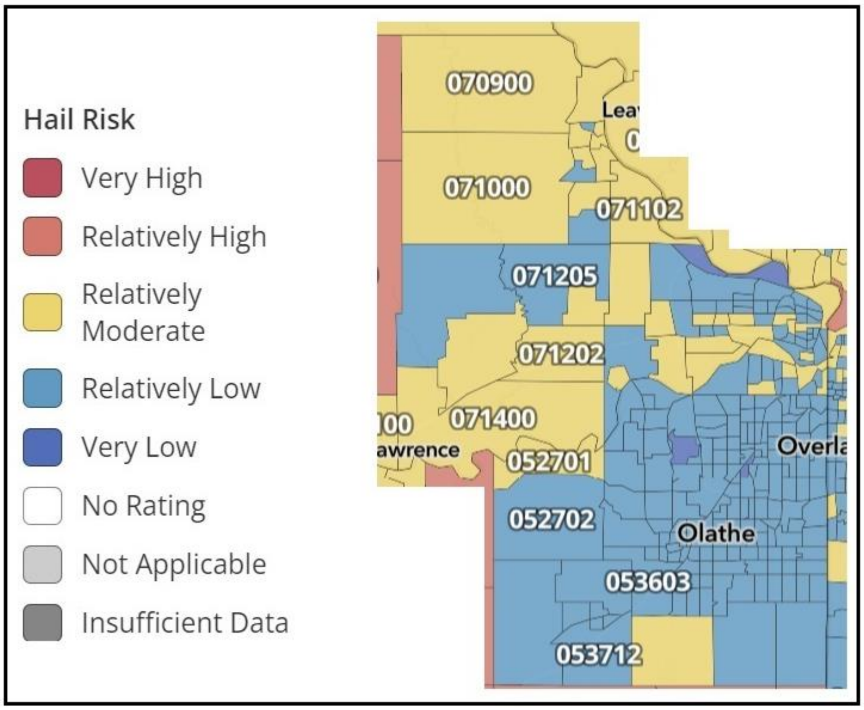
Subject	Potential Impacts
	Even if some of the costs can be recouped through federal reimbursements (federal disaster declaration), there is a fiscal impact on the local government.
Public Confidence in Governance	Ineffective response can decrease the public's confidence in the ability to respond and govern. Governmental response across local, state, regional, and federal levels require direct actions that must be immediate and effective to maintain public confidence.

4.13.7 Jurisdictional Risk and Vulnerability

To help understand the risk and vulnerability to severe weather of participating jurisdictions, mapping from the FEMA NRI was run on a census tract level. As the NRI does not generate mapping for individual jurisdictions, census tract analysis is the closest analogue available to understand individual jurisdiction conditions.

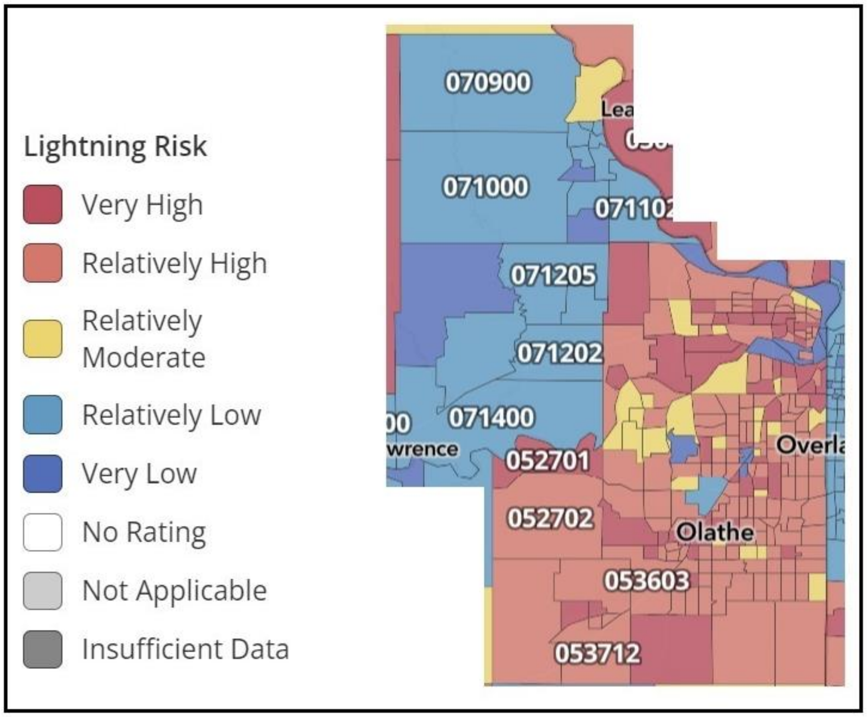
Using the FEMA NRI, and consisting of three input components (expected annual loss, social vulnerability, and community resilience), the following map was created indicating the potential risk to participating jurisdictions (as indicated by census tract) from the components of severe weather (hail, lightning, and strong winds):

Map 75: FEMA NRI Jurisdictional Hail Risk



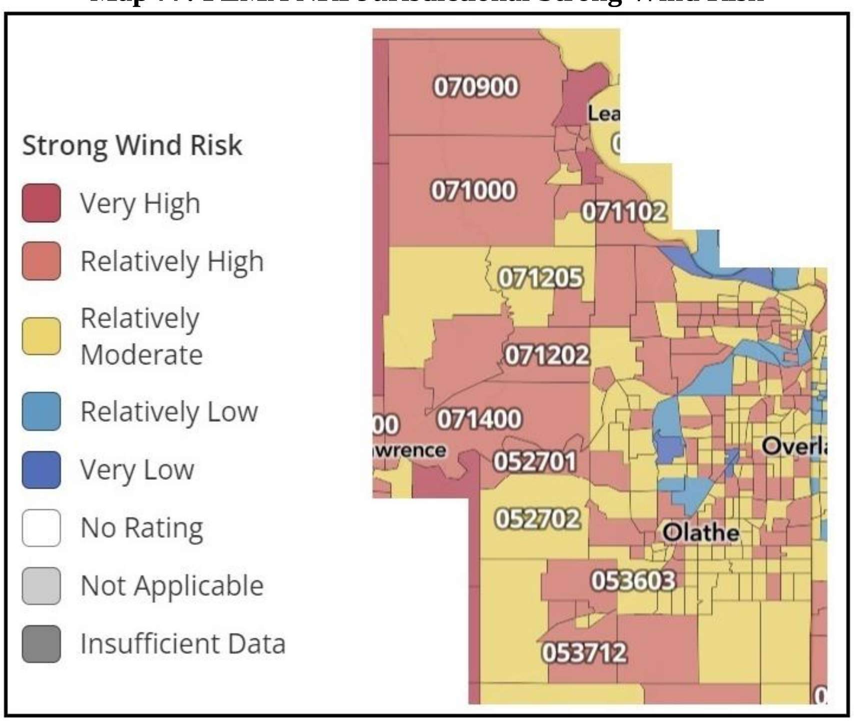
Source: FEMA NRI

Map 76: FEMA NRI Jurisdictional Lightning Risk



Source: FEMA NRI

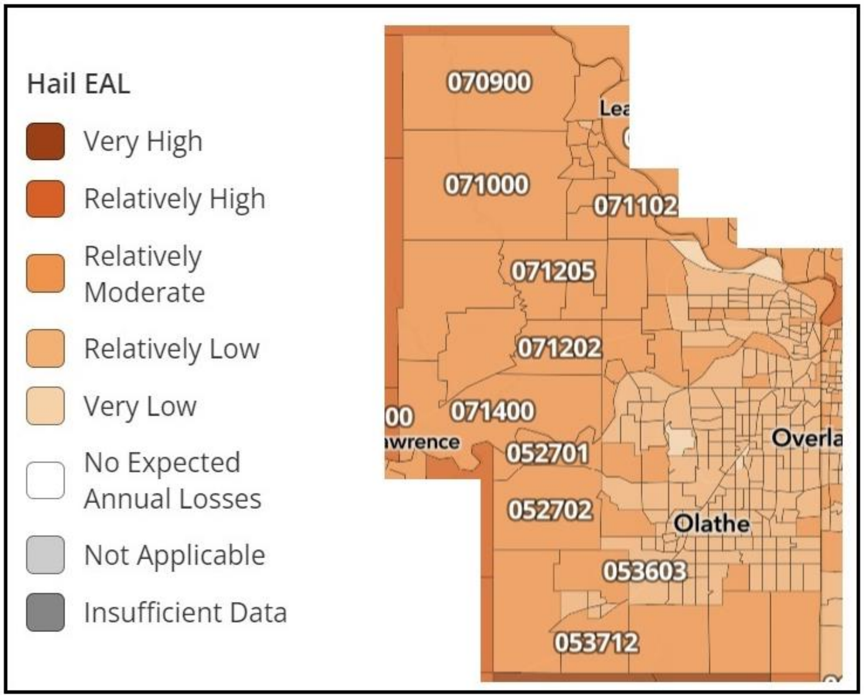
Map 77: FEMA NRI Jurisdictional Strong Wind Risk



Source: FEMA NRI

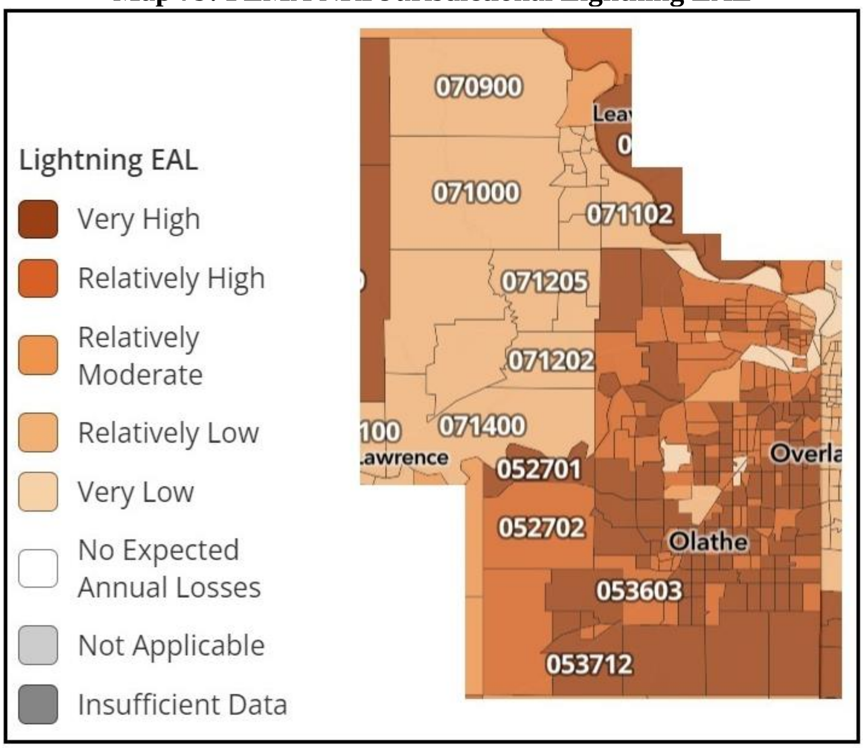
As part of the NRI, EAL represents the average economic loss in dollars resulting from natural hazards each year and is proportional to a community's risk. The following map indicates the EAL for the components of severe weather (hail, lightning, and strong winds) for participating jurisdictions (as indicated by census tract) within Kansas Region L:

Map 78: FEMA NRI Jurisdictional Hail EAL



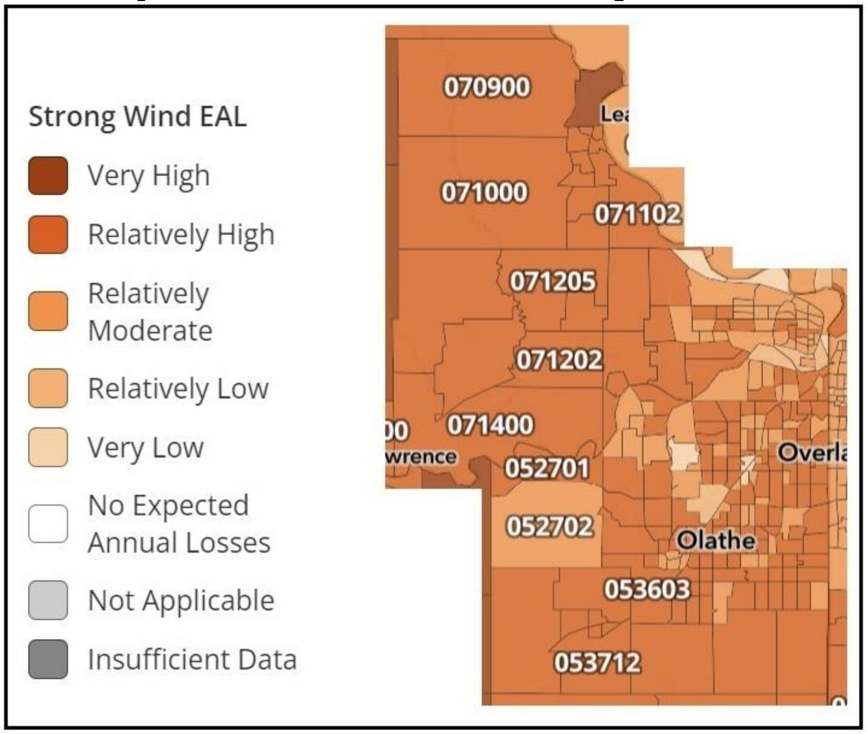
Source: FEMA NRI

Map 79: FEMA NRI Jurisdictional Lightning EAL



Source: FEMA NRI

Map 80: FEMA NRI Jurisdictional Strong Wind EAL



Source: FEMA NRI

FEMA NRI data tables, by census tract, are included in Appendix C. These data tables contain the risk index and EAL along with total building valuation and agricultural valuation allowing for an understanding of potential structural and agricultural vulnerability on a jurisdictional basis.

Kansas Region L citizens living in mobile homes may have an increased vulnerability to Severe Weather. Please see section 3.6 for more details on the percentage of mobile homes for each participating county.

4.14 Severe Winter Weather

4.14.1 Hazard Description

A winter storm encompasses multiple effects caused by winter weather. Included are strong winds, ice storms, heavy or prolonged snow, sleet, and extreme temperatures. Winter storms can be increasingly hazardous in areas and regions that only see winter storms intermittently.

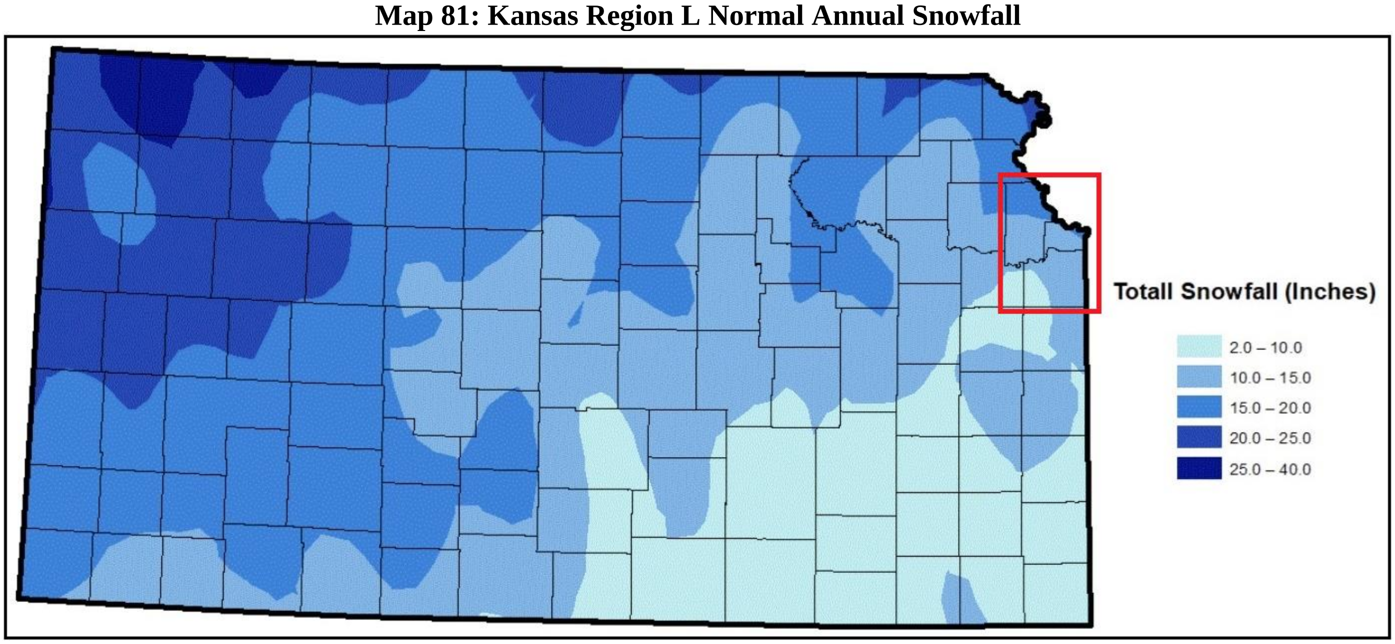
This plan defines winter storms as a combination of the following winter weather effects as defined by NOAA and the NWS.

- **Ice Storm:** An ice storm is used to describe occasions when damaging accumulations of ice are expected during freezing rain situations. Significant accumulations of ice pull down trees and utility lines resulting in loss of power and communication, and can make travel extremely dangerous. Significant ice accumulations are usually accumulations of ¼" or greater.
- **Heavy Snow:** This generally means snowfall accumulating to 4" or more in depth in 12 hours or less; or snowfall accumulating to 6" or more in depth in 24 hours or less.
- **Winter Storm:** Hazardous winter weather in the form of heavy snow, freezing rain, or heavy sleet. It may also include extremely low temperatures and increased wind.
- **Cold Wave/Extreme Cold:** As described by NWS, a cold wave is a rapid fall in temperature within a 24-hour period requiring substantially increased protection to agriculture, industry, commerce, and social activities. As evidenced by past incidents across the U.S., extreme cold can cause impact to human life and property.

4.14.2 – Location and Extent

Winter storms occur regularly throughout Kansas Region L. These events occur on a large geographic scale, often affecting multiple counties, regions, and states. Winter storms typically form with warning and are often anticipated. Like other large storm fronts, the severity of a storm is not as easily predicted and when it is, the window of notification is up to a few hours to under an hour. Although meteorologists estimate the amount of snowfall a winter storm will drop, it is not known exactly how much snow will fall, whether or not it will form an ice storm, or how powerful the winds will be until the storm is already affecting a community. The following map from Kansas State University indicates the average annual snowfall for Kansas Region L:

Map 81: Kansas Region L Normal Annual Snowfall



Source: NOAA

The Northeast Snowfall Impact Scale is a scale used to assess and rank the impact of snowfall events in the northeastern United States, but allows for an idea of intensity for Kansas Region L. It was developed by NOAA to provide a standardized way of measuring the societal and economic impacts of snowstorms. The scale takes into account factors such as snowfall amount, population density, and the area affected by the storm to determine its impact. The scale has five categories, each with its own associated impacts:

Table 85: Snowfall Impact Scale

Category	Description	Impacts
1	Notable	Light to moderate snowfall. Limited impacts on transportation and daily life. Typically localized to small areas.
2	Significant	Moderate to heavy snowfall. Widespread impacts on transportation, including delays and disruptions. Some school and business closures. Widespread power outages are rare.
3	Major	Heavy snowfall, often exceeding one foot or more. Significant transportation disruptions, including major highway closures. Widespread school and business closures. Power outages may occur, especially in areas with wet, heavy snow.
4	Crippling	Extreme snowfall, often exceeding two feet or more. Severe and prolonged transportation disruptions, including highway closures. Widespread school and business closures for an extended period. Widespread and prolonged power outages, especially in areas with ice accumulation.
5	Extreme	Exceptional snowfall, often exceeding three feet or more. Complete paralysis of transportation systems, including major highways and airports. Extended school and business closures. Widespread and prolonged power outages with significant damage to the electrical infrastructure.

Source: NOAA

The scale provides information for emergency management, public safety agencies, and the public to understand the potential impacts of a snowstorm and to prepare accordingly. It helps to quantify and communicate the severity of winter weather events, especially where snowfall can have a major impact on daily life and the economy.

Ice storms are characterized by the accumulation of freezing rain or freezing drizzle, which coats surfaces with a layer of ice. These storms can have significant impacts on transportation, infrastructure, and the environment. Ice storms occur when there's a layer of warm air above a layer of cold air near the surface. Precipitation falls as rain in the warm layer and then freezes upon contact with surfaces at or below freezing temperatures in the cold layer. The most common type of precipitation during an ice storm is freezing rain. This is rain that falls as a liquid but freezes upon contact with cold surfaces, forming a layer of ice.

The Sperry–Piltz Ice Accumulation Index is an ice accumulation and ice damage prediction index that, when combined with NWS data, predicts the projected footprint, total ice accumulation, and resulting potential damage from approaching ice storms.

Figure 2: Sperry–Piltz Ice Accumulation Index

ICE DAMAGE INDEX	DAMAGE AND IMPACT DESCRIPTIONS
0	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
1	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
2	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
3	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1 – 5 days.
4	Prolonged & widespread utility interruptions with extensive damage to main distribution feeder lines & some high voltage transmission lines/structures. Outages lasting 5 – 10 days.
5	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.

Source: Sperry–Piltz Ice Accumulation Index

4.14.3 Previous Occurrence

The following table presents NCEI identified ice storm and winter storm events and the resulting damage totals in Kansas Region L from 1950 to 2023. This data is presented regionally as these storms tend to cover large areas.

Table 86: NCEI Kansas Region L Winter Storm Events

Region	Event Type	Number of Days with Events	Property Damage	Deaths and Injuries
Kansas Region L	Blizzard	4	0	$0
	Ice Storm	11	0	$9,538,000
	Winter Storm	28	0	$0

Source: NCEI

It is worth noting that damage estimates indicated by the NCEI are often artificially low. This underreporting is a result of the way the events are reported to the NCEI, often by the local and/or NWS office. When reporting an event oftentimes the NWS office does not have access to the actual damage assessment resulting from that event. As such, the report often details a very low amount or zero-dollar amount for damages. Additionally, deaths and injuries may be underreported as they may be a result of a concurrent event, such as a person driving unsafely during heavy rain and passing away.

4.14.4 Probability of Future Events

Predicting the probability of winter storm occurrences is tremendously changing due to the large number of factors involved and the random nature of formation. Data from NOAA and the NWS indicate that Kansas Region L can expect an average annual snowfall of between two to 15 inches per year.

Based on historical occurrences, Kansas Region L will continue to experience severe winter storm events on an annual basis. The following table, using data from the NCEI, indicates the yearly probability of a severe winter storm event, the number of deaths or injuries, and estimated property damage for each county in Kansas Region L.

Table 87: Kansas Region L NCEI Severe Winter Storm Event Probability Summary

Event Type	Days with Event	Average Events per Year	Deaths / Injuries	Average Deaths / Injuries per Year	Property Damage	Average Property Damage per Year
Blizzard	4	<1	0	0	$0	$0
Ice Storm	11	<1	0	0	$9,538,000	$179,962
Winter Storm	28	1	0	0	$0	$0

Source: NCEI

4.14.5 Projected Changes in Location, Intensity, Frequency, and Duration

Climate change can lead to greater variability in precipitation patterns. In Kansas Region L, this may result in more erratic winter storms with periods of heavy snowfall followed by rain or freezing rain. These mixed precipitation events can make winter storms more changing to predict and can lead to a greater risk of ice accumulation. Additionally, Kansas Region L may experience milder winters as average temperatures rise due to climate change. While this could lead to a decrease in the frequency of traditional snowstorms, it may also increase the likelihood of winter storms that produce mixed precipitation, including freezing rain and sleet. Warmer temperatures can lead to a higher snowfall threshold, meaning that storms that would have produced snow in the past may now bring more rain or a mix of precipitation types. This can affect the accumulation of snow in the state. Changes in atmospheric circulation patterns associated with climate change can influence the tracks of winter storms. This could lead to a shift in the amounts of heavy snowfall, ice, and other winter weather hazards in Kansas Region L.

4.14.5 Vulnerability and Impact

All of Kansas Region L is vulnerable to winter and ice storms. Based on the non-geographic specific aspect of this hazard, i.e., no one area is at a greater risk, all of the planning area's structural inventory and population is vulnerable.

Extremely cold temperatures are a threat to anyone exposed to them. Extreme cold can cause frostbite and hypothermia. Bitterly cold temperatures can also burst water and create an excessive demand on providers to deliver energy for household heating. There are also fire dangers associated with home heating. Heavy snow and/or ice can paralyze communities. Roads can become hazardous which may cause accidents, disrupted flow of supplies, and challenges in the delivery of emergency and medical services. Additional impacts on people and the community may include:

- Injuries and Fatalities: Slippery sidewalks, roads, and driveways can lead to slip and fall accidents, vehicle crashes, and pedestrian injuries. Exposure to extreme cold temperatures can cause frostbite, hypothermia, and cold-related illnesses, which can be life-threatening.
- Power Outages: Heavy snow, ice, and freezing rain can bring down power lines and disrupt electricity supply. Power outages can lead to heating and lighting challenges, particularly in extreme cold conditions.
- Transportation Disruptions: Winter storms can make roads and highways treacherous, leading to travel delays, accidents, and stranded motorists. Public transportation services may be disrupted, affecting commuters and essential travel.
- Stranded or Isolated Communities: Severe winter weather can leave communities isolated and cut off from emergency services and supplies. Residents may need to shelter in place or rely on local resources until conditions improve.
- Health Risks: Exposure to extreme cold can lead to a range of health risks, including frostbite, hypothermia, and cold-related illnesses. Individuals with pre-existing health conditions may face exacerbated risks.
- Increased Heating Costs: Cold weather can result in higher heating costs, which can be a financial burden for many households. Low-income individuals and families may struggle to afford adequate heating.
- Disruption of Essential Services: Severe winter weather can disrupt essential services such as healthcare, emergency response, and utilities. Hospitals may face increased patient volumes due to weather-related injuries and illnesses.

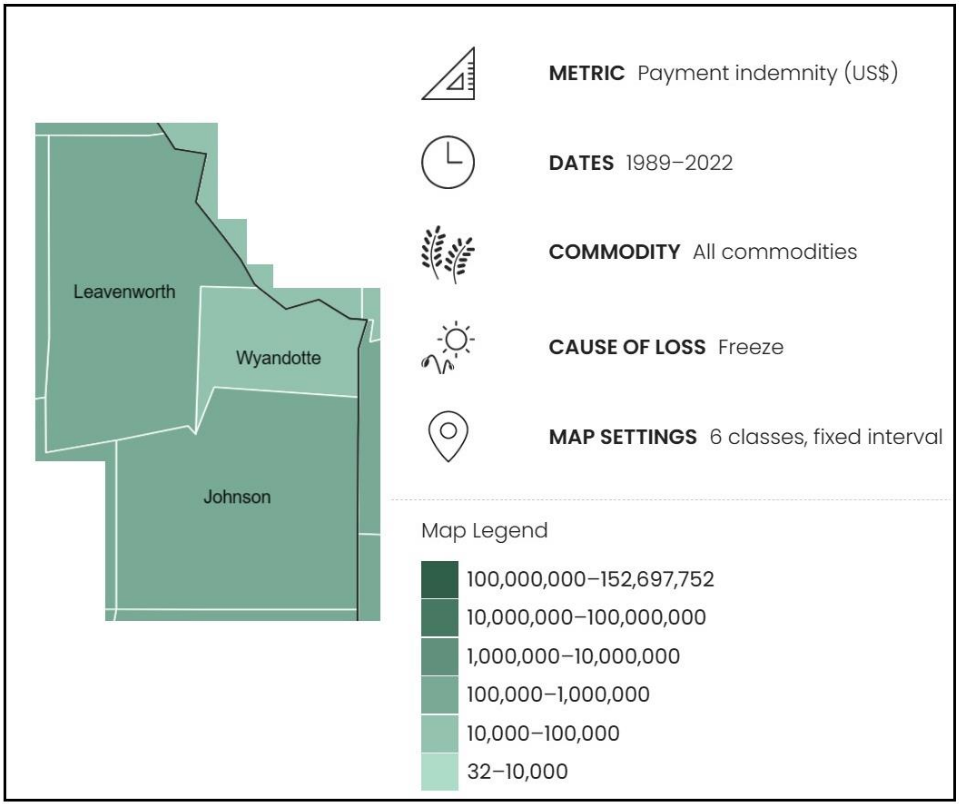
Severe winter storms can have significant and wide-ranging impacts on facilities, and may include:

- Power Outages: Severe winter storms can cause power outages by bringing down power lines, causing ice accumulation on electrical infrastructure, or overloading the electrical grid due to increased demand for heating. Critical facilities such as hospitals, emergency response centers, and data centers may rely on backup generators to maintain essential operations during outages.
- Communication Disruptions: Ice and freezing rain can damage communication infrastructure, including cell towers, telephone lines, and data centers, leading to disruptions in phone and internet services. This can hinder emergency communication and coordination, affecting critical response efforts.
- Transportation Disruptions: Snow and ice accumulation on roads, runways, and railways can disrupt transportation networks, leading to travel delays, accidents, and closures. Critical facilities may face challenges in receiving essential supplies and personnel during and after the storm.
- Water Supply Interruptions: Freezing temperatures can cause water pipes to burst, leading to water supply interruptions and damage to water infrastructure. Critical facilities such as hospitals and emergency response centers rely on a continuous supply of clean water for various purposes, including patient care and firefighting.
- Wastewater Systems: Cold temperatures can affect wastewater treatment plants, leading to potential operational disruptions and contamination risks.
- Fuel Supply Disruptions: Snow and ice can disrupt fuel supply chains, leading to shortages of gasoline, diesel, and heating oil. Critical facilities may rely on fuel for backup power generators and heating systems.
- Property Damage: Severe winter storms can result in property damage, including roof collapses due to heavy snow accumulation, ice damming, and frozen pipes.

Winter storms can have various impacts on the environment, particularly in regions prone to cold and snowy winters. These impacts can affect ecosystems, wildlife, and natural resources and can include habitat disruption, reduction of food sources, changes in migration patterns, and damage to foliage (especially if a spring storm). Additionally, the use of salt and de-icing chemicals on roads and sidewalks can have negative environmental impacts. These chemicals can find their way into nearby water bodies, leading to water pollution and harm to aquatic ecosystems. Snowmelt can also introduce pollutants from roadways and urban areas into rivers and streams, leading to reduced water quality. Elevated sediment levels and changes in water temperature can also affect aquatic life.

Severe winter weather conditions can cause significant agricultural impacts. The following map from the United States Department of Agriculture details total agricultural losses, by county, due to freeze events from 1989 to 2021:

Map 82: Agricultural Losses Due to Freeze Events, 1989 to 2021



Source: USDA

Severe winter weather can pose risks to local operations and can disrupt government functions and strain resources. Some of the risks to operations include:

- Transportation Disruptions: Snow and ice accumulation on roads and highways can hinder transportation, making it difficult for state agencies and personnel to travel and respond to emergencies. RIDOT must allocate resources to plow and salt roads, clear snow and ice, and repair potholes caused by freezing and thawing. These efforts are costly and resource intensive.
- School Closures: Winter storms often lead to school closures, which can affect state-run education programs and services. State agencies may need to coordinate with school districts to ensure the safety of students.
- Emergency Response and Public Safety: Winter storms can result in increased demands for emergency services, including responses to traffic accidents, medical emergencies, and stranded motorists. State and local agencies must allocate additional resources to address these needs.
- Economic Impact: Winter storms can result in economic losses due to reduced economic activity, transportation disruptions, property damage, and increased spending on emergency response and recovery efforts.
- Emergency Shelter Operations: Local jurisdictions may need to operate or coordinate emergency shelters during winter storms to provide shelter and resources to vulnerable populations, including those experiencing homelessness.
- Resource Allocation: State agencies must allocate resources, including personnel, equipment, and stockpiled supplies, to support emergency response efforts and maintain public services.
- Communication Challenges: Winter storms can disrupt communication networks, hindering the ability of state agencies to communicate internally and with the public. This can impact emergency notifications and coordination efforts.
- Budgetary Impact: The costs associated with snow removal, road maintenance, emergency response efforts, and infrastructure repair can strain state budgets.

- Governance and Administrative Challenges: State government offices and facilities may experience closures or reduced staffing during severe winter weather, affecting administrative functions, regulatory processes, and public services.

Potentially Vulnerable Community Lifelines
Extreme cold temperatures often associated with winter weather can impact various community lifelines, critical systems, and services that communities rely on for their functioning. Vulnerabilities arise due to the stress that winter weather places on infrastructure, resources, and operational processes. As an overview, the May 2023 FEMA Benefit-Cost Analysis Sustainment and Enhancements Standard Economic Value Methodology Report indicates the following loss values for community lifelines:

Table 88: Economic Impacts of Loss of Service Per Capita Per Day (in 2022 dollars)

Category	Loss
Loss of Electrical Service	$199
Loss of Wastewater Services	$66
Loss of Water Services	$138
Loss of Communications/Information Technology Services	$141

Source: May 2023 FEMA Benefit-Cost Analysis Sustainment and Enhancements Standard Economic Value Methodology Report

Winter storms can have significant impacts on road infrastructure, creating changing conditions for transportation and necessitating proactive measures for maintenance and safety. Winter storms can impact road infrastructure:

- Snow Accumulation: Snowfall can accumulate on road surfaces, creating slippery and hazardous conditions for drivers. Accumulated snow can reduce road visibility and make travel difficult.
- Ice Formation: Freezing temperatures can lead to the formation of ice on roadways, increasing the risk of accidents and making roads slippery. Black ice, which is nearly invisible, poses a particular hazard.
- Snowdrifts: Strong winds during winter storms can lead to the formation of snowdrifts on roads, especially in open areas. These drifts can obstruct visibility and impede traffic flow.
- Road Surface Damage: The freeze-thaw cycle, where melted snow refreezes, can lead to the formation of ice patches and potholes on road surfaces. This cycle can contribute to the deterioration of road infrastructure over time.
- Freeze-Thaw Cycling: Alternating freezing and thawing can cause the expansion and contraction of water within pavement cracks, leading to the formation and enlargement of potholes.
- Snowplow and Deicing Operations: Snowplows and deicing operations are necessary to clear roads and improve driving conditions. However, the use of salt and chemicals for deicing can contribute to corrosion and deterioration of road surfaces and infrastructure.
- Infrastructure Stress: Bridges and overpasses are particularly susceptible to ice formation due to the lack of ground contact. Winter storms can stress these structures, potentially leading to structural issues over time.

The following table, from the Kansas Department of Transportation, indicates the total road miles by county for Kansas Region L, all of which require plowing and maintenance during winter weather events:

Table 89: Kansas Region L Road Mileage by County

County	Total Road Miles
Johnson	3,352
Leavenworth	1,158
Wyandotte	1,146

Source: Kansas Department of Transportation

In smaller counties with fewer resources and equipment, the cost may be on the lower end of the spectrum, ranging from a few thousand dollars to around $10,000 per snow event. In larger counties or urban areas with extensive road networks and higher population densities, the cost can be much higher, potentially ranging from $10,000 to $50,000 or more per snow event.

Extreme Conditions or Emergencies: During severe winter storms or blizzards, the cost of snow removal can escalate significantly due to increased demand for services, overtime wages for workers, and the need for additional equipment and resources. In such cases, costs could exceed $100,000 or even reach into the millions for major metropolitan areas.

In general, the priority for snow removal is based on traffic volume, speed limits and road surface types. Preference is generally given in the following order:

- State trunklines
- Primary roads
- Major local roads
- Residential / subdivision streets

Winter storms can impact electrical utilities in various ways, potentially leading to disruptions in service. These impacts include:

- Power Outages: High temperatures can strain electrical systems, leading to increased demand for cooling systems like air conditioners. This heightened demand can overload power grids, resulting in power outages.
- Equipment Failure: Electrical equipment, such as cables and switches, may experience higher resistance and increased stress during extreme heat, increasing the likelihood of equipment failures.
- Reduced Efficiency in Power Plants: Power generation facilities may experience reduced efficiency during heatwaves due to elevated ambient temperatures. This can affect the output of power plants and potentially lead to supply shortages.
- Icing on Power Lines: Ice accumulation on power lines can lead to increased weight, potentially causing lines to sag or break. This can result in power outages and safety hazards.

Mapping concerning electrical generation plants, high-capacity transmission lines, and electrical utility providers as well as utility repair and replacement cost estimation provides may be found in Maps 31 and 32, pages 75 and 76, and Chart 15, page 76.

Winter storms can significantly impact emergency response infrastructure, creating challenges for first responders and organizations involved in managing and mitigating the effects of severe weather events. Winter storms can impact emergency response through:

- Transportation Disruptions: Snow and ice accumulation on roads can hinder the ability of emergency vehicles to navigate and reach affected areas promptly. Hazardous road conditions may result in delays in response times.
- Road Closures: Winter storms can lead to the closure of roads due to snow accumulation, ice, and hazardous conditions. This can limit access for emergency vehicles and impede the evacuation of residents.
- Communication Disruptions: Snow and ice can disrupt communication networks, affecting the ability of emergency responders to coordinate and communicate effectively. Downed power lines and damage to communication infrastructure contribute to these disruptions.
- Power Outages: Severe winter weather, including ice storms, can lead to power outages. Emergency response facilities, such as command centers and fire stations, may lose power, affecting their operational capabilities.
- Exposure: Emergency responders face increased health and safety risks in winter conditions. Exposure to extreme cold, snow, and ice can impact the well-being of responders and affect their ability to provide effective assistance.
- Resource Allocation Challenges: Winter storms often require the allocation of additional resources, including personnel, equipment, and supplies, to address immediate needs. This can strain emergency response organizations and impact their ability to respond to other concurrent incidents.

- Logistical Challenges: Snow accumulation and icy conditions may create logistical challenges for the transportation of supplies, equipment, and personnel to affected areas, hindering the overall effectiveness of emergency response efforts.
- Increased Demand for Services: Winter storms can result in an increased demand for emergency services, including medical assistance, search and rescue operations, and responses to accidents. Emergency response organizations may need to manage a higher volume of incidents simultaneously.

Mapping concerning fire and police infrastructure may be found in Maps 67 and 68, pages 144 and 145.

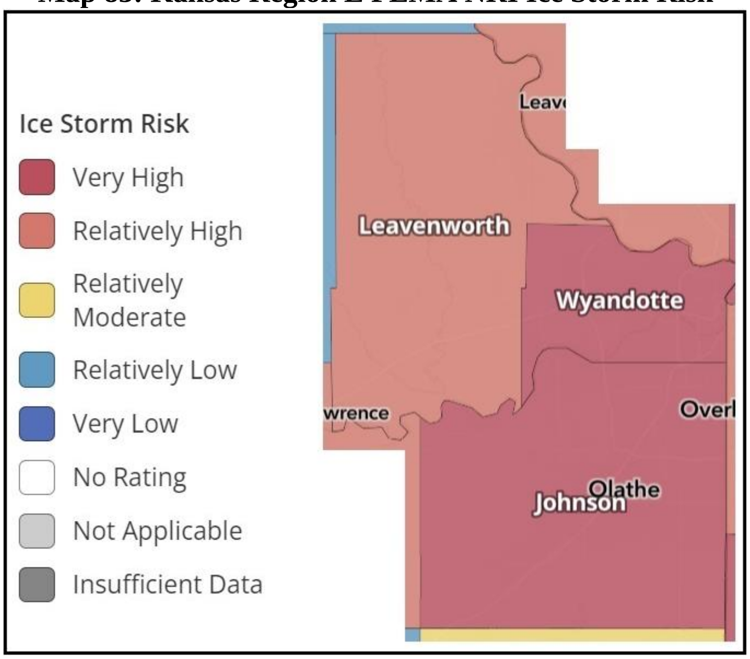
Hospitals and other smaller medical facilities may see an increase in winter storm related injuries during an event, but it is considered unlikely that this increase will impact or overload capacity. Hospital capacity mapping may be found in Map 33, page 77.

Winter storms can increase the demand for emergency shelters, particularly in cases of widespread power outages. Setting up and managing these shelters can strain resources.

FEMA NRI

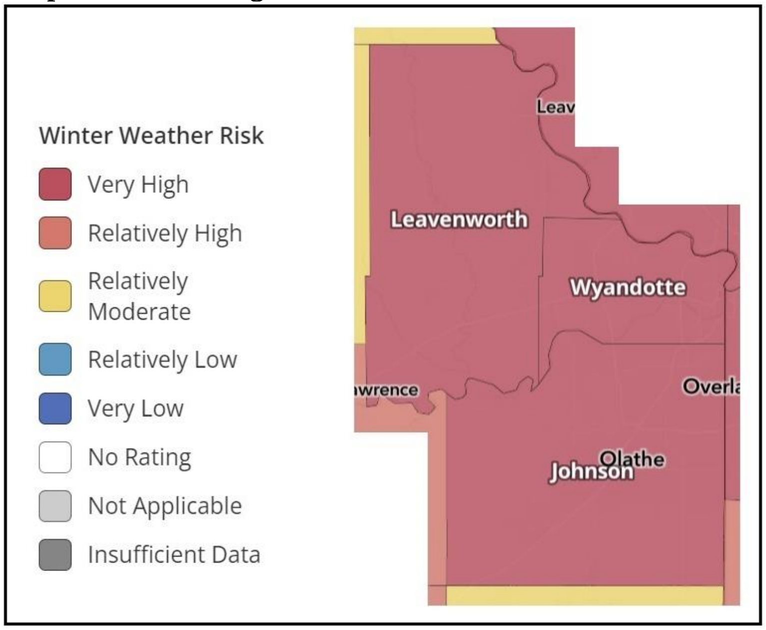
Using the FEMA NRI, and consisting of three input components (expected annual loss, social vulnerability, and community resilience), the following map was created indicating the potential risk to participating counties from ice storms and winter weather:

Map 83: Kansas Region L FEMA NRI Ice Storm Risk



Source: FEMA NRI

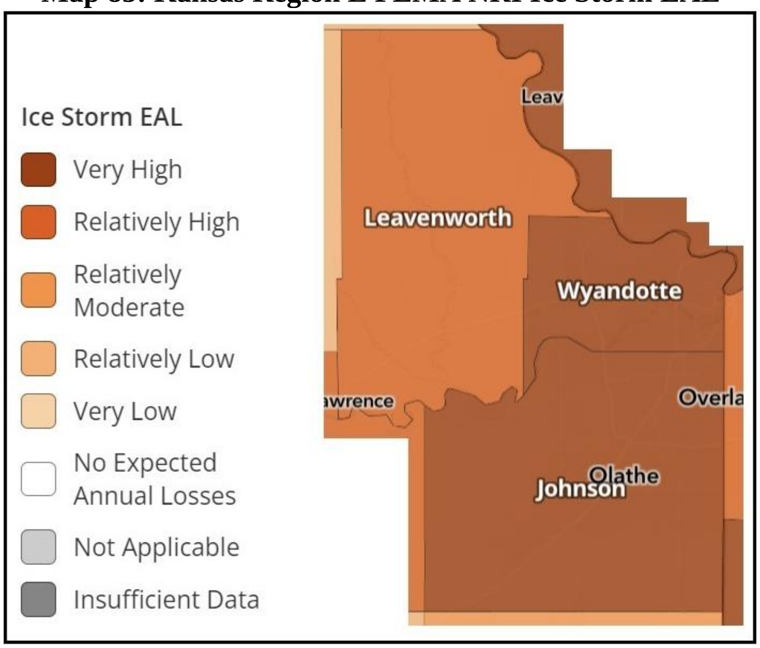
Map 84: Kansas Region L FEMA NRI Winter Weather Risk



Source: FEMA NRI

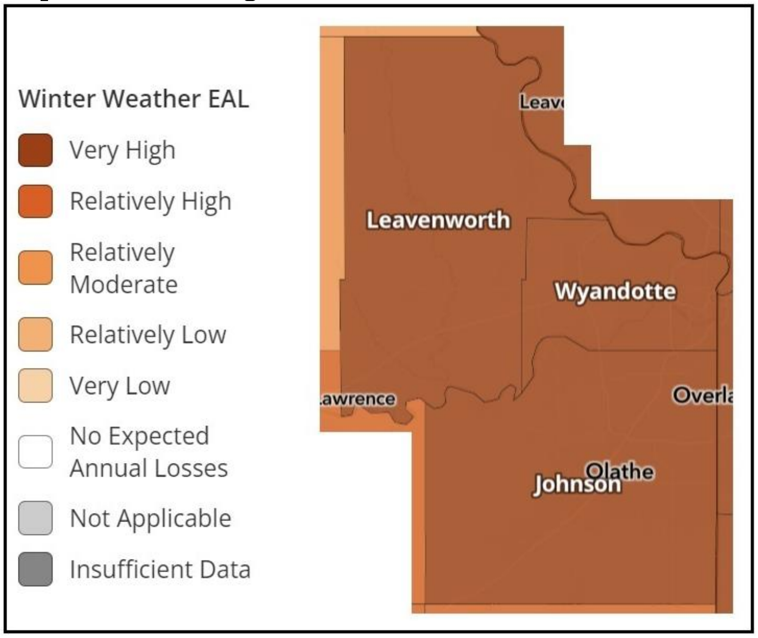
As part of the NRI, EAL represents the average economic loss in dollars resulting from natural hazards each year and is proportional to a community's risk. The following map indicates the EAL for ice storms and winter weather for participating counties within Kansas Region L:

Map 85: Kansas Region L FEMA NRI Ice Storm EAL



Source: FEMA NRI

Map 86: Kansas Region L FEMA NRI Winter Weather EAL



Source: FEMA NRI

The following tables indicates the FEMA NRI and EAL analysis for each participating Kansas Region L county for winter weather events:

Table 90: Kansas Region L FEMA NRI and EAL for Ice Storm by County

County	Risk Index	EAL
Johnson	Very High	Very High
Leavenworth	Relatively High	Relatively High
Wyandotte	Very High	Very High

Table 91: Kansas Region L FEMA NRI and EAL for Winter Weather by County

County	Risk Index	EAL
Johnson	Very High	Very High
Leavenworth	Very High	Very High
Wyandotte	Very High	Very High

Source: FEMA NRI

Consequence Analysis

This consequence analysis lists the potential impacts of a hazard on various elements of community and state infrastructure. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Kansas Region L residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

Table 92: Severe Winter Weather Consequence Analysis

Subject	Potential Impacts
Impact on the Public	Freezing temperatures coupled with heavy snow accumulation can cause dangerous travel conditions, leading to accidents and road closures. Downed power lines can lead to a loss of electricity and heat, with the young and the elderly especially vulnerable. Extremely cold temperatures may lead to hypothermia and death.
Impact on Responders	Dangerous road conditions create a transportation challenges for first responders. First responders will need to control their own exposure to the elements for prolonged periods of time and will need to continuously seek heat and shelter to stay warm. Equipment may also be damaged or destroyed due to cold temperatures, heavy wind, ice, and heavy snow fall, which may lead to a decrease in response capabilities.

Table 92: Severe Winter Weather Consequence Analysis

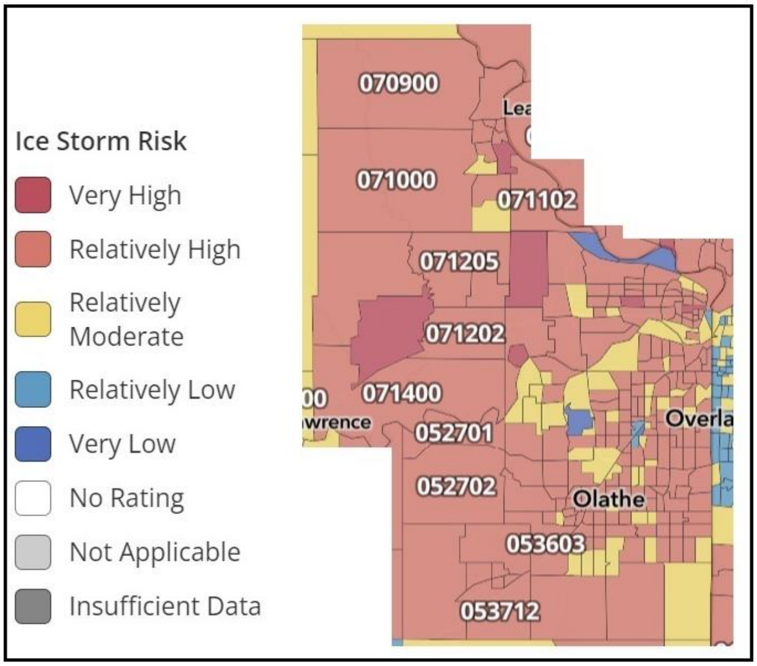
Subject	Potential Impacts
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary. Severe winter weather may impact an agency's ability to maintain operations due to power outages and transportation difficulties. If the activation of alternate facilities was required, travel may be difficult. Additionally, computer/network and other communication access may be impacted due to power outages.
Delivery of Services	The ability to deliver services can be impacted locally, regionally, or statewide depending on the severity of the severe winter weather event. Dangerous road conditions may lead to roadway and bridge closures, as well as transit service disruptions. Businesses and places of commerce may completely shut down, which leads to the disruption of goods and services.
Property, Facilities, and Infrastructure	Transportation, governmental operations, and communications may be heavily disrupted. Roads and bridges may be heavily impacted by severe winter weather, and may be completely obstructed by downed trees, powerlines, and snow accumulation. Snow and ice can impact access to homes and critical facilities such as hospitals, schools, and supermarkets. Power loss can lead to disruption of critical infrastructure and technology.
Impact on Environment	Heavy snow and ice accumulation can weigh down and damage vegetation, tree limbs, and power lines. Flooding may also occur after the rapid melting of a heavy snowfall, causing bodies of water to flood, damaging the surrounding areas. Exposure to extreme winter weather may result in animal death. Chemicals used to treat roadways may contaminate natural environments and water reservoirs if used in large quantities.
Economic Conditions	Severe winter weather poses a fiscal impact on the governments, even if some of those costs can be recouped through federal grant reimbursements. Local, county, and state resources may be drained by a severe winter weather event.
Public Confidence in Governance	The public's confidence in governance is affected by immediate local and state response through direct and effective actions. Efficiency in response and recovery operations is critical in keeping public confidence high.

4.14.8 Jurisdictional Risk and Vulnerability

To help understand the risk and vulnerability to severe winter weather of participating jurisdictions mapping from the FEMA NRI was run on a census tract level. As the NRI does not generate mapping for individual jurisdictions, census tract analysis is the closest analogue available to understand individual jurisdiction conditions.

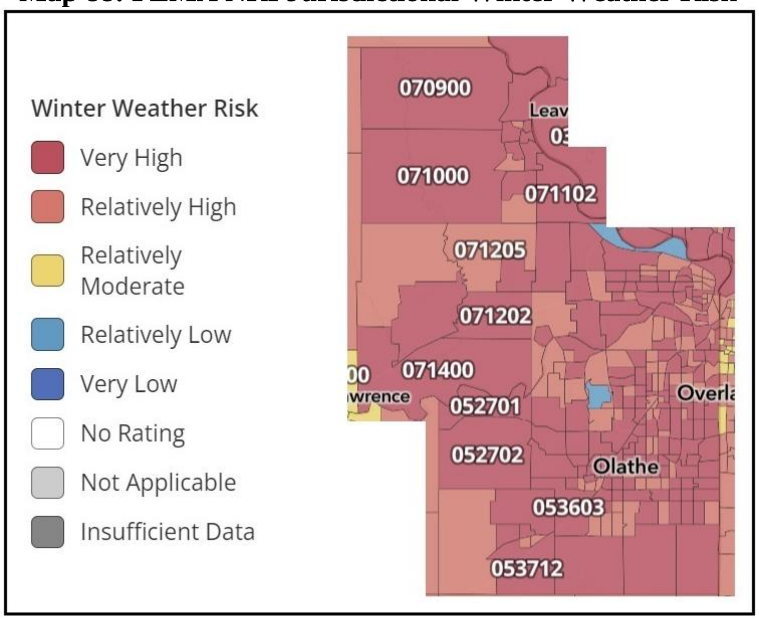
Using the FEMA NRI, and consisting of three input components (expected annual loss, social vulnerability, and community resilience), the following map was created indicating the potential risk to participating jurisdictions (as indicated by census tract) from ice storms and winter weather events:

Map 87: FEMA NRI Jurisdictional Ice Storm Risk



Source: FEMA NRI

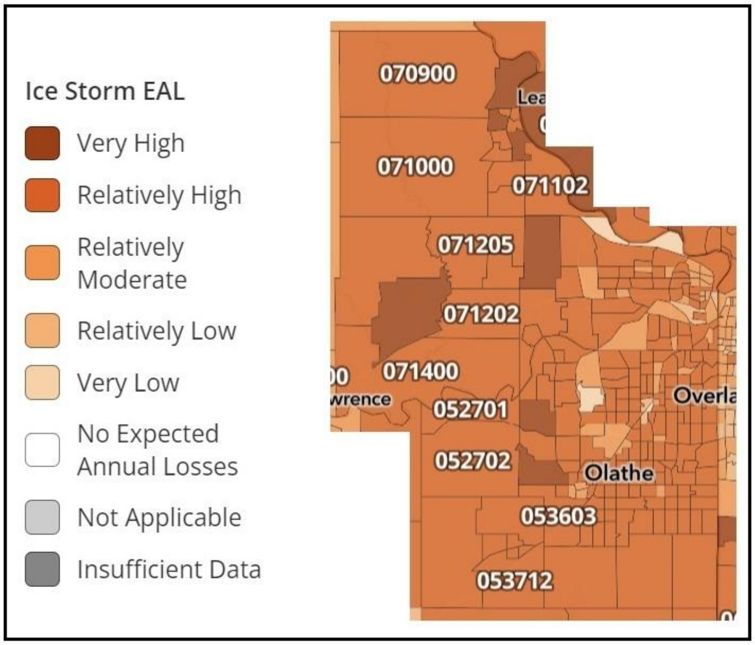
Map 88: FEMA NRI Jurisdictional Winter Weather Risk



Source: FEMA NRI

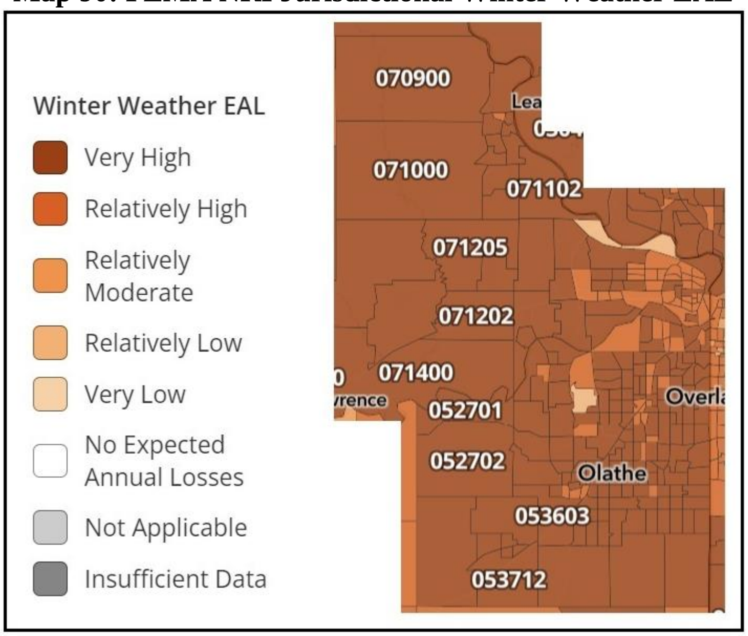
As part of the NRI, EAL represents the average economic loss in dollars resulting from natural hazards each year and is proportional to a community's risk. The following map indicates the EAL for ice storms and winter weather for participating jurisdictions (as indicated by census tract) within Kansas Region L:

Map 89: FEMA NRI Jurisdictional Ice Storm EAL



Source: FEMA NRI

Map 90: FEMA NRI Jurisdictional Winter Weather EAL



Source: FEMA NRI

FEMA NRI data tables, by census tract, are included in Appendix C. These data tables contain the risk index and EAL along with total building valuation and agricultural valuation allowing for an understanding of potential structural and agricultural vulnerability on a jurisdictional basis.

Low temperatures associated with severe winter storms can pose various risks to local facilities and assets, and may include:

- Power Grid Strain: Cold temperatures can lead to increased demand for electricity. This can strain the power grid, potentially causing power outages, which can disrupt government operations, including the functioning of critical infrastructure such as hospitals, emergency services, and data centers.

- Infrastructure Stress: Buildings and infrastructure can suffer damage due to low temperatures. Extreme cold can freeze and damage pipes, leading to water leaks and flooding when temperatures rise.
- Transportation Disruptions: Extreme cold can result in icy road conditions and reduce visibility, making travel hazardous.

4.15 Tornadoes

4.15.1 Hazard Description

A tornado is a violent, dangerous, rotating column of air that is in contact with both the surface of the earth and a cumulonimbus cloud or, in rare cases, the base of a cumulus cloud. Tornadoes 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.

Tornadoes can cause several kinds of damage to buildings. Tornadoes have been known to lift and move objects weighing more than three tons, toss homes more than 300 feet from their foundations, and siphon millions of tons of water. However, less spectacular damage is much more common. Houses and other obstructions in the path of the wind cause the wind to change direction. This change in wind direction increases pressure on parts of the building. The combination of increased pressures and fluctuating wind speeds creates stress on the building that frequently causes connections between building components, roofing, siding, and windows to fail. Tornadoes can also generate a tremendous amount of flying debris. If wind speeds are high enough, airborne debris can be thrown at buildings with enough force to penetrate windows, roofs, and walls.

4.15.2 – Location and Extent

Tornadoes can strike anywhere in Kansas Region L. A tornado may arrive with a squall line or cold front and touch down quickly. Smaller tornadoes 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.

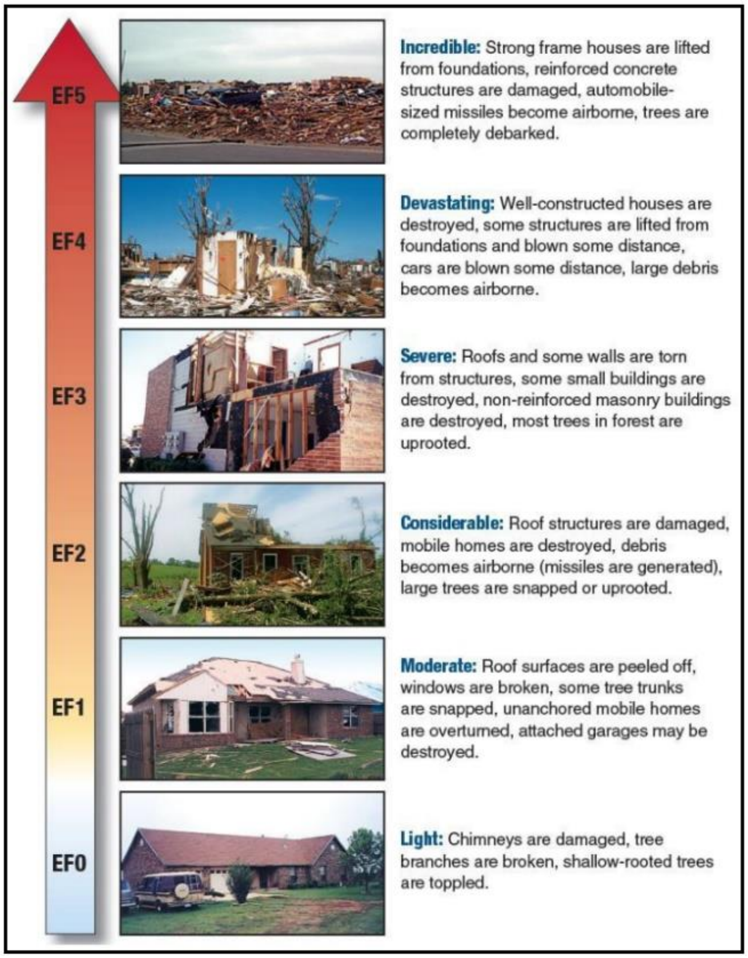
Since 2007, the United States uses the Enhanced Fujita (EF) Scale to categorize tornadoes. The scale correlates wind speed values per F level and provides a rubric for estimating damage.

Table 93: 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 tornadoes 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.
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

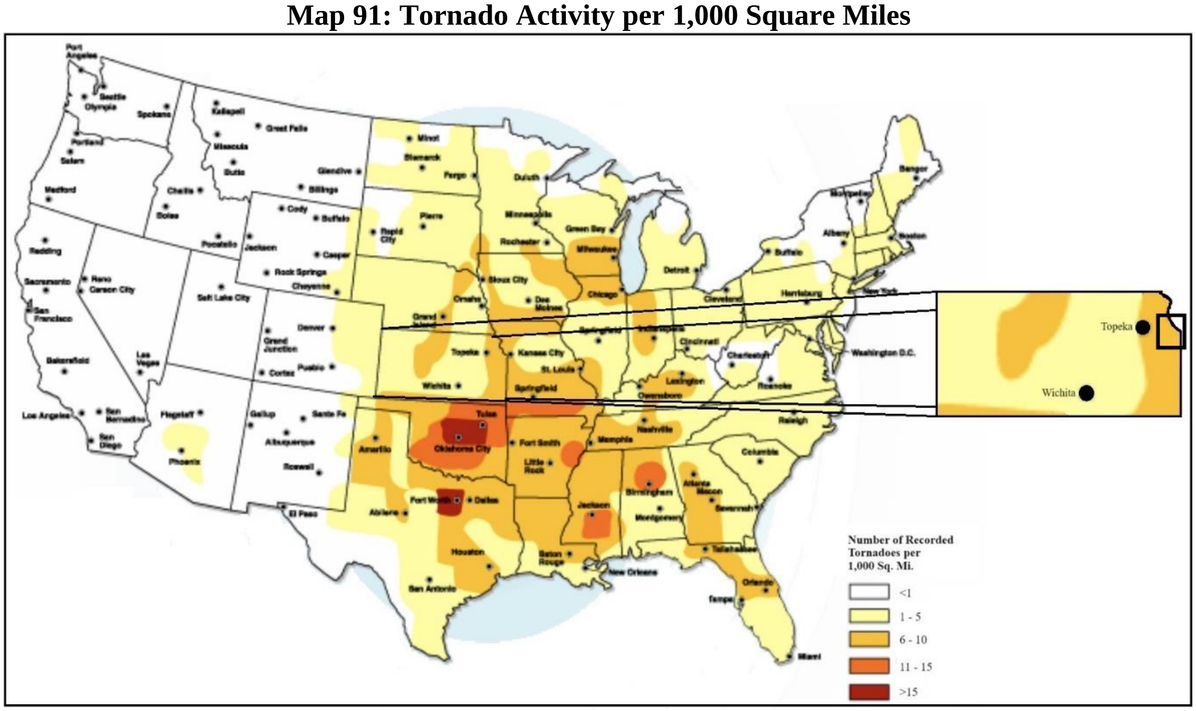
Figure 3: Enhanced Fujita Scale Damage Estimates



Source: FEMA

The following map, from FEMA, indicates tornado activity per 1,000 square miles for Kansas Region L.

Map 91: Tornado Activity per 1,000 Square Miles



Source: FEMA

4.15.3 Previous Occurrences

Historical events of significant magnitude or impact can result in a Presidential Disaster Declaration. The following table details Presidential Disaster Declarations related to tornadoes over the past 10 years:

Table 94: Kansas Region L Presidentially Declared Disasters

Designation	Declaration Date	Incident Type	Counties	Assistance
DR-4747-KS	10/26/2023	Severe Storms, Straight-Line Winds, Tornadoes, and Flooding	Johnson, Wyandotte	-
DR-4449-KS	8/14/2019	Severe Storms, Straight-Line Winds, Flooding, Tornadoes, Landslides, and Mudslides	Leavenworth	$51,157,548

The following table presents NCEI identified tornado events and the resulting damage totals in Kansas Region L from 1950 to 2023.

Table 95: Kansas Region L Tornado Events

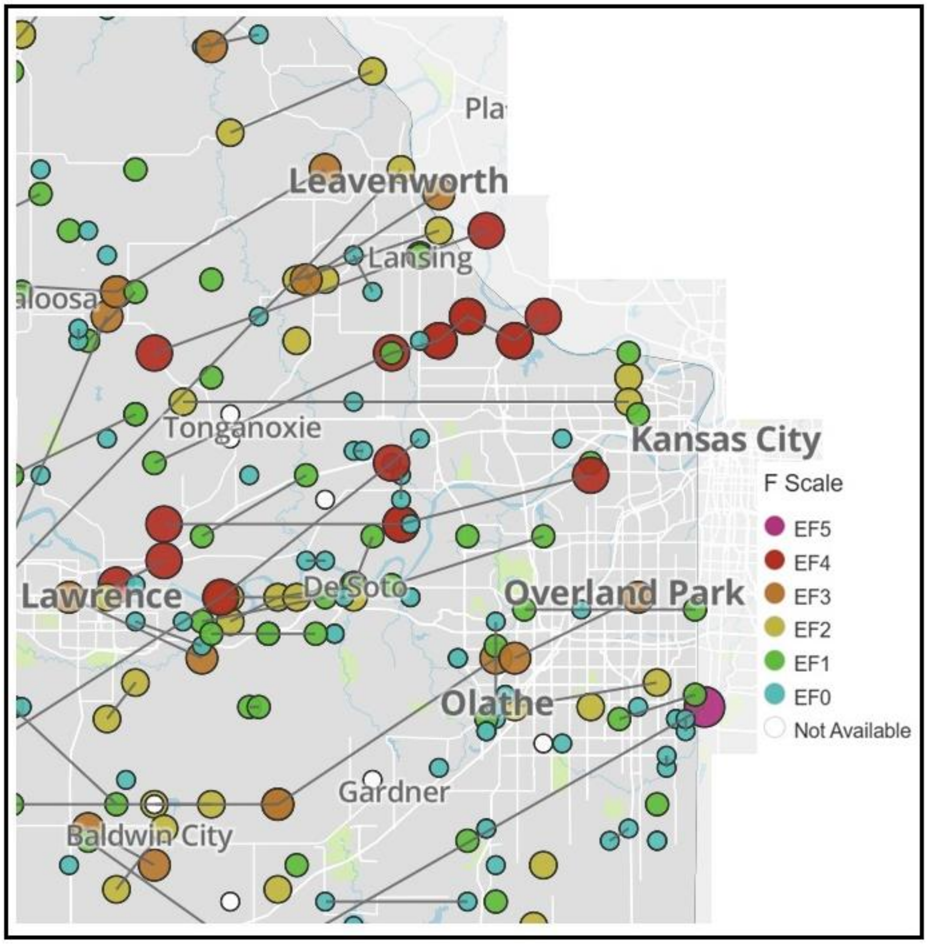
County	Number of Events	Property Damage	Deaths or Injuries	Highest Rated Tornados	Number of EF2 or Greater Tornadoes
Johnson	32	12	$7,488,000	EF4	8
Leavenworth	24	29	$39,640,000	EF4	13
Wyandotte	9	49	$23,025,000	EF4	5

Source: NCEI

It is worth noting that damage estimates indicated by the NCEI are often artificially low. This underreporting is a result of the way the events are reported to the NCEI, often by the local and/or NWS office. When reporting an event oftentimes the NWS office does not have access to the actual damage assessment resulting from that event. As such, the report often details a very low amount or zero-dollar amount for damages. Additionally, deaths and injuries may be underreported as they may be a result of a concurrent event, such as a person driving unsafely during heavy rain and passing away.

NOAA has been tracking tornadoes in Kansas for decades. This following map, which contains data from 1950 to 2023, pinpoints where tornadoes have touched down and traces its path.

Map 92: Kansas Region L Tornado Paths



Source: NOAA

4.15.4 Probability of Future Events

Predicting the probability of tornado occurrences is tremendously changing due to the large number of factors involved and the random nature of formation. Based on historical occurrences, Kansas Region L will continue to experience tornado events on an annual basis. The following tables, using data from the NCEI, indicate the yearly probability of a tornado event, the number of deaths or injuries, and estimated property damage for each county in Kansas Region L.

Table 96: Kansas Region L NCEI Tornado Event Probability Summary

County	Days with Event	Average Events per Year	Deaths / Injuries	Average Deaths / Injuries per Year	Property Damage	Average Property Damage per Year
Johnson	32	2	12	<1	$7,488,000	$102,575
Leavenworth	24	1	29	1	$39,640,000	$543,014
Wyandotte	9	<1	49	2	$23,025,000	$315,411

Source: NCEI

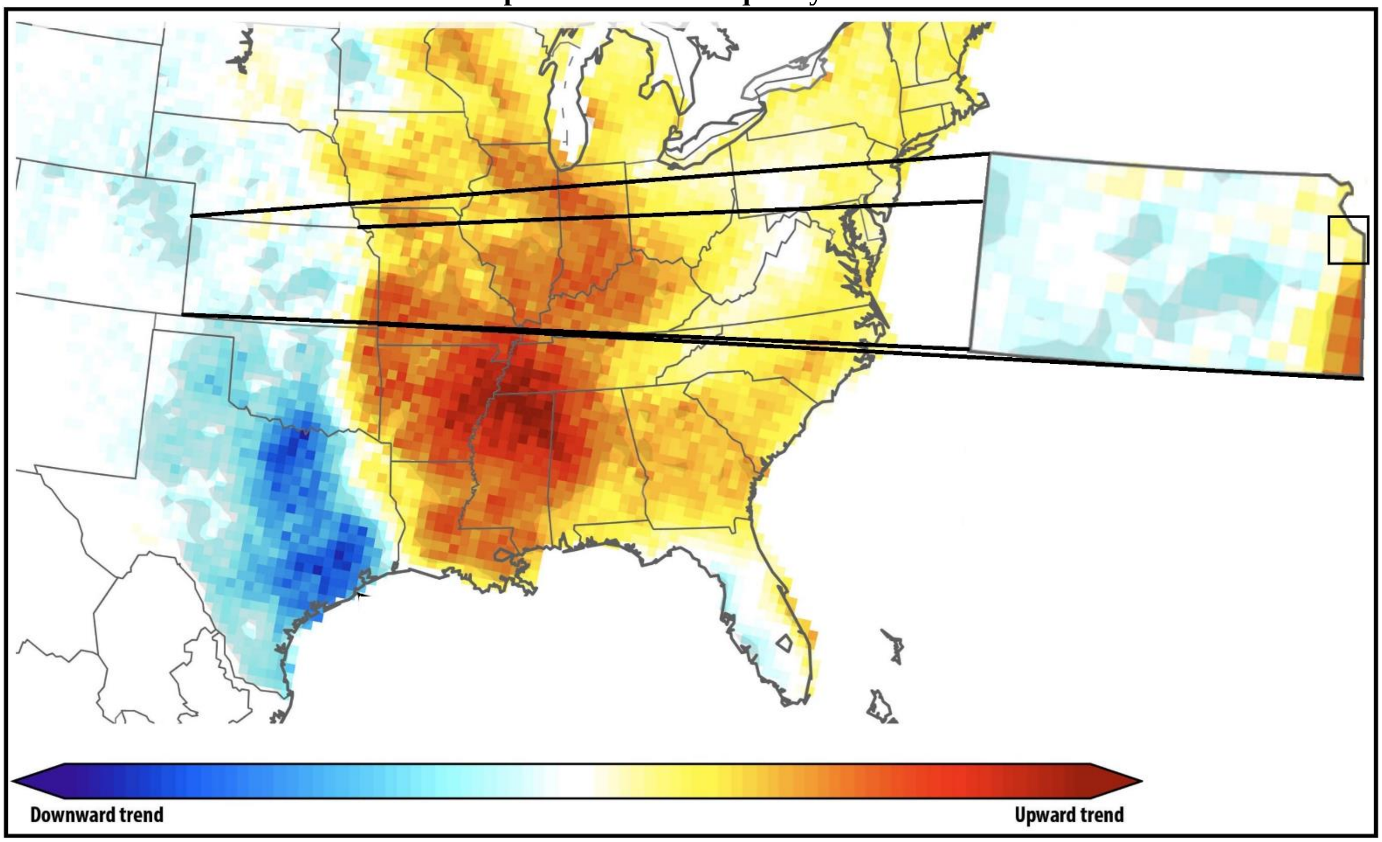
4.15.5 Projected Changes in Location, Intensity, Frequency, and Duration

The relationship between climate change and tornadoes is complex, and while there is ongoing research in this area, it is not fully understood. Tornadoes are small-scale, short-lived weather phenomena that can be influenced by a variety of atmospheric factors, including temperature, humidity, wind patterns, and atmospheric instability. Climate change can influence some of these factors, which may, in turn, affect tornado activity. Tornadoes typically form when warm, moist air near the surface clashes with cooler, drier air aloft, creating atmospheric instability. Climate change can alter temperature and humidity patterns, potentially affecting the conditions necessary for tornado formation. Additionally, climate change can lead to more extreme and variable weather patterns. While this may not necessarily increase the overall number of tornadoes, it could lead to more unpredictable and severe tornado events when they do occur. Some research suggests that climate change could lead to longer tornado seasons, with tornadoes occurring outside of their typical timeframes.

It's important to emphasize that while there may be some links between climate change and tornado activity, these links are not fully understood, and it is difficult to attribute specific tornado events to climate change. Tornadoes are influenced by a complex interplay of factors, and any changes in tornado patterns may vary by region.

Research conducted by the National Severe Storms Lab looked at Significant Tornado Parameters to help determine future tornado probability. Significant Tornado Parameters are 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 Significant Tornado Parameter data, indicates that Kansas Region L may see a decreasing number of tornados.

Map 93: Tornado Frequency Trends



Source: Northern Illinois University

Research conducted by the National Severe Storms Lab looked at Significant Tornado Parameters to help determine future tornado probability. Significant Tornado Parameters are 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 Significant Tornado Parameter data, indicates that Kansas Region L may see an increasing number of tornados.

4.15.6 Vulnerability and Impact

While difficult to quantify, as the impacts of future tornadoes will be determined by many factors, the impacts of a tornado may be widespread. An EF4 or EF5 tornado has the potential to level facilities. A lesser magnitude tornado can rip off roofs and walls while launching airborne missiles born from debris. In the absence of proper shelter tornadoes can cause serious injury. In general, if potentially exposed persons take shelter in a solid, well-constructed shelter protection from tornadoes would be provided. However, old or poorly constructed facilities may be more prone to damage, potentially increasing the impact on economically disadvantaged populations.

Tornadoes can have significant and often devastating impacts on people and communities. These impacts can vary depending on the tornado's intensity, size, path, and may include:

- Injuries and Fatalities: Tornadoes can cause a wide range of injuries, from minor cuts and bruises to severe trauma. Flying debris, structural damage, and the force of the wind can lead to injuries or fatalities among those directly affected by the tornado. Prompt medical care is essential to treat injuries effectively and save lives.
- Mental Health Effects: Tornadoes can be extremely traumatic events, causing psychological distress and emotional trauma for survivors. Individuals may experience post-traumatic stress disorder, anxiety, depression, and grief. Mental health support and counseling services are often needed to help survivors cope with these emotional challenges.
- Displacement: People may need to evacuate their homes or be temporarily displaced due to tornado damage, requiring emergency shelter and support.

After a tornado, health risks may arise due to contaminated water, debris, and unsafe conditions. Inadequate sanitation and exposure to harsh weather can exacerbate health issues. Children, the elderly, and individuals with disabilities or limited mobility may face additional challenges in evacuating to safety and accessing needed resources.

Tornadoes can have significant and wide-ranging impacts on facilities. These risks can have significant economic consequences, and can include:

- Power Outages: Tornadoes can cause power outages by bringing down power lines and damaging electrical infrastructure. Critical facilities such as hospitals, emergency response centers, and data centers may rely on backup generators to maintain essential operations during outages.
- Communication Disruptions: Tornadoes can damage communication infrastructure, including cell towers, telephone lines, and data centers, leading to disruptions in phone and internet services. This can hinder emergency communication and coordination, affecting critical response efforts.
- Transportation Disruptions: Debris and fallen trees on roads, runways, and railways can disrupt transportation networks, leading to travel delays, accidents, and closures. Critical facilities may face challenges in receiving essential supplies and personnel during and after the storm.
- Water and Wastewater System Interruptions: Tornadoes can damage water treatment plants, pumping stations, and water distribution systems. This can lead to a loss of clean drinking water and sanitation services, posing health risks to affected communities. Damage to wastewater treatment facilities and sewer systems can result in the release of untreated sewage, creating environmental hazards and public health concerns.
- Fuel Supply Disruptions: Tornadoes disrupt fuel supply chains, leading to shortages of gasoline, diesel, and heating oil. Critical facilities may rely on fuel for backup power generators and heating systems.
- Property Damage: Tornadoes can result in property damage, up to and including complete structural collapse.

Tornadoes can have significant impacts on the environment. These impacts are often destructive and can affect ecosystems, wildlife, natural resources, and even the local climate. Tornadoes can disrupt natural habitats by uprooting or damaging trees, destroying vegetation, and altering landscapes. This can affect the habitat suitability for wildlife and plant species. Tornadoes can harm or displace wildlife, resulting in injury or death. Nesting birds, burrowing mammals, and other species can be particularly vulnerable. As tornadoes can transport plant seeds, insects, and other organisms over long distances, in the aftermath it is possible for invasive species to take root in new areas, especially those impacted by wildfires caused by downed utility lines.

Tornadoes can have significant and wide-ranging impacts on local operations. When tornadoes strike, they can disrupt government functions and strain resources. Some of the key impacts of tornadoes on operations may include:

- Emergency Response and Public Safety: Tornadoes can lead to a surge in emergency calls for services related to accidents, injuries, and damaged structures. State agencies involved in emergency response must mobilize additional resources to handle these demands.

- Emergency Operations Centers: Tornadoes often require the activation of state Emergency Operations Centers to coordinate emergency response efforts. These centers serve as hubs for communication, resource allocation, and decision-making during disasters.
- Emergency Shelters and Services: Tornadoes may require the establishment of emergency shelters and services for displaced residents. State agencies must coordinate the setup and operation of these facilities.
- Education Disruption: Tornadoes can lead to school closures, affecting state-run education programs and services. State agencies may need to coordinate with school districts to ensure the safety of students.
- Budgetary Impact: The costs associated with emergency response efforts, disaster recovery, and infrastructure repair can strain state budgets.
- Resource Allocation: State governments must allocate resources, including personnel, equipment, and stockpiled supplies, to support emergency response and recovery efforts.
- Communication Challenges: Tornadoes can disrupt communication networks, hindering the ability of government agencies to communicate internally and with the public. This can impact emergency notifications and coordination efforts.
- Administrative and Governance Challenges: State government offices and facilities may experience closures or reduced staffing during tornadoes, affecting administrative functions, regulatory processes, and public services.
- Economic Impact: The destruction of infrastructure and businesses can have significant economic consequences for the state and local communities, including job losses and reduced economic activity.
- Public Services: Tornadoes can disrupt the delivery of public services, including transportation, utilities, and social services, affecting the well-being of residents.

Potentially Vulnerable Community Lifelines

Tornadoes can impact various community lifelines, critical systems and services that communities rely on for their functioning. Vulnerabilities arise due to the stress that tornadic conditions place on infrastructure, resources, and operational processes. As an overview, the May 2023 FEMA Benefit-Cost Analysis Sustainment and Enhancements Standard Economic Value Methodology Report indicates the following loss values for community lifelines:

Table 97: Economic Impacts of Loss of Service Per Capita Per Day (in 2022 dollars)

Category	Loss
Loss of Electrical Service	$199
Loss of Communications/Information Technology Services	$141

Source: May 2023 FEMA Benefit-Cost Analysis Sustainment and Enhancements Standard Economic Value Methodology Report

The high winds associated with smaller tornadoes can cause trees, branches, and other debris to fall onto power lines. Higher intensity tornadoes can destroy transmission infrastructure. This can result in downed power lines, structural damage to utility poles, and disruptions in electrical service.

Mapping concerning electrical generation plants, high-capacity transmission lines, and electrical utility providers as well as utility repair and replacement cost estimation provides may be found in Maps 31 and 32, pages 75 and 76, and Chart 15, page 76.

Communications systems within Kansas Region L may have an increased vulnerability to tornado events. Of particular concern are 911 and dispatch systems. All jurisdictions are served by a 911 and dispatch system, providing direct dispatching for:

- Law Enforcement
- Emergency Medical Services
- Fire

Tornadoes can disrupt this vital communications system, affecting reliability and functionality. Some of the key vulnerabilities include:

- Structural Damage to Communication Towers: Tornadoes can cause direct structural damage to communication towers, including cellular, television, radio, and microwave towers. Toppled or damaged towers can disrupt signal transmission and reception.
- Power Outages: Tornadoes often cause power outages by damaging electrical infrastructure. Communication facilities, including cell towers and data centers, rely on a stable power supply. Power failures can lead to service interruptions.
- Fiber Optic Cable Damage: Flying debris and tornado-related destruction can damage underground and aerial fiber optic cables. Severed cables can disrupt data transmission and internet connectivity.
- Microwave Link Disruptions: Tornadoes can interfere with microwave communication links, which are used for long-distance communication. High winds and debris can disrupt the line of sight needed for these links.
- Equipment Damage: Communication equipment located outdoors, such as antennas, dishes, and amplifiers, can be damaged by tornadoes, affecting the performance of communication systems.
- Loss of Communication Nodes: Tornadoes can damage communication nodes, exchanges, and network switching centers. Loss of these critical components can lead to widespread service disruptions.
- Cellular Network Congestion: In the aftermath of a tornado, there is often an increased demand for cellular communication as individuals seek information and contact loved ones. This surge in demand can lead to network congestion and reduced service quality.

The cost to repair communications networks can vary widely depending on the extent of the damage, the size of the network, and the specific technologies involved. Repair costs may include expenses for labor, equipment replacement or repair, materials, and any additional resources required to restore the network to full functionality. Data from the U.S. Department of Homeland Security Cybersecurity and Infrastructure Security Agency concerning cost ranges for communications system components may be found in Table 80, page 143.

Tornadoes can significantly impact emergency response infrastructure, creating challenges for first responders and organizations involved in managing and mitigating the effects of severe weather events. Tornadoes can impact emergency response through:

- Transportation Disruptions: Debris on roads can hinder the ability of emergency vehicles to navigate and reach affected areas promptly. Hazardous road conditions may result in delays in response times.
- Road Closures: Tornadoes can lead to the closure of roads due to debris accumulation and hazardous conditions. This can limit access for emergency vehicles and impede the evacuation of residents.
- Communication Disruptions: Tornadoes can disrupt communication networks, affecting the ability of emergency responders to coordinate and communicate effectively. Downed power lines and damage to communication infrastructure contribute to these disruptions.
- Power Outages: Tornadoes downing power lines can lead to power outages. Emergency response facilities, such as command centers and fire stations, may lose power, affecting their operational capabilities.
- Resource Allocation Challenges: Tornadoes often require the allocation of additional resources, including personnel, equipment, and supplies, to address immediate needs. This can strain emergency response organizations and impact their ability to respond to other concurrent incidents.
- Logistical Challenges: Tornadoes may create logistical challenges for the transportation of supplies, equipment, and personnel to affected areas, hindering the overall effectiveness of emergency response efforts.
- Increased Demand for Services: Tornadoes can result in an increased demand for emergency services, including medical assistance, search and rescue operations, and responses to accidents. Emergency response organizations may need to manage a higher volume of incidents simultaneously.

Mapping concerning fire and police locations may be found in Maps 67 and 68, pages 144 and 145.

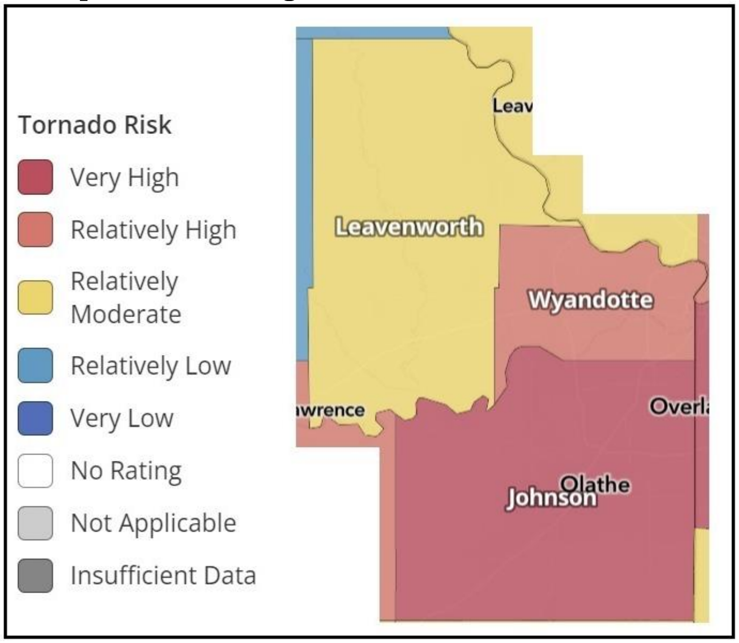
Hospitals and other smaller medical facilities may see an increase in tornado related injuries during an event, but it is considered unlikely that this increase will impact or overload capacity. Hospital capacity mapping may be found in Map 33, page 77.

Tornadoes can increase the demand for emergency shelters, particularly in cases of widespread power outages. Setting up and managing these shelters can strain resources.

FEMA NRI

Using the FEMA NRI, and consisting of three input components (expected annual loss, social vulnerability, and community resilience), the following map was created indicating the potential risk to participating counties from tornadoes:

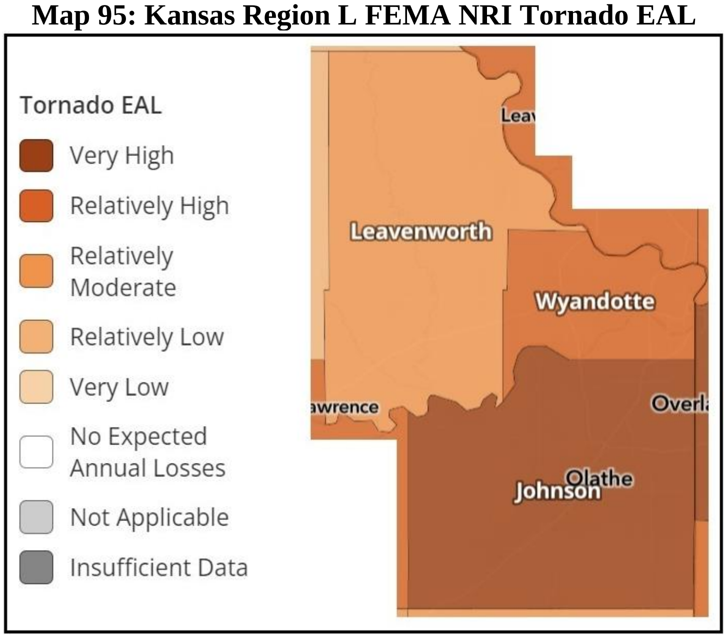
Map 94: Kansas Region L FEMA NRI Tornado Risk



Source: FEMA NRI

As part of the NRI, EAL represents the average economic loss in dollars resulting from natural hazards each year and is proportional to a community's risk. The following map indicates the EAL for tornadoes for participating counties within Kansas Region L:

Map 95: Kansas Region L FEMA NRI Tornado EAL



Source: FEMA NRI

The following table indicates the FEMA NRI and EAL analysis for each participating Kansas Region L county for tornado:

Table 98: Kansas Region L FEMA NRI and EAL for Tornadoes by County

County	Risk Index	EAL
Johnson	Very High	Very High
Leavenworth	Relatively Moderate	Relatively Moderate
Wyandotte	Relatively High	Relatively High

Source: FEMA NRI

Consequence Analysis

This consequence analysis lists the potential impacts of a hazard on various elements of community and state infrastructure. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Kansas Region L residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

Table 99: Tornado Consequence Analysis

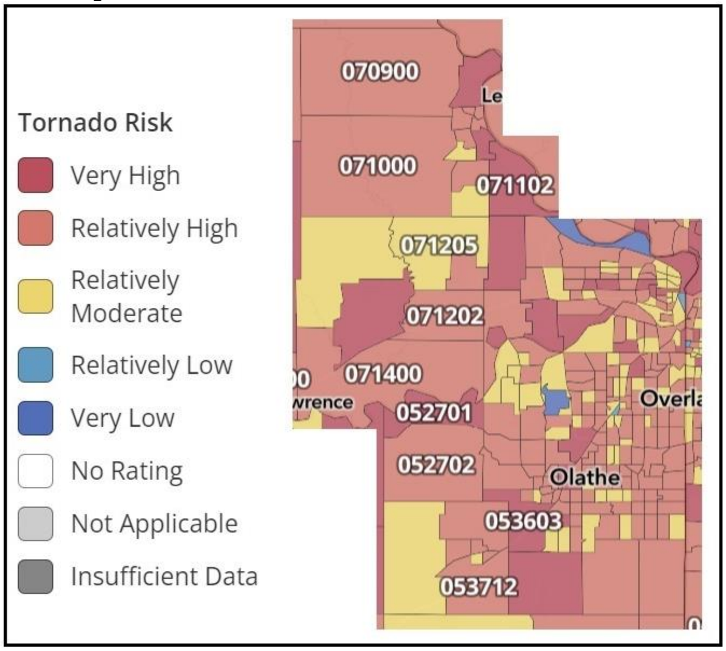
Subject	Potential Impacts
Impact on the Public	High wind speeds can cause automobiles to become airborne, destroy homes, and turn debris into projectiles, which may cause injury or death. An increased demand for medical treatment for traumatic injuries caused by the tornado would be anticipated. Significant portions of the population may be displaced by the destruction and those individuals may not have access to personal documents or medical records.
Impact on Responders	First responders may be injured as the tornado passes, resulting in employee absenteeism that impacts the overall capacity to respond to the event. The deposit of debris on major roadways, the location of the event, and/or damage to equipment or facilities may increase the response times. Exposed wires or hazardous materials may cause injury to first responders during search and rescue operations.
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary based on the situation. Tornadoes may impact an agency’s ability to maintain continuity of operations due to power or communications infrastructure impacts. If the activation of alternate facilities was required, travel may be difficult due to reduced transportation options, power outages, or damage to facilities.
Delivery of Services	Delivery of services may be impacted by dangerous conditions or disruption to transportation systems, causing food, water, and resource systems to be delayed or halted. Waterway infrastructure may be damaged or malfunction, stopping barge and ship traffic. Goods may be damaged, destroyed, or carried off by high winds.
Property, Facilities, and Infrastructure	Damages from lower intensity tornadoes can range from chimney damage to uprooted shallow trees. A significant tornado (EF-2) would cause damage to roofs on frame houses, complete destruction of mobile homes and large trees and utility lines snapping. A devastating tornado (EF-4) would result in well-constructed houses being leveled, weak foundations blown away, and cars thrown away. Communications or power infrastructure may be damaged or destroyed.
Impact on Environment	Tornadoes may cause significant damage to the environment by exposing hazardous materials, causing contamination of water or food sources, or uprooting vegetation. Animals may be injured by flying debris or being lifted by the tornado. Agricultural crops may be lost due to contamination or being uprooted.
Economic Conditions	Tornadoes pose a fiscal impact on the local governments, even if some of those costs can be recouped through federal grant reimbursements. Fiscal resources may be drained by the occurrence of a tornado.
Public Confidence in Governance	The public’s confidence in governance is affected by immediate local and state response through direct and effective actions. Efficiency in response and recovery operations is critical in keeping public confidence high.

4.15.7 Jurisdictional Risk and Vulnerability

To help understand the risk and vulnerability to tornadoes of participating jurisdictions mapping from the FEMA NRI was run on a census tract level. As the NRI does not generate mapping for individual jurisdictions, census tract analysis is the closest analogue available to understand individual jurisdiction conditions.

Using the FEMA NRI, and consisting of three input components (expected annual loss, social vulnerability, and community resilience), the following map was created indicating the potential risk to participating jurisdictions (as indicated by census tract) from tornadoes:

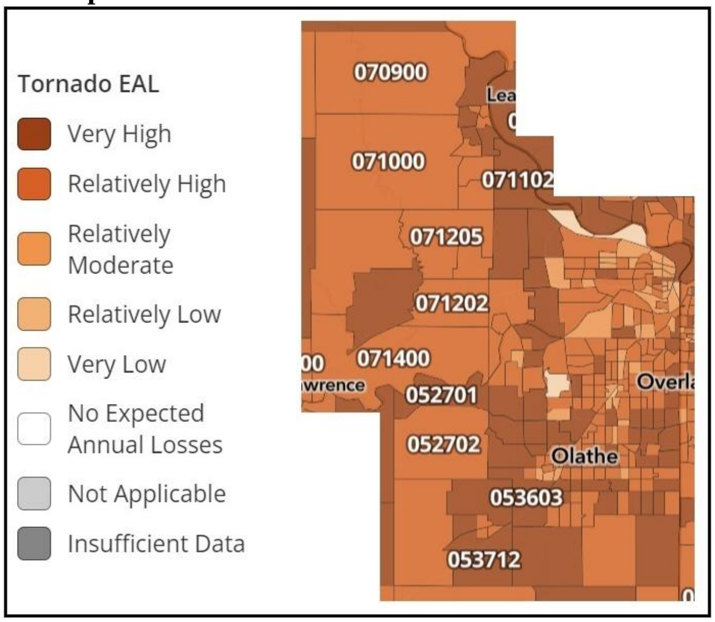
Map 96: FEMA NRI Jurisdictional Tornado Risk



Source: FEMA NRI

As part of the NRI, EAL represents the average economic loss in dollars resulting from natural hazards each year and is proportional to a community's risk. The following map indicates the EAL for tornadoes for participating jurisdictions (as indicated by census tract) within Kansas Region L:

Map 97: FEMA NRI Jurisdictional Tornado EAL



Source: FEMA NRI

FEMA NRI data tables, by census tract, are included in Appendix C. These data tables contain the risk index and EAL along with total building valuation and agricultural valuation allowing for an understanding of potential vulnerability on a jurisdictional basis.

Kansas Region L citizens living in mobile homes may have an increased vulnerability to tornadoes. Please see Section 3.6 for more details on the percentage of mobile homes for each participating county.

4.16 Wildfires

4.16.1 Hazard Description

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.

According to the National Park Service there three classifications of wildfires:

- **Surface Fire:** Burning which may spread rapidly and ignite leaf litter, fallen branches and other fuels located at ground level.
- **Ground Fire:** Burning of organic matter in the soil beneath the surface.
- **Crown Fire:** Burning through the top layer (canopy) of trees. Crown fires, which can be very intense and difficult to contain, require strong winds, steep slopes, and large amounts of fuel to burn.

Wildfires are strongly influenced by multiple factors, including:

- **Weather:** Factors such as relative humidity, wind speed, ambient temperature and precipitation all influence the formation and growth of wildfires.
- **Topography:** Natural features, such as canyons or ridges, can increase the spread rate of a fire by funneling or drawing heated air and fire.
- **Fuel Type, Distribution and Moisture:** Available fuels, the spacing and density of available fuels, and fuel moisture content can determine spread rates and intensity of wildfires.
- **Drought Conditions:** Drought tends to increase both the likelihood and severity of wildfires.

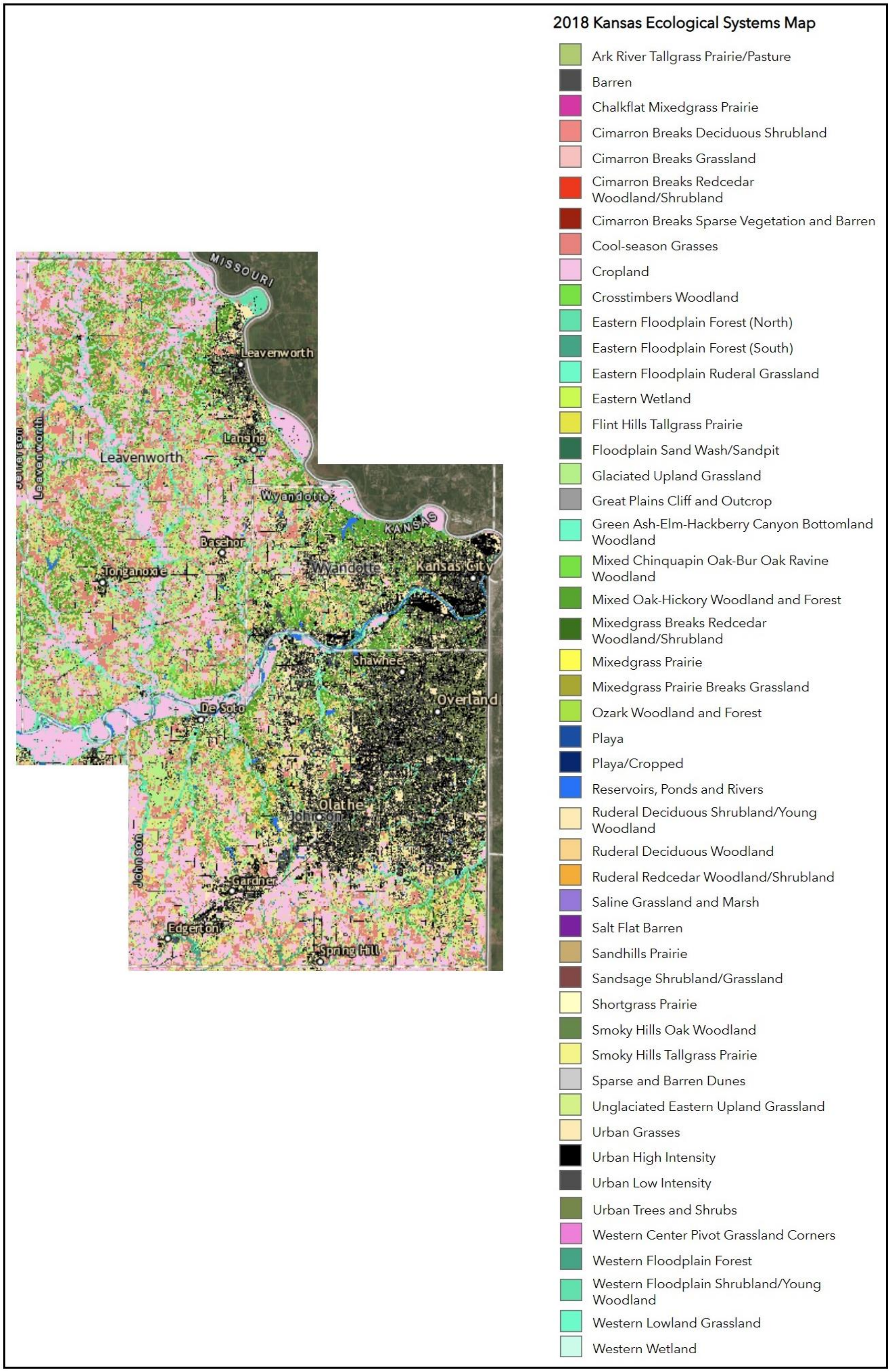
4.16.2 – Location and Extent

According to the Office of the State Fire Marshal, in 2021 Kansas fire departments responded to close to 5,000, vegetation-related fires that burned over 185,000 acres. Over 900 of these fires required counties to seek mutual-aid assistance to bring them under control.

According to fire officials, nearly ninety-five percent of all wildfires result from the activity of people and, subsequently, a significant number could be prevented through taking proper actions towards fire safety.

The following map, from the University of Kansas, indicates vegetation types within Kansas Region L, with areas of grasses, forest, and crops more likely to experience a wild or brush fire:

Map 98: Kansas Region L Vegetation Cover

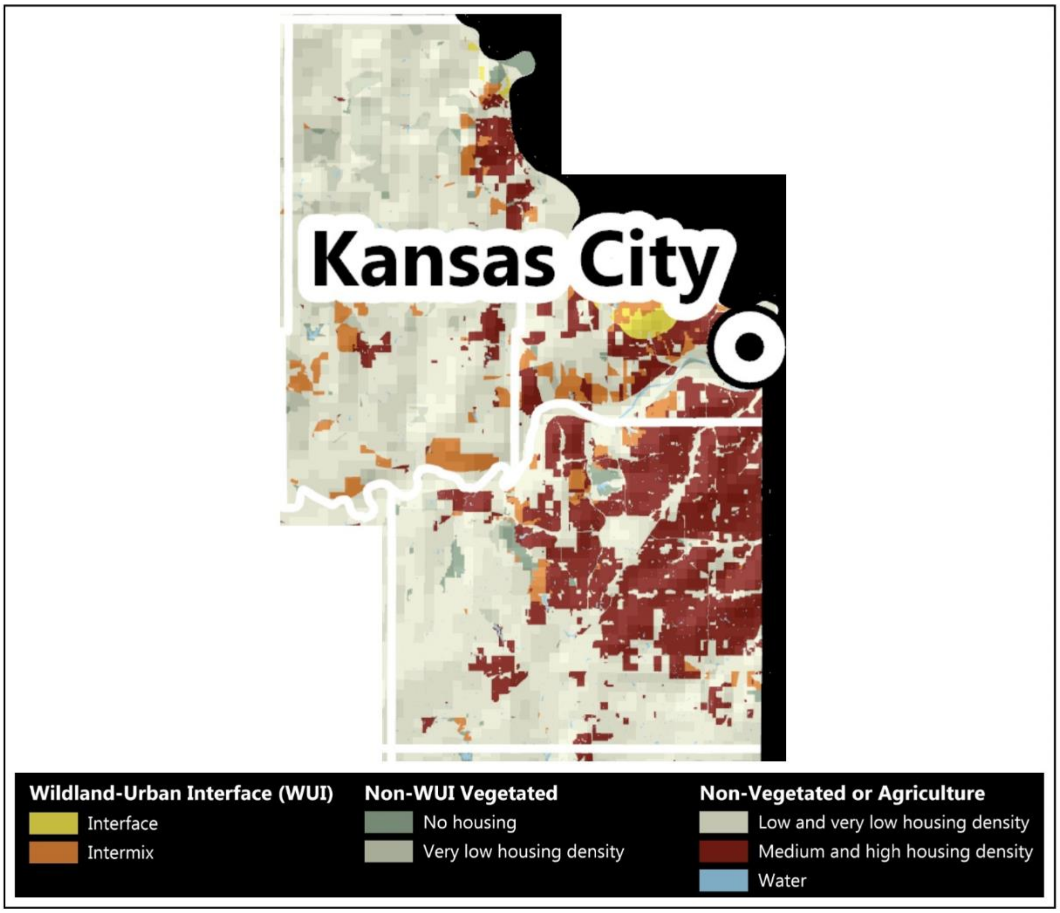


Source: University of Kansas

The wildland/urban interface (WUI) is the area where human improvements such as homes, ranches and farms come in contact with the wildlands. The WUI creates an environment in which fire can move readily between structure and vegetation fuels, often resulting in massive fires, or conflagrations, that may lead to widespread evacuations. The expansion of the WUI in recent decades has significant implications for wildfire management and its impact. There are two types of WUI, intermixed and interface. Intermix WUI are areas where housing and vegetation intermingle, and interface WUI are areas with housing in the vicinity of dense, contiguous wildland vegetation.

The following map, from the University of Wisconsin SILVIS Labs, illustrates WUI areas throughout the Kansas Region L:

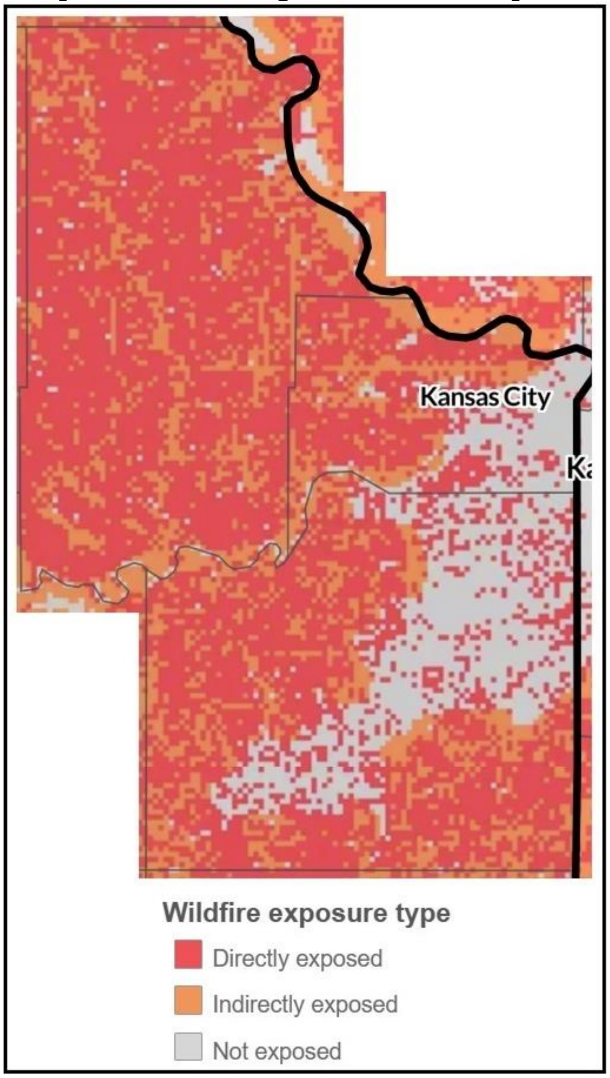
Map 99: Kansas Region L WUI Areas



Source: University of Wisconsin SILVIS Labs

Exposure is the intersection of wildfire likelihood and intensity with communities. Communities can be directly exposed to wildfire from adjacent wildland vegetation, or indirectly exposed to wildfire from embers and home-to-home ignition. Communities that are not exposed are not likely to be subjected to wildfire from either direct or indirect sources. Wildfire exposure is calculated based on wildfire likelihood and proximity to large areas of flammable wildland vegetation. Any community that is located where there is a chance wildfire could occur (in other words, where wildfire likelihood is greater than zero) is exposed to wildfire. Directly exposed homes are located in an area considered to be covered by flammable wildland vegetation. Indirectly exposed homes are located within one mile of a large area considered to be covered by flammable wildland vegetation. Non-exposed homes are located more than one mile from a large area considered to be covered by flammable wildland vegetation. The following map, from NOAA’s Wildfire Risk to Communities, indicates the wildfire exposure for Kansas Region L:

Map 100: Kansas Region L Wildfire Exposure



Source: NOAA's Wildfire Risk to Communities

The duration of a wildfire depends on the weather conditions, how dry it is, the availability of fuel to spread, and the ability of responders to contain and extinguish the fire. Historically, some wildfires have lasted only hours, while other fires have continued to spread and grow for an entire season. They spread quickly and often begin unnoticed until they have grown large enough to signal by dense smoke. If fuel is available, and high wind speeds hit, a wildfire can spread over a large area in a very short amount of time. These factors make the difference between small upstart fires easily controlled by local fire services to fires destroying thousands of acres requiring multiple state and federal assets for containment and suppression.

The National Fire Danger Rating System allows fire managers to estimate today's or tomorrow's fire danger for a given area. It combines the effects of existing and expected states of selected fire danger factors into one or more qualitative or numeric indices that reflect an area's fire protection needs. It links an organization's readiness level (or pre-planned fire suppression actions) to the potential fire problems of the day. The following is a brief explanation of the different fire danger levels based on criteria established by the National Fire Danger Rating System.

Table 100: National Fire Danger Rating System

Rating	Description
Low	Fuels do not ignite easily from small embers, but a more intense heat source, such as lightning, may start fires in duff or dry rotten wood. Fires in open, dry grasslands may burn easily a few hours after a rain, but most wood fires will spread slowly, creeping or smoldering. Control of fires is generally easy.

Table 100: National Fire Danger Rating System

Rating	Description
Moderate	Fires can start from most accidental causes, but the number of fire starts is usually pretty low. If a fire does start in an open, dry grassland, it will burn and spread quickly on windy days. Most wood fires will spread slowly to moderately. Average fire intensity will be moderate except in heavy concentrations of fuel, which may burn hot. Fires are still not likely to become serious and are often easy to control.
High	Fires can start easily from most causes and small fuels (such as grasses and needles) will ignite readily. Unattended campfires and brush fires are likely to escape. Fires will spread easily, with some areas of high intensity burning on slopes or concentrated fuels. Fires can become serious and difficult to control unless they are put out while they are still small.
Very High	Fires will start easily from most causes. The fires will spread rapidly and have a quick increase in intensity, right after ignition. Small fires can quickly become large fires and exhibit extreme fire intensity, such as long-distance spotting and fire whirls. These fires can be difficult to control and will often become much larger and longer-lasting fires.
Extreme	Fires of all types start quickly and burn intensely. All fires are potentially serious and can spread very quickly with intense burning. Small fires become big fires much faster than at the "very high" level. Spot fires are probable, with long-distance spotting likely. These fires are very difficult to fight and may become very dangerous and often last for several days.

Source: Wildfire Fire Assessment System

The severity of wildfire depends on several quickly changing environmental factors. It is impossible to strategically estimate the severity of a wildfire as these factors, including drought conditions and wind speed, have such a great influence on the wildfire conditions. The Characteristic Fire Intensity Scale within the Southern Wildfire Risk Assessment Summary Report specially identifies areas where significant fuel hazards and associated dangerous fire behavior potential exist based on a weighted average of four percentile weather categories.

The following table details the range of wildfire intensity:

Table 101: Characteristic Fire Intensity Scale

Class	Description
Class 1- Very Low	Very small, discontinuous flames, usually less than 1 foot in length; very low rate of spread; no spotting. Fires are typically easy to suppress by firefighters with basic training and non-specialized equipment.
Class 2- Low	Small flames, usually less than two feet long; small amount of very short-range spotting possible. Fires are easy to suppress by trained firefighters with protective equipment and specialized tools.
Class 3- Moderate	Flames up to 8 feet in length; short-range spotting is possible. Trained firefighters will find these fires difficult to suppress without support from aircraft or engines, but dozer and plows are generally effective. Increasing potential for harm or damage to life and property.
Class 4 - High	Large Flames, up to 30 feet in length; short-range spotting common; medium range spotting possible. Direct attack by trained firefighters, engines, and dozers are generally ineffective, indirect attack may be effective. Significant potential for harm or damage to life and property
Class 5- Very High	Very large flames up to 150 feet in length; profuse short-range spotting, frequent long-range spotting; strong fire-induced winds. Indirect attack marginally effective at the head of the fire. Great potential for harm or damage to life and property.

Source: Southern Wildfire Risk Assessment Summary Report

4.16.3 Previous Occurrences

FEMA can approve declarations for fire management assistance when the Administrator determines that a fire or fire complex on public or private forest land or grassland threatens such destruction as would constitute a major disaster. There have been no fire management declarations for Kansas Region L.

Wildfires are a frequent occurrence in both Kansas and Kansas Region L with over 35,000 incidents reported from 2018 to 2023. The majority of these are generally small and quickly contained with recent fire occurrences burning a smaller acreage due to quicker response times, better spotting practices, and stronger management policies. The following table details recent Kansas Region L wildfires that burned over 500 acres, caused damages greater than $100,000, and/or caused injuries or fatalities:

Table 102: Kansas Region L Wildfires 2018- 2023

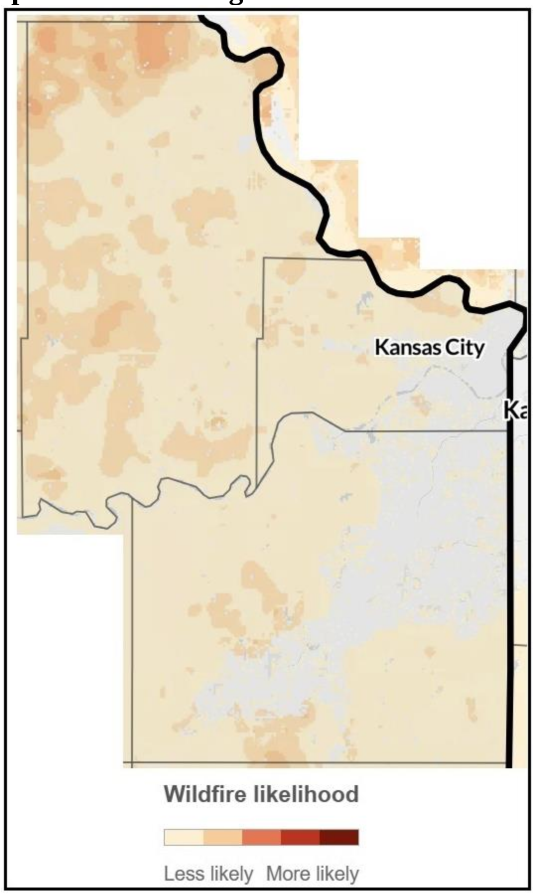
Date	Jurisdiction	County	Buildings Burned	Total Dollar Loss	Injuries and Fatalities	Acres Burned
03/04/2021	Johnson County	Johnson	0	$200,000	0	Not reported

Source: KDEM

4.16.4 Probability of Future Events

Predicting the probability of wildfire occurrences is tremendously changing due to the large number of factors involved and the random nature of formation. NOAA's Wildfire Risk to Communities mapping, which uses the best available science to identify risk, was used to help determine the probability of future wildfires within Kansas Region L. The following map indicates the likelihood of a wildfire within the Kansas Region L:

Map 101: Kansas Region L Wildfire Likelihood



Source: NOAA's Wildfire Risk to Communities

4.16.5 Projected Changes in Location, Intensity, Frequency, and Duration

Climate change can result in a significant increase in the likelihood and severity of wildfires. The occurrence of more frequent and longer lasting droughts due to climate change can increase the availability of fuels for wildfires through the drying of vegetation. Additionally, both the increased occurrence and continued decline of native species due to lack of precipitation can cause the proliferation of invasive species which can provide quick-burning fuels that contribute to the start and spread of fire.

Climate change may impact the frequency and magnitude of wildfires in the following ways:

- Increased Frequency: Warmer temperatures and prolonged periods of drought associated with climate change create conditions that favor more frequent wildfires. Extended fire seasons are becoming the new norm in many regions.
- Greater Intensity: Higher temperatures and drier conditions can lead to more intense wildfires. These fires burn hotter and spread more rapidly, making them more changing to control and extinguish.
- Longer Fire Seasons: Climate change is extending the length of fire seasons, leading to earlier starts and later endings. This puts additional stress on firefighting resources and increases the risk of wildfires overlapping with other disasters.
- Altered Precipitation Patterns: Changes in precipitation patterns, including more intense rainfall events followed by extended dry periods, can promote the growth of vegetation, which can then become fuel for wildfires during subsequent dry periods.
- Drought Conditions: Prolonged droughts associated with climate change reduce soil moisture levels and the availability of water sources. Dry conditions increase the susceptibility of vegetation to ignition.
- Vegetation Changes: Climate change can alter the distribution and composition of vegetation, such as the expansion of drought-tolerant species. This can change fuel availability and make ecosystems more fire prone.
- Insect Infestations: Warmer temperatures can lead to increased insect infestations in forests. Infested and dead trees provide additional fuel for wildfires.
- Wildfire Behavior: Climate change can lead to changes in wildfire behavior, including the development of fire whirls, more extreme fire behavior events, and increased spotting (the spread of embers ahead of the main fire).

Compounding the potential future impact of this hazard, local discussions indicate that a continued staffing shortage and aging equipment in the majority of regional fire departments may hamper future response activities.

4.16.5 Vulnerability and Impact

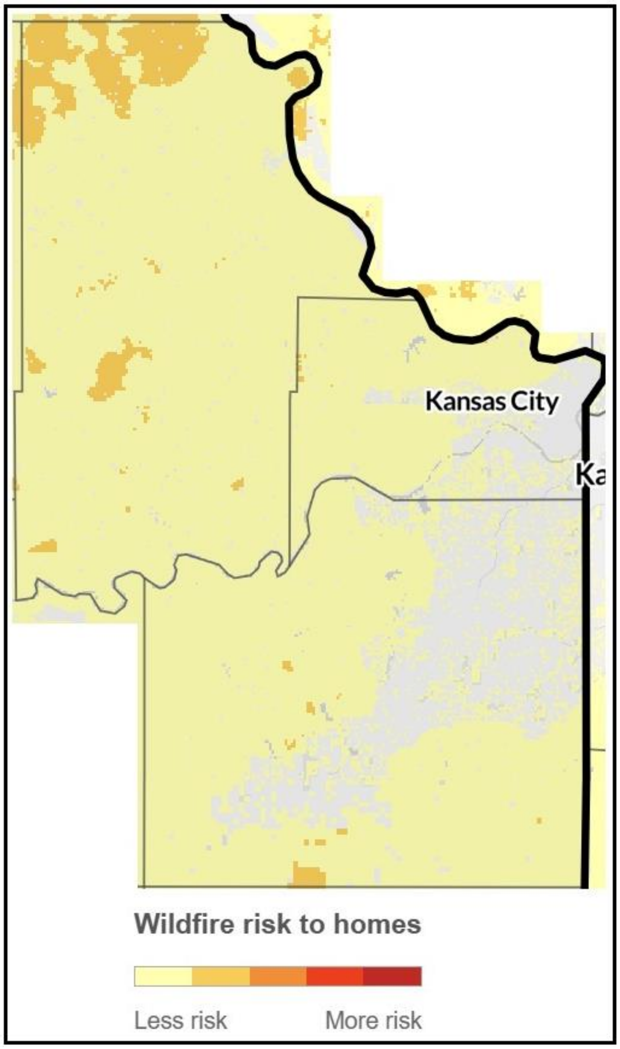
Wildfires can have significant and often devastating impacts on people and communities. These impacts can vary depending on the wildfire's intensity, size, path, and the preparedness of the affected area, and may include.

- Injuries and Fatalities: Wildfires can lead to injuries and fatalities among residents, firefighters, and emergency responders due to burns, smoke inhalation, and accidents during firefighting efforts.
- Evacuations and Displacement: Wildfire damage can force people to leave their homes, leading to temporary or even long-term displacement. Some may require emergency shelter and assistance from relief organizations.
- Property Loss: Wildfires can cause extensive property damage to homes, businesses, and vehicles.
- Health Risks: Smoke from wildfires can contain harmful pollutants, including fine particulate matter and toxic gases, which can lead to respiratory problems and exacerbate pre-existing health conditions. Vulnerable populations, such as children and the elderly, are at higher risk.
- Mental Health Impact: The trauma and stress associated with experiencing a wildfire, evacuations, property loss, and the challenges of recovery can have a significant impact on mental health, including anxiety, depression, and post-traumatic stress disorder.
- Emergency Response Challenges: Wildfires can strain emergency response resources, including firefighting personnel, equipment, and medical facilities. First responders may be faced with a large number of emergency calls.
- Economic Costs: Wildfires result in economic costs, including property damage and insurance claims.

Additionally, wildfires can devastate communities and homes. They can cause various types of property damage, including burning structures, charring of exterior surfaces, and damage to roofs, walls, and windows. The heat generated by wildfires can weaken or melt building materials. In extreme cases, wildfires can completely destroy homes, reducing them to ashes and rubble. Homes that may not have been directly impacted by the fire may also be affected. Wildfires can damage utility infrastructure, including power lines and gas pipelines, leading to utility interruptions that affect homes and residents. They can damage or contaminate water supply infrastructure, affecting access to clean water for drinking, firefighting, and sanitation.

The following map, from NOAA’s Wildfire Risk to Communities, indicates the wildfire risk to homes in Kansas Region L:

Map 102: Kansas Region L Wildfire Risk to Homes



Source: NOAA's Wildfire Risk to Communities

Wildfires can have wide-ranging impacts on critical infrastructure. They can damage electrical transmission and distribution lines, transformers, and power substations. This can lead to widespread power outages, affecting homes, businesses, hospitals, and emergency response capabilities. Damage cell towers, telephone lines, and other communication infrastructure can hinder emergency response efforts, as well as the ability of individuals to call for help or communicate with loved ones. Wildfires can block roads with debris, making them impassable and hindering emergency response and evacuation efforts.

Hospitals and healthcare facilities may be damaged or rendered inoperable during wildfires, affecting the ability to provide medical care during a disaster. Fire stations, police stations, and emergency operation centers may be damaged or destroyed, impacting the ability of first responders to coordinate disaster response efforts. Damage to emergency shelters and housing facilities can disrupt services which are critical for providing temporary shelter to displaced individuals and families.

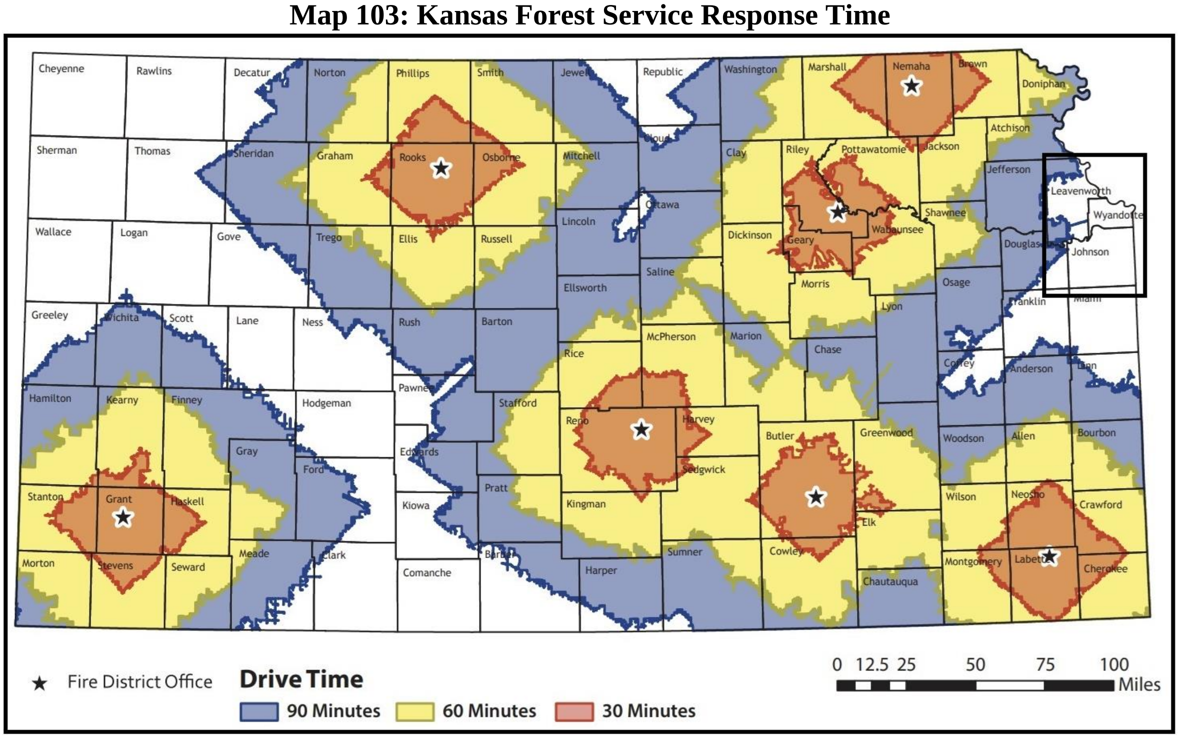
Wildfires can have varied impacts on the environment. These impacts are often destructive and can affect ecosystems, wildlife, natural resources, and even the local climate. They can destroy natural habitats, including forests, grasslands, wetlands, and shrublands. This can have devastating effects on wildlife species that depend on these ecosystems for shelter, food, and breeding. Wildfires can harm or displace wildlife, resulting in injury or death. They can force wildlife to flee their habitats, leading to displacement and potential conflicts with human populations. Animals may struggle to find suitable new habitats. Post-fire landscapes are often vulnerable to colonization by invasive plant species, which can outcompete native vegetation and disrupt ecosystem functions.

Wildfires can have significant impacts on government operations, which may include:

- Emergency Response and Public Safety: Wildfires can lead to a surge in emergency calls for services related to accidents, injuries, and damaged structures. Agencies involved in emergency response must mobilize additional resources to handle these demands.
- Emergency Operations Centers: Wildfire often require the activation of Emergency Operations Centers to coordinate emergency response efforts. These centers serve as hubs for communication, resource allocation, and decision-making during disasters.
- Infrastructure Damage: Wildfires can cause extensive damage to critical infrastructure, including roads, bridges, schools, government buildings, and utility facilities. This damage can disrupt government operations and hinder transportation and communication.
- Budgetary Impact: The costs associated with emergency response efforts, disaster recovery, and infrastructure repair can strain budgets.
- Resource Allocation: Local governments must allocate resources, including personnel, equipment, and stockpiled supplies, to support emergency response and recovery efforts.
- Communication Challenges: Wildfires can disrupt communication networks, hindering the ability of government agencies to communicate internally and with the public. This can impact emergency notifications and coordination efforts.
- Economic Impact: The destruction of infrastructure and businesses can have significant economic consequences for local communities, including job losses and reduced economic activity.
- Public Services: Wildfires can disrupt the delivery of public services, including transportation, utilities, and social services, affecting the well-being of residents.

The Kansas Forest Service operates seven full-time district offices with fire staff to serve firefighters and communities in wildland fire efforts. The following map illustrates the anticipated response time for these staff to reach Kansas Region L communities when requested by local resources:

Map 103: Kansas Forest Service Response Time



Source: Kansas Forest Service

Potentially Vulnerable Community Lifelines

Wildfires can impact various community lifelines, critical systems and services that communities rely on for their functioning. Vulnerabilities arise due to the stress that wildfires conditions place on infrastructure, resources, and operational processes. As an overview, the May 2023 FEMA Benefit-Cost Analysis Sustainment and Enhancements Standard Economic Value Methodology Report indicates the following loss values for community lifelines:

Table 103: Economic Impacts of Loss of Service Per Capita Per Day (in 2022 dollars)

Category	Loss
Loss of Electrical Service	$199
Loss of Wastewater Services	$66
Loss of Water Services	$138
Loss of Communications/Information Technology Services	$141

Source: May 2023 FEMA Benefit-Cost Analysis Sustainment and Enhancements Standard Economic Value Methodology Report

Wildfires can have significant impacts on electrical utilities, affecting both the infrastructure and the services they provide. Some of the key impacts include:

- Damage to Power Lines and Equipment: Wildfires can cause direct damage to electrical infrastructure such as power lines, transformers, substations, and other equipment. The intense heat from the fire can melt wires, damage insulators, and compromise the structural integrity of utility poles and towers.
- Power Outages: The destruction of power lines and equipment can lead to widespread power outages in affected areas. This not only disrupts daily life for residents but can also impact critical services such as hospitals, emergency response systems, and water treatment facilities.
- Infrastructure Accessibility: Wildfires can make it difficult for utility crews to access affected areas due to road closures, damaged infrastructure, and hazardous conditions. This can delay repair and restoration efforts, prolonging the duration of power outages.
- Grid Instability: The loss of transmission lines and substations can destabilize the electrical grid, leading to voltage fluctuations, frequency variations, and potential cascading outages. Restoring grid stability after a wildfire requires careful coordination and management by utility operators.
- Safety Concerns: Wildfires pose safety risks to utility workers involved in repair and restoration efforts. In addition to the immediate dangers of fire and smoke, there may be hazards such as downed power lines, weakened structures, and unstable terrain.

Mapping concerning electrical generation plants, high-capacity transmission lines, and electrical utility providers as well as utility repair and replacement cost estimation provides may be found in Maps 31 and 32, pages 75 and 76, and Chart 15, page 76.

Communications systems within Kansas Region L may have an increased vulnerability to wildfire events. Of particular concern are 911 and dispatch systems. All jurisdictions are served by a 911 and dispatch system, providing direct dispatching for:

- Law Enforcement
- Emergency Medical Services
- Fire

Wildfires can disrupt this vital communications system, affecting reliability and functionality. Some of the key vulnerabilities include:

- Structural Damage to Communication Towers: Wildfires can cause direct structural damage to communication towers, including cellular, television, radio, and microwave towers. Toppled or damaged towers can disrupt signal transmission and reception.

- Power Outages: Wildfires often cause power outages by damaging electrical infrastructure. Communication facilities, including cell towers and data centers, rely on a stable power supply. Power failures can lead to service interruptions.
- Fiber Optic Cable Damage: Wildfires can damage underground and aerial fiber optic cables. Severed cables can disrupt data transmission and internet connectivity.
- Equipment Damage: Communication equipment located outdoors, such as antennas, dishes, and amplifiers, can be damaged by wildfires, affecting the performance of communication systems.
- Loss of Communication Nodes: Wildfires can damage communication nodes, exchanges, and network switching centers. Loss of these critical components can lead to widespread service disruptions.
- Cellular Network Congestion: During and after a wildfire there is often an increased demand for cellular communication as individuals seek information and contact loved ones. This surge in demand can lead to network congestion and reduced service quality.

The cost to repair communications networks can vary widely depending on the extent of the damage, the size of the network, and the specific technologies involved. Repair costs may include expenses for labor, equipment replacement or repair, materials, and any additional resources required to restore the network to full functionality. Data from the U.S. Department of Homeland Security Cybersecurity and Infrastructure Security Agency concerning cost ranges for communications system components may be found in Table 80, page 143:

Wildfires can significantly impact emergency response infrastructure, creating challenges for first responders and organizations involved in managing and mitigating the effects. Wildfires can impact emergency response through:

- Transportation Disruptions: Debris on roads can hinder the ability of emergency vehicles to navigate and reach affected areas promptly. Hazardous road conditions may result in delays in response times.
- Road Closures: Wildfires can lead to the closure of roads due to debris accumulation and hazardous conditions. This can limit access for emergency vehicles and impede the evacuation of residents.
- Communication Disruptions: Wildfires can disrupt communication networks, affecting the ability of emergency responders to coordinate and communicate effectively. Downed power lines and damage to communication infrastructure contribute to these disruptions.
- Power Outages: Wildfires downing power lines can lead to power outages. Emergency response facilities, such as command centers and fire stations, may lose power, affecting their operational capabilities.
- Resource Allocation Challenges: Wildfires often require the allocation of additional resources, including personnel, equipment, and supplies, to address immediate needs. This can strain emergency response organizations and impact their ability to respond to other concurrent incidents.
- Logistical Challenges: Wildfires may create logistical challenges for the transportation of supplies, equipment, and personnel to affected areas, hindering the overall effectiveness of emergency response efforts.
- Increased Demand for Services: Wildfires can result in an increased demand for emergency services, including medical assistance, search and rescue operations, and responses to accidents. Emergency response organizations may need to manage a higher volume of incidents simultaneously.

Mapping concerning fire and police locations may be found in Maps 67 and 68, pages 144 and 145.

Wildfires can have various impacts on water utilities and infrastructure, affecting both the supply and quality of water as well as the infrastructure used to treat and distribute it. Here are some ways wildfires can impact water utilities and infrastructure:

- Water Source Contamination: Wildfires can contaminate surface water and groundwater sources with ash, debris, sediment, and pollutants. When rain falls on burned areas, it can wash ash and other contaminants into rivers, lakes, and reservoirs, compromising water quality. This can pose challenges for water treatment plants in removing contaminants and ensuring the safety of drinking water supplies.

- Reduced Water Availability: Wildfires can decrease water availability in affected watersheds by altering hydrological processes such as infiltration, runoff, and groundwater recharge. The loss of vegetation and soil cover increases the risk of erosion and reduces water retention capacity, leading to decreased streamflow and lower reservoir levels. Water utilities may need to implement conservation measures and adjust water allocation plans to manage shortages during and after wildfires.
- Infrastructure Damage: Wildfires can damage water infrastructure such as pipelines, pump stations, treatment plants, and storage facilities. Direct exposure to flames, intense heat, and falling debris can cause structural damage, melting of pipes, and electrical equipment failure. In addition, the loss of vegetation and soil stability can increase the risk of landslides and mudflows, which can damage or block water conveyance systems.
- Power Outages: As mentioned earlier, wildfires can disrupt electrical utilities, leading to power outages that affect water treatment and distribution operations. Many water treatment plants rely on electricity to power pumps, motors, and treatment processes. Without power, water utilities may be unable to maintain adequate water pressure, treat water to regulatory standards, or supply water to customers.

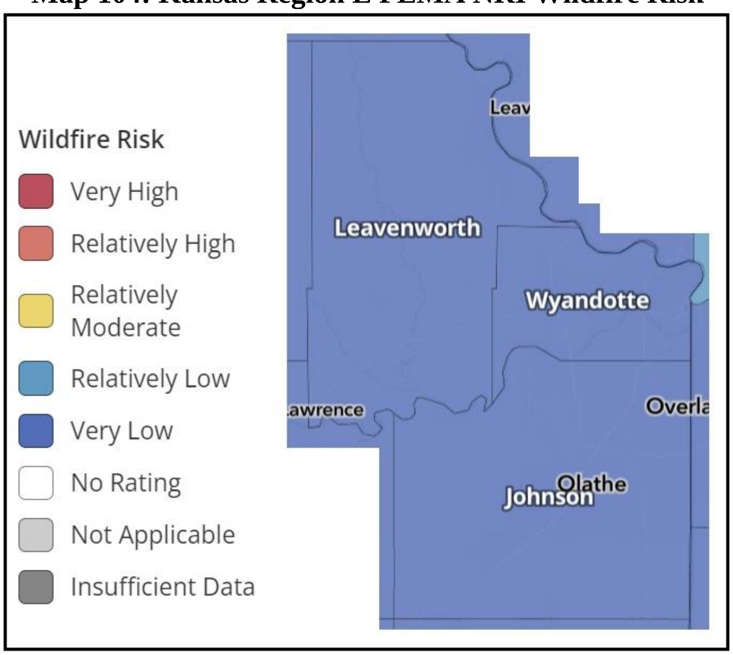
Mapping concerning water infrastructure may be found in Maps 36 and 37, pages 86 and 88.

Hospitals and other smaller medical facilities may see an increase in wildfire related injuries during an event, but it is considered unlikely that this increase will impact or overload capacity. However, tornadoes can increase the demand for emergency shelters, particularly in cases of widespread power outages. Setting up and managing these shelters can strain resources. Hospital capacity mapping may be found in Map 33, page 77.

FEMA NRI

Using the FEMA NRI, and consisting of three input components (expected annual loss, social vulnerability, and community resilience), the following map was created indicating the potential risk to participating counties from wildfires:

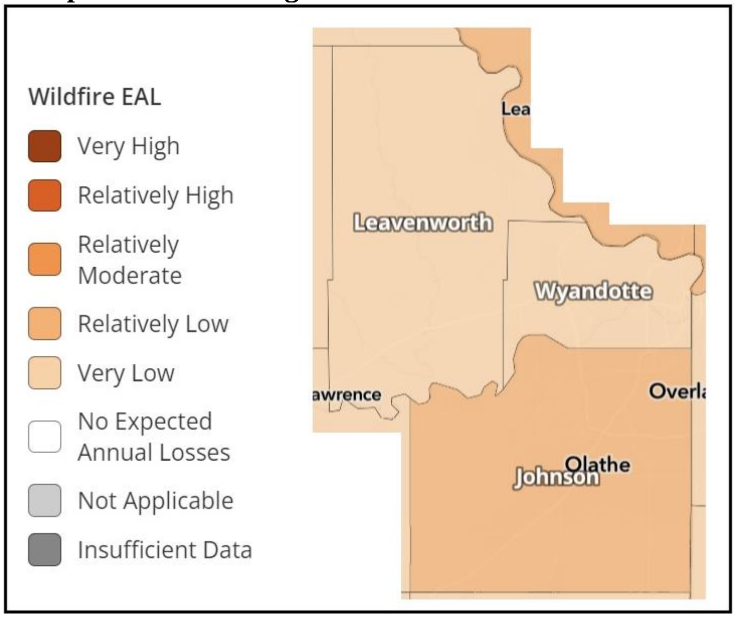
Map 104: Kansas Region L FEMA NRI Wildfire Risk



Source: FEMA NRI

As part of the NRI, EAL represents the average economic loss in dollars resulting from natural hazards each year and is proportional to a community's risk. The following map indicates the EAL for wildfires for participating counties within Kansas Region L:

Map 105: Kansas Region L FEMA NRI Wildfires EAL



Source: FEMA NRI

The following table indicates the FEMA NRI and EAL analysis for each participating Kansas Region L county for wildfire:

Table 104: Kansas Region L FEMA NRI and EAL for Wildfire by County

County	Risk Index	EAL
Johnson	Very Low	Relatively Low
Leavenworth	Very Low	Very Low
Wyandotte	Very Low	Very Low

Source: FEMA NRI

Consequence Analysis

This consequence analysis lists the potential impacts of a hazard on various elements of community and state infrastructure. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Kansas Region L residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

Table 105: Wildfire Consequence Analysis

Subject	Potential Impacts
Impact on the Public	People located in the immediate area of the fire face the risk injury or death if not evacuated in time. Once evacuated, they may face lengthy period of relocation. Fires can release toxic components which can cause adverse health effects including respiratory and cardiovascular system impacts. Psychological and psychiatric concerns may arise due to exposure to the traumatic event. Young children and the elderly are especially vulnerable to health issues stemming from fire and smoke exposure.
Impact on Responders	Fire, police, and emergency responders may be called to evacuate people from the fire area, close roads, create fire breaks, attend to the injured, and direct traffic. Firefighters are at a higher risk of smoke inhalation, burns, and health problems due to working in close proximity to fires and the subsequent smoke.
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary based on the situation. Wildfires may impact an agency’s ability to maintain continuity of operations due to impacts on critical infrastructure.
Delivery of Services	Fires can cause disruption of services, including the ability to deliver goods and services. Impacts on operations could lead to a reduction or cessation of services.

Table 105: Wildfire Consequence Analysis

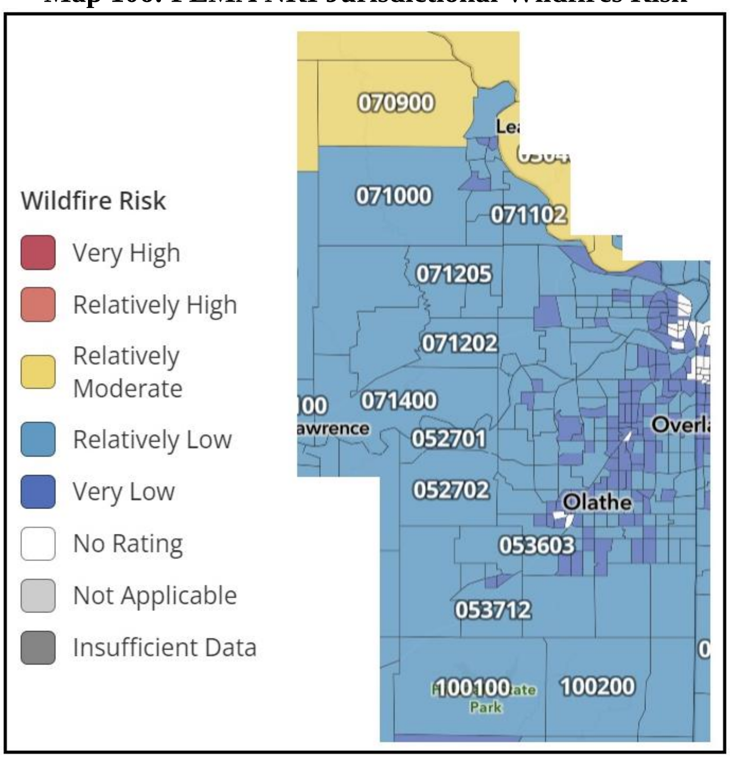
Subject	Potential Impacts
	Goods and facilities may be damaged or destroyed by fire, smoke, or extremely high temperatures.
Property, Facilities, and Infrastructure	Fire can damage or completely destroy property and critical facilities, as well as lead to interruption of the power supply system. A fire of significant strength can cause major damage to buildings or farmland. Large fires may also interrupt transportation systems such as train and bus lines, creating challenges for public transit and evacuation.
Impact on Environment	Fires can cause significant impact to the environment by spreading pollution, damaging agricultural crops, and disturbing the wildlife and natural areas. Water and soil pollution caused by fire can cause longer term threats to ecosystem health. Fire damage may also affect soil formation, nutrient cycling, and carbon sequestration and storage.
Economic Conditions	Fires can cause a fiscal impact on the local government, even if costs can be recouped by federal grants. Agriculture is a major component of the local, county and state economy, and major fires could cause significant impact. Costs may be associated with loss of income, damage to property, firefighting can be significant.
Public Confidence in Governance	Governmental response, on all levels, state and local, would require direct action that must be immediate and effective to maintain public confidence.

4.16.7 Jurisdictional Risk and Vulnerability

To help understand the risk and vulnerability to wildfires of participating jurisdictions mapping from the FEMA NRI was run on a census tract level. As the NRI does not generate mapping for individual jurisdictions, census tract analysis is the closest analogue available to understand individual jurisdiction conditions.

Using the FEMA NRI, and consisting of three input components (expected annual loss, social vulnerability, and community resilience), the following map was created indicating the potential risk to participating jurisdictions (as indicated by census tract) from wildfires:

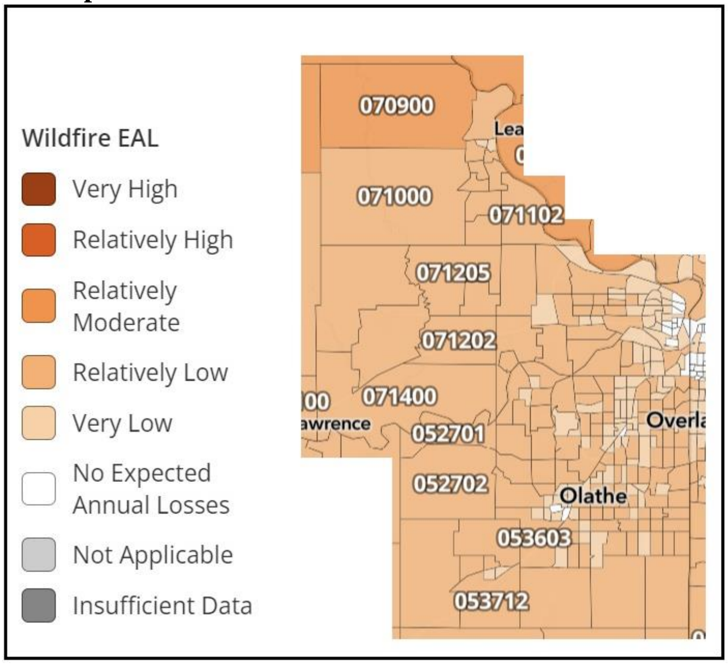
Map 106: FEMA NRI Jurisdictional Wildfires Risk



Source: FEMA NRI

As part of the NRI, EAL represents the average economic loss in dollars resulting from natural hazards each year and is proportional to a community's risk. The following map indicates the EAL for wildfires for participating jurisdictions (as indicated by census tract) within Kansas Region L:

Map 107: FEMA NRI Jurisdictional Wildfires EAL



Source: FEMA NRI

FEMA NRI data tables, by census tract, are included in Appendix C. These data tables contain the risk index and EAL along with total building valuation and agricultural valuation allowing for an understanding of potential vulnerability on a jurisdictional basis.

4.17 Cybersecurity Event

4.17.1 Hazard Description

Cybersecurity attack refers to a deliberate and malicious attempt to compromise the security of computer systems, networks, devices, or data. The primary objectives of cyberattacks can vary widely and may include gaining unauthorized access, stealing sensitive information, disrupting operations, or extorting payment. Cybersecurity threat actors can be classified as:

- Hacktivists: Loosely organized groups known for conducting distributed denial-of-service attacks and defacing websites to promote political or social causes.
- Ransomware Operators: Criminal groups use ransomware to encrypt victims' data and demand ransoms for decryption keys.
- Malware Developers: Individuals or groups create and distribute malicious software (malware) for profit.
- Organized Crime: Criminal organizations may engage in various forms of cybercrime, such as identity theft, credit card fraud, and hacking for profit.
- Advanced Persistent Threat Groups: Nation-state-sponsored groups are among the most sophisticated threat actors. They conduct long-term, highly targeted cyber espionage campaigns.

4.17.2 – Location and Extent

The entire state is vulnerable to cybersecurity incidents. As most day-to-day activities rely on the internet in one aspect or another, any person or infrastructure is susceptible to cybersecurity threats. Cyber-attacks can take various forms, each with its own tactics and techniques, and include:

- Malware Attacks: Malicious software, such as viruses, worms, Trojans, ransomware, and spyware, is used to infect and compromise a computer or network. Malware can cause damage, steal information, or provide unauthorized access.
- Phishing Attacks: Phishing attacks involve tricking individuals into revealing sensitive information, such as passwords or financial details, by posing as a legitimate entity. Phishing emails, websites, and messages are common tools for attackers.
- Denial-of-Service Attack: An attack that overwhelms a target system or network with traffic, rendering it inaccessible.
- Distributed Denial-of-Service Attack: An attack that involves multiple compromised devices (a botnet) flooding a target with traffic, making it impossible to function effectively.
- Man-in-the-Middle Attacks: In these attacks, an attacker intercepts and possibly alters communications between two parties without their knowledge. This can lead to data interception, eavesdropping, or impersonation.
- SQL Injection Attacks: Attackers inject malicious SQL code into input fields of a web application to manipulate a database, potentially gaining unauthorized access or extracting data.
- Zero-Day Vulnerabilities: Attackers leverage security vulnerabilities in software or hardware that are not yet known to the vendor or public. These vulnerabilities are known as "zero-days."
- Brute Force: Attackers attempt to gain access to an account or system by trying all possible password combinations until the correct one is found.
- Dictionary Attacks: Attackers use precompiled lists of common passwords to guess login credentials.
- Social Engineering Attacks: This involves manipulating individuals into divulging confidential information or performing actions that compromise security. It often relies on psychological manipulation.
- Ransomware Attacks: Attackers encrypt a victim's data and demand a ransom in exchange for the decryption key. Payment does not guarantee data recovery, and it encourages further attacks.
- Insider Attacks: Malicious or negligent actions by individuals within an organization can pose significant cybersecurity risks, as they may have access to sensitive information and systems.

- Supply Chain Attacks: Attackers target suppliers, vendors, or partners to compromise the security of products or services, which can affect downstream organizations and consumers.
- Internet of Things Attacks: Devices connected to the internet, such as smart appliances and sensors, can be targeted to gain unauthorized access or control.

4.17.3 Previous Occurrences

Kansas Region L has experienced numerous cyber-attacks over the past few years. In general, jurisdictions impacted by cyber-attacks have elected not to publicize these events as part of this HMP.

4.17.4 Probability of Future Events

The continued evolution of cyber criminals and nation sponsored groups indicates that the probability of future events is significant. Although the Kansas Region L has not experienced a large-scale cybersecurity incident, large-scale attacks occur worldwide on a regular basis. The number of attacks is projected to increase, especially on critical infrastructure. Additionally, due to the widespread use of computers, email, and the internet, and the reliance on technology to support daily functions, the risks of cybersecurity incidents will continue to grow.

4.17.5 Projected Changes in Location, Intensity, Frequency, and Duration

Predicting the exact future changes in the frequency and intensity of cyber-attacks is changing due to the rapidly evolving nature of threats, the expanding diversity of attack vectors, and the dynamic landscape of technology. Cyber criminals are likely to continue evolving their tactics, techniques, and procedures to become more sophisticated. This includes the use of advanced malware, ransomware, and targeted attacks that exploit vulnerabilities in both technology and human behavior.

Future geopolitical landscape conditions can influence the location and targeting of cyber-attacks. Nation-state actors may shift their focus based on political tensions, economic interests, or strategic objectives. Critical infrastructure, government entities, and corporations may be primary targets.

4.17.6 Vulnerability and Impact

Cybersecurity attacks can have a range of potential impacts on individuals, both direct and indirect, often affecting their finances and privacy. Some of the potential impacts of a cybersecurity attack may include:

- Theft of Funds: Attackers may steal money from victims' bank accounts or cryptocurrency wallets.
- Credit Card Fraud: Stolen credit card information can be used for unauthorized purchases.
- Identity Theft: Attackers may steal personal data, such as Social Security numbers, addresses, and dates of birth, to commit identity theft.
- Opening Fraudulent Accounts: Cybercriminals can use stolen information to open credit cards, loans, or other financial accounts in the victim's name.
- Data Exposure: Personal or sensitive information may be exposed, leading to loss of privacy and potential embarrassment or harm.
- Blackmail or Extortion: Attackers may use compromising information to blackmail or extort victims.

The impact of a cybersecurity attack on people can be far-reaching, affecting various aspects of their lives. Timely detection, response, and preventive measures, such as strong passwords, cybersecurity awareness, and software updates, are essential to mitigate these risks.

Cybersecurity attacks can have wide-ranging impacts on facilities, including critical infrastructure, industrial facilities, government buildings, and data centers. The extent of these impacts depends on the type and sophistication of the attack, the facility's level of cybersecurity preparedness, and the criticality of the systems and operations involved. Potential impacts may include:

- Disruption of Operations: Cyberattacks can lead to the disruption of facility operations, causing downtime that can be costly and disruptive.

- Production Delays: Manufacturing and industrial facilities may experience delays in production processes, affecting supply chains and delivery schedules.
- Revenue Loss: Downtime and operational disruptions can result in financial losses due to lost sales, contracts, or customer trust.
- Remediation Costs: Facilities must invest in cybersecurity measures and incident response efforts, incurring additional costs.
- Data Breach: Facilities that store sensitive data, such as customer information or proprietary research, may suffer data breaches, leading to data loss or theft.
- Regulatory Penalties: Compliance violations and regulatory fines may be imposed for failing to protect sensitive data.
- Physical Safety Risks: Attacks on critical infrastructure facilities, such as power plants or water treatment plants, can pose physical safety risks to the public and the environment.
- Industrial Accidents: Industrial control systems attacks can lead to accidents or malfunctions with serious safety implications.
- Loss of Control: Cyberattacks targeting operational technology systems can lead to a loss of control over critical processes, affecting safety and efficiency.

Attacks on facilities with environmental controls can lead to environmental damage, such as chemical spills or pollution which can affect the surrounding ecosystem and wildlife.

Cyberattacks on government operations can have wide-ranging impacts on the services provided to citizens. The effects of these attacks can vary depending on factors like the type of attack, the target's level of cybersecurity readiness, and the criticality of the systems involved, and may include:

- Disruption of Government Services: Cyberattacks can disrupt government services, leading to delays in processing applications, issuing licenses, or providing essential public services.
- Website Downtime: Government websites may become inaccessible, hindering access to information and online services.
- Financial Costs: States may incur significant expenses related to incident response, system recovery, and cybersecurity improvements.
- Loss of Revenue: Disrupted services can lead to revenue losses, impacting budgets and financial stability.
- Confidential Data Exposure: Cyberattacks can result in the exposure of sensitive citizen and employee data, including Social Security numbers, health records, and financial information.
- Regulatory Penalties: Non-compliance with data protection regulations can lead to penalties and legal consequences.
- Election Integrity: Attacks on election systems can compromise the integrity of elections, eroding trust in the democratic process.
- Emergency Response: Cyberattacks on public safety and emergency response systems can hinder responses to disasters or crises.
- Reputation Damage: Publicized cyberattacks can damage citizens' trust in government agencies and institutions.
- Legal and Regulatory Consequences: Jurisdictions may face legal liability for cybersecurity incidents, leading to lawsuits, fines, and settlements.

Consequence Analysis

This consequence analysis lists the potential impacts of a hazard on various elements of community and state infrastructure. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Kansas Region L residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

Table 106: Cybersecurity Incident Consequence Analysis

Subject	Potential Impacts
Impact on the Public	The public is heavily reliant on technology for daily life. Any disruption caused by a cyber incident could impair activities such as communications and mobile banking. Although mostly indirect, public health impacts may include loss of access of important medical information and services, personal information, and unwanted sharing of information.
Impact on Responders	If a cybersecurity incident were to directly impact the communications infrastructure relied upon by first responders, it would create severe disruptions in the ability to provide response services. If a cybersecurity event were to affect the 911 operations, response capabilities would be impacted significantly increasing critical response times.
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary based on the situation. A cybersecurity event may impact an agency's ability to maintain continuity of operations based on the hazard's potential to impact power or communications infrastructure. Specifically, agencies that rely on electronic backup of critical files are vulnerable to cyber incidents. A cyber incident that disrupts access to technology at both the primary and alternative facilities would be catastrophic.
Delivery of Services	The delivery of goods and services is heavily reliant on technology for the facilitation of transactions. A cyber incident could significantly disrupt the delivery of goods and services for businesses that rely on technology for the delivery of their materials.
Property, Facilities, and Infrastructure	Property and facilities may become unusable as a result of a cyber incident, particularly if their infrastructure is reliant on technology for sustainability. In addition, a significant majority of critical infrastructure systems are tied to technology through virtual operations and supervisory control and data acquisition systems. A cyber incident could disable the majority of systems which control critical infrastructure, as well as traffic control, dispatch, utility, and response systems.
Impact on Environment	Targeted cyber incidents can impact water or wastewater treatment facilities. The disruption of the systems tied to this infrastructure could cause water pollution or contamination. In addition, a cyber incident could impact the environment if a release of a hazardous material was triggered as a cascading effect of the incident.
Economic Conditions	A significant cyber incident could have ramifications on the state economy. Society is heavily reliant on electronic-based commerce through mobile banking, automated teller machines, and electronic trading. Any disruption to daily activities by a cyber incident could effectively halt the ability to conduct transactions electronically.
Public Confidence in Governance	In the case of a cyber incident in which significant amounts of data is stolen, the government's inability to protect confidential personal data would impact confidence. Such an incident would also subsequently cause pause regarding the security of using electronic systems for government services.

4.17.7 Hazard Planning Significance

Utilizing the above detailed formula for calculating the hazard planning significance for human caused and technological hazards, the following table details the rating of each criterion along with a composite rating:

Table 107: Cyber Security Incident Planning Significance

County	Probability	Magnitude	Warning Time	Duration	Score	Planning Significance
Johnson	4	3	3	3	3.5	High
Leavenworth	4	3	3	3	3.5	High
Wyandotte	4	3	3	3	3.5	High

4.18 Hazardous Material Incident

4.18.1 Hazard Description

Hazardous materials 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.

4.18.2 – Location and Extent

All of Kansas Region L is vulnerable to hazardous materials incidents. Hazardous materials incidents are generally classified as:

- **Fixed Facility Incidents:** Commercial Facilities and Superfund Sites
- **Transportation Incidents:** Highway, Railway, Pipeline, Air, and Water

Tier II facilities, also known as Tier II Reporting facilities, refer to certain types of industrial or commercial establishments that are required to report information about the hazardous chemicals they store or use. This reporting is mandated under the Emergency Planning and Community Right-to-Know Act under Section 312. Key factors in Tier II reporting include:

- Hazardous Chemicals: Tier II facilities are those that store or use hazardous chemicals in quantities that meet or exceed specific thresholds established by EPCRA. Hazardous chemicals can include substances such as flammable liquids, toxic gases, and corrosive materials.
- Reporting Thresholds: Facilities must report if they have a quantity of any hazardous chemical at the facility that equals or exceeds established thresholds. These thresholds can vary depending on the specific chemical and are typically set in terms of pounds (or a lower threshold for Extremely Hazardous Substances).
- Reporting Frequency: Tier II reports must be submitted annually to the State Emergency Response Commission, the Local Emergency Planning Committee, and local fire department.
- Information Required: Tier II reports must include detailed information about the hazardous chemicals stored or used at the facility, including the chemical name, location on the site, quantities, and specific health and physical hazards.
- Community Right-to-Know: In addition to assisting emergency responders, Tier II reporting also serves the "Community Right-to-Know" aspect of EPCRA, allowing the public to access information about hazardous chemicals in their communities. This information is typically made available through public databases.
- Enforcement: Non-compliance with Tier II reporting requirements can result in penalties and fines. Facilities are responsible for ensuring accurate and timely reporting.

Transportation-related hazardous materials incidents can encompass a wide range of scenarios involving the transportation of hazardous materials, including chemicals, flammable substances, radioactive materials, and other dangerous goods. These incidents can occur during the movement of these materials by road, rail, or air These transportation-related hazardous materials incidents can include:

- Chemical Spills on Highways: Accidents involving trucks carrying hazardous chemicals can result in spills on highways. This can lead to the release of toxic, flammable, or corrosive substances, posing risks to people, the environment, and emergency responders.
- Train Derailments: Train derailments can result in the release of hazardous materials from tanker cars. These incidents can occur on both freight and passenger rail lines and may involve chemicals, fuels, or other hazardous substances.
- Aircraft Hazmat Incidents: Cargo planes and commercial aircraft can carry hazardous materials as cargo. Incidents may involve leaks, fires, or other issues related to hazardous materials on board.
- Marine Spills: Incidents involving the transport of hazardous materials by sea can lead to marine spills. These spills may involve oil, chemicals, or other substances, and can have significant environmental and economic consequences.
- Pipeline Leaks: Pipelines transport hazardous liquids and gases over long distances. Leaks or ruptures in pipelines can result in the release of hazardous materials into the environment.
- Radiological Transport Incidents: The transport of radioactive materials, including medical isotopes and nuclear fuel, carries the risk of accidents that can result in the release of radioactive substances. These incidents can have serious health and environmental consequences.
- Chemical Fires in Transit: Fires in transit vehicles carrying hazardous chemicals can be particularly changing to control. The fire may cause chemical reactions, leading to toxic smoke or explosions.
- Cargo Container Incidents: Shipping containers transported by truck or rail can contain hazardous materials. Incidents involving these containers may include leaks, fires, or chemical reactions.
- Intermodal Transport Incidents: When goods are transferred between different modes of transportation (e.g., ship to truck), there is the potential for mishandling or spills during these transfers.

Counties with multiple chemical facilities experience a greater risk of a chemical incident than other locations. However, almost every community in Kansas Region L has at least one fixed facility that stores, produces, or utilizes hazardous material. Hazardous materials shipments move through Kansas Region L annually. These shipments can occur at any time, day or night, and by means of road, rail, or air, and often through areas with urbanized, high volume traffic routes.

4.18.3 Previous Occurrences

The United States Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) is a federal agency responsible for regulating the safe and secure transportation of hazardous materials by all modes of transportation, including pipelines, trucks, trains, and aircraft. PHMSA's primary mission is to protect people and the environment from the risks associated with the transportation of hazardous materials. PHMSA plays a crucial role in safeguarding public safety, protecting the environment, and ensuring the integrity of the nation's hazmat transportation infrastructure. Its work encompasses a wide range of hazardous materials, including chemicals, radioactive materials, explosives, and more. The agency collaborates with industry stakeholders, state and local governments, and other federal agencies to achieve its safety and security objectives.

For the five-year period from 2018 to 2023, PHMSA has reported over 2,300 hazardous materials incidents in Kansas. Of these incidents, three events in Kansas Region L resulted in a serious evacuation, a major artery closure, fatalities, or injuries.

4.18.4 Probability of Future Events

Data from PHSMA indicates that the probability of a hazardous material incident during any given year is 100%. However, data indicates that the large majority of these incident will be small in scale and cause no evacuation, injuries, or deaths,

4.18.5 Projected Changes in Location, Intensity, Frequency, and Duration

Projecting specific changes in the location, intensity, and frequency of hazardous materials events involves numerous variables, including future industrial activities, changes in transportation systems, and more stringent regulatory measures. The location of hazardous materials events is often influenced by urbanization and industrialization. The vulnerability of communities to hazardous materials incidents may change based on demographic shifts, land-use changes, and socioeconomic factors. Population density and proximity to industrial sites influence the potential impact of such incidents.

The continued transportation of hazardous materials by road, rail, and air poses inherent risks. Changes in transportation patterns, such as increased volumes or altered routes, can impact the potential for accidents and spills. However, the adoption of new technological solutions, such as sensor technologies, remote monitoring, and safety measures, can contribute to the mitigation of hazardous materials risks.

Changes in climate patterns, such as extreme weather events, floods, or wildfires, can influence the frequency and intensity of hazardous materials incidents. Events like floods or wildfires may impact facilities handling hazardous materials.

As previously noted, Kansas Region L facilities have seen no major changes in the past five years, with only modest repairs and upgrades being conducted and no major rehabilitation or construction projects completed. As such, the risk to jurisdictional facilities has remained static since the completion of the 2019 HMP.

4.18.6 Vulnerability and Impact

Kansas Region L's first line of defense in protecting public health, safety, and welfare in a hazardous materials event are trained local responders and the Office of the State Fire Marshal. The Office of the State Fire Marshal Hazardous Materials Division was developed in 1999 to enhance the safety of Kansans by making trained, equipped hazardous materials teams available throughout the state. These teams support local first responders in hazardous materials incidents, accidents, weapons of mass destruction and acts of terrorism.

Hazardous materials teams exist through contracts between individual local fire departments and the Office of the State Fire Marshal. The fire departments agree to provide team members and regional response outside their local jurisdiction and the Office of the State Fire Marshal provides training and supplements equipment at no cost to the department. The ten regional response teams, consisting of nationally accredited hazardous materials technicians, are fully equipped to enter the area immediately surrounding the hazardous material in order to monitor the environment and mitigate the incident. The regional response teams comprise a network and are able to support each other with personnel and or equipment when needed.

These teams can respond to most areas in Kansas within an hour or less in order to address hazardous materials incidents. The regional response teams are located in the following areas:

- Coffeyville
- Colby
- Emporia
- Ford County
- Manhattan
- Overland Park
- Salina
- Sedgwick County
- Topeka

A hazardous materials release can have serious and immediate impacts on human health and safety, as well as long-term effects depending on the nature of the hazardous materials involved, the release's magnitude, and the proximity of individuals to the incident. Acute health effects from a hazardous materials release can include:

- Chemical Exposure: Depending on the type of hazardous material, exposure can lead to symptoms such as respiratory distress, skin burns, eye irritation, nausea, vomiting, and headaches.
- Toxicity: Exposure to highly toxic substances can cause severe poisoning, organ damage, and even death.

- Asphyxiation: Some hazardous materials, like certain gases, can displace oxygen and lead to asphyxiation when inhaled in high concentrations.
  Injuries and Trauma:
- Physical Injuries: Explosive releases or fires involving hazardous materials can cause physical injuries such as burns, cuts, and blunt force trauma.
- Psychological Trauma: Witnessing or being affected by a hazardous materials incident can lead to psychological trauma, including post-traumatic stress disorder (PTSD) and anxiety.

Long-Term Health Effects from a hazardous materials release can include:

- Chronic Illnesses: Exposure to hazardous materials may lead to chronic health conditions, including cancer, respiratory diseases, neurological disorders, and reproductive problems.
- Delayed Effects: Some hazardous substances have delayed health effects, with symptoms appearing days, months, or even years after exposure.

Additionally, a hazardous material release can result in impacted populations requiring:

- Evacuation: To protect public safety, authorities may order evacuations of affected areas, displacing residents from their homes.
- Temporary Shelter: Evacuated individuals may require temporary shelter, food, and medical care.

The direct risk or vulnerability to property and facilities from a hazardous materials incident is generally limited. Impacts include restricting access to a facility or potential damage to the facility from corrosive agents. Direct risk and vulnerability to actual structures is limited due to the characteristics of a hazardous materials incident.

Critical facilities and infrastructure may suffer secondary impacts from a hazardous materials incident. Access may be restricted due to closures, causing employee absenteeism which could indirectly impact the ability for a critical facility to operate. Without necessary operators, critical infrastructure may be susceptible to indirect failure.

A hazardous materials release can have significant and lasting impacts on the environment, depending on the type and quantity of hazardous materials involved, the location of the release, and the effectiveness of response and cleanup efforts. Environmental impacts can range from immediate and localized effects to long-term ecological damage and may include:

- Soil Contamination: Hazardous materials can seep into the soil, contaminating it with toxic substances. This can affect soil quality and fertility.
- Agricultural Damage: Contaminated soil may harm crops, leading to reduced agricultural yields or the need to abandon affected fields.
- Surface Water Contamination: Hazardous materials can enter rivers, lakes, and streams, leading to water pollution. This can harm aquatic ecosystems, fish, and wildlife.
- Groundwater Contamination: Contaminants can infiltrate underground aquifers, potentially affecting drinking water supplies and requiring costly remediation efforts.
- Habitat Destruction: Contamination can harm natural habitats, disrupt ecosystems, and threaten the survival of plant and animal species.
- Bioaccumulation: Toxic substances can accumulate in the food chain, leading to health issues for wildlife and potentially impacting humans who consume contaminated organisms.

Some hazardous materials are persistent and can remain in the environment for extended periods, causing ongoing harm. Environmental recovery from hazardous materials releases can be slow and changing, requiring extensive remediation efforts.

A hazardous materials incident can have wide-ranging impacts on local operations. These impacts can disrupt government operations, strain resources, and pose challenges to maintaining public order. Some of the impacts of a hazardous materials release on operations may include:

- Emergency Response and Healthcare: Local agencies must rapidly mobilize emergency response teams, medical personnel, and healthcare facilities to address a release. The surge in demand for medical resources can strain healthcare systems, including hospitals, clinics, and emergency services.
- Resource Allocation: Local agencies may need to allocate resources to respond to the incident. This includes personnel, equipment, and facilities.
- Transportation and Supply Chain Disruption: Transportation infrastructure closures can affect the movement of essential goods and services, including medical supplies, food, and fuel.
- Economic Impact: The economic consequences of a hazardous materials incident can be severe. Business closures, reduced consumer confidence, and trade disruptions can lead to financial losses, unemployment, and economic instability.
- Public Services: Essential public services, such as law enforcement, fire services, and sanitation, may be stretched thin due to the demands of responding to an incident.
- Agency Coordination: Coordination and communication among various state agencies and with federal authorities will be tested during a hazardous materials incident. Local emergency management agencies will activate emergency response plans and incident command structures.

Consequence Analysis

This consequence analysis lists the potential impacts of a hazard on various elements of community and state infrastructure. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Kansas Region L residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

Table 108: Hazardous Materials Incident Consequence Analysis

Subject	Potential Impacts
Impact on the Public	Cities within Kansas Region L with dense populations, particularly along major travel routes, are the most vulnerable (with an emphasis on any particularly vulnerable groups, such as infants and young children in day-care centers, children in schools, the elderly in residential facilities, hospital patients, etc.). Varying materials will have different effects on the population as well as environmental effects which will dilute or increase potency. Protective measures will need to be taken particularly for those of the most vulnerable communities.
Impact on Responders	Hazardous material incidents can create a dangerous environment and significant challenges for first responders. First responders may have to manage the evacuation of people from the area impacted by an incident, as well as direct traffic, close roads, operate shelters, and take care of the injured and sick. First responders must control their own exposure to the incident and ensure the correct PPE is utilized. Equipment may also be damaged or destroyed due to the impact of the incident, which may lead to a decrease in response capabilities.
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary based on the situation. A hazardous materials incident may impact an agency’s ability to maintain continuity of operations based on the incidents potential to cause workforce absenteeism, contamination, or destruction of public facilities.
Delivery of Services	The ability to deliver services can be impacted locally, regionally, or statewide depending on the characteristics of the incident. To reduce the public’s potential exposure to dangerous materials, roadway and bridge closures may be required, as well as transit service disruptions. Businesses and places of commerce may completely shut down due to chemical incidents, which leads to the disruption of goods and services.
Property, Facilities, and Infrastructure	Transportation, governmental operations, and infrastructure facilities may be disrupted during a significant incident. Roads and bridges can be completely obstructed and

Table 108: Hazardous Materials Incident Consequence Analysis

Subject	Potential Impacts
	require cleanup. Incidents can impact access to homes and critical entities such as hospitals, schools, and supermarkets, as well as other critical facilities. Safe access to homes, vehicles, structures, and resources may adversely affect response activities. Power loss can lead to disruption of critical infrastructure and technology.
Impact on Environment	Agriculture crops and livestock are extremely susceptible to the adverse effects of biological incidents that may cause contamination of a large area of land livestock. biological incidents may impact the environment long-term by disturbing or killing wildlife and adversely affecting nature preserves.
Economic Conditions	Hazardous materials incidents pose a fiscal impact on the local and state governments. Local, county, and state resources may be required during a large incident therefore reducing their availability for future events. Additionally, private businesses may not be able to maintain operations during or after an incident if they are impacted, which would impact the economy.
Public Confidence in Governance	The public's confidence in the state's governance is affected by immediate local and state response through direct and effective actions. Efficiency in response and recovery operations is critical in keeping public confidence high.

4.18.7 Hazard Planning Significance

Utilizing the above detailed formula for calculating the hazard planning significance for human caused and technological hazards, the following table details the rating of each criterion along with a composite rating:

Table 109: Hazardous Materials Incident Planning Significance

County	Probability	Magnitude	Warning Time	Duration	Score	Planning Significance
Johnson	4	2	4	1	3.1	High
Leavenworth	4	1	4	1	2.8	Moderate
Wyandotte	4	2	4	1	3.1	High

4.19 Infrastructure Failure

4.19.1 Hazard Description

Infrastructure failure refers to the malfunction, breakdown, or collapse of critical infrastructure systems or components that are essential for the functioning of the State. These failures can disrupt essential services, impact public safety, and lead to economic losses. There are many potential causes of infrastructure failure, including:

- Aging Infrastructure: Many infrastructure systems, such as bridges, roads, and water pipelines, have exceeded their designed lifespan. Over time, the materials degrade, and the risk of failure increases.
- Earthquakes: Seismic events can damage or destroy buildings, bridges, dams, and utility systems.
- Floods: Flooding can damage electrical systems, disrupt transportation, and contaminate water supplies.
- Severe Weather: High winds and heavy rainfall can damage infrastructure.
- Extreme Heat: Prolonged periods of extreme heat can cause roads to buckle, power lines to sag, and strain electrical grids.
- Freezing Temperatures: Cold weather can lead to frozen water pipes, which can burst and disrupt the water supply.
- Design Flaws and Poor Maintenance: Inadequate design, construction, or maintenance practices can result in structural weaknesses or deteriorating infrastructure.
- Corrosion and Erosion: Infrastructure components, particularly those involving metals, can deteriorate due to corrosion over time. Erosion of natural landscapes can damage infrastructure.
- Material Failures: Inadequate materials or the use of substandard materials during construction can lead to premature infrastructure failure.
- Overloading and Overuse: Bridges, roads, and other structures can fail if they are subjected to loads beyond their designed capacity. Water and wastewater systems can fail if they are overwhelmed by excessive demand.
- Cyberattacks: Critical infrastructure systems, such as power grids, water treatment plants, and transportation systems, can be vulnerable to cyberattacks, which can disrupt operations and compromise safety.
- Terrorism and Sabotage: Deliberate acts of terrorism or sabotage can target critical infrastructure, leading to failures and disruptions.
- Environmental Changes: Long-term environmental changes due to climate change can threaten infrastructure.

Infrastructure failures can have significant consequences, including economic losses, public safety risks, and disruptions to daily life. Preventing such failures and ensuring the resilience of critical infrastructure often require proactive measures such as regular maintenance, improvements in design and construction practices, disaster preparedness, and investments in modernization and upgrades.

4.19.2 – Location and Extent

Details concerning Kansas Region L's infrastructure were sourced from the 2020 Report Card for Kansas's Infrastructure from the American Society of Civil Engineers (ASCE). The report provides information on infrastructure components and provides a letter grade to indicate condition. Grades are issued based on the following scale:

Table 110: ASCE Infrastructure Grade System

Grade	Description
A: Exceptional	The infrastructure in the system or network is generally in excellent condition, typically new or recently rehabilitated, and meets capacity needs for the future. A few elements show signs of general deterioration that require attention. Facilities meet modern standards for functionality and are resilient to withstand most disasters and severe weather events.

Table 110: ASCE Infrastructure Grade System

Grade	Description
B: Adequate for Now	The infrastructure in the system or network is in good to excellent condition; some elements show signs of general deterioration that require attention. A few elements exhibit significant deficiencies. Safe and reliable with minimal capacity issues and minimal risk.
C: Mediocre, Requires Attention	The infrastructure in the system or network is in fair to good condition; it shows general signs of deterioration and requires attention. Some elements exhibit significant deficiencies in conditions and functionality, with increasing vulnerability to risk.
D: Poor, At Risk	The infrastructure is in poor to fair condition and mostly below standard, with many elements approaching the end of their service life. A large portion of the system exhibits significant deterioration. Condition and capacity are of significant concern with strong risk of failure.
F: Failing/Critical, Unfit for Purpose	The infrastructure in the system is in unacceptable condition with widespread advanced signs of deterioration. Many of the components of the system exhibit signs of imminent failure.

Source: ASCE

The following table indicates the grades by the State of Kansas received for infrastructure components:

Table 111: ASCE Kansas Infrastructure Grades

Infrastructure Component	Grade
Aviation	C-
Bridges	C
Dams	C-
Drinking Water	C
Energy	C
Levees	C
Rail	C
Roads	C-
Stormwater	C-
Overall Grade	**C**

Source: ASCE

The Aviation Division of the Kansas Department of Transportation supports airfield pavement management programs and calculates pavement condition for all airports within its system apart from Dwight D. Eisenhower National airport in Wichita, which is required to perform the program as a small hub airport. The most recent state-wide pavement management report indicated pavement on 79 of 80 airports examined as having a condition of fair or less than fair on 51% of the pavement area, and a condition of satisfactory or good on the remaining 49% of the pavement. Runway pavement condition, of critical importance to operations, is reported as 50% of the runways available fall below a fair condition.

Kansas ranks fifth in the nation for total number of bridges with approximately 5,000 state-owned, 19,500 locally owned, and 400 Kansas Turnpike Authority owned structures, making up the 25,001 Kansas bridge inventory. The majority of local bridges are owned by counties. The average age of a Kansas bridge is 48 years, with over 20% of the bridges exceeding the modern 75-year design life

Railroads in Kansas consist of 4,700 miles of track which transport approximately 340,000,000 tons of freight per year. While the 2,800 miles of track owned by the major rail companies is typically well maintained, short line tracks that carry lower traffic volumes may not have adequate funding in place for necessary maintenance and upgrades.
Kansas has over 140,000 miles of public roadways. The two agencies responsible for the major highways and interstates are the Kansas Department of Transportation and the Kansas Turnpike Authority, who maintain 10,300 miles (7.4%)

and 236 miles (less than 0.2%) of the state's total public road miles, The remainder of road network is maintained by cities and counties.

In general, electricity in Kansas Region L 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 online.

4.19.3 Previous Occurrences

Small scale infrastructure failures occur as a secondary impact from a natural disaster, such as a temporary power outage due to a thunderstorm or a communications outage from downed lines following a severe storm. Kansas Region L experiences these minor disruptions routinely and manages them through coordination across agencies and with the private sector. Specifically, when utility and/or infrastructure failure does occur, utility providers generally respond quickly to restore service. However, depending on the cause of the utility disruption, events of prolonged outages do occur.

4.19.4 Probability of Future Events

The probability of a utility failure can vary depending on a range of factors, including the type of utility, the condition of the infrastructure, weather conditions, and maintenance practices. Utility providers typically have systems and protocols in place to minimize the risk of utility failures, and they work to respond quickly to any outages or disruptions. The probability of a utility failure may also vary seasonally or during extreme weather events.

4.19.5 Projected Changes in Location, Intensity, Frequency, and Duration

Climate change can influence the frequency, intensity, and patterns of extreme weather events. An increase in these events can cause a commensurate increase in infrastructure failures. It is expected that climate change will impact infrastructure in the following ways:

- Increased Frequency of Extreme Weather Events: Climate change is associated with an increased frequency and intensity of extreme weather events, such as hurricanes, heatwaves, heavy rainfall, and wildfires. These events can damage utility infrastructure, leading to outages.
- Heatwaves and Electrical Grids: Rising temperatures can lead to more frequent and prolonged heatwaves. High temperatures can strain electrical grids, leading to increased demand for electricity for cooling and potentially causing power outages.
- Increased Storm Intensity and Utility Damage: Hurricanes and tropical storms may become more intense due to warming oceans. Stronger storms can damage power lines, transformers, and other electrical infrastructure, resulting in widespread electricity outages.
- Sea-Level Rise and Coastal Infrastructure: Sea-level rise, a consequence of climate change, can threaten coastal infrastructure, including power plants, wastewater treatment facilities, and transportation systems. It can lead to saltwater intrusion, erosion, and damage to critical infrastructure.
- Flooding and Water Utilities: More frequent and severe flooding events can impact water supply and wastewater treatment facilities, causing contamination and disruptions in water services.
- Wildfires and Power Lines: Climate change can contribute to more extensive and intense wildfires. In regions prone to wildfires, power lines and electrical equipment are at risk of igniting fires, leading to power outages and infrastructure damage.
- Extreme Weather and Gas Pipelines: Extreme weather events, including extreme cold or heat, can impact natural gas pipelines. Cold temperatures can freeze pipelines, while heatwaves can affect gas compressors and transmission systems.
- Changing Precipitation Patterns: Altered precipitation patterns, such as more intense rainfall or prolonged droughts, can affect the availability and quality of water resources, impacting water utilities and hydropower generation.

As previously noted, Kansas Region L facilities have seen no major changes in the past five years, with only modest repairs and upgrades being conducted and no major rehabilitation or construction projects completed. As such, the risk to state facilities has remained static since the completion of the 2019 HMP.

4.19.6 Vulnerability and Impact

Infrastructure failure can have significant and immediate impacts on people. The specific impacts can vary depending on the type of utility that fails (electricity, water, gas) and the duration of the outage, and may include:

- Disruption of Daily Life: Utility failures can disrupt daily routines, including cooking, bathing, heating or cooling homes, and using electronic devices. Lack of electricity can also disrupt businesses, schools, and healthcare facilities.
- Safety Concerns: Utility failures, particularly in electrical and gas systems, can pose safety risks such as fires, electrical hazards, and gas leaks. Lack of electricity can result in the loss of lighting, increasing the risk of accidents and falls.
- Health Implications: Medical equipment that relies on electricity can become non-functional, posing risks to individuals with medical conditions. Lack of access to clean water can impact hygiene and health. Utility failures in healthcare facilities can impact the ability to provide medical care and support for patients. Prolonged utility failures, especially during extreme weather events, can lead to stress, anxiety, and discomfort. Vulnerable populations, such as the elderly, children, and those with special needs, may be particularly affected.

Utility failures can have significant impacts on critical infrastructure and facilities. The specific impacts can vary depending on the type of utility affected, the duration of the outage, and the criticality of the infrastructure, and may include:

- Disruption of Operations: Utility failures can disrupt the normal operations of critical facilities, including hospitals, emergency response centers, data centers, and transportation hubs.
- Compromised Safety and Security: Loss of electricity can impact security systems, including surveillance cameras and alarm systems. Critical facilities may rely on backup power sources to maintain safety and security.
- Loss of Communication: Utility failures can disrupt communication systems, affecting the ability of critical facilities to coordinate responses and communicate with staff and the public.
- Healthcare Impacts: Hospitals and healthcare facilities may experience disruptions in patient care due to power outages, affecting the health and safety of patients. Medical equipment may require backup power to continue functioning.
- Water and Sanitation Services: Water utility failures can disrupt water supply to critical facilities, impacting sanitation services, firefighting capabilities, and patient care. Wastewater treatment plants may be affected, posing environmental and health risks.
- Transportation Disruptions: Transportation infrastructure, including airports, train stations, and traffic management systems, may be impacted by utility failures, leading to travel disruptions.
- Safety Hazards: Gas utility failures can result in gas leaks, posing fire and explosion hazards to critical infrastructure and nearby areas. Electrical failures may lead to equipment malfunctions, increasing the risk of accidents and safety incidents.

In general, a utility failure would have little effect on the environment. However, specific circumstances of the failure, such as a chemical leak, a downed power line in a fire prone area, or loss of wastewater containment could pose a concern. The impacts from those type of events can range from relatively minor and localized effects to more significant and widespread environmental consequences, and may include:

- Wildfires: Electrical utility failures, such as downed power lines or equipment malfunctions, can trigger wildfires. Wildfires can have devastating effects on natural landscapes and ecosystems.
- Water Pollution: Water utility failures, such as sewage system overflows or treatment plant malfunctions, can lead to the release of untreated wastewater into rivers, lakes, or oceans. This can result in water pollution, harm aquatic ecosystems, and affect drinking water quality downstream.

- Chemical Spills: Utility failures, particularly in industrial settings, can result in chemical spills and releases. These spills can harm the environment, contaminate soil and water, and endanger wildlife.

Infrastructure failure can have significant impacts on governmental operations, affecting the ability to provide essential services, respond to emergencies, and maintain critical infrastructure. The specific impacts can vary depending on the type of utility affected and the duration of the outage, and may include:

- Disruption of Emergency Services: Failures can disrupt the operations of emergency response agencies, including police, fire departments, and medical services. This can impede their ability to respond to accidents, fires, and medical emergencies.
- Communication Challenges: Failures, particularly in telecommunications and internet infrastructure, can hinder communication between government agencies, first responders, and the public. This can impact coordination during emergencies.
- Data Loss and Information Technology Disruptions: Electrical outages and information technology infrastructure failures can result in data loss and disrupt government operations that rely on digital records and systems.
- Transportation Disruptions: Transportation infrastructure, such as traffic management systems and public transit, may be impacted by utility failures, leading to travel disruptions and challenges in managing traffic flow.
- Public Health Services: Healthcare facilities and public health agencies may experience disruptions in patient care, vaccination programs, and disease surveillance during utility failures.
- Safety Risks: Failures can pose safety risks to government employees and the public, particularly when they result in electrical hazards, gas leaks, or water contamination.
- Economic Consequences: The economic impact of infrastructure failures can extend to governmental operations, affecting budgets and resources available for public programs and services.
- Disaster Response and Recovery: Failures may occur during natural disasters, adding complexity to state response and recovery efforts. Coordination among agencies becomes crucial.

Consequence Analysis

This consequence analysis lists the potential impacts of a hazard on various elements of community and state infrastructure. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Kansas Region L residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

Table 112: Infrastructure Failure Consequence Analysis

Subject	Potential Impacts
Impact on the Public	Critical infrastructure failures can lead to heavy flooding, power loss, property damage, injury, and even death. Roadways may be obstructed or inaccessible to the public, changing transport and resource acquirement activities. A failure of critical infrastructure would have a direct impact on public health. Power outages, transit failures, access to clean water would create severe and immediate public health impacts.
Impact on Responders	Infrastructure failure would have a direct and immediate impact on first responder's ability to respond effectively. Critical infrastructure failure may cause inaccessibility of roadways. Communications system failure would impact the responders' ability to communicate their status or response capability.
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary based on the situation. An infrastructure failure may impact an agency's ability to maintain operations based on the incidents impact, including access to facility by transportation systems, and the availability of utilities, communications, energy, and water and wastewater systems.

Table 112: Infrastructure Failure Consequence Analysis

Subject	Potential Impacts
Delivery of Services	Delivery of services will be disrupted due to critical infrastructure failure. Transit systems may face closures due to public safety concerns. The ability to deliver food, drinking-water, and services will be impacted due to problems with accessibility and transport abilities. Communications, transportation, and governmental services operations would be impacted due to power failure and accessibility challenges.
Property, Facilities, and Infrastructure	Roads and bridges may be impacted, water and sewer systems may be damaged, leading to the issue of sanitation and waste collection. Property of homes and businesses may be completely destroyed if situated close to the failure point.
Impact on Environment	The impacts on the environment of critical infrastructure would vary based on the event. Failure of wastewater plants would result in spreading pollution and hazardous materials throughout the environment including large bodies of water. Ecosystems and natural habitats may be destroyed, causing migration or death of wildlife.
Economic Conditions	Critical infrastructure failure would have a direct and considerable fiscal impact on the local government, however through federal disaster may be offset. Additionally, infrastructure failure in every sector has the potential to impact the ability of businesses to operate. If the private sector was not able to maintain operability, there would be continued revenue loss until operability was restored.
Public Confidence in Governance	Critical infrastructure failure would have a direct and immediate impact on the state's ability to provide governance, maintain order, and ensure the continuity of public services. Given a prolonged failure, the public would become increasingly distrustful of the government's abilities. Direct, immediate, and effective actions must be taken in order to maintain public confidence.

4.19.7 Hazard Planning Significance

Utilizing the above detailed formula for calculating the hazard planning significance for human caused and technological hazards, the following table details the rating of each criterion along with a composite rating:

Table 113: Infrastructure Failure Planning Significance

County	Probability	Magnitude	Warning Time	Duration	Score	Planning Significance
Johnson	3	3	3	2	2.9	Moderate
Leavenworth	3	3	3	2	2.9	Moderate
Wyandotte	3	3	3	2	2.9	Moderate

4.20 Terrorism

4.20.1 Hazard Description

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."

Terrorism is characterized by the use of violence, intimidation, or the threat of violence to instill fear, achieve political, religious, ideological, or social objectives, and disrupt the normal functioning of a society. It often involves acts of violence deliberately targeting civilians. Key elements and characteristics of terrorism include:

- Political or Ideological Motivation: Terrorism is often driven by political, religious, ideological, or social goals. Perpetrators seek to advance a particular agenda or bring about change in accordance with their beliefs.
- Use of Violence: Terrorism involves the use of violence, which can range from bombings, shootings, and kidnappings to cyberattacks and biological threats. The intent is to cause harm and instill fear.
- Targeting Civilians: Terrorist acts typically target civilians or non-combatants, rather than military or government personnel. This is done to maximize the psychological impact and create a sense of vulnerability within society.
- Psychological Impact: The primary objective of terrorism is to create fear and anxiety within the population. The fear generated by terrorist acts can have profound psychological and societal effects.
- Non-State Actors: Terrorism is often associated with non-state actors, such as terrorist organizations, extremist groups, or individuals acting independently. However, some state entities have also been accused of engaging in acts that meet the criteria of terrorism.
- Symbolism: Terrorist acts are often symbolic in nature, targeting specific locations, landmarks, or institutions that hold significance to the perpetrators or their cause.

Terrorism in the United States can take various forms, and the nature of terrorist threats has evolved over time. Common forms of terrorism in the United States include:

- Domestic Terrorism: Domestic terrorism involves acts of violence or intimidation committed by individuals or groups within the United States. These acts are typically driven by extremist ideologies, such as far-right extremism, far-left extremism, or other radical beliefs. Recent examples of domestic terrorism include attacks on religious institutions, acts of violence against minority communities, and violent protests.
- Far-Right Extremism: Far-right extremism refers to ideologies and movements characterized by extreme nationalism, racism, and opposition to government authority. Some far-right extremists have engaged in acts of violence targeting minority communities, government officials, or perceived enemies.
- Far-Left Extremism: Far-left extremism encompasses a range of radical ideologies, including anarchist and socialist beliefs. While not as prevalent as far-right extremism, far-left extremists have been involved in protests, clashes with law enforcement, and acts of violence.
- Religiously Motivated Terrorism: Religious extremism can lead to acts of terrorism. In the United States, this has included attacks by individuals or groups inspired by extremist interpretations of Islam, Christianity, or other religions.
- Examples include the 1993 World Trade Center bombing and the 2009 Fort Hood shooting.
- Single-Actor Terrorism: Lone-wolf terrorism involves individuals who carry out acts of violence without direct affiliation with established terrorist organizations. These individuals are often self-radicalized and may be

inspired by online propaganda. Examples include the 1995 Oklahoma City bombing and the 2013 Boston Marathon bombing.

- Eco-Terrorism: Eco-terrorism refers to acts of violence or sabotage carried out in the name of environmental activism. These acts target industries or organizations perceived as harmful to the environment.
- Examples include arson attacks on logging facilities or animal testing labs.
- Cyberterrorism: Cyberterrorism involves using computer technology to disrupt or damage critical infrastructure, institutions, or networks. While not as common as other forms of terrorism, cyberattacks pose significant risks. Cyberattacks by state-sponsored actors or independent hackers can target government agencies, corporations, and infrastructure.

The U.S. government, law enforcement agencies, and intelligence services actively monitor and address various forms of terrorism. Counterterrorism efforts include preventive measures, intelligence gathering, community engagement, and law enforcement actions. Public awareness, community outreach, and reporting suspicious activities also play a role in countering terrorism in the United States.

Whether mass shooting events (especially school shootings) are considered acts of terrorism can be a subject of debate and can vary depending on the specific circumstances and legal definitions in different jurisdictions. There is no standardized definition of a mass shooting. The United States Investigative Assistance for Violent Crimes Act defines a mass killing as three or more killings in a single incident while the Federal Bureau of Investigation defines a mass shooting as any incident in which at least four people were shot and killed. Mass shootings involve acts of violence carried out in public places, often by individuals who may have personal grievances, mental health issues, or other motivations not necessarily connected to a political or ideological agenda. While mass shootings are undoubtedly acts of violence that result in tragedy and loss of life, they may not always fit the traditional definition of terrorism, as the primary motivation is often not to advance a political or ideological cause. If the shooter's primary aim is to instill fear, advance a political agenda, or promote a particular ideology, it may be more likely to be classified as terrorism. However, if the shooter's motivation is primarily personal, such as a desire for revenge or mental health issues, the act may not be considered terrorism under many legal definitions.

4.20.2 – Location and Extent

All of Kansas Region L is vulnerable to terrorism, particularly in densely populated urban areas or crowded venues. However, it is nearly impossible to pinpoint the exact location of the next terrorist attack. Through information and intelligence sharing, public safety personnel at the local, state, and federal level help identify potential targets for terrorist activity. Although it is impossible to predict for certain where the next terrorist attack will take place, terrorists generally target large, crowded places, such as malls, parks, and other large public or social gatherings, in order to maximize damage. In addition, some acts of terror are conducted against critical infrastructure in an effort to weaken or cripple services such as transportation, communications, and electricity.

The extent of terrorism can vary significantly depending on a range of factors including the tactics, capabilities, and the effectiveness of counterterrorism efforts. Tactics employed may include bombings, firearm attacks, kidnappings, assassinations, cyberattacks, or a combination. The choice of targets, such as civilians, government institutions, religious sites, or critical infrastructure can also affect the extent of the terrorist threat. The extent of terrorism may also be influenced by public support or sympathy for extremist ideologies, as well as the recruitment and radicalization of individuals into terrorist organizations. Socio-economic factors, such as poverty, unemployment, and inequality, can contribute to the conditions conducive to terrorism.

The effectiveness of counterterrorism efforts by governments and international organizations can influence the extent of terrorism. Robust counterterrorism measures can disrupt terrorist networks and reduce the frequency and impact of attacks. Efforts to address terrorism typically involve a combination of security measures, intelligence sharing, diplomacy, counter-radicalization programs, and community engagement. Reducing the extent of terrorism often requires a multifaceted approach that addresses both the root causes and the immediate security threats associated with terrorism.

4.20.3 Previous Occurrences

Although there has not been a terrorist attack in Kansas Region L, this does not reduce the significance of the threat. There have been numerous examples of terrorism that have occurred in the United States, and specifically terrorist events that have occurred in the region. Of note:

- Alfred P. Murrah Federal Building, Oklahoma City (1995), 168 killed.

4.20.4 Probability of Future Events

Assessing the probability of a terrorist attack in Kansas Region L involves complex analysis conducted by intelligence and law enforcement agencies such as the U.S. Department of Homeland Security, the Federal Bureau of Investigation, and the Kansas State Police. These agencies regularly provide threat assessments and security information to the public based on local, international, and geopolitical intelligence.

4.20.5 Projected Changes in Location, Intensity, Frequency, and Duration

Predicting the specific changes in the location, intensity, and frequency of terrorist events is highly changing due to the complex and dynamic nature of terrorism. Terrorism is influenced by a multitude of factors, including political, social, economic, and ideological considerations. Additionally, responses by governments, international cooperation, and evolving global dynamics contribute to the uncertainty surrounding future projections.

The increasing reliance on technology provides terrorists with new tools and methods for conducting attacks. Cyberterrorism can be used to disrupt critical infrastructure or compromise information systems may become more prevalent. Additionally, the use of online platforms for radicalization and recruitment purposes is a growing concern. Changes in the online landscape, social media platforms, and encryption methods can influence the reach and effectiveness of extremist propaganda.

Climate change can indirectly influence terrorism by exacerbating certain conditions that may contribute to the emergence and persistence of terrorist threats. While climate change itself does not directly cause terrorism, it can interact with other factors to create a more conducive environment for terrorist activities. Climate change can lead to resource scarcity, such as water and arable land shortages, which may intensify poverty. This scarcity can create conditions that extremist groups exploit. Additionally, climate-induced displacement and migration can result from events like sea-level rise, extreme weather events, and droughts. Displaced populations can become vulnerable to recruitment by extremist groups, as they may lack basic necessities and economic opportunities.

As previously noted, Kansas Region L facilities have seen no major changes in the past five years, with only modest repairs and upgrades being conducted and no major rehabilitation or construction projects completed. As such, the risk to state facilities has remained static since the completion of the 2019 SHMP.

4.20.6 Vulnerability and Impact

Terrorism can have profound and far-reaching impacts on individuals and communities. These effects can be physical, psychological, social, and economic, and may include:

- Loss of Life and Injury: Terrorism often results in the loss of innocent lives and injuries to survivors. Victims may suffer physical trauma, disabilities, and long-term health issues.
- Psychological Trauma: Many survivors of terrorist attacks and witnesses may experience Post-Traumatic Stress Disorder, characterized by flashbacks, nightmares, anxiety, and emotional distress. Children and young people may be particularly vulnerable to the psychological effects of terrorism, which can impact their emotional and cognitive development.
- Anxiety and Depression: Terrorism can lead to increased anxiety and depression in affected individuals and communities.
- Grief and Loss: Those who lose loved ones in terrorist attacks may experience profound grief and loss, which can be long-lasting.

Terrorism can disrupt social structures and community cohesion, leading to feelings of insecurity and mistrust. Fear of future attacks may limit social activities and interactions, impacting the quality of life. Some terrorist attacks, such as bombings, can result in displacement and homelessness for those affected, leading to housing instability and further psychological stress. People may alter their daily routines, travel plans, or social activities due to fear of further attacks. This can impact personal freedom and quality of life.

Critical infrastructure is often high-value and high-impact, making it an attractive target for terrorists looking to cause disruption, economic damage, and fear. Many critical infrastructure sectors are interconnected, so an attack on one sector can have cascading effects on others. For example, an attack on the power grid can impact telecommunications and transportation. Compounding the issue, certain critical infrastructure facilities are accessible to the public or located in urban areas, making them vulnerable to physical attacks, such as bombings or shootings. Specific impacts on critical infrastructure may include:

- Disruption of Operations: Attacks can disrupt the normal operations of critical facilities, including hospitals, emergency response centers, data centers, and transportation hubs.
- Economic Disruption: Attacks can lead to significant economic disruption, including damage to facilities, loss of productivity, and increased operational costs.
- Public Safety: Attacks on certain critical infrastructure, such as transportation hubs or healthcare facilities, can pose immediate risks to public safety, leading to injuries and loss of life.
- Disruption of Services: Infrastructure attacks can result in service disruptions, including power outages, water supply interruptions, and communication breakdowns.
- Healthcare Impact: Attacks on healthcare infrastructure, like hospitals, can limit access to medical care during emergencies, potentially leading to higher casualties.

Terrorism can have significant impacts on governmental operations. These impacts can vary depending on the nature and scale of terrorist attacks, the level of preparedness and response, and the specific vulnerabilities, and may include:

- Security and Law Enforcement: An attack would lead to an increased demand on law enforcement agencies to prevent, investigate, and respond to terrorist threats and incidents. Allocation of significant resources to counterterrorism efforts would stretch resources.
- Emergency Response: Local emergency management agencies, in conjunction with state and federal agencies, would need to activate emergency response and management systems to coordinate response. A long-term activation could strain resources and personnel. Additionally, responders may be vulnerable to secondary devices or attacks.
- Public Services: An attack could lead to the disruption of public services, such as transportation, utilities, and public spaces, due to security concerns.
- Economic Impact: Negative economic consequences, including damage to businesses, loss of investor confidence, and reduced tourism and foreign investment can occur.
- Surveillance and Privacy Concerns: Expansion of surveillance capabilities may result in concerns about potential violations of privacy rights.
- Impact on Government Operations: An attack would likely cause the disruption of government functions, including closures of government offices and facilities.
- Psychological Impact on Government Officials: Psychological stress and burnout among government officials and first responders involved in counterterrorism efforts.
- Public Opinion and Confidence: Fluctuations in public opinion and confidence in the government's ability to provide security and protect citizens would occur.

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.

In general, it is difficult to quantify potential losses of terrorism due to the many variables and human elements. The following hypothetical scenario, using the Electronic Mass Casualty Assessment and Planning Scenarios developed by Johns Hopkins University, provides an estimated impact of a potential terrorism event.

Scenario: Improvised Explosive Device

Event: A van transported improvised explosive device utilizing an ammonium nitrate/fuel oil mixture is detonated in the parking area of a stadium as people are entering. 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 one 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, and the falling glass hazard distance is estimated at 600 feet according to the Bureau of Alcohol, Tobacco, Firearms and Explosives Standards. In this event, damage would occur to vehicles, and depending on the proximity of other structures, damage 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 114: 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

Consequence Analysis

This consequence analysis lists the potential impacts of a hazard on various elements of community and state infrastructure. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Kansas Region L residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

Table 115: Terrorism Consequence Analysis

Subject	Potential Impacts
Impact on the Public	Terrorist activities including bombings, kidnappings, shootings, and hijackings could cause considerable injury and death. An attack could kill and injure hundreds to thousands of people, which could overwhelm hospitals.
Impact on Responders	Attacks can create a dangerous environment and significant challenges for first responders, who may have to manage the evacuation of people, close areas, operate shelters, and take care of the injured. First responders may be a direct target of terrorism themselves from a secondary attack during response activities. Equipment may also be damaged or destroyed, which may lead to a decrease in response capabilities.
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary based on the situation. A terrorist event may impact an agency's ability to maintain operations due to the potential to cause a significant injury to staff or impede travel.
Delivery of Services	The ability to deliver services can be impacted depending on the characteristics of the attack. Roadway and bridge closures may be required, as well as transit service disruptions. Businesses and places of commerce may completely shut down, which leads to the disruption of goods and services.
Property, Facilities, and Infrastructure	Transportation, governmental operations, and infrastructure facilities may be disrupted both directly and indirectly. Roads and bridges may be impacted if explosive devices

Table 115: Terrorism Consequence Analysis

Subject	Potential Impacts
	are utilized in the attack. Access to homes and critical facilities such as hospitals, schools, and supermarkets may be impossible. If power loss occurs following an attack, it may lead to disruption of critical infrastructure and technology.
Impact on Environment	Terrorist attacks involving bombings and arson pose considerable negative impacts to the environment in the form of smoke and destruction of vegetation. A terrorist attack utilizing chemical, nuclear, and biological weapons pose a significantly higher risk to the environment by causing pollution, damaging sewer and wastewater treatment plants; or disturbing or killing wildlife, and adversely affecting nature preserves.
Economic Conditions	Local, county, and state resources may be severely depleted during a terrorist attack response. Private businesses may not be able to maintain operations during or after an incident if they are impacted, which would impact the economy.
Public Confidence in Governance	If government employees or facilities are targeted directly by terrorism, it will have a significant impact on the ability to govern. The public's confidence in the state's governance is affected by immediate response through direct and effective actions. Efficiency in response and recovery operations is critical in keeping public confidence.

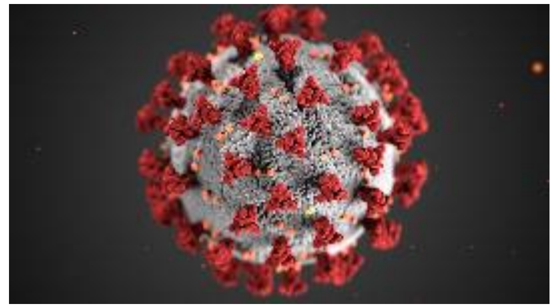
4.20.7 Hazard Planning Significance

Utilizing the above detailed formula for calculating the hazard planning significance for human caused and technological hazards, the following table details the rating of each criterion along with a composite rating:

Table 116: Terrorism Planning Significance

County	Probability	Magnitude	Warning Time	Duration	Score	Planning Significance
Johnson	1	3	1	4	1.9	Low
Leavenworth	1	3	1	4	1.9	Low
Wyandotte	1	3	1	4	1.9	Low

4.21 Transmissible Disease



4.21.1 Hazard Description

A transmissible disease, also known as a communicable or infectious disease, is a type of illness caused by pathogens (such as bacteria, viruses, fungi, or parasites) that can be transmitted from one person or organism to another, directly or indirectly. These diseases can spread through various means, including person-to-person contact, respiratory droplets, contaminated food or water, vectors like mosquitoes, or contact with infected animals.

Transmissible diseases are characterized by their ability to pass from an infected individual to a susceptible host, leading to new cases of the disease. The transmission can occur through various routes, depending on the specific pathogen and the mode of transmission it utilizes. Examples of transmissible diseases include:

- Influenza: The flu is caused by influenza viruses and can spread through respiratory droplets when an infected person coughs or sneezes.
- West Nile virus: A mosquito-borne virus that can cause a range of illnesses in humans, from mild febrile symptoms to severe neurological disease. It is primarily transmitted to humans through the bite of infected mosquitoes.
- Malaria: Malaria is caused by Plasmodium parasites and is transmitted through the bite of infected female Anopheles mosquitoes.
- Salmonella Infection: This bacterial infection is often contracted through the consumption of contaminated food or water and can lead to gastrointestinal symptoms.
- Tuberculosis: • Tuberculosis is caused by Mycobacterium tuberculosis and can be transmitted through the inhalation of respiratory droplets from an infected person with an active disease.
- Measles: Measles is caused by the measles virus and spreads through respiratory droplets, making it highly contagious.

Of particular concern are novel transmissible diseases. This is a disease that is caused by a pathogen (such as a virus, bacterium, or other microorganism) that is newly recognized in a human population or is increasing in incidence or geographic range. These diseases are termed novel because they have not been previously identified or have not been known to affect humans in the past. Several factors can contribute to the emergence of novel transmissible diseases, including changes in human behavior, urbanization, deforestation, climate change, global travel, and the encroachment of humans into natural habitats. Defining characteristics of novel transmissible diseases: include

- New Pathogen or Strain: Novel transmissible diseases often involve a pathogen or strain of a pathogen that is new to humans. This may result from genetic mutations, cross-species transmission (zoonotic diseases), or the introduction of a pathogen to a new geographic area.
- Human Transmission: These diseases have the potential to spread from person to person, either through direct contact, respiratory droplets, contaminated surfaces, or other modes of transmission.
- Challenges in Control: Because these diseases are new and may have limited prior immunity in the population, they can pose challenges for public health authorities in terms of surveillance, diagnosis, treatment, and containment.

Novel transmissible diseases can have pandemic potential, meaning they can spread globally and affect a large portion of the world's population. Dealing with novel transmissible diseases requires a multi-pronged approach, including surveillance, early detection, containment measures, public health interventions, and research to understand the pathogen and develop effective countermeasures. It also underscores the importance of preparedness and global cooperation in responding to emerging infectious diseases.

4.21.2 – Location and Extent

Kansas Region L's geographic and demographic characteristics make it vulnerable to the spread of transmissible diseases. The extent of a transmissible disease can vary widely depending on several factors, including:

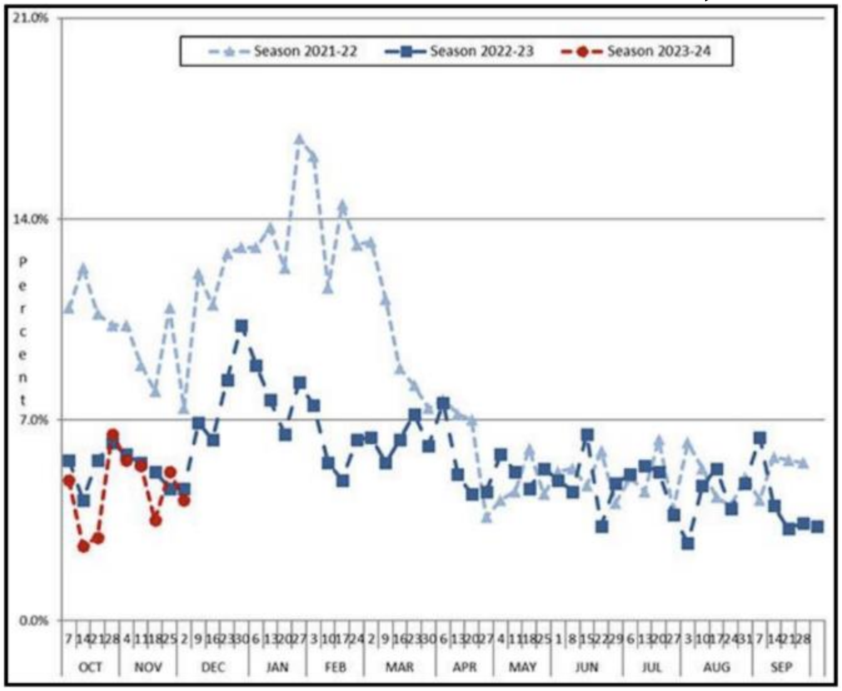
- Pathogen Characteristics: The biological properties of the infectious agent, such as its mode of transmission, incubation period, and virulence, play a significant role. Pathogens that are highly contagious and have a short incubation period are more likely to spread rapidly.
- Human Behavior: Human behavior and practices, such as hygiene, travel, and social interactions, can influence the extent of disease spread. For example, frequent travel and close interpersonal contact can facilitate the rapid transmission of infectious diseases.
- Public Health Measures: The effectiveness of public health measures, such as quarantine, isolation, contact tracing, and vaccination, can limit the extent of disease spread. Prompt and coordinated public health responses can be crucial.
- Geographic Factors: The geographic spread of a disease can be influenced by factors like population density, climate, and geographic barriers. Dense urban areas may experience more rapid transmission, while isolated or remote regions may be less affected.
- Healthcare Infrastructure: The capacity of healthcare systems to detect, treat, and isolate cases can impact the extent of an outbreak. Overwhelmed healthcare systems can lead to a larger extent of disease.
- Pre-existing Immunity: If a portion of the population has pre-existing immunity to the disease, either due to prior exposure or vaccination, this can limit the extent of disease transmission.
- Global Travel: In an era of global travel, novel infectious diseases can quickly cross international borders, affecting multiple countries and regions.
- Vaccination: The availability and coverage of vaccines against the disease can significantly reduce the extent of an outbreak. High vaccination rates create herd immunity, protecting even those who are not vaccinated.
- Mutation and Variants: Some infectious agents may undergo mutations that affect their transmissibility or virulence. New variants can lead to changes in the extent and severity of the disease.
- Public Awareness and Compliance: Public awareness of the disease, willingness to follow public health guidance, and compliance with preventive measures can affect disease transmission rates.
- Timeliness of Response: The speed with which authorities and healthcare systems respond to an outbreak can have a substantial impact. Rapid detection and containment efforts can limit the extent of spread.

The extent of a transmissible disease can range from localized outbreaks that are quickly contained to global pandemics that affect large populations across multiple countries. The management of such diseases requires a combination of robust surveillance, effective public health interventions, research, and international collaboration to minimize their impact on human health and society.

4.21.3 Previous Occurrences

One of the most common transmissible diseases within the Kansas Region L is Influenza. Influenza, commonly known as the flu, is a contagious respiratory illness caused by influenza viruses. It can affect humans, birds, and other animals. Influenza viruses are classified into types A, B, C, and D, with types A and B being the most common in humans and responsible for seasonal flu outbreaks. The following chart details deaths for the state from 2021 through 2023:

Chart 25: Percent of Deaths Associated with Pneumonia and Influenza, October 2020 to Present



Source: Kansas Department of Health and Environment

The most notable recent novel infectious disease to strike Kansas Region L is COVID-19, also known as Coronavirus Disease 2019. Covid-19 is an infectious respiratory illness caused by a novel coronavirus known as SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus 2). It was first identified in December 2019 in the city of Wuhan, China, and spread globally leading to a pandemic. COVID-19 primarily spreads from person to person through respiratory droplets when an infected person coughs, sneezes, talks, or breathes. It can also spread by touching surfaces contaminated with the virus and then touching the face. Symptoms can range from mild to severe and may include fever, cough, shortness of breath, fatigue, muscle aches, loss of taste or smell, sore throat, congestion, and gastrointestinal symptoms like diarrhea. Some individuals may remain asymptomatic, meaning they carry the virus without displaying symptoms. While many people with COVID-19 experience mild to moderate symptoms and recover without hospitalization, the disease can be severe, especially among older adults and individuals with underlying health conditions. Severe cases can lead to pneumonia, acute respiratory distress syndrome, organ failure, and death. Available data from the Kansas Department of Health and Environment indicates the following for COVID-19 for Kansas:

- 946,56 cases
- 10,229 deaths

COVID-19 has had a profound impact on public health, economy, and daily life across Kansas Region L. Some of the key measures taken in Kansas Region L in response to the COVID-19 pandemic include:

- Public Health Measures: Kansas implemented various public health measures to slow the spread of the virus. These included stay-at-home orders, mask mandates, social distancing guidelines, and limits on gathering sizes.
- Testing and Contact Tracing: Kansas established testing sites and conducted contact tracing to identify and isolate individuals who had been exposed to the virus. Testing was widely available to the public.
- Vaccination Efforts: Kansas launched vaccination campaigns to administer COVID-19 vaccines to eligible residents. Mass vaccination sites, healthcare providers, and pharmacies played a role in the distribution of vaccines.
- School Closures and Remote Learning: Like many other states, Kansas Region L temporarily closed schools and shifted to remote learning to minimize the risk of virus transmission among students and staff.
- Travel and Quarantine Measures: Kansas issued travel advisories and quarantine requirements for travelers coming into the state, especially from areas with high infection rates.

- Mask Mandates and Social Distancing: Face mask mandates and social distancing measures were enforced in indoor public spaces and in situations where social distancing was not possible.

Additionally, COVID-19 had numerous, and oftentimes severe impacts on Kansas Region L, including:

- Economic Repercussion: Job losses, business closures, and economic strain on individuals and families were common within the Kansas Region L. Kansas, like other states, implemented economic relief measures.
- Healthcare System Overload: Hospitals and healthcare facilities in Kansas Region L worked to increase capacity to treat COVID-19 patients. There were efforts to secure additional medical supplies and equipment.
- Protection of Vulnerable Populations: Efforts were made to protect vulnerable populations, including the elderly and those with underlying health conditions, who were at higher risk of severe illness from COVID-19.
- Educational Impact: The pandemic disrupted education, with students and teachers adapting to remote learning. Schools implemented safety measures upon reopening.

The response to COVID-19 evolved as more information became available, and measures were adjusted based on the changing circumstances of the pandemic. Kansas Region L worked to balance public health concerns with the economic and social well-being of its residents. The state and region's response were guided by recommendations from health experts from the Centers for Disease Control.

4.21.4 Probability of Future Events

While it is impossible to predict with certainty when or if a transmissible disease outbreak will occur, the probability of occurrence can be estimated based on historical patterns and current global conditions. Factors to consider include:

- Globalization: Increased global travel and trade can facilitate the rapid spread of infectious diseases. The interconnectedness of the world means that a disease can quickly cross borders, increasing the risk of a pandemic.
- Vaccine Coverage: The level of vaccination coverage against preventable diseases can impact the likelihood of pandemics. Low vaccine coverage can lead to outbreaks that have pandemic potential.
- Public Health Preparedness: The readiness of healthcare systems, public health agencies, and governments to respond to outbreaks is crucial. Adequate preparedness can help contain outbreaks before they become pandemics.
- Surveillance and Early Detection: Improved surveillance systems and early detection mechanisms can help identify and contain outbreaks before they escalate to pandemics.
- Scientific Advancements: Advances in science and technology, such as the rapid development of vaccines and treatments, can influence our ability to respond to emerging infectious diseases.
- Behavioral Factors: Human behavior, including adherence to preventive measures like handwashing, mask-wearing, and vaccination, plays a role in disease transmission. Public health campaigns can influence behavior.
- Climate Change: Environmental changes driven by climate change can alter the geographic distribution of diseases and the behavior of vectors (like mosquitoes). This can affect disease transmission patterns and increase the risk of outbreaks.
- Agriculture and Farming Practices: The way animals are raised and farmed can impact the risk of zoonotic diseases, which are diseases transmitted from animals to humans. The probability of another pandemic is influenced by the frequency of spillover events (when a pathogen jumps from animals to humans). Factors like deforestation, urbanization, and increased contact with wildlife can contribute to these events.

Transmissible disease outbreaks can vary in their impact, and public health measures can mitigate their effects. Governments, international organizations, and scientists continuously monitor and assess the risk of transmissible diseases and work to improve preparedness and response capabilities.

In order to prevent the rapid spreads of transmissible diseases, the Kansas Department of Health and Environment tracks occurrences of the following diseases and conditions:

- Acute flaccid myelitis
- Anthrax
- Anaplasmosis
- Arboviral disease, neuroinvasive and nonneuroinvasive (including chikungunya virus, dengue virus, La Crosse, West Nile virus, and Zika virus)
- Babesiosis
- Botulism
- Brucellosis
- Campylobacteriosis
- Candida auris
- Carbapenem-resistant bacterial infection or colonization
- Chancroid
- Chickenpox (varicella)
- Chlamydia trachomatis infection
- Cholera
- Coccidioidomycosis
- Cryptosporidiosis
- Cyclosporiasis
- Diphtheria
- Ehrlichiosis
- Giardiasis
- Gonorrhea (include antibiotic susceptibility results, if performed)
- Haemophilus influenzae, invasive disease
- Hansen's disease (leprosy)
- Hantavirus
- Hemolytic uremic syndrome, post-diarrheal
- Hepatitis, viral (A, B, C, D, and E, acute and chronic)
- Histoplasmosis
- Human Immunodeficiency Virus (HIV) (
- Leptospirosis
- Influenza, novel A virus infection
- Legionellosis
- Listeriosis
- Lyme disease
- Malaria
- Measles (rubeola)
- Meningococcal disease
- Mumps
- Pertussis (whooping cough)
- Plague (Yersinia pestis)
- Poliovirus
- Psittacosis
- Q Fever (Coxiella burnetii, acute and chronic)
- Rabies
- Rubella
- Salmonellosis, including typhoid fever
- Severe Acute Respiratory Syndrome-associated coronavirus (SARS-CoV)

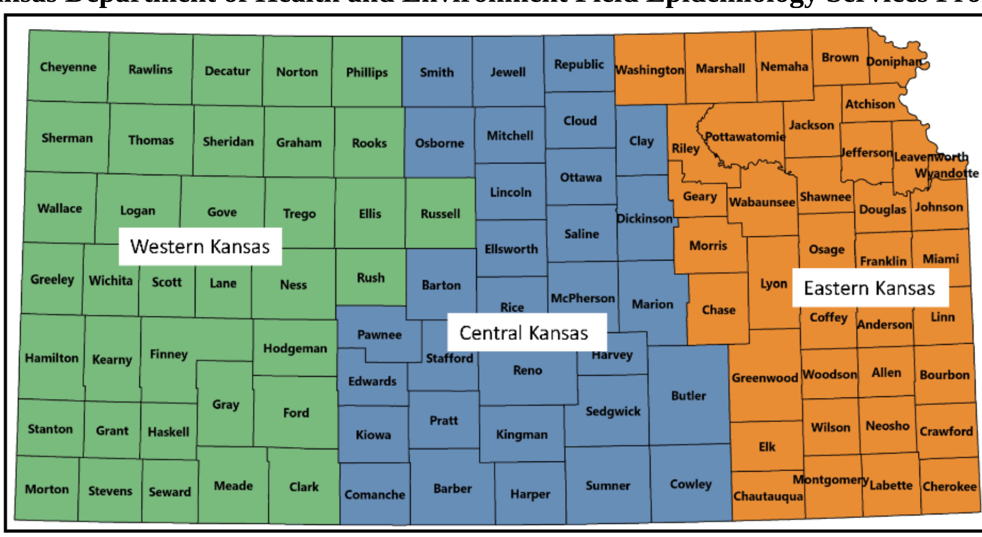
- Shiga toxin-producing Escherichia coli
- Shigellosis
- Smallpox
- Spotted fever rickettsiosis
- Streptococcus pneumoniae, invasive disease
- Syphilis, all stages, including congenital syphilis
- Tetanus
- Toxic shock syndrome, streptococcal and other
- Transmissible spongioform encephalopathy or prion disease
- Trichinellosis or trichinosis
- Tuberculosis
- Tularemia, including laboratory exposures
- Vancomycin-intermediate and resistant Staphylococcus aureus
- Vibriosis (all cholerae and non-cholerae Vibrio species)
- Viral hemorrhagic fevers
- Yellow fever

Kansas Region L Health Departments report all nationally notifiable conditions to the Centers for Disease Control using the National Electronic Disease Surveillance System to allow for rapid and appropriate response.

The Kansas Department of Health and Environment Field Epidemiology Services Program provides trained field epidemiologists to support epidemiological activities of local health departments. Field epidemiologists are the boots on the ground regionally for the state health department and serve as a liaison between the local health departments and the Kansas Department of Health and Environment. The four primary areas of support include:

- Investigation of complex or unusual infectious disease cases and large or complicated outbreaks
- Reporting and surveillance for reportable diseases
- Data analysis and reporting
- Public health training and education

Map 108: Kansas Department of Health and Environment Field Epidemiology Services Program Regions



Source: Kansas Department of Health and Environment

4.21.5 Projected Changes in Location, Intensity, Frequency, and Duration

A continued increase in international travel, both to and from Kansas, may increase the spread of infectious disease. The movement of people across diverse geographical regions brings together individuals with different immunological profiles. This mingling creates opportunities for the emergence of novel pathogens or the introduction of diseases into populations with limited immunity.

Climate change can have several impacts on the emergence and spread of transmissible diseases. While the relationship between climate change and transmissible diseases is complex, there are several ways in which climate change can influence disease dynamics including:

- Altered Disease Transmission Patterns in Vector-Borne Diseases: Climate change can affect the distribution and behavior of disease vectors (mosquitoes and ticks) by influencing temperature and precipitation patterns. This can lead to the expansion of diseases like malaria, dengue fever, and Lyme disease into new geographic areas.
- Extended Transmission Seasons: Rising temperatures can lengthen the transmission seasons for certain diseases, allowing them to be active for a more extended period each year.
- Changes in Pathogen Survival: Some pathogens can survive longer in warmer and wetter conditions. This can affect the persistence of infectious agents in the environment.
- Increased Risk of Zoonotic Diseases: Climate change can disrupt ecosystems and alter the habitats and migration patterns of wildlife. This can lead to increased interactions between humans, domestic animals, and wildlife, potentially facilitating the transmission of zoonotic diseases (diseases that originate in animals) to humans.
- Weakened Immune Response: Climate-related stressors, such as extreme heat events, can weaken the immune systems of vulnerable populations, making them more susceptible to infectious diseases.

To mitigate the impacts of climate change, public health measures, adaptation strategies, and international cooperation are essential, and may include:

- Strengthening disease surveillance systems to monitor changing disease patterns.
- Implementing vector control measures in areas at risk of vector-borne diseases.
- Enhancing healthcare infrastructure resilience to climate-related disasters.
- Promoting climate-resilient agricultural practices to ensure food security.
- Supporting research on the links between climate change and infectious diseases.
- Raising awareness and educating communities about the risks and preventive measures.

4.21.6 Vulnerability and Impact

People can be vulnerable to transmissible diseases due to various factors that influence their susceptibility to infection and the potential severity of illness. These vulnerabilities can be influenced by individual, societal, and environmental factors, and may include:

- Lack of Immunity: Many transmissible diseases are ones that people have little to no immunity to.
- Vaccination Status: Vaccination can provide immunity against certain diseases. People who are not vaccinated or have not received booster shots may be more vulnerable.
- Age: Infants, young children, and the elderly often have weaker immune systems, making them more susceptible to infections and complications.
- Underlying Health Conditions: Individuals with underlying health conditions, such as immunodeficiency disorders, chronic diseases, or respiratory conditions, may be more vulnerable to severe illness.
- Medication and Treatment Availability: The availability of medications or treatments specific to the disease can impact vulnerability. Rapid access to appropriate treatments can be lifesaving.
- Population Density: Highly populated areas can facilitate the rapid spread of diseases, making people in densely populated regions more vulnerable.
- Sanitation and Hygiene: Poor sanitation and hygiene practices can increase the risk of disease transmission. Access to clean water and sanitation facilities is crucial for reducing vulnerability.

- Access to Healthcare: The availability and accessibility of healthcare services, including diagnostic testing and medical treatment, can significantly impact the outcome of a novel transmissible disease.
- Public Awareness: People who are unaware of the risks associated with a novel transmissible disease or who do not know how to protect themselves may be more vulnerable.
- Behavioral Factors: People's behavior, such as adherence to public health guidelines (e.g., handwashing, wearing masks), can influence vulnerability.
- Fear and Panic: Fear and panic can hinder effective responses, potentially increasing vulnerability.
- Access to Information: Timely and accurate information can empower individuals to take protective measures. Lack of information or misinformation can increase vulnerability.

The spread of a transmissible disease can have severe and far-reaching impacts on human health and society, and can include:

- Illness and Death: The most immediate impact is the potential for widespread illness and death. Depending on the disease, the severity of illness can range from mild to life-threatening.
- Healthcare Overload: A rapidly spreading disease can quickly overwhelm healthcare systems, leading to shortages of medical supplies, hospital beds, and healthcare personnel. The ability to provide timely medical care may be compromised.
- Social Disruption: Social disruption can occur due to isolation and quarantine measures, as well as the need for social distancing. Schools, businesses, and public gatherings may be canceled or limited, affecting daily life and routines.
- Psychological Trauma: Survivors of a transmissible disease may experience long-lasting psychological trauma due to the fear of infection, the loss of loved ones, and the overall trauma of the event.
- Long-Term Health Effects: Some diseases can cause long-term health effects in survivors, including chronic illnesses and disabilities.

It is important to note that public health agencies and emergency responders work to minimize vulnerabilities by implementing preventive measures, conducting public awareness campaigns, and having response plans in place. Preparedness efforts, including vaccination programs, stockpiling of medical supplies, and coordination among healthcare providers, are critical for reducing vulnerabilities.

The direct risk or vulnerability to property and critical facilities from a transmissible disease is generally limited. While unlikely, transmissible diseases could possibly be moved through a facility's ventilation system. An incident like this would not pose a direct risk to the structure's integrity; however, considerable contamination of the facility may occur, requiring decontamination and potential loss of access to the building for a considerable length of time. Critical facilities and infrastructure generally will not suffer direct impacts from a novel transmissible disease event. Employee absenteeism could indirectly impact the ability for a critical facility to operate. Without necessary operators, critical infrastructure may be susceptible to indirect failure.

Zoonotic diseases are infections that can be transmitted between animals and humans. These diseases can have significant impacts on both human and animal populations, as well as broader environmental consequences. Some diseases have caused significant declines and extinctions in affected species and can infect domesticated animals, leading to economic losses in the agricultural sector. Diseases like avian influenza and foot-and-mouth disease can result in culling of livestock to prevent disease spread. Zoonotic diseases can also influence the health and dynamics of ecosystems. Changes in wildlife populations due to disease can have cascading effects on biodiversity and ecosystem function.

The rapid spread of a transmissible disease can have wide-ranging impacts on governmental operations, affecting functions and public safety. These impacts can disrupt government operations, strain resources, and pose challenges to maintaining public order, and can include:

- Emergency Response and Healthcare: Kansas Region L would need to rapidly mobilize emergency response teams, medical personnel, and healthcare facilities. The surge in demand for medical resources can strain healthcare systems, including hospitals, clinics, and emergency services.
- Public Health Services: County health departments would play a critical role in disease surveillance, contact tracing, and public health messaging. A transmissible disease could require additional personnel and resources to manage the outbreak.
- Resource Allocation: County health departments may need to help allocate resources for medical supplies, pharmaceuticals, personal protective equipment, and vaccine distribution. Competition for limited resources can lead to shortages and increased costs.
- Transportation and Supply Chain Disruption: Quarantine measures, travel restrictions, and supply chain disruptions can affect the movement of essential goods and services, including medical supplies, food, and fuel.
- Economic Impact: The economic consequences of a transmissible disease can be severe. Business closures, reduced consumer confidence, and trade disruptions can lead to financial losses, unemployment, and economic instability.
- Education Disruption: School closures and disruptions to education can affect students' learning and parental work arrangements, leading to social and economic consequences.
- Public Services: Essential public services, such as law enforcement, fire services, and sanitation, may be stretched thin due to the demands of responding to the outbreak.
- Social Distancing and Isolation Measures: Government directives for social distancing, isolation, and quarantine can impact daily life, social interactions, and public gatherings. The enforcement of such measures can be challenging.
- Psychological and Societal Impact: Fear and anxiety can spread rapidly during disease transmission, affecting public morale and mental health. Disinformation and rumors can compound these psychological impacts.

Consequence Analysis

This consequence analysis lists the potential impacts of a hazard on various elements of community and state infrastructure. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Kansas Region L residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

Table 117: Transmissible Disease Consequence Analysis

Subject	Potential Impacts
Impact on the Public	Depending on the scale of outbreak and type of disease, residents may be at risk of illness or death. Population density may play a role in the spread of disease, with urban areas being more likely to be impacted than rural areas. Specific impacts to residents will be dependent upon the type of disease and how it is transmitted.
Impact on Responders	Epidemics pose a unique risk to first responders because they are more likely to be exposed to a transmissible disease before it has been identified. If the novel transmissible disease infects first responders and healthcare practitioners, the provision of public safety and public health services may be significantly impacted.
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary based on the situation. A transmissible disease may impact an agency’s ability to maintain continuity of operations based on the potential to create high levels of employee absenteeism. Employee absenteeism could also hinder the ability to fulfill critical operations as well as implementation and maintenance of the plan itself.
Delivery of Services	Epidemics may cause disruption of services in the event of employee absenteeism.
Property, Facilities, and Infrastructure	It is unlikely that an epidemic would have direct effects on critical infrastructure or other facilities or structures. However, under cases of absenteeism, it is possible that regular maintenance or repairs would not be performed, resulting in disrepair.
Impact on Environment	In some cases, disease outbreaks are caused by infections spreading from animals to humans. Under these circumstances, infections may be spread as the result of normal care (proximity) to sick animals or consumption of byproducts of infected animals.

Table 117: Transmissible Disease Consequence Analysis

Subject	Potential Impacts
	Infected animals may die as a result of the disease. Timely removal of infected animal carcasses may help to reduce the spread of the disease among animals.
Economic Conditions	Depending on the scale of outbreak and type of disease, a localized infectious disease outbreak could impact Kansas Region L significantly. In the event residents and workers became infected from an epidemic, employee absenteeism would increase and the length of time necessary to recover could be significant.
Public Confidence in Governance	Governmental response requires direct actions that must be immediate and effective to maintain public confidence. If government functionality is reduced by absenteeism, the public's confidence in governance may be reduced. The ability to perform critical functions will directly impact the community's perception of government. Maintenance of these operations will be critical to response and recovery operations.

4.21.7 Hazard Planning Significance

Utilizing the above detailed formula for calculating the hazard planning significance for human caused and technological hazards, the following table details the rating of each criterion along with a composite rating:

Table 118: Transmissible Disease Planning Significance

County	Probability	Magnitude	Warning Time	Duration	Score	Planning Significance
Johnson	3	4	1	4	3.1	High
Leavenworth	3	3	1	4	2.8	Moderate
Wyandotte	3	4	1	4	31	High

Section 5 –Capability Assessment

5.1 Introduction

This capability overview for Kansas Region L documents programs, policies, and funding mechanisms for participating jurisdictions. All listed capabilities documented in the previous HMP were reviewed for relevance and updated to reflect the current environment, as necessary. Additionally, any programs, policies, or funding mechanisms that are no longer applicable, are outdated, or are no longer in existence have been removed. As part of this process, updated jurisdictional capability profiles were sent for review and, if necessary, further revision.

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, and 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 jurisdiction's vulnerability to an identified hazard. Additionally, a capability assessment can detail current successful mitigation actions that should continue to receive support.

Currently, all Kansas Region L counties have an emergency management program that has the primary responsibility for directing the hazard mitigation planning process. However, the capability of each emergency management program varies based largely on the size and financial capabilities of the jurisdiction. While all counties, and some participating jurisdictions, have the capability needed to conduct mitigation planning, many rely on the technical expertise of KDEM to apply for mitigation grant funding and oversee mitigation projects. Additionally, further augmenting local emergency management capabilities, KDEM aids with state and federal mitigation and emergency management initiatives and available funding opportunities.

Technical capabilities for each county and participating jurisdiction vary widely and are generally based on financial capabilities. In general, more urban, or larger jurisdictions have a greater range of technical capabilities and staffing related to planning, engineering, and mapping, while smaller counties and jurisdictions lack these capabilities. It should be noted that KDEM offers a variety of programs to provide local jurisdictions with technical expertise, including mapping and planning.

The following table details local departments and positions and their roles in supporting hazard mitigation planning:

Table 119: Local Jurisdiction Department and Positions Supporting Mitigation Planning

Department or Position	Description	Role in Mitigation
Building Officials	Implements and enforces building codes and zoning ordinances.	Ensures construction standards are consistently applied.
Emergency Management Director	Directs local response, recovery, and mitigation programs.	Develops Local Emergency Operations Plan, Continuity Plans, and Hazard Mitigation Plans, helping to minimize loss of life and property damage.
NFIP/CRS Coordinators	Oversees compliance with the NFIP and CRS and addresses flood determinations, mapping issues, and construction standards within Special Flood Hazard Areas.	Reviews floodplain/building permits for structures within floodplains and inspects developments to determine compliance with the community development standards and NFIP requirements. Explains floodplain

Table 119: Local Jurisdiction Department and Positions Supporting Mitigation Planning

Department or Position	Description	Role in Mitigation
		development requirements to community leaders, citizens, and the general public.
Planning Boards	Recommends land use regulations	Coordinates with the NFIP Coordinator and the Hazard Mitigation Committee through the mitigation planning process and the implementation of the plans.
Public Works Departments	Responsible for municipal drainage and storm water management systems.	Provides for the ongoing maintenance and upgrading of local storm water systems to help reduce flood risks.
Town/Township/City Council	Approves subdivision, zoning and land ordinances and bylaws and facilitates capital improvements budget and plan.	Provide leadership and approval for local hazard mitigation plans, projects, grants, and programs.

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

The scope of regulation 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.

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).

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.

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 Regulation of Development

The regulation of development plays a crucial role in helping a community become more resilient in the face of various hazards. Effective regulation of development contributes to community resilience through:

- Risk Reduction: Regulations guide land use and construction practices, ensuring that they provide strong protection against hazards.
- Public Safety: Building codes and land-use regulations establish minimum safety standards for construction, including structural integrity, fire resistance, and the use of resilient materials.
- Infrastructure Resilience: Regulations may require infrastructure improvements, such as the construction of resilient roads, bridges, utility systems, and drainage systems. This strengthens a community's ability to withstand hazards, ensures the continued operation of critical services, and aids in recovery.
- Floodplain Management: Regulations in flood-prone areas can mandate elevation requirements for new construction, ensuring that structures are built above the base flood elevation. This minimizes flood damage, reduces the need for costly post-disaster repairs, and protects property values.
- Land Use Planning: Effective land-use planning helps communities avoid inappropriate development in areas at high risk of hazards.
- Community Awareness: Public education and outreach can be incorporated into regulations, requiring communities to inform residents about local hazards, evacuation routes, and preparedness. Informed residents are more likely to take protective measures and respond effectively to disasters.

The following sections provide further detail on building codes, zoning ordinances, and floodplain management.

Building Codes

In Kansas, the authority for enacting and enforcing building codes lies with local governments, such as cities and counties. Each jurisdiction can adopt its own building code, which can be based on national or international building codes like the International Building Code or the International Residential Code.

Building codes establish general minimum construction standards and are enforced through authorized local building inspection agencies and inspectors. Building codes provide for:

- Life Safety: Building codes include provisions for fire safety, emergency egress, and the use of fire-resistant materials.
- Accessibility and Life Support: Building codes incorporate accessibility standards, ensuring that buildings are designed to accommodate all individuals. This is crucial during and after disasters when people with mobility issues may require assistance. Accessible features also benefit emergency responders and support recovery efforts.
- Retrofitting Existing Buildings: Building codes may require the retrofitting of older structures to meet modern safety standards.
- Public Awareness: Building codes promote public awareness of hazards and the importance of resilient construction. This can lead to informed decision-making by property owners, builders, and developers, resulting in safer structures.

Key hazard resistant building code provisions found in current building codes include:

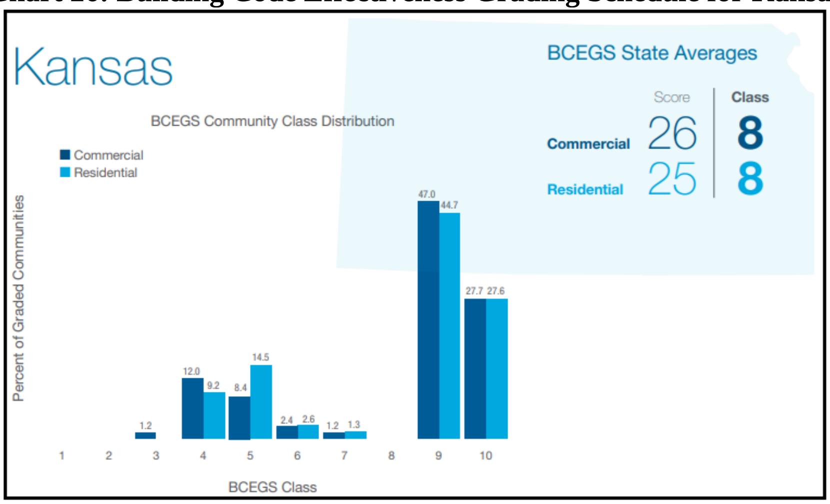
- Structural Design Requirements: Provides requirements for the structural design of buildings to ensure their resistance to various hazards, including earthquakes, high winds, and snow loads. These requirements are aimed at enhancing the overall structural integrity and safety of buildings.

- Wind Design Requirements: Provides specific provisions for wind design, considering the geographical location of the structure. Wind loads are calculated based on factors such as wind speed, exposure, and building height.
- Seismic Design Requirements: Incorporates seismic design provisions to address earthquake hazards. The code includes seismic design categories and requirements for the design and construction of buildings in seismic-prone regions.
- Flood-Resistant Design Requirements: Includes provisions related to flood-resistant design, particularly in areas prone to flooding. It may specify elevation requirements, construction materials, and other considerations to reduce the risk of flood damage. The vast majority of the regulations required by the NFIP are included within the International Building Code and the International Residential Code.
- Fire-Resistant Construction Requirements: Requirements for fire-resistant construction are included to mitigate the risk of fire hazards. This includes specifications for fire-resistant materials, assemblies, and building features.
- Material and Construction Standard Requirements: Establishes standards for building materials and construction methods to ensure the durability and safety of structures, considering various hazards.

As building codes vary by jurisdiction, it is essential to contact the local building department for the most accurate information concerning application and enforcement.

The Building Code Effectiveness Grading Schedule assesses the building codes in effect in a particular community and how the community enforces its building codes, with special emphasis on mitigation of losses from natural hazards. The program assigns each participating municipality a Building Code Effectiveness Grading Schedule grade of 1 (exemplary commitment to building code enforcement) to 10 (lowest possible score). The following graph illustrates the rating for each rated State of Kansas participating municipalities.

Chart 26: Building Code Effectiveness Grading Schedule for Kansas



Source: Building Code Effectiveness Grading Schedule

The average score for the State of Kansas was 26 (Class 8) rating for commercial, and a 25 (Class 8) for residential.

As part of this planning effort, county personnel charged with regulating or overseeing development were given the opportunity to review and comment of the elements of this plan. Please note that not all counties have building or zoning departments. The following personnel involved in regulating development were identified:

Table 120: Kansas Region L County Building or Development Stakeholders

Jurisdiction	Name	Title
Johnson County	Jay C. Leipzig	Building Code Director
Leavenworth County	John Jacobson	Planning & Zoning Director

Table 120: Kansas Region L County Building or Development Stakeholders

Jurisdiction	Name	Title
Wyandotte County	Greg Talkin	Neighborhood Resource Center Department Head

Zoning Ordinances

Zoning ordinances in Kansas Region L govern land use, development, and building requirements. These ordinances work by dividing the land into different zoning districts and establishing rules and guidelines for land use, building placement, density, and setback within the zoning districts. In general, zoning ordinances establish:

- **Zoning districts:** Areas designated for specific types of land use, such as residential, commercial, industrial, agricultural, mixed-use, or special districts.
- **Land usage within a zoning district:** Specifications as to which activities, buildings, and operations are permitted in each zoning district.
- **Enforcement:** Zoning ordinances are enforced by the local building department or zoning enforcement officers.

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.

Legal authority for Kansas Region L local governments to adopt and implement zoning regulations is found at K.S.A. 12-741, which provides for the enactment of planning and zoning laws and regulations by cities and counties. The components of local zoning ordinances are detailed at K.S.A. 12-753(a). and include the provision for the adoption or amendment of zoning regulations and the provision for restricting and regulating the height, number of stories and size of buildings

Zoning ordinances play a significant role in enhancing hazard resilience for communities and can help reduce vulnerability to various natural and man-made hazards by regulating land use and development practices. In Kansas Region L, locally instituted and enforced zoning ordinances provide for:

- Land Use Planning: Zoning ordinances designate land use zones within a community, ensuring that certain areas are reserved for particular uses. This can prevent the construction of critical infrastructure, homes, or businesses in high-risk zones, such as floodplains or wildfire-prone areas.
- Setback Requirements: Zoning ordinances often mandate specific setbacks, which are distances between structures and property lines or natural features. These setbacks can help prevent buildings from being too close to potential hazards, potentially reducing the risk of damage.
- Building Height and Design Standards: Zoning codes can establish building height limits to reduce exposure to certain hazards. Design standards, including materials and construction methods, can be specified to make structures more resilient.
- Floodplain Management: Many zoning ordinances incorporate floodplain regulations, which dictate where and how buildings can be constructed within flood-prone areas. These regulations may require buildings to be elevated, use flood-resistant materials, or include openings to allow floodwaters to pass through.
- Wildfire Mitigation Zones: In regions susceptible to wildfires, zoning ordinances can establish wildfire mitigation zones with specific requirements for defensible space, fire-resistant landscaping, and building materials to reduce the risk of wildfires spreading to structures.

In addition to zoning ordinances, historic preservation is an important consideration for all jurisdictions within Kansas Region L. Historic preservation is enacted under K.S.A. 12-755(a)(3), and provides local governments the authority they need to adopt zoning regulations to preserve structures listed on local, state, or national historic registers.

Properly applied, zoning restriction and historic preservation are some of the most effective hazard mitigation tools available against a wide variety of hazards.

Floodplain Management Standards

Floodplain ordinances and management are one of the most effective hazard mitigation tools available against flooding.

Local floodplain ordinances, required for NFIP participants, are often used to prevent inappropriate development in floodplains and to reduce flood hazards. In general, they allow the jurisdiction 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 public health, safety, and welfare for citizens in flood hazard areas.
- Manage planned growth.
- Grant permits for use in development within special flood hazard areas that are consistent with the community ordinance and the NFIP under 44 CFR 60.3.

The NFIP floodplain management regulations work alongside local building codes by providing specific flood-related requirements that must be met in addition to general building code standards. In NFIP communities, when constructing or substantially improving a structure in a Special Flood Hazard Area (SFHA), the structure must be elevated to or above the Base Flood Elevation (BFE), which is a requirement imposed by the NFIP's regulations.

The following table details the status of these codes and ordinances for participating jurisdictions:

Table 121: Kansas Region L Jurisdictional Codes and Ordinances

Jurisdiction	Building Code	Floodplain Ordinance	Zoning Ordinance
Johnson County	x	x	x
City of DeSoto	x	x	x
City of Edgerton	x	x	
City of Fairway	x	x	
City of Gardner	x	x	
City of Lake Quivira	x	x	
City of Leawood	x	x	x
City of Lenexa	x	x	x
City of Merriam	x	x	
City of Mission	x	x	
City of Mission Hills	x	x	x
City of Mission Woods	x	x	
City of Olathe	x	x	
City of Overland Park	x	x	
City of Prairie Village	x	x	
City of Roeland Park	x	x	
City of Shawnee	x	x	x
City of Spring Hill	x	x	
City of Westwood	x	x	
City of Westwood Hills	x	x	
Leavenworth County	x	x	x
City of Basehor	x	x	x
City of Easton		x	
City of Lansing	x	x	x
City of Leavenworth	x	x	x
City of Linwood		x	
City of Tonganoxie		x	x
Unified Government of Wyandotte County and Kansas City, Kansas	x	x	x
City of Bonner Springs	x	x	x
City of Edwardsville	x	x	x

5.4 Jurisdictional Compliance with NFIP

All NFIP participating jurisdictions are required to meet the minimum standards set forth in the program. The jurisdictions' NFIP Coordinator ensures all new construction projects are properly surveyed and receive an elevation certificate.

NFIP participants are committed to continued involvement and compliance. To help facilitate compliance, NFIP participating jurisdictions:

- Adopted floodplain regulations through local ordinance
- Enforces floodplain ordinances through building restrictions
- Regulates new construction in Special Flood Hazard Areas as outlined in their floodplain ordinance
- Utilizes FEMA DFIRMs, where available
- Monitors floodplain activities

Please see Table 73, page 150 for current effective map dates for each participating community

As part of this planning effort, jurisdictional NFIP and CRS Coordinators were given the opportunity to review and comment of the elements of this plan. Additionally, these members helped form the Flood Mitigation Planning committee for those communities currently participating in, or looking to join, the CRS. The following individuals designated as NFIP Coordinators were identified:

Table 122: Kansas Region L Jurisdictional NFIP Coordinators

Jurisdiction	NFIP Coordinator	Title
Johnson County	Brian Pietig	Director Public Works
City of DeSoto	Mike Brungardt	Technical Supervisor
City of Edgerton	David Hamby	Engineer
City of Fairway	None listed	None listed
City of Gardner	Tim McEldowney	NFIP Coordinator
City of Lake Quivira	None listed	None listed
City of Leawood	David Ley	Director of Public Works
City of Lenexa	Tim Green	Flood Plain Administrator
City of Merriam	Bryan Dyer	Community Development Director
City of Mission	Laura Smith	City Administrator
City of Mission Hills	Jennifer Lee	City Administrator
City of Mission Woods	John Sullivan	Director of Public Works
City of Olathe	Rob J. Beilfuss	Public Works Director
City of Overland Park	Tony Meyers	CFM
City of Prairie Village	Cliff Speegle	Stormwater Engineer
City of Roeland Park	John Jacobson	Building Inspector
City of Shawnee	Jeff Bartz	Development Engineering Manager
City of Spring Hill	Patrick Burton	Community Development Director-
City of Westwood	John Sullivan	FPMA
City of Westwood Hills	Beth O'Bryan	NFIP Coordinator
Leavenworth County	Amy Allison	FPM
City of Basehor	Gene Myracle	Municipal Services Director
City of Easton	Becky Jones	City Clerk
City of Lansing	Michael W. Spickelmier	Director of Public Works
City of Leavenworth	Brian Faust	Public Works Director
City of Linwood	Karen Kane	Clerk and FPM
City of Tonganoxie	Brandon Harder	Inspector
Unified Government of Wyandotte County and Kansas City, Kansas	Gunnar Hand	FPM
City of Bonner Springs	Mark Lee	City Planner

Table 122: Kansas Region L Jurisdictional NFIP Coordinators

Jurisdiction	NFIP Coordinator	Title
City of Edwardsville	Michael Webb	City Manager

Source: State of Kansas

Participation in the NFIP is based on an agreement between the municipality and the federal government. If a municipality agrees to adopt and enforce a floodplain ordinance designed to reduce future flood risks, all citizens in the participating municipality can purchase flood insurance.

In Kansas Region L, as part of NFIP participation communities must:

- Use current NFIP flood maps in adopting floodplain management regulations.
- Require permits for all development in SFHAs
- Ensure that development does not increase the flood hazard on other properties.
- Meet current elevation standards. Ensuring the lowest occupied floor is elevated to or above the base flood elevation indicated on the NFIP flood map.

While most floodplain requirements have been incorporated into the current Building Codes, some additional provisions and regulations may be required by a community. Communities participating in the NFIP are required to adopt, enforce and maintain a local floodplain ordinance as a stipulation of compliance with the program. The purpose of this ordinance is to ensure public safety, minimize impact to persons and property from flooding, protect watercourses from encroachment, and maintain the capability of floodplains to retain and carry off floodwaters. The local floodplain administrator is typically the municipal official responsible for overseeing the enforcement and update of the document. Floodplain ordinances are typically enforced by law enforcement departments or code enforcement offices. In general, the enforcement process generally works as follows:

- Identification of Violations: Violations are often identified through various means, such as citizen complaints, routine inspections, or observations by enforcement officers.
- Notification: Once a violation is identified, the responsible party is typically notified of the violation. This notification may come in the form of a written citation, warning letter, or verbal communication depending on the severity of the violation and local procedures.
- Correction Notice: In many cases, the responsible party is given a certain amount of time to correct the violation. They may be required to remedy the situation, obtain necessary permits, or comply with specific regulations.
- Follow-up Inspections: After the designated correction period, enforcement officers may conduct follow-up inspections to ensure that the violation has been addressed satisfactorily.
- Penalties and Fines: If the responsible party fails to comply with the ordinance or correct the violation within the specified timeframe, they may face penalties or fines. These penalties can vary depending on the nature and severity of the violation and may escalate for repeated offenses.
- Legal Action: In cases of persistent non-compliance or serious violations, local authorities may initiate legal proceedings against the responsible party. This can involve court appearances, injunctions, or other legal measures to compel compliance.

The following figure represents both pre- and post-disaster community NFIP requirements:

Figure 4: Pre- and Post-Disaster Community NFIP requirements

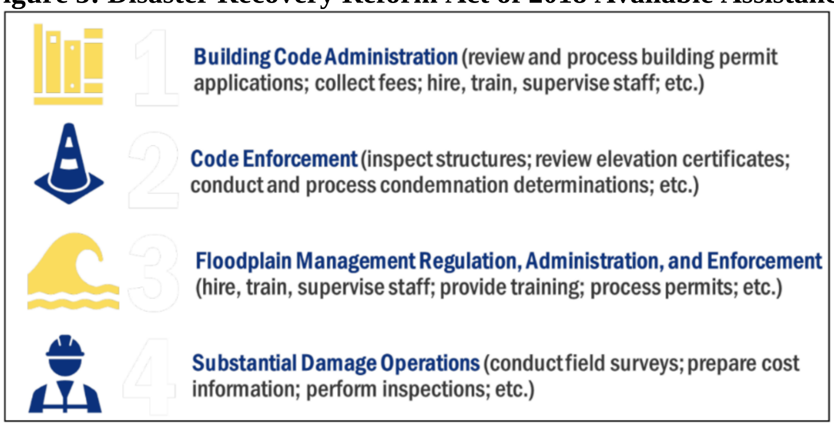
Source: FEMA

When structures located in the SFHAs are substantially modified (more than 50% damaged or improved) they are required to be brought into compliance with current NFIP standards and local building codes. In cases of repairs being conducted as a result of damage, jurisdictional NFIP Coordinators are responsible for substantial damage and improvement determinations. These determinations are required for compliance in the NFIP and must be completed before residents begin repairs or permits are issued.

However, the May 2020 Report to Congressional Committees on the National Flood Insurance Program by the United States Government Accountability indicates “FEMA generally does not collect or analyze the results of these assessments, limiting its ability to ensure the process operates as intended. Furthermore, FEMA has not clarified how communities can access NFIP claims data. Such data would help communities target substantial damage assessments after a flood.” This has been found to be true in the Kansas Region L, with submitted information and data underutilized and some FEMA available data unshared and/or unadvertised.

Section 1206 of the Disaster Recovery Reform Act of 2018 authorizes the FEMA to provide communities with the resources to administer and enforce building code and floodplain management ordinances following a major disaster declaration through FEMA’s Public Assistance Program. To be eligible for reimbursement under the Public Assistance Program, including for the Disaster Recovery Reform Act of 2018 Section 1206, communities must be designated for Public Assistance permanent work under a major disaster declaration and be legally responsible to administer and enforce building codes or floodplain management regulations. Communities must also be in good standing with the NFIP. Available assistance includes:

Figure 5: Disaster Recovery Reform Act of 2018 Available Assistance



Source: FEMA

It is worth noting that this assistance is available for a variety of hazards occurrence types, not just flooding.

Key to achieving across the board reduction in flood damages is a robust community assistance, education, and awareness program. As such, NFIP participating jurisdictions will continue to develop both electronic (including social media) and in person outreach activities.

5.5 Jurisdictional Plans

Planning plays a critical role in hazard mitigation by helping communities identify, assess, and reduce risks associated with natural and man-made hazards. Effective planning involves a proactive, strategic, and comprehensive approach to minimize the impact of disasters and enhance community resilience. Jurisdictions were asked if they had completed the following plans:

- 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.

- Emergency Operations Plan: An emergency operations plan outlines the responsibility and means and methods by which resources are deployed during and following an emergency or disaster. In Kansas Region L, the overarching county provides emergency operation planning for jurisdictions within its borders.
- Fire Mitigation Plan: A fire mitigation plan is used to mitigate a jurisdiction’s 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.

The following table details the status of these plan types for each participating jurisdiction:

Table 123: Kansas Region L Jurisdictional Plans

Jurisdiction	Comprehensive Plan	Emergency Operations Plan	Fire Mitigation Plan	Flood Mitigation Assistance Plan
Johnson County	x	x	x	x
City of DeSoto	x	x		
City of Edgerton	x			
City of Fairway	x			
City of Gardner	x	x		
City of Lake Quivira	x			
City of Leawood	x	x		
City of Lenexa	x	x		
City of Merriam	x	x		
City of Mission	x	x		
City of Mission Hills	x	x		
City of Mission Woods	x	x		
City of Olathe	x	x		
City of Overland Park	x	x		
City of Prairie Village	x			
City of Roeland Park	x			
City of Shawnee	x	x		x
City of Spring Hill	x	x		
City of Westwood	x			
City of Westwood Hills	x			
Leavenworth County	x	x		
City of Basehor		x		x
City of Easton		x		
City of Lansing	x	x		
City of Leavenworth	x	x		x
City of Linwood		x		
City of Tonganoxie	x	x		x
Unified Government of Wyandotte County and Kansas City, Kansas	x	x		
City of Bonner Springs	x	x		
City of Edwardsville	x	x		

5.6 Special Districts Mitigation Capabilities

Special districts, which are independent government units created for specific purposes, have several mitigation capabilities:

- Infrastructure Development and Maintenance: They can build and maintain infrastructure like levees, drainage systems, or firebreaks to reduce the impact of natural hazards.
- Emergency Services: Some districts manage fire protection, flood control, or emergency medical services, which are critical in disaster response and mitigation.
- Land Use and Zoning: They can enforce zoning regulations that limit development in high-risk areas.
- Public Education and Outreach: Special districts often provide information and resources to help communities prepare for and respond to hazards.
- Collaboration: They often work with local, state, and federal agencies to coordinate mitigation efforts and share resources.

Fire districts mitigation capabilities include:

- Fire Prevention Programs: They conduct inspections, enforce fire codes, and promote fire-safe practices within communities.
- Hazardous Fuels Management: Fire districts manage vegetation to reduce fuel loads, including controlled burns and clearing brush, to prevent the spread of wildfires.
- Emergency Response Planning: They develop and implement response plans for wildfires, floods, and other emergencies, ensuring quick and effective action.
- Public Education: Fire districts educate residents on fire safety, evacuation procedures, and emergency preparedness.
- Infrastructure Protection: They work to protect critical infrastructure and buildings by ensuring compliance with building codes and fire-resistant construction practices.
- These capabilities allow special districts to play a crucial role in reducing risks and enhancing community resilience against natural hazards.

School district mitigation capabilities include:

- Building Safety: They enforce building codes and design schools to withstand hazards like earthquakes, floods, and tornadoes.
- Emergency Preparedness Plans: School districts develop and regularly update emergency response plans, including evacuation routes, shelter-in-place procedures, and communication strategies.
- Drills and Training: They conduct regular safety drills and provide training for students, teachers, and staff on how to respond during emergencies.
- Community Coordination: School districts collaborate with local emergency services, law enforcement, and public health agencies to ensure a coordinated response to hazards.
- Resilience Education: They integrate disaster preparedness into the curriculum, teaching students about hazard awareness and safety practices.

Water district mitigation capabilities include:

- Flood Control: They manage reservoirs, levees, and drainage systems to prevent or reduce flooding.
- Water Supply Management: Water districts ensure the stability and reliability of water supplies during droughts or emergencies by implementing conservation measures and diversifying water sources.
- Infrastructure Resilience: They maintain and upgrade water infrastructure to withstand hazards like earthquakes, storms, and wildfires.

- Emergency Response: Water districts develop and implement emergency response plans to quickly address disruptions in water services due to natural hazards.
- Public Education: They educate the community on water conservation, hazard preparedness, and response strategies.

Watershed district mitigation capabilities include:

- Flood Control: They design and maintain infrastructure like dams, levees, and retention basins to control flooding and manage stormwater.
- Water Quality Management: Watershed districts implement practices to reduce pollution, manage runoff, and protect drinking water sources.
- Erosion Control: They work to prevent soil erosion by implementing land management practices and restoring natural vegetation along waterways.
- Public Education: Watershed districts educate the community on water conservation, pollution prevention, and the importance of maintaining healthy watersheds.
- Habitat Restoration: They engage in efforts to restore wetlands, rivers, and other ecosystems to enhance biodiversity and natural resilience to hazards.

The above enumerated capabilities allow special districts to play a crucial role in reducing risks and enhancing community resilience against natural hazards.

5.7 Challenges and Opportunities for Capability Improvement

As always, challenges exist for all participating jurisdictions due to the day-to-day demands of the working environment including staffing issues, budget restrictions, and staffing turnover. These issues can, and do, impact the utilization and incorporation of the HMP and the completion of identified hazard mitigation projects.

Improving capabilities can lead to enhanced performance, increased efficiency, and better outcomes in hazard mitigation planning and implementation. The following identify recommended improvements for jurisdictions, with some recommendations being applicable to all jurisdictions, and others being applicable to specific jurisdictions:

- On a yearly basis, many counties and jurisdictions throughout Kansas Region L fully allocate their tax revenue to basic services and programs. Because of this, funding for mitigation projects is often unavailable or severely limited. While the capability to assess special taxes or issue bonds does exist, historically it has been shown that passing these measures is extremely difficult. As a result, many needed mitigation projects throughout Kansas Region L are not completed due to lack of funding. All Kansas Region L jurisdictions should, as possible, prioritize budgeting for mitigation projects.
- All participating jurisdictions should build a relationship with local meteorologists and the NWS to give priority access to rapidly developing weather conditions.
- All participating jurisdictions could receive instruction from the State of Kansas Division of Emergency Management /Homeland Security and FEMA Region VII on grant application processes and grant management strategies. These classes could help all participating jurisdictions receive available grant funding.
- All participating jurisdictions should consider adoption of the 2018 (or newer) International Building Codes to ensure current constructions standards, including climate resiliency standards.
- Participating jurisdictions without a long-term community plan would benefit from the creation of a comprehensive plan to help plan and budget for hazard mitigation measures, policies, and procedures. Legal authority for Kansas local governments to develop comprehensive plans, both individually and with other jurisdictions, is found at K.S.A 12-747 and K.S.A. 19-2958. The statute also authorizes county planning commissions to develop comprehensive plans for unincorporated areas, and for cities, where appropriate.
- Jurisdictions that do not currently participate in the NFIP should enroll in the program to allow citizens to purchase federally backed flood insurance.

- Current NFIP participants should apply for membership in the CRS to allow citizens to receive discounts off their federally backed flood insurance policies.
- All participating jurisdictions should explore engaging in public-private emergency planning partnerships to further increase hazard resiliency through the infusion of additional funding and expertise to help complete mitigation projects.

To help overcome many of these identified challenges, participating jurisdictions will work collaboratively using the following strategies, as appropriate:

- Innovation and Adaptation: Foster a culture of innovation and adaptability. Encourage employees to think creatively, embrace change, and explore new ways of doing things to overcome challenges.
- Training and Development: Invest in training and development to enhance skills and knowledge.
- Communication Improvement: Enhance communications and provide clear and transparent communication when sharing information, aligning teams, and addressing concerns.
- Collaboration and Teamwork: Encourage collaboration and teamwork which allows for the pooling of diverse skills and perspectives, leading to more effective problem-solving (the MPC is a good example of effective use of this strategy).
- Technology Adoption: Embrace technology to streamline operations and enhance productivity.
- Agile Project Management: Implement agile project management methodologies to enhance flexibility and responsiveness to changing conditions. Agile approaches allow teams to adapt quickly to challenges.

As appropriate, these strategies will be tailored for specific circumstances, with a combination of these strategies often being more effective than relying on a single approach.

Section 6 – Mitigation Strategy

6.1 Introduction

As part of this planning effort, Kansas Region L participating jurisdictions worked to minimize the risk of future impacts from identified hazards to all citizens of the region. In an attempt to shape future regulations, ordinances and policy decisions the MPC reviewed, revised, and developed a comprehensive hazard mitigation strategy. This comprehensive strategy includes:

- Goals to guide the selection of activities to mitigate and reduce potential loss.
- A discussion of funding capabilities for hazard mitigation projects.
- Identification, evaluation, and prioritization of mitigation actions along with potential funding sources.

Kansas Region L's mitigation strategy promotes long-term hazard resilience that will have a positive impact on quality-of-life issues. By minimizing both the exposure to, and potential impacts from, identified hazards jurisdictions can expect to minimize injuries and loss of life, reduce property damage, and minimize the day to day social and economic disruptions that follow hazard events.

6.2 Goals and Objectives

Kansas Region L's overall mitigation goal is to minimize the protect lives and properties within the region from the impacts of hazards identified in this plan. Based on discussion with the discussions by the MPC, it was determined that the goals (desired outcomes) identified in the 2019 HMP remained viable and valid. The following represent the identified goals and objectives for the 2024 HMP:

- **Goal 1:** Reduce the risk to the people and property from the identified hazards in this plan.
- **Goal 2:** Work to protect all vulnerable populations, structures, and critical facilities 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 the understanding identified hazards and hazard mitigation opportunities.
- **Goal 4:** Enhance communication and coordination among all agencies and between agencies and the public.

The Kansas Region L MPC will continuously evaluate these identified goals against current capabilities and conditions. As part of this process, the Kansas Region L MPC will utilize a monitoring and evaluation system to systematically track, assess, and measure the progress of activities and outcomes related to the goals outlined in this HMP. Key components to the monitoring and evaluation system include:

- Establishment of baseline data to quantify the starting point upon the approval of this plan. This will provide a reference against which progress can be measured.
- Enactment of a monitoring plan which outlines the specific activities, tasks, and responsibilities for regularly collecting, analyzing, and reporting data on the performance indicators.
- Identification and specification of the methods for collecting data, whether through surveys, interviews, focus groups, or observations.
- Definition of the criteria and methods for analyzing collected data. This includes determining how quantitative and qualitative data will be processed and interpreted to assess progress.
- Involvement of stakeholders to ensure that all perspectives are considered, and that feedback on the progress of achieving the delineated goals is taken into account.

Providing specific goals for each hazard type in Appendix D, the jurisdictions tailored their mitigation efforts to address the unique challenges posed by different types of hazards while still working towards the overarching goals established for the entire region.

6.3 Review and Creation of Hazard Mitigation Actions

Hazard mitigation actions are proactive measures taken to reduce or eliminate the long-term risk and impact of natural and human-made hazards. These actions are designed to minimize the damage caused by disasters and contribute to the overall resilience of communities and infrastructure.

For this plan update members of the MPC were provided with a complete list of previously identified mitigation actions and asked to review them to determine their status. Previously identified mitigation status was reported using the following definitions:

- **Completed:** The action has been fully completed.
- **Carried over:** The action was not started or has been started and is not completed.
- **Deleted:** The action has been removed from consideration due to either a lack of resources or changing mitigation priorities.
- **Ongoing:** The action is completed and has become an ongoing activity or capability.

Additionally, MPC members and stakeholders were provided with opportunities to identify and incorporate newly identified actions based on the changing hazard environment or previously unidentified needs.

In preparing a mitigation strategy all reasonable and obtainable mitigation actions were considered to help achieve the general goals. Priorities were developed based on past damages, existing exposure to risk, and weaknesses identified by capability assessments. In identifying mitigation actions, the following activities 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.

In general, all considered mitigation actions were classified under one of the following broad categories:

- **Local plans and regulations:** Actions that create or update plans to reflect situational changes and/or actions that aid in the creation, revision, or adoption of regulations related to hazard mitigation and management.
- **Natural systems protection:** Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems.
- **Public education and awareness:** Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them.
- **Structural and infrastructure projects:** Actions that the modification of existing building, structures, or infrastructure, or involve the construction of structures to reduce the impact of hazard.
- **Preparedness and response:** Emergency response or operational preparedness actions. In general, many of these actions do not fit the definition of a mitigation project.

6.4 Prioritization of Mitigation Actions

The MPC and subject matter experts worked together to prioritize both previously identified and newly identified hazard mitigation actions. The methodology used to determine mitigation action priorities was based upon the following:

- Review of the updated risk assessments.
- Review of revised goals and objectives.
- Review of capabilities.

A multi-pronged and flexible analysis method was used for determining and prioritizing mitigation actions. An initial review of previously identified but not completed actions was conducted to ensure that, based on current condition and capabilities, the actions were still viable. Actions that were considered viable were retained in this plan update, with minor revisions completed as necessary.

For identified actions that were retained, and for newly identified actions, the FEMA recommended Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLEE) criteria were used to assist with action selection and prioritization. The following table details the STAPLEE criteria:

Table 124: STAPLEE Review Criteria

Criteria	Discussion	Example Considerations
Social	There should be community acceptance and support for the mitigation action?	Does the action have community acceptance? Will the proposed action adversely affect one segment of the population?
Technical	The proposed mitigation action should be technically feasible and should provide a long-term reduction in losses.	How effective is the action in avoiding or reducing future losses? Does it solve a problem or only a symptom? Does the action create additional problems?
Administrative	Personnel and administrative capabilities should be available to administer all phases of the project.	Are the staffing and administrative capabilities to implement the action in place? Is there someone to coordinate and lead the effort?
Political	Political support for the mitigation action needs to be present.	Is the action politically acceptable? Have political leaders been involved in the planning process? Is there a political champion to help see the project to completion?
Legal	The legal authority to implement the actions need to be in place or possible with the passing of laws or regulations.	Does the legal authority to implement the proposed action exist? Are there potential legal repercussions?
Economic	The current budget (and/or general obligation bonds or other instruments) need to be in place to fully fund the mitigation action.	Do the potential benefits of this action exceed the potential costs? Has funding been secured for the proposed action? What are the potential funding sources (public, non-profit, and private)? How will this action affect the fiscal capability of the community(s)? Does the action contribute to other community goals, such as capital improvements or economic development?
Environmental	Actions should interface with the need for sustainable and environmentally healthy communities. Also, statutory considerations, such as the National Environmental Policy Act need to considered for federal funds.	How will the action affect the environment? Will the action need environmental regulatory approvals? Will it meet federal, state, and local state regulatory requirements? Are endangered or threatened species likely to be affected?

Based on the action selection and prioritization review, the MPC assigned each action the following prioritized ranking:

- **High Priority:** Actions that provide substantial progress towards improving resiliency and are determined as potentially urgent in nature by the MPC. This would include actions that strongly support the reduction of high hazard risks and meet mitigation goals. Additionally, actions in this ranking may have imminent funding availability or strong community support.
- **Medium Priority:** Actions that provide reasonable progress towards improving resiliency and are determined as moderately urgent in nature by the MPC. This would include actions that would lessen impact hazard events, but not eliminate the impact completely.

- **Low Priority:** Actions that provide incremental progress towards improving resiliency and are determined as slightly urgent in nature by the MPC. This would include actions that are generally the responsibility of the local community, actions outside the normal authority of the State, or actions whose cost/benefit analysis returns a low yield.

6.5 Mitigation Action Funding Sources

It is generally recognized that mitigation actions help realize long term savings by preventing future losses due to hazard events. However, many mitigation actions are beyond the budgetary capabilities of a single jurisdiction. This section provides a general description of some of the avenues available to defray the cost of implementing mitigation actions.

FEMA provides financial assistance to state, local, tribal, and territorial governments, as well as certain private non-profit organizations, to implement projects that help reduce the risk and impact of future disasters. These grant programs are designed to support initiatives aimed at mitigating hazards and improving resilience. The main grant program offered by FEMA for hazard mitigation is the Hazard Mitigation Assistance (HMA) program. The HMA program includes four subprograms, the Hazard Mitigation Grant Program (HMGP), the HMGP Post-Fire, Building Resilient Infrastructure and Communities (BRIC), and the Flood Mitigation Assistance (FMA) grant program. Applicants to these grant programs are required to submit project proposals that demonstrate the effectiveness of their proposed mitigation projects. The eligibility criteria, application process, and specific requirements for each program are outlined by FEMA in their guidelines and announcements, which are typically published on FEMA's website.

The following provides a general overview of major grant funding streams:

- **HMGP and HMGP Fire:** The HMGP grants assist in implementing long-term hazard mitigation measures following Presidential disaster declarations, including fire declarations. Funding is available to implement projects in accordance with State, Tribal, and local priorities.
- **BRIC:** BRIC supports states, local communities, tribes and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards. The BRIC program guiding principles are supporting communities through capability- and capacity-building; encouraging and enabling innovation; promoting partnerships; enabling large projects; maintaining flexibility; and providing consistency. Working in coordination with BRIC, the National Mitigation Investment Strategy is intended to provide a national, whole-community approach to investments in mitigation activities and risk management.
- **FMA Grant Program:** FMA is a competitive grant program that provides funding to states, local communities, federally recognized tribes and territories. Funds can be used for projects that reduce or eliminate the risk of repetitive flood damage to buildings insured by the NFIP. FEMA chooses recipients based on the applicant's ranking of the project and the eligibility and cost-effectiveness of the project. FEMA requires state, local, tribal and territorial governments to develop and adopt hazard mitigation plans as a condition for receiving certain types of non-emergency disaster assistance, including funding for hazard mitigation assistance projects.

The following chart summarizes HMA grants programs:

Chart 27: HMA Grant Program Summary

HMA Program Comparison	HMGP	HMGP Post Fire	BRIC	FMA
Program Type	Post-disaster	Post-disaster	Pre-disaster	Pre-disaster
Funding Availability	Presidentially declared disaster	FMAG-declared disaster	6% set aside from federal post-disaster grant funding	Annual appropriations
Competitive?	No	No	Yes	Yes
Eligible Applicants	States, federally recognized tribes, territories and the District of Columbia (DC)	States, federally recognized tribes, territories and DC	States, federally recognized tribes, territories and DC	States, federally recognized tribes, territories and DC
Eligible Subapplicants	State agencies, local governments, tribes and private nonprofit organizations	State agencies, local governments, tribes and private nonprofit organizations	State agencies, local governments and tribes	State agencies, local governments and tribes
Hazard Mitigation Plan Requirement	Yes	Yes	Yes	Yes
NFIP Participation	Communities with projects in Special Flood Hazard Areas (SFHAs)	Communities with projects in SFHAs	Communities with projects in SFHAs	Subapplicants and properties

Source: FEMA

Additionally, the following provide available grant funding avenues for hazard mitigation projects:

- **Rehabilitation Of High Hazard Potential Dam (HHPD) Grant Program:** HHPD awards provide technical, planning, design and construction assistance in the form of grants for rehabilitation of eligible high hazard potential dams. A state or territory with an enacted dam safety program, the State Administrative Agency, or an equivalent state agency, is eligible for the grant.
- **Emergency Management Performance Grant:** Program provides state, local, tribal and territorial emergency management agencies with the resources required for implementation of the National Preparedness System and works toward the National Preparedness Goal of a secure and resilient nation. Allowable costs support efforts to build and sustain core capabilities across the prevention, protection, mitigation, response and recovery mission areas.
- **State Homeland Security Program:** Program includes a suite of risk-based grants to assist state, local, tribal and territorial efforts in preventing, protecting against, mitigating, responding to and recovering from acts of terrorism and other threats. This grant provides grantees with the resources required for implementation of the National Preparedness System and working toward the National Preparedness Goal of a secure and resilient nation.
- **Nonprofit Security Grant Program:** Program is one of three grant programs that support DHS/FEMA's focus on enhancing the ability of state, local, tribal, and territorial governments, as well as nonprofits, to prevent, protect against, prepare for, and respond to terrorist or other extremist attacks. These grant programs are part of a comprehensive set of measures authorized by Congress and implemented by DHS to help strengthen the nation's communities against potential terrorist or other extremist attacks. Among the five basic homeland security missions noted in the DHS Strategic Plan for Fiscal Years 2020-2024
- **Public Assistance Program:** The mission of FEMA's Public Assistance program is to provide assistance to State, Tribal and local governments, and certain types of Private Nonprofit organizations so that communities

can quickly respond to and recover from major disasters or emergencies declared by the President. Through the Public Assistance program, FEMA provides supplemental Federal disaster grant assistance for debris removal, emergency protective measures, and the repair, replacement, or restoration of disaster-damaged, publicly owned facilities and the facilities of certain private non-profit organizations. The Public Assistance Program also encourages protection of these damaged facilities from future events by providing assistance for hazard mitigation measures during the recovery process. The Federal share of assistance is not less than 75% of the eligible cost for emergency measures and permanent restoration. The grantee determines how the non-Federal share (up to 25%) is split with the eligible applicants.

- **Individual Assistance Program:** After a disaster, the federal government determines if any county in the state meets the criteria for individual disaster assistance. The decision is based on damage related to the severity and magnitude of the event. When a county receives an Individual Assistance declaration from the President of the United States, anyone who lives in that county can apply for assistance.
- **Small Business Administration Disaster Loans:** The Small Business Administration provides low-interest disaster loans to homeowners, renters, businesses of all sizes, and most private nonprofit organizations. Small Business Administration disaster loans can be used to repair or replace the following items damaged or destroyed in a declared disaster: real estate, personal property, machinery and equipment, and inventory and business assets.
- **The Housing and Urban Development Agency**: Provides flexible grants to help cities, counties, and States recover from Presidentially declared disasters, especially in low-income areas, subject to availability of supplemental appropriations.
- **Community Development Block Grant Program**: This is a flexible program that provides communities with resources to address a wide range of unique community development needs. The program provides annual grants on a formula basis to general units of local government and States.
- **Individual and Households, Other Needs Assistance Program:** This 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 provides grants for necessary expenses and serious needs that cannot be provided for by insurance, another federal program, or other source of assistance. The current maximum allowable amount for any one disaster to individuals or families is $25,000. 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.
- **WUI Grants:** The 10-Year Comprehensive Strategy focuses on assisting people and communities in the WUI to moderate the threat of catastrophic fire through the four broad goals of improving prevention and suppression, reducing hazardous fuels, restoring fire-adapted ecosystems, and promoting community assistance. The WUI Grant may be used to apply for financial assistance towards hazardous fuels and educational projects within the four goals of: improved prevention, re duction of hazardous fuels, restoration of fire-adapted ecosystems and promotion of community assistance.
- **Bureau of Indian Affairs Aid to Tribal Governments:** This program provides funds to Indian Tribal governments to support general Tribal government operations, to maintain up-to-date Tribal enrollment, to conduct Tribal elections, and to develop appropriate Tribal policies, legislation, and regulations. Funds may be used in a variety of ways to strengthen the capabilities of Indian tribes in self-government, community planning, and maintenance of membership records.
- **Bureau of Indian Affairs Replacement and Repair of Indian Schools:** Providing safe, functional, code-compliant, economical, and energy efficient education facilities for American Indian students attending Bureau of Indian Affairs owned or funded primary and secondary schools or residing in Bureau owned or funded dormitories.
- **Bureau of Indian Affairs Wildland Fire Management:** Cooperative agreements for grants and reimbursable costs related to wildland fire management directly associated with programs contracted by tribes under the authority of the National Indian Forest Resources Management Act.

Small and impoverished communities that receive grants may receive a federal cost share of up to 90% of the total amount approved under the grant award. As defined in 44 CFR 201.2, a small and impoverished community is:

- A community of 3,000 or fewer individuals that is identified by the State as a rural community

- Is not a remote area within the corporate boundaries of a larger city
- Is economically disadvantaged, by having an average per capita annual income of residents not exceeding 80% of national, per capita income
- The local unemployment rate exceeds by one percentage point or more, the most recently reported, average yearly national unemployment rate
- Any other factors identified in the State Plan in which the community is located

6.6 Completed Mitigation Actions

Kansas Region L and its participating jurisdictions remain committed to investigating and obtaining all available grant funding for the completion of hazard mitigation projects. Since the completion of the previous HMP, the MPC has been tracking the completion status of all identified hazard mitigation actions. The onset of COVID-19 early in the life of the 2019 HMP necessitated all available resources, funding, and capabilities to be reassigned to help manage the pandemic. Additionally, staff shortages and non-standard working arrangements were instituted for all agencies. As such, Kansas Region L and its participating jurisdictions only managed to complete a sub-set of previously identified mitigation action items since the completion of the last HMP. Completed actions are marked as such in the detailed list jurisdictional mitigation actions found in Appendix D.

6.7 Jurisdictional Mitigation Actions

To support the mitigation goals identified in this HMP, all participating Kansas Region L jurisdictions identified a comprehensive range mitigation projects and activities. The selected set carefully takes an all-hazards approach to mitigation while simultaneously addressing each of the plan's profiled hazards. The list of mitigation actions is based upon the potential to reduce risk to life and property with an emphasis on ease of implementation, community and agency support, consistency with local jurisdictions' plans and capabilities, available funding, and jurisdictional vulnerability. This plan update includes carryover mitigation actions from the 2019 HMP as they are still relevant and/or in progress or ongoing. It also includes projects that have been carried over due to a lack of funding and/or resources required for project completion during the last five-year cycle.

It is important to note that since the previous HMP, requirements for plan approval have changed. In the previous plan, all jurisdictions identified only a few actions, with many of the actions identified at the county level to cover local participants. As such, the actions in this plan have been re-written and reclassified on a wholesale basis to ensure each participating jurisdiction has identified at least one action per identified hazard. In doing so, presenting a comparison to previously identified actions in impractical. However, any actions previously identified that have been completed are noted to illustrate successes.

The Kansas Region L MPC acknowledges that the adoption and approval of this plan does not obligate any participating jurisdictions to complete each identified action. Rather, the MPC understands that progress should be shown in mitigation efforts which may include the completion of mitigation actions or other actions or progress in achieving the goals of the HMP.

Please note that not all jurisdictions elected to propose potential mitigation actions for each identified natural hazard. Justification for not identifying an action for an identified hazard include:

- Jurisdiction would not be impacted by an occurrence of the hazard event. For example, the jurisdiction is not located in proximity of inundation area of a dam or levee failure, nor is concerned about the downstream impacts from such an event, and therefore not vulnerable to the potential impacts.
- The jurisdiction's size and capabilities do not allow for them to provide sustainable mitigating actions for identified hazards. In these cases, actions listed by a larger organization, through agreement, will be used to mitigate a potential hazard. For example, the updating of building codes on a county basis to mitigate against hazards.
- Potential mitigation actions for the identified hazard are managed by another entity. For example, mitigation actions for Agricultural Infestation are generally managed by Agricultural Extension Offices (a state entity), the Kansas Department of Agriculture, and the USDA.

- The purpose of the jurisdiction covers a narrow area of focus, such as a Rural Water District or Fire District. In these cases, actions are proposed within the capabilities and area of expertise for the entities. Again, actions for other hazards are provided by a larger entity such as the county.

A revised version of the requirement allows for a more tailored approach to mitigation planning, ensuring that communities address the hazards most relevant to their circumstances while also acknowledging that not all hazards may be equally significant across different areas. It promotes a more efficient use of resources by focusing efforts on mitigating the most pressing risks faced by each community.

The following table details each participating jurisdiction's mitigation action items against identified hazards. A detailed list of each participating jurisdiction's hazard mitigation actions may be found in Appendix D.

Table 125: Jurisdictional Mitigation Action Cross Check

Jurisdiction	All Hazards	Agricultural Infestation	Dam or Levee Failure	Drought	Extreme Temperature	Flood	Severe Weather	Severe Winter Weather	Tornado	Wildfire
Johnson County	1	2, 3	4	3, 5	6, 7	7-17	19, 19, 20	21	18, 19, 20	22, 23
City of DeSoto	1, ,2, 3	X	4	5	6	7, 8, 9	10	11	12	10, 13
City of Edgerton	1, 2, 3	X	4	5	6	7, 8, 9	10	11	12	10, 13
City of Fairway	1, 2, 3	X	4	5	6	7, 8, 9	10	11	12	10, 13
City of Gardner	1, 2, 3	X	4	5	6	7, 8	9	10	11	9, 12
City of Lake Quivira	1, 2, 3	X	4	5	6	7, 8, 9	10	11	12	10, 13
City of Leawood	1-6	X	X	7	8	9-13	14	15	16	14, 18
City of Lenexa	1, 2, 3	4, 5	6	5, 7	8, 9	10-13	14	15	16	14, 17
City of Merriam	1, 2, 3	X	4	5	6	7, 8, 9	10	11	12	10, 13
City of Mission	1, 2, 3	X	4	5	6	7, 8, 9	10	11	12	10, 13
City of Mission Hills	1, 2, 3	X	X	4	5	6-10	11	12	13	11, 14
City of Mission Woods	1	X	X	1	1	2, 3	4	1	1	1
City of Olathe	1-4	X	5	6	7	8, 9	10	11	10	12
City of Overland Park	1-5	X	6	7	8	9,10, 11	8, 12	13	14	12, 15
City of Prairie Village	1, 3	X	X	4	5	6, 7, 8	9	10	11	9, 12
City of Roeland Park	1, 2, 3	X	4	5	6	7, 8, 9	10	11	12	10, 13
City of Shawnee	1, 2, 3, 4	X	5	6, 7	8	9-14	15	16	17	15, 18
City of Spring Hill	1, 2, 3	X	4	5	6	7, 8, 9	10	11	12	10, 13
City of Westwood	1, 2, 3	X	4	5	6	7, 8, 9	10	11	12	10, 13
City of Westwood Hills	1, 2, 3	X	4	5	6	7, 8, 9	10	11	12	10, 13
Johnson County Community College	1, 2	X	X	3	4	5	6	4	7	6
Kansas School for the Deaf	1-3	X	X	4	5	6	7	4	8	7
University of Kansas Edwards Campus	1	X	X	2	3	4	5	3	6	5
USD #229 – Blue Valley	1, 2	X	X	3	4	5	6	4	7	6
USD #230 – Spring Hill	1, 2	X	X	3	4	5	6	4	7	6
USD #231 – Gardner/Edgerton	1, 2	X	X	3	4	5	6	4	7	6
USD #232 – DeSoto	1, 2	X	X	3	4	5	6	4	7	6
USD #233 – Olathe	1, 2	X	X	3	4	5	6	4	7	6
USD #512 – Shawnee Mission	1, 2	X	X	3	4	5	6	4	7	6
Fire District No. 1	1	X	X	X	2	X	2	X	X	3, 4
Consolidated Fire District No. 2	1	X	X	X	2	X	2	X	X	3, 4
Consolidated Fire District No. 2	1	X	X	X	2	X	2	X	X	3, 4
Johnson County Fire District No. 2	1	X	X	X	2	X	2	X	X	3, 4
Northwest Consolidated Fire District	1	X	X	X	2	X	2	X	X	3, 4
Water District #7	1	X	X	2	X	X	X	X	X	2

Table 125: Jurisdictional Mitigation Action Cross Check

Jurisdiction	All Hazards	Agricultural Infestation	Dam or Levee Failure	Drought	Extreme Temperature	Flood	Severe Weather	Severe Winter Weather	Tornado	Wildfire
WaterOne	1	X	X	2, 4, 5, 8, 9	3, 4, 7, 8	X	X	X	X	2, 9
Evergy	1	X	1	1	1	1	1	1	1	1
Leavenworth County	1-9	10, 11	12, 13, 14	15, 16	17, 18	19-30	31-34	35	31-34	34, 36-41
City of Basehor	1, 2, 3	X	4	5	6	7, 8, 9	10	11	12	10, 13
City of Easton		X								
City of Lansing	1, 2, 3	X	4	5	6	7, 8, 9	10	11	12	10, 13
City of Leavenworth	1	X	2	3, 4	5	6-11	12, 13	14	12	13, 15
City of Linwood	1, 2	X	3	4	5	6, 7, 8	9	10	11	9, 12
City of Tonganoxie	1, 2	X	3	4	5	6-9	10	11	12	10, 13
USD #207 – Fort Leavenworth	1	X	X	2	3	4	5	3	6, 7	5
USD #449 – Easton	1, 2	X	X	3	4	5	6	4	7	6
USD #453 – Leavenworth	1, 2	X	X	3	4	5	6	4	7	6
USD #458 – Basehor-Linwood	1, 2	X	X	3	4	5	6	4	7	6
USD #464 – Tonganoxie	1, 2	X	X	3	4	5	6	4	7	6
USD #469 – Lansing	1, 2	X	X	3	4	5	6	4	7	6
University of St. Mary	1, 2	X	X	3	4	5	6	4	7	6
Rural Water District #7	X	X	X	1	X	X	X	X	X	1, 2
Rural Water District #12	1-6	1-6	1-6	1-6	1-6	1-6	1-6	1-6	1-6	1-6
WaterOne	1	X	X	2, 4, 5, 8, 9	3, 4, 7, 8	X	X	X	X	2, 9
Unified Government of Wyandotte County and Kansas City, Kansas	1-26	X	27, 28	29	30	31-42	43-47	48	46, 47, 49	50, 51
City of Bonner Springs	1, 2	X	3	4	5	6-13	14, 15	14, 16	17	18
City of Edwardsville	1, 2	X	3	4, 5	6	7, 8, 9	10	11	12	10, 13
Kansas City Community College	1	X	X	2	3	4	5	3	6	5
Kansas School for the Deaf and Blind	1, 2	X	X	3	4	5	6	4	7	6
USD #202 - Turner	1, 2	X	X	3	4	5	6	4	7	X
USD #203 - Piper	1, 2	X	X	3	4	5	6	4	7	6
USD #204 – Bonner-Edwardsville	1, 2	X	X	3	4	5	6	4	7	6
USD #500 – Kansas City, Kansas	1, 2	X	X	3	4	5	6	4	7	6
University of Kansas Hospital	X	X	X	1	X	2	3	3	3, 4	3
Providence Med	X	X	X	1	X	2	3	3	3, 4	3
Board of Public Utilities	X	X	X	1	1,2	X	3	X	X	X

Table 125: Jurisdictional Mitigation Action Cross Check

Jurisdiction	All Hazards	Agricultural Infestation	Dam or Levee Failure	Drought	Extreme Temperature	Flood	Severe Weather	Severe Winter Weather	Tornado	Wildfire
Boy Scouts of America	1	X	X	X	X	2	X	X	X	X
Harvesters	X	X	X	X	X		1	1	1	1
Fairfax Drainage District	X	X	1	X	X	1	X	X	X	X
Kaw Valley Drainage District	X	X	1, 2, 3, 4	X	X	1, 2, 3, 4	X	X	X	X
WaterOne	1	X	X	2, 4, 5, 8, 9	3, 4, 7, 8	X	X	X	X	2, 9

Note: X: Jurisdiction did not consider hazard to be either a major risk to the community, provided an action for the hazard classified as all hazards, and/or the hazard to be managed by another entity.

Prior to the implementation of any action further feasibility analysis will be performed. Additionally, a Benefit-Cost Analysis that determines the future risk reduction benefits of a hazard mitigation project and compares those benefits to its costs will be conducted as required. Applicants and sub-applicants will use FEMA approved methodologies and tools, such as the Benefit-Cost Analysis Toolkit, to demonstrate the cost-effectiveness of their projects. The result of the analysis is a Benefit-Cost Ratio, and a project is considered cost-effective when the Benefit-Cost Ratio is 1.0 or greater. Depending on the project, either a full Benefit-Cost Analysis will be completed by entering documented values into the FEMA Benefit-Cost Analysis Toolkit, which calculates a benefit-cost ratio or, if the project meets specified criteria, a streamlined Benefit-Cost Analysis may be completed (FEMA's cost-effectiveness requirement is never waived).

6.8 Mitigation Action Implementation and Monitoring

Kansas Region L participating jurisdictions are responsible for implementing their identified mitigation actions. To foster accountability and increase the likelihood that actions will be implemented, every proposed action is assigned to a specific department or position as a champion. In general:

- The identified champion will be responsible for tracking and reporting on action status.
- The identified champion should provide input on whether the action as implemented is successful in reducing vulnerability, if applicable.
- 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 determine if the action is being implemented according to plan.

In general, the Kansas Region L HMP is responsible for monitoring the progress of mitigation activities and projects throughout the county in conjunction with participating jurisdictions. To facilitate the tracking of any awarded hazard mitigation grants, the Kansas Region L MPC, in conjunction with participating jurisdictions, will compile a list of projects funded throughout the calendar year, if any, and add it to an electronic database administered by KDEM. Additionally, the Kansas Region L MPC will monitor information on any other mitigation projects that were not funded through hazard mitigation grants.
To track mitigation projects from initiation to closeout, participating jurisdictions will use a project tracking spreadsheet that includes, at a minimum, the following information:

- Applicant/Subrecipient
- Grant Identifier
- Contractor
- Total Cost Estimate
- Federal/Local share
- Award Date
- Period of Performance
- Quarterly Reports
- Subrecipient Risk
- Reimbursements

Upon completion of a project, a member of the awarded jurisdiction, a member of the Kansas Region L MPC, and a State of Kansas representative will conduct a closeout site visit to:

- Review all files and documents
- Review all procurement files and contracts to third parties
- Take photos of the completed project

Project closeout packages will generally be submitted 90 days after a project has been completed, and will include the following:

- Summary of documentation
- Pictures of completed project
- Materials, labor, and equipment forms, if required
- Close-out certification

Additionally, the State of Kansas is currently working with FEMA to apply the FEMA GO system to all FEMA grants. The FEMA GO system allows users to apply, track, and manage all disaster and non-disaster grants and helps improve oversight and monitoring.

6.9 Hazard Mitigation Plan Incorporation and Integration

The hazard mitigation plan is an overarching document that is both comprised of, and contributes to, various county, tribal, and local plans. Unfortunately, previous versions of the Kansas Region L HMP have not been incorporated into jurisdictional planning efforts. Under the leadership of the MPC, it is hoped that when future revisions occur to these other plans, they will be measured against the contents of this HMP. Plan integration will help:

- Align community goals, objectives, and prime concerns
- Avoid lost opportunities
- Eliminate duplication of effort

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. Each participating jurisdiction has committed to actively encourage all departments to implement actions that minimize loss of life and property damage from hazards. Whenever possible, each participating jurisdiction will use existing plans, policies, procedures, and programs to aid in the implementation of identified hazard mitigation actions.

On a local level, hazard mitigation plans can be integrated into various planning documents and initiatives to ensure a comprehensive and coordinated approach to reducing the impact of hazards. Local level plans where hazard mitigation strategies can be integrated include:

- Comprehensive Plans: Helps guide long term community development to ensure future resilience against identified hazards.
- Threat and Hazard Identification and Risk Assessment: Utilizes information from the HMP to understand the specific threats and hazards that may impact the community. This informs the development of strategies and resource allocation for emergency management capabilities, ensuring that the community is well-prepared to respond effectively.
- Comprehensive Land-Use Plans: Helps guide the development and zoning decisions in a way that minimizes vulnerability to hazards. This includes avoiding construction in high-risk areas and encouraging resilient building practices.
- Emergency Operations Plans: Contributes to detailing specific actions to be taken before, during, and after disasters to reduce vulnerability and enhance community resilience.
- Climate Action Plans: Can help address both short-term hazards and long-term climate-related risks. This includes considerations for extreme temperatures and changes in precipitation patterns.
- Transportation Plans: Helps ensure the resilience of transportation infrastructure to hazards such as floods, and earthquakes. This may involve designing infrastructure to withstand extreme weather events.
- Infrastructure Master Plans: Contributes to the design, construction, and maintenance of critical infrastructure, such as water supply systems, roads, bridges, and utility networks.
- Community Development Plans: Helps ensure that new development projects align with hazard resilience goals. This may involve establishing building codes that prioritize hazard-resistant construction.
- Open Space and Recreation Plans: Provides for the consideration of green infrastructure and open spaces for flood control, wildfire buffers, and other hazard mitigation purposes.

- School Emergency Plans: Enhances the safety and resilience of educational facilities. This may involve retrofitting buildings, establishing evacuation routes, and conducting regular drills.
- Public Health Preparedness Plans: Addresses potential health risks associated with hazards. This includes planning for medical surge capacity, disease prevention, and healthcare facility resilience.

Integration of hazard mitigation into these various plans ensures that resilience efforts are embedded in the broader fabric of community development. Coordination and collaboration among different sectors and stakeholders are essential for the successful implementation of hazard mitigation strategies on the local level. Plan incorporation and integration is crucial for creating a cohesive and coordinated approach to address various aspects of hazard mitigation. All participating jurisdictions and stakeholders and participating jurisdictions utilize similar internal procedures for plan incorporation and integration. The following represent commonly utilized integration methods:

- Cross-Referencing: Identify and cross-reference relevant sections of different plans and policies. This involves explicitly noting connections between the goals, strategies, and actions outlined in one plan with those in others.
- Consistency Checks: Conduct consistency checks to ensure that the language, objectives, and strategies in different plans and policies align with each other.
- Joint Planning Committees: Establish joint planning committees or task forces that involve representatives from different departments or agencies responsible for various plans (for example, the MPC). These committees facilitate communication, collaboration, and the coordination of planning efforts across sectors.
- Collaborative Workshops and Meetings: Organize collaborative workshops and meetings to bring together stakeholders involved in different planning processes (as seen in the planning meetings for the HMP). These forums provide an opportunity for stakeholders to share information and discuss common goals.
- Alignment with State and Regional Plans: Ensure that local plans align with broader regional and state plans. This involves considering regional and state priorities and incorporating them into local planning efforts to create a harmonized approach to development.
- Data Sharing and Analysis: Share relevant data among planning efforts and conduct joint data analysis. This helps in creating a common understanding of the challenges and opportunities, facilitating evidence-based decision-making across different plans.
- Unified Implementation Strategies: This involves identifying common actions and initiatives that contribute to the achievement of multiple goals outlined in various plans.

All participating jurisdictions within Kansas Region L have good working relationships with both each other, the State of Kansas, and FEMA indicating great potential for plan incorporation and integration across the planning area. Where appropriate, The Kansas Region L MPC will take the lead in integrating this HMP into overarching plans, codes, ordinances and any other relevant documents, policies, or procedures.

Community Rating System Integration

The CRS is a voluntary program within the National Flood Insurance Program (NFIP) that incentivizes communities to undertake floodplain management activities beyond the minimum NFIP requirements. Participating communities can earn discounts on flood insurance premiums for their residents based on their level of CRS activity.

According to FEMA, HMP and CRS plan are more valuable and offer greater benefits if they are developed in an intentionally coordinated fashion. Consider the following quote from FEMA’s Mitigation Planning and the Community Rating System bulletin:

- “...too often, if a community prepares both, they are done as two separate processes with different planning products. This does not have to be the case. Communities can coordinate these two processes and develop a single plan that meets the goals, intent, and requirements of each program. It is intended for local governments to use [both plans together] to improve their local mitigation plans and leverage the insurance benefits of the CRS to advance mitigation outcomes. This one-plan approach can save time and add value for local communities.”

Leveraging HMP and CRS together offers several benefits not realized when creating separate plans. These include:

- An integrated mitigation planning process with more specific flood mitigation actions and projects
- Eligibility for FEMA mitigation grants to help fund actions and projects recommended in the plan
- Credits toward a reduction in flood insurance premiums in CRS-participating communities
- Familiarizing more communities with the CRS program and the benefits of its flood insurance benefits

For communities currently participating in the CRS, or communities considering taking part in the program, the following table provide a CRS and HMP integration cross-check:

Table 126: CRS and HMP Integration

CRS Planning Step	Region L HMP Planning Section
Organize to prepare the plan	Section 2: Document of the Planning Process.
Involve the public	Section 2.9: Community Outreach
Review existing studies	Section 2.11: Planning Document Resources Section 2.12: Technical Resources Section 6.9: Hazard Mitigation Plan Incorporation and Integration
Coordinate with agencies and organizations	Section 2.7: Stakeholders
Assess the hazard	Section 4.0: Hazard Identification and Risk Assessment
Assess the problem	Section 4.0: Hazard Identification and Risk Assessment Section4.12.10: Repetitive Loss Structures
Set goals	Section 6.2: Goals and Objectives Section 6.3: Review and Creation of Mitigation Actions
Review possible activities	Section 5.0: Capability Assessment Section 5.4: Jurisdictional Compliance with NFIP Section 6.0: Mitigation Strategy
Draft action plan	Section 6.4: Prioritization of Mitigation Actions Section 6.9: Hazard Mitigation Plan Incorporation and Integration.
Implement, evaluate, and revise	Section 3.0: Regional Profile and Development Trends Section 6.6; Completed Mitigation Actions Section 2.4: 2024 Plan Update Section 7.0: Plan Maintenance Section 1.4 Plan Adoption

Federal Program Integration
KDEM and Kansas Region L work closely with FEMA Region VII in all aspects of planning, response, and mitigation. To ensure understanding and cooperation, the KDEM SHMO and Kansas Region L Emergency Managers regularly interface with FEMA mitigation staff on the status of local plans, changing FEMA guidelines, and opportunities for closer working relationships.

Risk Mapping, Assessment, and Planning Program Integration
Kansas Region L and KDEM work closely with FEMA, tribal, and local partners to identify flood risk and promote informed planning and development practices through the Risk MAP program. Risk MAP is the process used to make FIRMs which both map flood risk and provide informational datasets. Mapping occurs in four phases:

- Discovery: An initial investigation into a community’s flood risk, challenges, and goals.
- Analysis and Mapping: A complete engineering analysis is performed that leads to the initial updates to the flood maps. Work is completed with technical experts in each community to make sure the drafts line up with community knowledge.

- Preliminary Flood Map Release: A preliminary flood map and supporting preliminary flood hazard data is generated for review and comment.
- Map Adoption: Community takes full ownership of the updated flood maps and data.

Kansas Region L and KDEM work with FEMA during the map update process from discovery to map adoption. In addition, Kansas Region L and KDEM provide any available data to FEMA as requested.

Section 7 – Plan Maintenance

7.1 Introduction
The HMP is a living document that will be updated and submitted to FEMA for approval every five years as required by 44 CRF 201.4. 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. Kansas Region L will utilize the MPC to provide plan updates, revisions, and data collection for future HMP planning purposes.

7.2 Plan Maintenance Responsibilities
KDEM serves as the lead coordinating agency for plan maintenance. Additional assistance in the plan maintenance process is provided by members of the MPC, subject matter experts, and representatives of local jurisdictions.

KDEM and the MPC will facilitate the review and revision of the HMP every five years. The review and revision will be an ongoing process. This process will incorporate all of the revisions made during the life of the plan, especially new data obtained from participating jurisdictions.

7.3 Plan Review Meetings
As part the Local Emergency Planning Committee (LEPC), a Mitigation Sub-Committee will be formed from members of the MPC. The LEPC Mitigation Sub-Committee will meet annually for the first two years after plan approval. Kansas Region L LEPC Mitigation Sub-Committee members will determine the meeting dates and locations and will ensure that the meetings are open to all participating jurisdictions and the public. The elected LEPC Mitigation Sub-Committee Chair will be the main point of contact for these meetings and will maintain attendance and meeting minutes.

The purpose of these meetings is to discuss agency capability changes, the status of proposed projects, and any new studies or mapping that may inform the HMP. Should a specific plan element or section require revision or amendment due to a state or federal legislation or policy change, the LEPC Mitigation Sub-Committee will work with the KDEM SHMO to complete a plan addendum and submit it to FEMA as quickly as is practicable.

During these meetings, and in order to monitor HMP progress, the following information will be tracked by the LEPC Mitigation Sub-Committee:

- 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 local jurisdictions are receiving technical assistance

Additionally, the LEPC Mitigation Sub-Committee will monitor the following elements to ensure the HMP is current and correct:

- 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

After each meeting, the LEPC Mitigation Sub-Committee will compile a meeting report for usage in future plan revisions.

In addition to these meetings, MPC members and local jurisdictional representatives will monitor and evaluate the progress of mitigation projects via quarterly reports, site visits, correspondence, and reimbursements. Completed projects will be evaluated for loss avoidance and alignment with local development plans.

KDEM may request a non-scheduled report on the monitoring, evaluation, or updating of any portion of the HMP plan due to irregular progress on mitigation actions and or projects, in the aftermath of a hazard event, or for any reason deemed appropriate.

7.4 Plan Monitoring and Situational Change

Plan monitoring can be defined as the ongoing process by which stakeholders obtain regular feedback on the progress being made towards achieving their goals and objectives. In the more limited approach, monitoring may focus on tracking projects and the use of the agency's resources. In the broader approach, monitoring also involves tracking strategies and actions being taken by partners and non-partners, and figuring out what new strategies and actions need to be taken to ensure progress towards the most important results.

The full MPC or the LEPC Mitigation Sub-Committee will track and record all substantial situational changes and will address, as appropriate, the following questions:

- Is the mitigation project under, over, or on budget?
- Is the mitigation project behind, ahead of, or on schedule?
- Are there any changes in jurisdictional capabilities which impact the plan?
- Are there any changes in jurisdictional hazard risk?
- Has the mitigation action been initiated, or its initiation planned?
- Is the current process of prioritizing mitigation actions and projects appropriate and accurate?
- Has the current method of incorporating mitigation actions and projects yielded a comprehensive action and project strategy to address seen and unforeseen hazards?
- If applicable, has participation in a mitigation action's collaboration been regular?
- Was a negative result caused directly or indirectly by insufficient levels of public outreach?
- If any, what plan updates occurred, why they occurred, and what is their impact?

7.5 Post-Disaster Review

After each Presidential disaster declaration, and in coordination with FEMA, KDEM and the full MPC will convene to document impacts on Kansas Region L and to determine if any mitigation actions should be considered to reduce future risk. This will allow for the development of hazard mitigation recommendations to FEMA during the disaster operation as well as to update the mitigation strategy as needed. The post-disaster review may coincide with established meetings or may be convened as separate events.

7.6 Plan Evaluation

A plan evaluation is a rigorous and independent assessment of either completed or ongoing activities to determine the extent to which they are achieving stated goals and contributing to decision making.

A plan evaluation report will be completed by either the full MPC or the LEPC Mitigation Sub-Committee when the situation dictates. The following situations are typical examples of when an evaluation will be necessary.

- Post hazard event
- Post training exercise
- Post tabletop or drill exercise
- Significant change or completion of a mitigation project
- Significant change or completion of a mitigation action

An evaluation report will ask the following questions in response to the previously listed events.

- Do the mitigation objectives and goals continue to address the current hazards?
- Are there new or previously unforeseen hazards?
- Does a change in hazard vulnerability demand a change of or addition of mitigation actions or projects?

- Does a change in the mitigation strategy demand a change of or addition of mitigation actions or projects?
- Are current resources appropriate for implementing a mitigation project?
- Was the outcome of a mitigation action/project expected?
- Are there implementation problems?
- Was the public engaged to the point where they were satisfied with current engagement strategies?
- Did the public participate in a number that produced a positive yield on the plan, action, or project?
- Are there coordination problems?

7.7 Plan Updates

Typically, the updating of a HMP is initiated upon the completion of a plan evaluation when the evaluation determines an update is appropriate. A plan update also occurs every five years per FEMA guidelines or at any time it is deemed necessary by MPC members or KDEM.

According to FEMA DMA 2000 guidelines for mitigation planning g, Kansas Region L will begin the update process three years from this plan's adoption under the direction of the LEPC Mitigation Sub-Committee. An increase in meeting tempo to twice yearly will allow the LEPC Mitigation Sub-Committee to gather relevant information needed for the next plan update. The following meeting schedule indicates the tasks to be performed during this plan update period:

- **2027 Spring Meeting:** The LEPC Mitigation Sub-Committee will begin updating the risk assessment portion of the plan. Hazards will be analyzed to determine if they are still relevant, if location should be updated, and if new hazards should be added. Previous occurrences will be reviewed to help determine the probability of future events.
- **2027 Fall Meeting:** The LEPC Mitigation Sub-Committee will begin updating the vulnerability assessment. The MPC will update the vulnerability assessment portion of the plan. Data will need to be gathered for assets, critical facilities, building stock values, jurisdictional damages, etc.
- **2028 Spring Meeting:** The LEPC Mitigation Sub-Committee will review information received and determine if the goals and objectives are still relevant and if new ones should be added. Actions will be reviewed to determine if they should remain in the plan, have been completed, or are no longer relevant. The LEPC Mitigation Sub-Committee will review the potential funding sources for each action.
- **2028 Fall Meeting:** As appropriate, a new MPC for Kansas Region L will be formed, and all participating jurisdictions will be convened, to take over the planning process. The new MPC and all participating jurisdictions will evaluate the policies, programs, capabilities, and funding sources from the previous plan to determine if they are still accurate and if any new items should be added.
- **2029 Spring Meeting:** The new MPC and all participating jurisdictions will review the draft copy of the mitigation plan and make comments and updates if necessary. Formal submittal to FEMA for re-approval will follow.

In general, the following steps will be taken to complete the next HMP revision:

Table 127: Kansas Region L HMP Update Task List

Task	Action
1	Evaluate and update the planning process.
2	Review the stakeholder contact list and identify new stakeholders.
3	Initiate plan outreach and discussion, including a stakeholder meeting.
4	Consider the addition, removal, or modification of hazards identified in the plan.
5	Update and revise membership of the MPC.
6	Evaluate risk assessment methodologies and data sources.
7	Evaluate and update critical facility inventory information.
8	Evaluate and update the hazard profiles.
9	Evaluate and update the risk assessment summary.
10	Evaluate and update the mitigation strategy, including proposed mitigation actions.

Table 127: Kansas Region L HMP Update Task List

Task	Action
11	Evaluate and update the mitigation implementation system.
12	Integrate new and updated local plans.
13	Evaluate and update other plans sections.
14	Identify and add any additional sections or information needed.
15	Review updated plan in its entirety.
16	Conduct updated plan outreach, including public information, comment period, and meetings.
17	Integrate additional comments received.
18	Finalize plan document.
19	Complete crosswalk and submit final plan to FEMA for review and approval.
20	Make additional modifications as required.
21	Obtain jurisdictional adoption resolutions.

7.8 Continued Public Involvement

Kansas Region L and all participating jurisdictions are dedicated to involving the public in the continual shaping of the HMP and in the development of its mitigation projects and activities.

The Kansas Region L MPC, the LEPC Mitigation Sub-Committee, and all participating jurisdictions will continue to keep the public informed about hazard mitigation projects and activities through jurisdictional websites, and as appropriate, public announcements. The public will also be invited to participate in all meetings to review and discuss the mitigation-related events. Additionally, participating jurisdictions will present to public officials in a public forum concerning the progress of mitigation actions identified in this plan as progress is made.

Copies of the Kansas Region L HMP will be distributed to all the participating jurisdictions and made available to the public. Methods of public availability may include electronically posted on a website or a hard copy kept at a jurisdictional office

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Appendix A – Kansas Region L Adoption Documentation and FEMA Region VII Approval Documentation

Appendix B – Community Feedback

Appendix C – FEMA NRI Census Tract Data

Table C1: FEMA NRI Census Tract General Data

County	Census Tract	Population	Building Value	Agricultural Value	Area	All Hazard Risk Rating	All Hazard EAL	Social Vulnerability Rating	Community Resilience Rating
Johnson	50000	5,065	$1,189,291,143	$0	1.4	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	50100	4,389	$662,294,593	$0	1.0	Relatively Low	Relatively Low	Relatively Low	Relatively High
Johnson	50200	3,759	$683,965,613	$0	1.0	Relatively Low	Relatively Low	Very Low	Relatively High
Johnson	50301	4,127	$626,519,563	$0	0.9	Relatively Low	Relatively Low	Relatively Low	Relatively High
Johnson	50302	1,799	$704,668,996	$0	0.7	Relatively Low	Relatively Low	Relatively Moderate	Relatively High
Johnson	50400	4,896	$935,509,087	$0	1.9	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	50500	2,507	$352,254,977	$15,248	1.0	Very Low	Relatively Low	Very Low	Relatively High
Johnson	50600	4,565	$949,585,054	$11,143	1.5	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	50700	4,821	$911,407,059	$0	1.4	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	50800	2,699	$1,030,372,574	$0	1.4	Very Low	Relatively Low	Very Low	Relatively High
Johnson	50900	4,728	$1,140,002,411	$0	1.4	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	51000	3,763	$665,995,424	$0	0.8	Relatively Low	Relatively Low	Very Low	Relatively High
Johnson	51100	3,525	$512,388,235	$0	1.0	Relatively Low	Relatively Low	Relatively Low	Relatively High
Johnson	51200	4,162	$647,981,483	$587	1.0	Relatively Low	Relatively Low	Relatively Low	Relatively High
Johnson	51300	4,526	$617,274,161	$0	1.0	Relatively Low	Relatively Low	Relatively Low	Relatively High
Johnson	51400	3,238	$750,449,563	$0	1.0	Relatively Low	Relatively Low	Very Low	Relatively High
Johnson	51500	4,115	$682,138,415	$6,451	0.9	Relatively Low	Relatively Low	Relatively Low	Relatively High
Johnson	51600	5,640	$1,500,921,458	$0	2.1	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	51700	4,754	$1,187,529,746	$0	1.9	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	51801	4,149	$1,168,002,268	$0	1.6	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	51803	4,331	$676,946,482	$587	1.0	Relatively Low	Relatively Low	Relatively Moderate	Relatively High
Johnson	51804	5,173	$1,165,257,040	$0	1.6	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively High
Johnson	51805	5,577	$1,454,268,052	$10,558	1.8	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively High
Johnson	51806	5,390	$1,197,540,052	$63,927	1.7	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively High
Johnson	51807	3,867	$641,101,464	$0	1.0	Relatively Low	Relatively Low	Very Low	Relatively High
Johnson	51808	2,622	$474,406,321	$0	0.5	Relatively Low	Relatively Low	Relatively Low	Relatively High
Johnson	51902	4,326	$652,342,080	$587	0.9	Relatively Low	Relatively Low	Very Low	Relatively High
Johnson	51904	6,318	$1,183,994,945	$11,729	1.6	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	51907	3,825	$1,090,994,283	$0	0.6	Relatively Moderate	Relatively Low	Relatively Moderate	Relatively High
Johnson	51908	1,715	$279,912,403	$9,971	0.5	Very Low	Relatively Low	Relatively Low	Relatively High
Johnson	51909	5,547	$840,570,091	$587	1.1	Relatively Low	Relatively Moderate	Relatively Low	Relatively High
Johnson	51910	2,169	$210,239,334	$0	0.3	Very Low	Relatively Low	Very Low	Relatively High
Johnson	51911	3,408	$470,928,382	$0	0.8	Relatively Low	Relatively Low	Relatively High	Relatively High
Johnson	51912	2,471	$301,846,056	$0	0.5	Relatively Low	Relatively Low	Relatively Low	Relatively High
Johnson	52001	2,257	$952,972,918	$0	0.7	Relatively Low	Relatively Low	Relatively High	Relatively High
Johnson	52004	1,701	$466,895,408	$0	0.9	Very Low	Relatively Low	Relatively Low	Relatively High
Johnson	52005	2,884	$470,778,208	$0	0.8	Relatively Low	Relatively Low	Relatively Moderate	Relatively High
Johnson	52006	3,614	$402,372,517	$0	0.8	Relatively Low	Relatively Low	Very Low	Relatively High
Johnson	52101	1,751	$420,602,496	$0	0.7	Relatively Low	Relatively Low	Relatively Low	Relatively High
Johnson	52102	2,669	$523,639,664	$0	1.0	Relatively Low	Relatively Low	Relatively Low	Relatively High
Johnson	52201	3,598	$643,608,662	$0	1.3	Relatively Low	Relatively Low	Relatively Low	Relatively High
Johnson	52202	3,433	$501,686,248	$61,577	1.0	Relatively Low	Relatively Low	Very Low	Relatively High
Johnson	52304	4,943	$1,414,096,543	$0	1.5	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	52305	4,856	$912,274,471	$102,995	2.0	Relatively Low	Relatively Moderate	Very Low	Relatively High

Table C1: FEMA NRI Census Tract General Data

County	Census Tract	Population	Building Value	Agricultural Value	Area	All Hazard Risk Rating	All Hazard EAL	Social Vulnerability Rating	Community Resilience Rating
Johnson	52306	3,571	$921,798,410	$302,669	3.1	Relatively Low	Relatively Low	Very Low	Relatively High
Johnson	52307	3,860	$593,796,612	$135,757	1.7	Relatively Low	Relatively Low	Relatively Low	Relatively High
Johnson	52308	3,521	$655,516,383	$438,425	1.9	Relatively Low	Relatively Low	Relatively High	Relatively High
Johnson	52410	5,200	$1,011,745,692	$143,957	1.7	Relatively Low	Relatively Moderate	Relatively Low	Relatively High
Johnson	52411	3,087	$704,034,030	$14,662	1.0	Relatively Low	Relatively Low	Very Low	Relatively High
Johnson	52414	4,018	$808,796,249	$10,557	1.0	Relatively Low	Relatively Low	Very Low	Relatively High
Johnson	52415	3,542	$589,944,167	$3,521	0.8	Relatively Low	Relatively Low	Very Low	Relatively High
Johnson	52416	4,492	$760,855,868	$22,284	1.0	Relatively Low	Relatively Low	Relatively Low	Relatively High
Johnson	52417	3,389	$882,720,252	$562	1.1	Relatively Low	Relatively Low	Relatively Moderate	Relatively High
Johnson	52418	3,483	$442,191,910	$0	0.4	Relatively Low	Relatively Low	Very High	Relatively High
Johnson	52419	4,785	$737,582,775	$0	1.0	Relatively Low	Relatively Low	Very Low	Relatively High
Johnson	52421	4,788	$950,920,840	$1,127	1.1	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	52422	4,758	$942,467,874	$0	1.1	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	52423	2,856	$488,744,180	$0	0.5	Relatively Low	Relatively Low	Very High	Relatively High
Johnson	52502	1,641	$637,480,464	$1,349,313	5.3	Very Low	Relatively Low	Very Low	Relatively High
Johnson	52505	3,073	$558,555,744	$62,856	0.7	Relatively Low	Relatively Low	Very Low	Relatively High
Johnson	52506	1,489	$350,868,496	$855,399	1.8	Very Low	Very Low	Very Low	Relatively High
Johnson	52507	3,186	$573,686,293	$761,079	2.4	Relatively Low	Relatively Low	Very Low	Relatively High
Johnson	52604	2,254	$864,735,361	$1,936,597	3.3	Very Low	Relatively Low	Very Low	Relatively High
Johnson	52606	1,992	$332,632,382	$434,177	1.3	Very Low	Relatively Low	Very Low	Relatively High
Johnson	52607	2,651	$463,022,971	$1,964,603	5.9	Very Low	Relatively Low	Very Low	Relatively High
Johnson	52608	6,418	$1,909,691,166	$1,532,996	5.5	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	52609	5,982	$1,452,701,169	$4,388,255	7.8	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	52610	6,246	$1,197,046,157	$760,243	4.3	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	52611	2,443	$746,197,964	$951,863	3.4	Relatively Low	Relatively Low	Very Low	Relatively High
Johnson	52612	3,115	$551,254,996	$130,777	0.8	Very Low	Relatively Low	Very Low	Relatively High
Johnson	52613	7,250	$1,427,252,808	$529,709	2.5	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	52701	5,383	$1,221,443,527	$6,072,669	18.1	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively High
Johnson	52702	2,239	$910,575,987	$28,505,796	48.2	Relatively Low	Relatively Low	Relatively Low	Relatively High
Johnson	52803	4,137	$366,268,939	$3,519	0.8	Relatively Low	Relatively Low	Relatively High	Relatively High
Johnson	52804	4,831	$1,628,811,052	$1,968,140	5.7	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	52805	8,151	$1,443,427,189	$3,407,110	8.7	Relatively Moderate	Relatively Moderate	Very Low	Relatively High
Johnson	52806	6,063	$1,013,595,851	$175,887	1.6	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	52807	4,830	$1,488,637,030	$1,787,786	3.9	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	52904	3,474	$452,669,967	$13,491	0.9	Relatively Low	Relatively Low	Relatively Low	Relatively High
Johnson	52905	4,589	$945,553,140	$82,081	1.5	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	52906	4,954	$572,106,810	$46,257	1.1	Relatively Low	Relatively Low	Relatively Moderate	Relatively High
Johnson	52907	4,545	$784,894,484	$0	1.2	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	52908	5,692	$1,223,405,613	$85,036	1.5	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	52910	4,318	$1,438,238,849	$1,432,754	3.3	Relatively Low	Relatively Moderate	Relatively Low	Relatively High
Johnson	53004	3,656	$1,332,465,174	$0	1.4	Relatively Low	Relatively Moderate	Relatively Low	Relatively High
Johnson	53005	1,794	$717,505,501	$0	0.8	Relatively Low	Relatively Low	Relatively Moderate	Relatively High
Johnson	53006	3,744	$753,565,230	$17,596	0.8	Relatively Low	Relatively Low	Relatively Low	Relatively High
Johnson	53007	4,908	$896,695,133	$53,063	1.0	Relatively Low	Relatively Moderate	Relatively Low	Relatively High

Table C1: FEMA NRI Census Tract General Data

County	Census Tract	Population	Building Value	Agricultural Value	Area	All Hazard Risk Rating	All Hazard EAL	Social Vulnerability Rating	Community Resilience Rating
Johnson	53008	4,863	$966,043,577	$25,220	1.0	Relatively Low	Relatively Moderate	Relatively Low	Relatively High
Johnson	53009	5,206	$1,343,416,541	$7,625	1.7	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	53010	6,081	$1,370,408,372	$44,572	1.5	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	53011	2,233	$603,324,191	$323,250	1.0	Very Low	Relatively Low	Very Low	Relatively High
Johnson	53012	3,242	$686,882,790	$0	0.8	Relatively Low	Relatively Low	Very Low	Relatively High
Johnson	53013	2,339	$347,921,082	$25,610	0.8	Relatively Low	Relatively Low	Relatively Low	Relatively High
Johnson	53101	4,163	$1,197,478,221	$38,121	1.5	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	53102	4,647	$1,466,666,431	$0	1.4	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	53105	3,306	$693,645,040	$7,038	0.7	Relatively Low	Relatively Low	Relatively Low	Relatively High
Johnson	53108	4,204	$807,622,380	$0	0.8	Relatively Low	Relatively Low	Very Low	Relatively High
Johnson	53109	2,950	$603,966,702	$22,873	0.7	Relatively Low	Relatively Low	Relatively Low	Relatively High
Johnson	53110	3,845	$962,526,195	$1,760	0.9	Relatively Low	Relatively Low	Very Low	Relatively High
Johnson	53201	2,468	$2,509,291,570	$70,709	2.7	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	53202	3,942	$906,984,813	$17,008	1.1	Relatively Low	Relatively Moderate	Relatively Low	Relatively High
Johnson	53203	5,649	$1,950,433,938	$111,924	2.2	Relatively Moderate	Relatively Moderate	Very Low	Relatively High
Johnson	53301	5,193	$2,122,539,375	$76,528	3.2	Relatively Moderate	Relatively Moderate	Very Low	Relatively High
Johnson	53302	7,138	$2,134,773,055	$115,071	2.6	Relatively Moderate	Relatively Moderate	Very Low	Relatively High
Johnson	53403	3,998	$791,976,049	$94,228	1.0	Relatively Low	Relatively Low	Very Low	Relatively High
Johnson	53409	3,810	$1,294,151,497	$357,212	2.1	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	53411	5,324	$1,038,618,218	$494,088	2.0	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	53413	4,082	$959,563,734	$42,189	1.0	Relatively Low	Relatively Low	Relatively Low	Relatively High
Johnson	53414	4,907	$961,678,161	$30,684	1.1	Relatively Low	Relatively Moderate	Relatively Low	Relatively High
Johnson	53415	4,267	$782,795,573	$85,037	1.0	Relatively Low	Relatively Low	Relatively Low	Relatively High
Johnson	53417	3,978	$817,396,489	$1,760	1.0	Relatively Low	Relatively Low	Very Low	Relatively High
Johnson	53418	4,818	$1,132,822,588	$321,351	2.0	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	53419	1,656	$495,615,076	$62,751	0.8	Very Low	Relatively Low	Very Low	Relatively High
Johnson	53421	4,173	$775,030,901	$201,550	1.0	Relatively Low	Relatively Low	Very Low	Relatively High
Johnson	53422	2,247	$570,040,209	$231,618	1.3	Relatively Low	Relatively Low	Very Low	Relatively High
Johnson	53423	5,436	$1,403,151,751	$184,245	1.7	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	53425	3,207	$729,330,720	$1,824,857	3.5	Relatively Low	Relatively Low	Very Low	Relatively High
Johnson	53426	5,435	$1,199,058,072	$987,428	2.4	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	53427	6,759	$1,651,451,339	$1,435,592	3.7	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	53428	4,293	$1,072,668,651	$895,892	2.1	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	53429	4,712	$1,446,675,134	$585,301	2.2	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	53430	4,881	$1,240,677,645	$447,362	2.0	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	53431	2,625	$773,861,213	$1,069,916	2.5	Very Low	Relatively Low	Very Low	Relatively High
Johnson	53502	3,667	$579,276,350	$588	0.7	Relatively Moderate	Relatively Low	Very High	Relatively High
Johnson	53506	3,790	$833,241,313	$49,849	1.0	Relatively Low	Relatively Low	Very Low	Relatively High
Johnson	53507	5,530	$921,265,922	$0	1.0	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	53508	6,072	$1,150,308,244	$89,874	1.5	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	53509	6,878	$1,551,321,612	$156,895	2.0	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively High
Johnson	53510	5,506	$774,301,363	$70,504	1.0	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	53555	2,112	$688,141,959	$0	0.6	Relatively Low	Relatively Low	Very High	Relatively High
Johnson	53556	2,597	$312,896,367	$0	0.6	Relatively Low	Relatively Low	Relatively High	Relatively High

Table C1: FEMA NRI Census Tract General Data

County	Census Tract	Population	Building Value	Agricultural Value	Area	All Hazard Risk Rating	All Hazard EAL	Social Vulnerability Rating	Community Resilience Rating
Johnson	53557	2,313	$343,867,123	$5,278	0.7	Relatively Low	Relatively Low	Relatively High	Relatively High
Johnson	53558	3,425	$462,644,889	$1,027,854	2.1	Very Low	Relatively Low	Very Low	Relatively High
Johnson	53559	3,605	$805,445,467	$824,469	1.9	Relatively Low	Relatively Low	Very Low	Relatively High
Johnson	53560	4,444	$1,027,230,136	$839,815	2.1	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	53601	2,098	$283,007,051	$37,533	0.7	Relatively Low	Relatively Low	Relatively Moderate	Relatively High
Johnson	53603	2,972	$2,396,456,483	$5,861,901	15.3	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively High
Johnson	53604	5,454	$681,483,278	$36,947	1.0	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively High
Johnson	53701	2,706	$564,312,409	$32,567,687	43.8	Relatively Low	Relatively Low	Very Low	Relatively High
Johnson	53703	3,376	$392,017,120	$73,980	0.9	Relatively Low	Relatively Low	Relatively Low	Relatively High
Johnson	53705	3,315	$357,398,621	$69,546	0.8	Relatively Low	Relatively Low	Relatively Moderate	Relatively High
Johnson	53707	5,214	$819,734,985	$106,522	1.3	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively High
Johnson	53709	6,354	$999,690,173	$1,132,583	3.2	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively High
Johnson	53711	5,066	$2,137,718,200	$10,372,312	18.0	Relatively Moderate	Relatively Moderate	Very Low	Relatively High
Johnson	53712	4,722	$1,084,560,777	$17,581,806	22.9	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	53801	7,596	$1,705,562,938	$26,100,602	30.3	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively High
Johnson	53803	4,079	$1,399,236,019	$15,562,182	22.5	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	53804	4,504	$1,136,776,015	$23,878,535	26.6	Relatively Low	Relatively Moderate	Very Low	Relatively High
Johnson	980001	18	$4,127,624,566	$1,498,565	5.3	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively High
Johnson	980003	1	$26,138,556	$1,652,514	3.7	Very Low	Very Low	Relatively Moderate	Relatively High
Johnson	980004	7	$251,788,763	$0	0.3	Very Low	Very Low	Relatively Moderate	Relatively High
Johnson	980005	1	$685,235,493	$0	0.6	Very Low	Very Low	Relatively Moderate	Relatively High
Johnson	980100	0	$516,031,854	$26	0.5	Very Low	Very Low	Relatively Moderate	Relatively High
Leavenworth	70100	2,074	$690,499,814	$166	0.7	Relatively Low	Relatively Low	Relatively High	Relatively High
Leavenworth	70200	2,785	$342,293,911	$0	0.6	Relatively Low	Relatively Low	Relatively Moderate	Relatively High
Leavenworth	70300	5,828	$804,431,565	$2,351	2.4	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively High
Leavenworth	70400	3,381	$599,128,502	$0	1.1	Relatively Low	Relatively Low	Relatively Moderate	Relatively High
Leavenworth	70500	5,757	$1,377,505,128	$35,015	3.2	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Leavenworth	70700	4,887	$849,890,306	$8,172	1.9	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively High
Leavenworth	70900	2,832	$722,389,909	$11,023,935	87.9	Relatively Low	Relatively Moderate	Relatively Low	Relatively High
Leavenworth	71000	4,168	$884,178,162	$9,599,325	97.7	Relatively Low	Relatively Moderate	Relatively Low	Relatively High
Leavenworth	71102	4,779	$1,027,777,195	$3,108,237	20.4	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively High
Leavenworth	71103	2,952	$570,633,820	$121,560	2.5	Very Low	Relatively Low	Very Low	Relatively High
Leavenworth	71104	2,616	$613,258,025	$662,014	7.1	Relatively Low	Relatively Low	Very Low	Relatively High
Leavenworth	71105	4,855	$807,296,532	$290,050	6.3	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively High
Leavenworth	71202	4,418	$874,447,260	$2,830,641	25.5	Relatively Low	Relatively Moderate	Relatively Low	Relatively High
Leavenworth	71204	4,701	$808,104,818	$801,193	7.7	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively High
Leavenworth	71205	3,841	$827,684,516	$4,728,066	34.1	Relatively Low	Relatively Moderate	Very Low	Relatively High
Leavenworth	71400	4,025	$818,976,680	$9,824,441	80.3	Relatively Low	Relatively Moderate	Very Low	Relatively High
Leavenworth	71600	2,948	$612,332,562	$3,948,655	52.7	Relatively Low	Relatively Low	Very Low	Relatively High
Leavenworth	71800	6,570	$1,142,855,735	$3,360,118	30.4	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively High
Leavenworth	981900	8,436	$1,503,981,622	$87,354	11.2	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively High
Wyandotte	40100	2,909	$300,770,811	$9	0.9	Relatively Low	Relatively Low	Very High	Relatively Moderate
Wyandotte	40200	1,422	$150,054,654	$851	0.9	Very Low	Very Low	Relatively High	Relatively Moderate
Wyandotte	40500	2,064	$153,331,454	$43	0.6	Very Low	Very Low	Relatively High	Relatively Moderate

Table C1: FEMA NRI Census Tract General Data

County	Census Tract	Population	Building Value	Agricultural Value	Area	All Hazard Risk Rating	All Hazard EAL	Social Vulnerability Rating	Community Resilience Rating
Wyandotte	40600	2,855	$222,291,702	$0	0.7	Relatively Low	Relatively Low	Very High	Relatively Moderate
Wyandotte	40700	1,791	$195,059,780	$2	0.4	Relatively Low	Very Low	Very High	Relatively Moderate
Wyandotte	40900	1,282	$144,134,542	$9	0.7	Very Low	Very Low	Relatively High	Relatively Moderate
Wyandotte	41100	1,440	$247,935,387	$1	0.4	Relatively Low	Very Low	Very High	Relatively Moderate
Wyandotte	41200	1,789	$186,964,345	$461	0.5	Relatively Low	Very Low	Very High	Relatively Moderate
Wyandotte	41300	5,369	$420,210,199	$0	1.0	Relatively Moderate	Relatively Low	Very High	Relatively Moderate
Wyandotte	41400	1,579	$240,112,048	$0	0.6	Relatively Low	Very Low	Very High	Relatively Moderate
Wyandotte	41500	2,787	$265,385,883	$261	1.0	Relatively Low	Relatively Low	Very High	Relatively Moderate
Wyandotte	41600	4,266	$504,275,590	$0	0.7	Relatively Moderate	Relatively Low	Very High	Relatively Moderate
Wyandotte	41900	1,707	$251,940,331	$0	0.3	Relatively Low	Very Low	Relatively High	Relatively Moderate
Wyandotte	42001	1,691	$137,011,371	$0	0.2	Very Low	Very Low	Very High	Relatively Moderate
Wyandotte	42002	1,728	$162,009,149	$0	0.2	Very Low	Very Low	Relatively High	Relatively Moderate
Wyandotte	42100	2,944	$241,028,517	$109	0.3	Relatively Low	Relatively Low	Very High	Relatively Moderate
Wyandotte	42200	1,853	$161,353,612	$17	0.7	Very Low	Very Low	Relatively High	Relatively Moderate
Wyandotte	42300	3,270	$315,459,049	$0	0.5	Relatively Low	Relatively Low	Very High	Relatively Moderate
Wyandotte	42400	2,586	$276,416,166	$1	0.4	Relatively Low	Relatively Low	Very High	Relatively Moderate
Wyandotte	42600	2,771	$576,377,537	$0	0.7	Relatively Low	Relatively Low	Relatively High	Relatively Moderate
Wyandotte	42700	3,509	$280,516,284	$53	0.9	Relatively Low	Relatively Low	Very High	Relatively Moderate
Wyandotte	42800	3,286	$409,235,882	$154	0.9	Relatively Low	Relatively Low	Very High	Relatively Moderate
Wyandotte	42900	4,808	$981,604,972	$0	0.8	Relatively Moderate	Relatively Moderate	Very High	Relatively Moderate
Wyandotte	43000	3,525	$629,255,236	$1,119	2.5	Relatively Low	Relatively Low	Relatively High	Relatively Moderate
Wyandotte	43301	3,445	$349,136,939	$437	0.9	Relatively Low	Relatively Low	Relatively High	Relatively Moderate
Wyandotte	43400	2,196	$329,501,428	$0	1.4	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate
Wyandotte	43500	1,684	$182,409,541	$0	0.7	Very Low	Very Low	Relatively Low	Relatively Moderate
Wyandotte	43600	6,648	$645,445,029	$1,063	1.8	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	43700	2,473	$275,855,726	$345	1.4	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate
Wyandotte	43802	1,305	$403,296,816	$320,248	7.1	Very Low	Very Low	Very Low	Relatively Moderate
Wyandotte	43803	2,959	$424,882,928	$3,344	2.1	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate
Wyandotte	43903	3,134	$258,271,222	$637	1.2	Relatively Low	Relatively Low	Very High	Relatively Moderate
Wyandotte	43904	3,606	$1,966,552,308	$405	1.5	Relatively Moderate	Relatively Moderate	Very High	Relatively Moderate
Wyandotte	43905	1,764	$535,584,153	$56,778	3.8	Relatively Low	Relatively Low	Very High	Relatively Moderate
Wyandotte	44001	3,592	$595,530,945	$22,752	4.6	Relatively Low	Relatively Low	Relatively High	Relatively Moderate
Wyandotte	44002	3,247	$1,031,719,794	$25,542	6.4	Relatively Moderate	Relatively Moderate	Very High	Relatively Moderate
Wyandotte	44101	1,125	$195,252,023	$1,561	0.8	Very Low	Very Low	Very High	Relatively Moderate
Wyandotte	44102	2,878	$307,963,847	$478	0.8	Relatively Low	Relatively Low	Relatively High	Relatively Moderate
Wyandotte	44103	3,049	$707,392,533	$58,321	1.3	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate
Wyandotte	44104	3,504	$697,027,607	$386	0.9	Relatively Moderate	Relatively Low	Very High	Relatively Moderate
Wyandotte	44201	4,209	$539,763,977	$1,008	1.8	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate
Wyandotte	44202	3,873	$395,967,385	$220	1.3	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate
Wyandotte	44301	2,452	$251,958,895	$0	0.7	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate
Wyandotte	44302	2,032	$186,562,779	$109	0.7	Relatively Low	Very Low	Very High	Relatively Moderate
Wyandotte	44303	2,484	$298,704,192	$319	0.8	Relatively Low	Relatively Low	Very High	Relatively Moderate
Wyandotte	44400	3,080	$305,925,120	$76	1.0	Relatively Low	Relatively Low	Very High	Relatively Moderate
Wyandotte	44500	2,309	$258,251,054	$4,543	3.1	Relatively Low	Relatively Low	Very High	Relatively Moderate

Table C1: FEMA NRI Census Tract General Data

County	Census Tract	Population	Building Value	Agricultural Value	Area	All Hazard Risk Rating	All Hazard EAL	Social Vulnerability Rating	Community Resilience Rating
Wyandotte	44601	2,761	$461,263,789	$23,723	8.3	Relatively Low	Relatively Low	Relatively High	Relatively Moderate
Wyandotte	44602	0	$34,834,273	$1,295,521	3.6	Very Low	Very Low	Relatively Moderate	Relatively Moderate
Wyandotte	44603	0	$26,129,869	$1,029,327	3.8	Very Low	Very Low	Relatively Moderate	Relatively Moderate
Wyandotte	44702	4,717	$1,471,194,250	$69,484	9.6	Relatively Moderate	Relatively Moderate	Relatively High	Relatively Moderate
Wyandotte	44703	3,470	$1,467,879,680	$240,374	5.0	Relatively Low	Relatively Moderate	Relatively Low	Relatively Moderate
Wyandotte	44704	1,705	$440,245,827	$61,457	4.1	Very Low	Relatively Low	Very Low	Relatively Moderate
Wyandotte	44803	6,835	$1,306,773,403	$1,588,600	17.9	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively Moderate
Wyandotte	44804	5,152	$925,757,266	$282,082	10.7	Relatively Low	Relatively Moderate	Very Low	Relatively Moderate
Wyandotte	44807	3,069	$782,279,690	$820,131	16.3	Relatively Low	Relatively Low	Very Low	Relatively Moderate
Wyandotte	44900	4,799	$791,926,272	$906	2.0	Relatively Moderate	Relatively Moderate	Very High	Relatively Moderate
Wyandotte	45100	1,985	$341,626,518	$52	0.7	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate
Wyandotte	45200	4,330	$1,436,580,804	$0	0.8	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	980000	0	$2,294,440,184	$131,498	4.5	Relatively Moderate	Relatively Moderate	Relatively High	Relatively Moderate
Wyandotte	980500	15	$241,436,830	$0	0.6	Very Low	Very Low	Relatively Moderate	Relatively Moderate
Wyandotte	980900	98	$627,077,076	$76	1.5	Very Low	Very Low	Relatively High	Relatively Moderate
Wyandotte	981200	11	$439,931,328	$1,158	1.9	Very Low	Very Low	Very High	Relatively Moderate
Wyandotte	981500	9	$1,148,160,650	$2,980	3.5	Relatively Low	Relatively Low	Relatively High	Relatively Moderate

Source: FEMA NRI

Table C2: FEMA NRI Identified Hazard Ratings

County	Census Tract	Drought EAL	Drought Risk Rating	Cold Wave EAL	Cold Wave Risk Rating	Heatwave EAL	Heatwave Risk Rating
Johnson	50000	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	50100	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	50200	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	50301	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	50302	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High
Johnson	50400	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	50500	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively Moderate
Johnson	50600	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	50700	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	50800	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively Moderate
Johnson	50900	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	51000	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	51100	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	51200	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	51300	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	51400	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	51500	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	51600	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	51700	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	51801	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	51803	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	51804	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	51805	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	51806	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	51807	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	51808	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High
Johnson	51902	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	51904	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	51907	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	51908	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively Moderate
Johnson	51909	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	51910	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively Moderate
Johnson	51911	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	51912	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High
Johnson	52001	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High
Johnson	52004	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively Moderate
Johnson	52005	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High
Johnson	52006	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	52101	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High
Johnson	52102	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High
Johnson	52201	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	52202	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	52304	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Very High	Relatively High

Table C2: FEMA NRI Identified Hazard Ratings

County	Census Tract	Drought EAL	Drought Risk Rating	Cold Wave EAL	Cold Wave Risk Rating	Heatwave EAL	Heatwave Risk Rating
Johnson	52305	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	52306	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	52307	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	52308	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	52410	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	52411	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High
Johnson	52414	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	52415	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	52416	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	52417	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	52418	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	52419	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	52421	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	52422	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	52423	No Expected Annual Losses	No Rating	Relatively Low	Relatively Moderate	Relatively High	Relatively High
Johnson	52502	Very Low	Very Low	Relatively Low	Relatively Low	Relatively High	Relatively Moderate
Johnson	52505	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High
Johnson	52506	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively Moderate
Johnson	52507	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	52604	Very Low	Very Low	Relatively Moderate	Relatively Low	Relatively High	Relatively Moderate
Johnson	52606	Very Low	Very Low	Relatively Low	Relatively Low	Relatively High	Relatively Moderate
Johnson	52607	Very Low	Very Low	Relatively Moderate	Relatively Low	Relatively High	Relatively Moderate
Johnson	52608	Very Low	Very Low	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	52609	Very Low	Very Low	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	52610	Very Low	Very Low	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	52611	Very Low	Very Low	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	52612	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Low	Relatively High	Relatively Moderate
Johnson	52613	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	52701	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	52702	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively High	Relatively High
Johnson	52803	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	52804	Very Low	Very Low	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	52805	Very Low	Very Low	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	52806	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	52807	Very Low	Very Low	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	52904	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	52905	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	52906	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	52907	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	52908	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Very High	Very High
Johnson	52910	Very Low	Very Low	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	53004	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	53005	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High

Table C2: FEMA NRI Identified Hazard Ratings

County	Census Tract	Drought EAL	Drought Risk Rating	Cold Wave EAL	Cold Wave Risk Rating	Heatwave EAL	Heatwave Risk Rating
Johnson	53006	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	53007	Very Low	Very Low	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	53008	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	53009	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	53010	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	53011	Very Low	Very Low	Relatively Low	Relatively Low	Relatively High	Relatively Moderate
Johnson	53012	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	53013	Very Low	Very Low	Relatively Low	Relatively Low	Relatively High	Relatively High
Johnson	53101	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	53102	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	53105	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	53108	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	53109	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High
Johnson	53110	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	53201	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High
Johnson	53202	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	53203	Very Low	Very Low	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	53301	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	53302	Very Low	Very Low	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	53403	Very Low	Very Low	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	53409	Very Low	Very Low	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	53411	Very Low	Very Low	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	53413	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	53414	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	53415	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	53417	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	53418	Very Low	Very Low	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	53419	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively Moderate
Johnson	53421	Very Low	Very Low	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	53422	Very Low	Very Low	Relatively Low	Relatively Low	Relatively High	Relatively High
Johnson	53423	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Low	Very High	Relatively High
Johnson	53425	Very Low	Very Low	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	53426	Very Low	Very Low	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	53427	Very Low	Very Low	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	53428	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	53429	Very Low	Very Low	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	53430	Very Low	Very Low	Relatively Moderate	Relatively Low	Very High	Relatively High
Johnson	53431	Very Low	Very Low	Relatively Moderate	Relatively Low	Relatively High	Relatively Moderate
Johnson	53502	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	53506	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	53507	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Low	Very High	Relatively High
Johnson	53508	Very Low	Very Low	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	53509	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Very High	Relatively High

Table C2: FEMA NRI Identified Hazard Ratings

County	Census Tract	Drought EAL	Drought Risk Rating	Cold Wave EAL	Cold Wave Risk Rating	Heatwave EAL	Heatwave Risk Rating
Johnson	53510	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Low	Very High	Relatively High
Johnson	53555	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High
Johnson	53556	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High
Johnson	53557	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High
Johnson	53558	Very Low	Very Low	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	53559	Very Low	Very Low	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	53560	Very Low	Very Low	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	53601	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High
Johnson	53603	Very Low	Very Low	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	53604	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	53701	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively High	Relatively High
Johnson	53703	Very Low	Very Low	Relatively Moderate	Relatively Low	Relatively High	Relatively High
Johnson	53705	Very Low	Very Low	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Johnson	53707	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	53709	Very Low	Very Low	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	53711	Very Low	Very Low	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Johnson	53712	Relatively Low	Very Low	Relatively High	Relatively Moderate	Relatively High	Relatively High
Johnson	53801	Relatively Low	Relatively Low	Relatively High	Relatively High	Very High	Very High
Johnson	53803	Very Low	Very Low	Relatively High	Relatively Moderate	Relatively High	Relatively High
Johnson	53804	Very Low	Very Low	Relatively High	Relatively Moderate	Relatively High	Relatively High
Johnson	980001	Very Low	Very Low	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate
Johnson	980003	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Very Low	Very Low
Johnson	980004	No Expected Annual Losses	No Rating	Very Low	Very Low	Relatively Low	Relatively Low
Johnson	980005	No Expected Annual Losses	No Rating	Very Low	Very Low	Relatively Low	Relatively Low
Johnson	980100	No Expected Annual Losses	No Rating	Very Low	Very Low	Relatively Low	Relatively Low
Leavenworth	70100	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High
Leavenworth	70200	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High
Leavenworth	70300	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Very High	Relatively High
Leavenworth	70400	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Leavenworth	70500	Very Low	Very Low	Relatively Moderate	Relatively Moderate	Very High	Very High
Leavenworth	70700	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Leavenworth	70900	Relatively Moderate	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Leavenworth	71000	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Leavenworth	71102	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Leavenworth	71103	Very Low	Very Low	Relatively Low	Relatively Low	Relatively High	Relatively Moderate
Leavenworth	71104	Relatively Low	Very Low	Relatively Moderate	Relatively Low	Relatively High	Relatively Moderate
Leavenworth	71105	Very Low	Very Low	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Leavenworth	71202	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Leavenworth	71204	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Leavenworth	71205	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Leavenworth	71400	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Leavenworth	71600	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High
Leavenworth	71800	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate	Very High	Very High

Table C2: FEMA NRI Identified Hazard Ratings

County	Census Tract	Drought EAL	Drought Risk Rating	Cold Wave EAL	Cold Wave Risk Rating	Heatwave EAL	Heatwave Risk Rating
Leavenworth	981900	Very Low	Very Low	Relatively Moderate	Relatively Moderate	Very High	Very High
Wyandotte	40100	No Expected Annual Losses	No Rating	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	40200	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively Low	Relatively Low
Wyandotte	40500	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate
Wyandotte	40600	No Expected Annual Losses	No Rating	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	40700	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively Low	Relatively Moderate
Wyandotte	40900	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively Low	Relatively Low
Wyandotte	41100	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively Low	Relatively Moderate
Wyandotte	41200	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively Low	Relatively Moderate
Wyandotte	41300	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	41400	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively Low	Relatively Moderate
Wyandotte	41500	No Expected Annual Losses	No Rating	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	41600	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	41900	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate
Wyandotte	42001	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively Low	Relatively Moderate
Wyandotte	42002	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively Low	Relatively Moderate
Wyandotte	42100	No Expected Annual Losses	No Rating	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	42200	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively Low	Relatively Moderate
Wyandotte	42300	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	42400	No Expected Annual Losses	No Rating	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	42600	No Expected Annual Losses	No Rating	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	42700	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	42800	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	42900	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	43000	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	43301	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	43400	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate
Wyandotte	43500	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively Low	Relatively Low
Wyandotte	43600	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	43700	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate
Wyandotte	43802	Very Low	Very Low	Relatively Low	Relatively Low	Relatively Low	Relatively Low
Wyandotte	43803	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate
Wyandotte	43903	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	43904	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively High
Wyandotte	43905	Very Low	Very Low	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate
Wyandotte	44001	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	44002	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	44101	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively Low	Relatively Low
Wyandotte	44102	No Expected Annual Losses	No Rating	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	44103	Very Low	Very Low	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	44104	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	44201	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	44202	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate

Table C2: FEMA NRI Identified Hazard Ratings

County	Census Tract	Drought EAL	Drought Risk Rating	Cold Wave EAL	Cold Wave Risk Rating	Heatwave EAL	Heatwave Risk Rating
Wyandotte	44301	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate
Wyandotte	44302	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate
Wyandotte	44303	No Expected Annual Losses	No Rating	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	44400	No Expected Annual Losses	No Rating	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	44500	Very Low	Very Low	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	44601	Very Low	Very Low	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	44602	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very Low	Very Low
Wyandotte	44603	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very Low	Very Low
Wyandotte	44702	Very Low	Very Low	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	44703	Very Low	Very Low	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	44704	Very Low	Very Low	Relatively Low	Relatively Low	Relatively Moderate	Relatively Low
Wyandotte	44803	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively High	Relatively Moderate
Wyandotte	44804	Very Low	Very Low	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	44807	Relatively Low	Relatively Low	Relatively Moderate	Relatively Low	Relatively Moderate	Relatively Moderate
Wyandotte	44900	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	45100	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate
Wyandotte	45200	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	980000	Very Low	Very Low	Very Low	Relatively Low	Relatively Moderate	Relatively Moderate
Wyandotte	980500	No Expected Annual Losses	No Rating	Very Low	Very Low	Relatively Low	Relatively Low
Wyandotte	980900	No Expected Annual Losses	No Rating	Very Low	Very Low	Relatively Low	Relatively Low
Wyandotte	981200	No Expected Annual Losses	No Rating	Very Low	Very Low	Relatively Low	Relatively Low
Wyandotte	981500	No Expected Annual Losses	No Rating	Very Low	Very Low	Relatively Moderate	Relatively Moderate

Source: FEMA NRI

Table C3: FEMA NRI Identified Hazard Ratings

County	Census Tract	Riverine Flood EAL	Riverine Flood Risk Rating	Hail EAL	Hail Risk Rating	Lightning EAL	Lightning Risk Rating	Strong Wind EAL	Strong Wind Risk Rating
Johnson	50000	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Very High	Relatively High	Relatively High
Johnson	50100	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively High
Johnson	50200	Relatively Low	Very Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	50301	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively High
Johnson	50302	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Johnson	50400	Very Low	Very Low	Relatively Low	Relatively Low	Very High	Very High	Relatively High	Relatively High
Johnson	50500	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively Moderate	Relatively Moderate	Relatively Moderate
Johnson	50600	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	50700	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	50800	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively Moderate	Relatively Moderate	Relatively Moderate
Johnson	50900	Very Low	Very Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	51000	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	51100	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively High	Relatively Moderate
Johnson	51200	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively High
Johnson	51300	Very Low	Very Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively High
Johnson	51400	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Johnson	51500	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively High
Johnson	51600	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively High
Johnson	51700	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	51801	Very Low	Very Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	51803	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Very High	Relatively High	Relatively High
Johnson	51804	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively Low	Very High	Very High	Relatively High	Relatively High
Johnson	51805	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively High
Johnson	51806	Relatively Moderate	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively High
Johnson	51807	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	51808	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Johnson	51902	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	51904	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Very High	Relatively High	Relatively High
Johnson	51907	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Very High	Very High	Relatively High	Relatively High
Johnson	51908	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively Moderate	Relatively Moderate	Relatively Moderate
Johnson	51909	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Very High	Relatively High	Relatively High
Johnson	51910	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively Moderate	Relatively Moderate	Relatively Moderate
Johnson	51911	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively High	Relatively High
Johnson	51912	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Johnson	52001	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate

Table C3: FEMA NRI Identified Hazard Ratings

County	Census Tract	Riverine Flood EAL	Riverine Flood Risk Rating	Hail EAL	Hail Risk Rating	Lightning EAL	Lightning Risk Rating	Strong Wind EAL	Strong Wind Risk Rating
Johnson	52004	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively Moderate	Relatively Moderate	Relatively Moderate
Johnson	52005	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Johnson	52006	Relatively Low	Very Low	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively High	Relatively Moderate
Johnson	52101	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively Low	Relatively High	Relatively Moderate	Relatively Moderate	Relatively Moderate
Johnson	52102	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Johnson	52201	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	52202	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively High	Relatively Moderate
Johnson	52304	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively High
Johnson	52305	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively High
Johnson	52306	Relatively Low	Very Low	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively High	Relatively Moderate
Johnson	52307	Very Low	Very Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	52308	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively High	Relatively High
Johnson	52410	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Very High	Relatively High	Relatively High
Johnson	52411	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively Moderate	Relatively Moderate	Relatively Moderate
Johnson	52414	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	52415	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	52416	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively High
Johnson	52417	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively High	Relatively High
Johnson	52418	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Very High	Relatively High	Relatively High
Johnson	52419	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively High
Johnson	52421	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	52422	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	52423	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Very High	Relatively Moderate	Relatively High
Johnson	52502	Relatively Moderate	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively Moderate	Relatively Moderate	Relatively Low
Johnson	52505	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Johnson	52506	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Low
Johnson	52507	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Johnson	52604	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively Moderate	Relatively Moderate	Relatively Moderate
Johnson	52606	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively Moderate	Relatively Moderate	Relatively Moderate
Johnson	52607	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively Moderate	Relatively Moderate	Relatively Moderate
Johnson	52608	Relatively Low	Relatively Low	Relatively Moderate	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	52609	Relatively Low	Relatively Low	Relatively Moderate	Relatively Low	Very High	Relatively High	Relatively High	Relatively High
Johnson	52610	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	52611	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively Moderate	Relatively Moderate	Relatively Moderate

Table C3: FEMA NRI Identified Hazard Ratings

County	Census Tract	Riverine Flood EAL	Riverine Flood Risk Rating	Hail EAL	Hail Risk Rating	Lightning EAL	Lightning Risk Rating	Strong Wind EAL	Strong Wind Risk Rating
Johnson	52612	Very Low	Very Low	Relatively Low	Relatively Low	Relatively High	Relatively Moderate	Relatively Moderate	Relatively Moderate
Johnson	52613	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively High
Johnson	52701	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate	Very High	Very High	Relatively High	Relatively High
Johnson	52702	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Johnson	52803	Very Low	Very Low	Relatively Low	Relatively Low	Very High	Very High	Relatively High	Relatively High
Johnson	52804	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	52805	Relatively Low	Relatively Low	Relatively Moderate	Relatively Low	Very High	Very High	Relatively High	Relatively High
Johnson	52806	Very Low	Very Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively High
Johnson	52807	Very Low	Very Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	52904	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively High	Relatively Moderate
Johnson	52905	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Very High	Very High	Relatively High	Relatively High
Johnson	52906	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Very High	Relatively High	Relatively High
Johnson	52907	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Very High	Very High	Relatively High	Relatively High
Johnson	52908	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Very High	Relatively High	Relatively High
Johnson	52910	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively High
Johnson	53004	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively High
Johnson	53005	Very Low	Very Low	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Johnson	53006	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	53007	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Very High	Relatively High	Relatively High
Johnson	53008	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Very High	Relatively High	Relatively High
Johnson	53009	Very Low	Very Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	53010	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Very High	Very High	Relatively High	Relatively High
Johnson	53011	Relatively Low	Very Low	Relatively Low	Relatively Low	Relatively High	Relatively Moderate	Relatively Moderate	Relatively Moderate
Johnson	53012	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Johnson	53013	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Johnson	53101	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	53102	Very Low	Very Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively High
Johnson	53105	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively High	Relatively Moderate
Johnson	53108	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	53109	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Johnson	53110	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	53201	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Johnson	53202	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively High
Johnson	53203	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively High
Johnson	53301	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively High
Johnson	53302	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Low	Very High	Relatively High	Relatively High	Relatively High
Johnson	53403	Relatively Low	Very Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	53409	Very Low	Very Low	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively High	Relatively Moderate
Johnson	53411	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively High

Table C3: FEMA NRI Identified Hazard Ratings

County	Census Tract	Riverine Flood EAL	Riverine Flood Risk Rating	Hail EAL	Hail Risk Rating	Lightning EAL	Lightning Risk Rating	Strong Wind EAL	Strong Wind Risk Rating
Johnson	53413	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	53414	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Very High	Very High	Relatively High	Relatively High
Johnson	53415	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively High
Johnson	53417	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	53418	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	53419	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively Moderate	Relatively Moderate	Relatively Moderate
Johnson	53421	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	53422	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively Moderate	Relatively Moderate	Relatively Moderate
Johnson	53423	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	53425	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Johnson	53426	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	53427	Relatively Low	Relatively Low	Relatively Moderate	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	53428	Very Low	Very Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	53429	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	53430	Relatively Moderate	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	53431	Relatively Moderate	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively Moderate	Relatively Moderate	Relatively Moderate
Johnson	53502	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Very High	Relatively High	Relatively High
Johnson	53506	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	53507	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	53508	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively High
Johnson	53509	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Very High	Relatively High	Relatively High
Johnson	53510	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	53555	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Johnson	53556	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Johnson	53557	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Johnson	53558	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively High	Relatively Moderate
Johnson	53559	Relatively Low	Very Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	53560	Relatively Low	Very Low	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	53601	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Johnson	53603	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively High	Relatively Moderate
Johnson	53604	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Very High	Very High	Relatively High	Relatively High
Johnson	53701	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively High	Relatively High	Relatively High	Relatively Moderate
Johnson	53703	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively High	Relatively Moderate
Johnson	53705	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively High	Relatively Moderate
Johnson	53707	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Very High	Relatively High	Relatively High
Johnson	53709	Very Low	Very Low	Relatively Low	Relatively Low	Very High	Very High	Relatively High	Relatively High
Johnson	53711	Relatively Low	Relatively Low	Relatively Moderate	Relatively Low	Very High	Relatively High	Relatively High	Relatively High

Table C3: FEMA NRI Identified Hazard Ratings

County	Census Tract	Riverine Flood EAL	Riverine Flood Risk Rating	Hail EAL	Hail Risk Rating	Lightning EAL	Lightning Risk Rating	Strong Wind EAL	Strong Wind Risk Rating
Johnson	53712	Relatively Low	Relatively Low	Relatively Moderate	Relatively Low	Very High	Relatively High	Relatively High	Relatively High
Johnson	53801	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate	Very High	Very High	Relatively High	Relatively High
Johnson	53803	Relatively Moderate	Relatively Low	Relatively Moderate	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	53804	Relatively Low	Relatively Low	Relatively Moderate	Relatively Low	Very High	Relatively High	Relatively High	Relatively Moderate
Johnson	980001	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively Low
Johnson	980003	Relatively Low	Relatively Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Johnson	980004	No Expected Annual Losses	No Rating	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Johnson	980005	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very Low	Very Low	Very Low	Very Low
Johnson	980100	No Expected Annual Losses	No Rating	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Leavenworth	70100	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively Low	Relatively High	Relatively High
Leavenworth	70200	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively High
Leavenworth	70300	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively Low	Relatively High	Relatively High
Leavenworth	70400	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively Low	Relatively High	Relatively High
Leavenworth	70500	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively Low	Relatively High	Very High
Leavenworth	70700	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively Low	Relatively High	Relatively High
Leavenworth	70900	Relatively High	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively Low	Relatively High	Relatively High
Leavenworth	71000	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively Low	Relatively High	Relatively High
Leavenworth	71102	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively Low	Relatively High	Relatively High
Leavenworth	71103	Relatively Low	Relatively Low	Relatively Moderate	Relatively Low	Relatively Low	Very Low	Relatively High	Relatively Moderate
Leavenworth	71104	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively Low	Very Low	Relatively High	Relatively Moderate
Leavenworth	71105	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively Low	Relatively High	Relatively High
Leavenworth	71202	Relatively Moderate	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively Low	Relatively High	Relatively High
Leavenworth	71204	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively Low	Relatively High	Relatively High
Leavenworth	71205	Relatively Moderate	Relatively Low	Relatively Moderate	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively Moderate
Leavenworth	71400	Relatively High	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively Low	Relatively High	Relatively High
Leavenworth	71600	Relatively Moderate	Relatively Low	Relatively Moderate	Relatively Low	Relatively Low	Very Low	Relatively High	Relatively Moderate
Leavenworth	71800	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively Low	Relatively High	Relatively High
Leavenworth	981900	Relatively Moderate	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate	Very High	Very High
Wyandotte	40100	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively High
Wyandotte	40200	Very Low	Very Low	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	40500	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Wyandotte	40600	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively High
Wyandotte	40700	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Wyandotte	40900	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	41100	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively Moderate	Relatively High	Relatively Moderate	Relatively Moderate
Wyandotte	41200	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate

Table C3: FEMA NRI Identified Hazard Ratings

County	Census Tract	Riverine Flood EAL	Riverine Flood Risk Rating	Hail EAL	Hail Risk Rating	Lightning EAL	Lightning Risk Rating	Strong Wind EAL	Strong Wind Risk Rating
Wyandotte	41300	No Expected Annual Losses	No Rating	Relatively Low	Relatively Moderate	Very High	Very High	Relatively High	Relatively High
Wyandotte	41400	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively Moderate	Relatively High	Relatively Moderate	Relatively Moderate
Wyandotte	41500	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Very High	Relatively Moderate	Relatively High
Wyandotte	41600	No Expected Annual Losses	No Rating	Relatively Low	Relatively Moderate	Very High	Very High	Relatively High	Relatively High
Wyandotte	41900	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Wyandotte	42001	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Wyandotte	42002	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Wyandotte	42100	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively High
Wyandotte	42200	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Wyandotte	42300	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Very High	Relatively Moderate	Relatively High
Wyandotte	42400	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively High
Wyandotte	42600	No Expected Annual Losses	No Rating	Relatively Low	Relatively Moderate	Relatively High	Relatively High	Relatively Moderate	Relatively High
Wyandotte	42700	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Very High	Relatively High	Relatively High
Wyandotte	42800	No Expected Annual Losses	No Rating	Relatively Low	Relatively Moderate	Relatively High	Very High	Relatively High	Relatively High
Wyandotte	42900	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Very High	Very High	Relatively High	Relatively High
Wyandotte	43000	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively Moderate	Relatively High	Very High	Relatively High	Relatively High
Wyandotte	43301	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very High	Very High	Relatively High	Relatively High
Wyandotte	43400	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Wyandotte	43500	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	43600	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Very High	Very High	Relatively High	Relatively High
Wyandotte	43700	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Wyandotte	43802	Relatively Moderate	Relatively Low	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Low
Wyandotte	43803	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Wyandotte	43903	Very Low	Very Low	Relatively Low	Relatively Low	Relatively High	Very High	Relatively Moderate	Relatively High
Wyandotte	43904	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively Moderate	Very High	Very High	Relatively High	Relatively High
Wyandotte	43905	Relatively Low	Relatively Moderate	Relatively Low	Relatively Moderate	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Wyandotte	44001	Relatively Low	Relatively Low	Relatively Low	Relatively Moderate	Relatively High	Very High	Relatively High	Relatively High
Wyandotte	44002	Relatively Moderate	Relatively High	Relatively Moderate	Relatively Moderate	Relatively High	Very High	Relatively High	Relatively High

Table C3: FEMA NRI Identified Hazard Ratings

County	Census Tract	Riverine Flood EAL	Riverine Flood Risk Rating	Hail EAL	Hail Risk Rating	Lightning EAL	Lightning Risk Rating	Strong Wind EAL	Strong Wind Risk Rating
Wyandotte	44101	Very Low	Very Low	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	44102	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively High
Wyandotte	44103	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High	Relatively Moderate	Relatively High
Wyandotte	44104	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate	Relatively High	Very High	Relatively High	Relatively High
Wyandotte	44201	Very Low	Very Low	Relatively Low	Relatively Low	Very High	Very High	Relatively High	Relatively High
Wyandotte	44202	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Very High	Relatively High	Relatively High	Relatively High
Wyandotte	44301	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Wyandotte	44302	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Wyandotte	44303	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively High
Wyandotte	44400	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Very High	Relatively Moderate	Relatively High
Wyandotte	44500	No Expected Annual Losses	No Rating	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Wyandotte	44601	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Wyandotte	44602	Relatively Moderate	Relatively Moderate	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Wyandotte	44603	Relatively Low	Relatively Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low
Wyandotte	44702	Relatively Moderate	Relatively Moderate	Relatively Moderate	Relatively Moderate	Very High	Very High	Relatively High	Relatively High
Wyandotte	44703	No Expected Annual Losses	No Rating	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High	Relatively High	Relatively High
Wyandotte	44704	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively Moderate	Relatively Moderate	Relatively Moderate
Wyandotte	44803	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate	Very High	Very High	Relatively High	Relatively High
Wyandotte	44804	Relatively Moderate	Relatively Low	Relatively Moderate	Relatively Low	Very High	Relatively High	Relatively High	Relatively High
Wyandotte	44807	Relatively Moderate	Relatively Low	Relatively Moderate	Relatively Low	Relatively High	Relatively High	Relatively High	Relatively Moderate
Wyandotte	44900	Relatively Moderate	Relatively High	Relatively Moderate	Relatively Moderate	Very High	Very High	Relatively High	Relatively High
Wyandotte	45100	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Wyandotte	45200	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate	Very High	Very High	Relatively High	Relatively High
Wyandotte	980000	Relatively Low	Relatively Low	Relatively Moderate	Relatively Moderate	Very Low	Very Low	Relatively Moderate	Relatively Moderate
Wyandotte	980500	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively Low	Very Low	Very Low	Very Low	Very Low
Wyandotte	980900	Relatively Low	Relatively Low	Relatively Low	Relatively Low	Very Low	Very Low	Relatively Low	Relatively Low
Wyandotte	981200	Very Low	Very Low	Relatively Low	Relatively Low	Very Low	Very Low	Relatively Low	Relatively Low
Wyandotte	981500	Very Low	Very Low	Relatively Moderate	Relatively Moderate	Very Low	Very Low	Relatively Low	Relatively Low

Source: FEMA NRI

Table C4: FEMA NRI Identified Hazard Ratings

County	Census Tract	Ice Storm EAL	Ice Storm Risk Rating	Winter Weather EAL	Winter Weather Rating	Tornado EAL	Tornado Risk Rating	Wildfire EAL	Wildfire Risk Rating
Johnson	50000	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Very Low
Johnson	50100	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Very Low	Very Low
Johnson	50200	Relatively High	Relatively High	Very High	Relatively High	Relatively High	Relatively High	Very Low	Very Low
Johnson	50301	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Johnson	50302	Relatively Moderate	Relatively Moderate	Very High	Very High	Relatively High	Relatively High	Very Low	Very Low
Johnson	50400	Relatively High	Relatively High	Very High	Very High	Relatively High	Very High	Relatively Low	Relatively Low
Johnson	50500	Relatively High	Relatively Moderate	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Relatively Low	Very Low
Johnson	50600	Relatively High	Relatively High	Very High	Relatively High	Relatively High	Relatively High	Relatively Low	Relatively Low
Johnson	50700	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Johnson	50800	Relatively High	Relatively Moderate	Very High	Relatively High	Relatively High	Relatively Moderate	Relatively Low	Relatively Low
Johnson	50900	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	51000	Relatively High	Relatively Moderate	Very High	Relatively High	Relatively High	Relatively Moderate	Relatively Low	Very Low
Johnson	51100	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Johnson	51200	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Very Low	Very Low
Johnson	51300	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Johnson	51400	Relatively High	Relatively Moderate	Very High	Relatively High	Relatively High	Relatively Moderate	Relatively Low	Relatively Low
Johnson	51500	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Very Low	Very Low
Johnson	51600	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	51700	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	51801	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Johnson	51803	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Very Low	Very Low
Johnson	51804	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Very Low	Very Low
Johnson	51805	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	51806	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	51807	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Johnson	51808	Relatively High	Relatively High	Very High	Relatively High	Relatively High	Relatively Moderate	Very Low	Very Low
Johnson	51902	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Johnson	51904	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Very Low
Johnson	51907	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Very Low	Very Low
Johnson	51908	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Very Low	Very Low
Johnson	51909	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Very Low
Johnson	51910	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Very Low	Very Low
Johnson	51911	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Very Low	Very Low
Johnson	51912	Relatively High	Relatively Moderate	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Very Low	Very Low
Johnson	52001	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Very Low	Very Low
Johnson	52004	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Very Low	Very Low
Johnson	52005	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Very Low	Very Low
Johnson	52006	Relatively High	Relatively High	Very High	Relatively High	Relatively High	Relatively Moderate	Very Low	Very Low
Johnson	52101	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Very Low	Very Low
Johnson	52102	Relatively High	Relatively High	Very High	Relatively High	Relatively High	Relatively High	Very Low	Very Low
Johnson	52201	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Very Low	Very Low
Johnson	52202	Relatively High	Relatively High	Very High	Relatively High	Relatively High	Relatively Moderate	Very Low	Very Low
Johnson	52304	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	52305	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Johnson	52306	Relatively High	Relatively Moderate	Very High	Relatively High	Relatively High	Relatively High	Relatively Low	Relatively Low

Table C4: FEMA NRI Identified Hazard Ratings

County	Census Tract	Ice Storm EAL	Ice Storm Risk Rating	Winter Weather EAL	Winter Weather Rating	Tornado EAL	Tornado Risk Rating	Wildfire EAL	Wildfire Risk Rating
Johnson	52307	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Very Low	Very Low
Johnson	52308	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Johnson	52410	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	52411	Relatively High	Relatively Moderate	Very High	Relatively High	Relatively High	Relatively Moderate	Relatively Low	Relatively Low
Johnson	52414	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Johnson	52415	Relatively High	Relatively High	Very High	Relatively High	Relatively High	Relatively Moderate	Very Low	Very Low
Johnson	52416	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Johnson	52417	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Very Low	Very Low
Johnson	52418	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Very Low	Very Low
Johnson	52419	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Very Low
Johnson	52421	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Very Low	Very Low
Johnson	52422	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Very Low
Johnson	52423	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Very Low	Very Low
Johnson	52502	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High	Relatively High	Relatively Moderate	Relatively Low	Relatively Low
Johnson	52505	Relatively High	Relatively Moderate	Very High	Relatively High	Relatively High	Relatively Moderate	Very Low	Very Low
Johnson	52506	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Relatively Low	Very Low
Johnson	52507	Relatively High	Relatively High	Very High	Relatively High	Relatively High	Relatively High	Relatively Low	Relatively Low
Johnson	52604	Relatively High	Relatively Moderate	Very High	Relatively High	Relatively High	Relatively Moderate	Relatively Low	Relatively Low
Johnson	52606	Relatively High	Relatively Moderate	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Very Low	Very Low
Johnson	52607	Relatively High	Relatively Moderate	Very High	Relatively High	Relatively High	Relatively Moderate	Relatively Low	Relatively Low
Johnson	52608	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	52609	Very High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	52610	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	52611	Relatively High	Relatively Moderate	Very High	Relatively High	Relatively High	Relatively Moderate	Relatively Low	Relatively Low
Johnson	52612	Relatively High	Relatively Moderate	Very High	Relatively High	Relatively High	Relatively Moderate	Very Low	Very Low
Johnson	52613	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	52701	Relatively High	Relatively High	Very High	Very High	Very High	Very High	Relatively Low	Relatively Low
Johnson	52702	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Johnson	52803	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Very Low	Very Low
Johnson	52804	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	52805	Very High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	52806	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	52807	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	52904	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Very Low	Very Low
Johnson	52905	Relatively High	Relatively High	Very High	Very High	Relatively High	Very High	Very Low	Very Low
Johnson	52906	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Very Low	Very Low
Johnson	52907	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Very Low	Very Low
Johnson	52908	Relatively High	Relatively High	Very High	Very High	Very High	Very High	Relatively Low	Relatively Low
Johnson	52910	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	53004	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Very Low	Very Low
Johnson	53005	Relatively Moderate	Relatively Moderate	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Johnson	53006	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Very Low	Very Low
Johnson	53007	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Johnson	53008	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Johnson	53009	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low

Table C4: FEMA NRI Identified Hazard Ratings

County	Census Tract	Ice Storm EAL	Ice Storm Risk Rating	Winter Weather EAL	Winter Weather Rating	Tornado EAL	Tornado Risk Rating	Wildfire EAL	Wildfire Risk Rating
Johnson	53010	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	53011	Relatively High	Relatively Moderate	Very High	Relatively High	Relatively High	Relatively Moderate	Relatively Low	Very Low
Johnson	53012	Relatively High	Relatively Moderate	Very High	Relatively High	Relatively High	Relatively Moderate	Relatively Low	Very Low
Johnson	53013	Relatively High	Relatively Moderate	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Very Low	Very Low
Johnson	53101	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Johnson	53102	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	53105	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Very Low	Very Low
Johnson	53108	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Very Low	Very Low
Johnson	53109	Relatively High	Relatively High	Very High	Relatively High	Relatively High	Relatively High	Very Low	Very Low
Johnson	53110	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Johnson	53201	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	53202	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Very Low	Very Low
Johnson	53203	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	53301	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	53302	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	53403	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Johnson	53409	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Johnson	53411	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	53413	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Johnson	53414	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Johnson	53415	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Johnson	53417	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Very Low
Johnson	53418	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Very Low	Very Low
Johnson	53419	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Very Low	Very Low
Johnson	53421	Relatively High	Relatively High	Very High	Relatively High	Relatively High	Relatively Moderate	Relatively Low	Relatively Low
Johnson	53422	Relatively High	Relatively Moderate	Very High	Relatively High	Relatively High	Relatively Moderate	Relatively Low	Very Low
Johnson	53423	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	53425	Relatively High	Relatively Moderate	Very High	Relatively High	Relatively High	Relatively Moderate	Very Low	Very Low
Johnson	53426	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	53427	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	53428	Relatively High	Relatively Moderate	Very High	Relatively High	Relatively High	Relatively Moderate	Relatively Low	Very Low
Johnson	53429	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	53430	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	53431	Relatively High	Relatively Moderate	Very High	Relatively High	Relatively High	Relatively Moderate	Relatively Low	Relatively Low
Johnson	53502	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Very Low	Very Low
Johnson	53506	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Johnson	53507	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Very Low	Very Low
Johnson	53508	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	53509	Relatively High	Relatively High	Very High	Very High	Very High	Very High	Relatively Low	Relatively Low
Johnson	53510	Relatively High	Relatively High	Very High	Relatively High	Relatively High	Relatively High	Very Low	Very Low
Johnson	53555	Relatively Moderate	Relatively High	Very High	Very High	Relatively High	Relatively High	No Expected Annual Losses	No Rating
Johnson	53556	Relatively High	Relatively High	Relatively High	Relatively High	Relatively Moderate	Relatively High	No Expected Annual Losses	No Rating
Johnson	53557	Relatively Moderate	Relatively High	Relatively High	Relatively High	Relatively Moderate	Relatively High	Very Low	Very Low

Table C4: FEMA NRI Identified Hazard Ratings

County	Census Tract	Ice Storm EAL	Ice Storm Risk Rating	Winter Weather EAL	Winter Weather Rating	Tornado EAL	Tornado Risk Rating	Wildfire EAL	Wildfire Risk Rating
Johnson	53558	Relatively High	Relatively Moderate	Very High	Relatively High	Relatively High	Relatively Moderate	Very Low	Very Low
Johnson	53559	Relatively High	Relatively Moderate	Very High	Relatively High	Relatively High	Relatively Moderate	Relatively Low	Very Low
Johnson	53560	Relatively High	Relatively Moderate	Very High	Relatively High	Relatively High	Relatively High	Relatively Low	Relatively Low
Johnson	53601	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Very Low	Very Low
Johnson	53603	Relatively High	Relatively High	Very High	Very High	Very High	Very High	Relatively Low	Relatively Low
Johnson	53604	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Very Low	Very Low
Johnson	53701	Relatively High	Relatively High	Very High	Relatively High	Relatively High	Relatively Moderate	Relatively Low	Relatively Low
Johnson	53703	Relatively High	Relatively High	Very High	Relatively High	Relatively High	Relatively Moderate	Very Low	Very Low
Johnson	53705	Relatively High	Relatively High	Very High	Relatively High	Relatively High	Relatively High	Very Low	Very Low
Johnson	53707	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Johnson	53709	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	53711	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	53712	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	53801	Relatively High	Relatively High	Very High	Very High	Very High	Very High	Relatively Low	Relatively Low
Johnson	53803	Relatively High	Relatively Moderate	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Johnson	53804	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Johnson	980001	Relatively Moderate	Relatively Moderate	Very High	Very High	Very High	Very High	Relatively Low	Relatively Low
Johnson	980003	Very Low	Very Low	Relatively Low	Relatively Low	Very Low	Very Low	Very Low	Very Low
Johnson	980004	Very Low	Very Low	Relatively High	Relatively High	Relatively Low	Relatively Low	No Expected Annual Losses	No Rating
Johnson	980005	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Very Low	Very Low
Johnson	980100	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Very Low	Very Low
Leavenworth	70100	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Very Low	Very Low
Leavenworth	70200	Relatively High	Relatively High	Relatively High	Relatively High	Relatively High	Relatively High	Very Low	Very Low
Leavenworth	70300	Very High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Leavenworth	70400	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Leavenworth	70500	Very High	Very High	Very High	Very High	Very High	Very High	Relatively Low	Relatively Low
Leavenworth	70700	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Leavenworth	70900	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate
Leavenworth	71000	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Leavenworth	71102	Relatively High	Relatively High	Very High	Very High	Very High	Very High	Relatively Low	Relatively Low
Leavenworth	71103	Relatively High	Relatively Moderate	Very High	Relatively High	Relatively High	Relatively Moderate	Relatively Low	Very Low
Leavenworth	71104	Relatively High	Relatively Moderate	Very High	Relatively High	Relatively High	Relatively Moderate	Relatively Low	Relatively Low
Leavenworth	71105	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Leavenworth	71202	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Leavenworth	71204	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Leavenworth	71205	Relatively High	Relatively High	Very High	Relatively High	Relatively High	Relatively Moderate	Relatively Low	Relatively Low
Leavenworth	71400	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Leavenworth	71600	Relatively High	Relatively High	Very High	Relatively High	Relatively High	Relatively Moderate	Relatively Low	Relatively Low
Leavenworth	71800	Very High	Very High	Very High	Very High	Very High	Very High	Relatively Low	Relatively Low
Leavenworth	981900	Very High	Relatively High	Very High	Very High	Very High	Very High	Relatively Low	Relatively Low
Wyandotte	40100	Relatively High	Relatively High	Relatively High	Very High	Relatively High	Relatively High	Very Low	Very Low
Wyandotte	40200	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Very Low	Very Low
Wyandotte	40500	Relatively Moderate	Relatively High	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Very Low	Very Low
Wyandotte	40600	Relatively High	Relatively High	Relatively High	Very High	Relatively High	Relatively High	Very Low	Very Low

Table C4: FEMA NRI Identified Hazard Ratings

County	Census Tract	Ice Storm EAL	Ice Storm Risk Rating	Winter Weather EAL	Winter Weather Rating	Tornado EAL	Tornado Risk Rating	Wildfire EAL	Wildfire Risk Rating
Wyandotte	40700	Relatively Moderate	Relatively High	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Very Low	Very Low
Wyandotte	40900	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	No Expected Annual Losses	No Rating
Wyandotte	41100	Relatively Moderate	Relatively High	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	No Expected Annual Losses	No Rating
Wyandotte	41200	Relatively Moderate	Relatively High	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Very Low	Very Low
Wyandotte	41300	Relatively High	Relatively High	Very High	Very High	Relatively High	Very High	Very Low	Very Low
Wyandotte	41400	Relatively Moderate	Relatively High	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	No Expected Annual Losses	No Rating
Wyandotte	41500	Relatively High	Relatively High	Relatively High	Very High	Relatively High	Relatively High	Very Low	Very Low
Wyandotte	41600	Relatively High	Relatively High	Very High	Very High	Relatively High	Very High	Very Low	Very Low
Wyandotte	41900	Relatively Moderate	Relatively High	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	No Expected Annual Losses	No Rating
Wyandotte	42001	Relatively Moderate	Relatively High	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	No Expected Annual Losses	No Rating
Wyandotte	42002	Relatively Moderate	Relatively High	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	No Expected Annual Losses	No Rating
Wyandotte	42100	Relatively High	Relatively High	Relatively High	Very High	Relatively High	Relatively High	No Expected Annual Losses	No Rating
Wyandotte	42200	Relatively Moderate	Relatively High	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Very Low	Very Low
Wyandotte	42300	Relatively High	Relatively High	Relatively High	Very High	Relatively High	Relatively High	No Expected Annual Losses	No Rating
Wyandotte	42400	Relatively High	Relatively High	Relatively High	Very High	Relatively Moderate	Relatively High	No Expected Annual Losses	No Rating
Wyandotte	42600	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	No Expected Annual Losses	No Rating
Wyandotte	42700	Relatively High	Relatively High	Relatively High	Very High	Relatively High	Relatively High	Very Low	Very Low
Wyandotte	42800	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Very Low	Very Low
Wyandotte	42900	Relatively High	Very High	Very High	Very High	Very High	Very High	Very Low	Very Low
Wyandotte	43000	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Wyandotte	43301	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Very Low	Very Low
Wyandotte	43400	Relatively High	Relatively High	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Very Low	Very Low
Wyandotte	43500	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Very Low	Very Low
Wyandotte	43600	Relatively High	Relatively High	Very High	Very High	Very High	Very High	Relatively Low	Relatively Low
Wyandotte	43700	Relatively High	Relatively High	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Very Low	Very Low
Wyandotte	43802	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively Low
Wyandotte	43803	Relatively High	Relatively High	Very High	Relatively High	Relatively High	Relatively High	Relatively Low	Relatively Low
Wyandotte	43903	Relatively High	Relatively High	Relatively High	Very High	Relatively High	Relatively High	Very Low	Relatively Low
Wyandotte	43904	Relatively High	Very High	Very High	Very High	Very High	Very High	Relatively Low	Relatively Low
Wyandotte	43905	Relatively High	Relatively High	Relatively High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Wyandotte	44001	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Wyandotte	44002	Relatively High	Relatively High	Very High	Very High	Relatively High	Very High	Relatively Low	Relatively Low
Wyandotte	44101	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Very Low	Very Low
Wyandotte	44102	Relatively High	Relatively High	Relatively High	Very High	Relatively High	Relatively High	Very Low	Relatively Low
Wyandotte	44103	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Wyandotte	44104	Relatively High	Relatively High	Very High	Very High	Relatively High	Very High	Relatively Low	Relatively Low

Table C4: FEMA NRI Identified Hazard Ratings

County	Census Tract	Ice Storm EAL	Ice Storm Risk Rating	Winter Weather EAL	Winter Weather Rating	Tornado EAL	Tornado Risk Rating	Wildfire EAL	Wildfire Risk Rating
Wyandotte	44201	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Wyandotte	44202	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Wyandotte	44301	Relatively High	Relatively High	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Very Low	Very Low
Wyandotte	44302	Relatively Moderate	Relatively High	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Very Low	Very Low
Wyandotte	44303	Relatively High	Relatively High	Relatively High	Very High	Relatively Moderate	Relatively High	Relatively Low	Relatively Low
Wyandotte	44400	Relatively High	Relatively High	Relatively High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Wyandotte	44500	Relatively High	Relatively High	Relatively High	Relatively High	Relatively Moderate	Relatively High	Very Low	Relatively Low
Wyandotte	44601	Relatively High	Relatively High	Very High	Very High	Relatively High	Relatively High	Relatively Low	Relatively Low
Wyandotte	44602	Very Low	Very Low	Relatively Low	Relatively Low	Very Low	Very Low	Very Low	Very Low
Wyandotte	44603	Very Low	Very Low	Relatively Low	Relatively Low	Very Low	Very Low	Very Low	Very Low
Wyandotte	44702	Relatively High	Relatively High	Very High	Very High	Very High	Very High	Relatively Low	Relatively Low
Wyandotte	44703	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Very Low	Very Low
Wyandotte	44704	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively Low
Wyandotte	44803	Very High	Very High	Very High	Very High	Very High	Very High	Relatively Low	Relatively Low
Wyandotte	44804	Relatively High	Relatively High	Very High	Very High	Very High	Relatively High	Relatively Low	Relatively Low
Wyandotte	44807	Relatively High	Relatively High	Very High	Relatively High	Relatively High	Relatively High	Relatively Low	Relatively Low
Wyandotte	44900	Relatively High	Very High	Very High	Very High	Relatively High	Very High	Relatively Low	Relatively Low
Wyandotte	45100	Relatively Moderate	Relatively High	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Very Low	Very Low
Wyandotte	45200	Relatively High	Relatively High	Very High	Very High	Very High	Very High	No Expected Annual Losses	No Rating
Wyandotte	980000	Relatively High	Relatively High	Very High	Very High	Very High	Very High	Relatively Low	Relatively Low
Wyandotte	980500	Relatively Low	Relatively Low	Relatively High	Relatively High	Relatively Low	Relatively Low	No Expected Annual Losses	No Rating
Wyandotte	980900	Relatively Moderate	Relatively Moderate	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Very Low	Very Low
Wyandotte	981200	Relatively Low	Relatively Moderate	Relatively High	Relatively High	Relatively Moderate	Relatively Moderate	Very Low	Very Low
Wyandotte	981500	Relatively Moderate	Relatively Moderate	Very High	Very High	Relatively High	Relatively High	Very Low	Relatively Low

Source: FEMA NRI

Appendix D – Jurisdictional Hazard Mitigation Actions

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Johnson County-1	Active building code enforcement to align with the national level.	All Hazards	Director of Planning Department	Low	1,2	Staff Time	Jurisdiction budget	Repeating	On-going
Johnson County-2	Mail updated information to all agricultural producers concerning emerging threats.	Agricultural Infestation	K-State Extension	Low	1, 2	Staff Time and $500	Jurisdiction budget	Five years	New
Johnson County-3	Conduct agricultural education program on water reduction methods.	Agricultural Infestation, Drought	K-State Extension	Low	1, 3	Staff Time	Jurisdiction budget	Five years	New
Johnson County-4	Contact owners of high hazard dams in the county and inform them of their responsibility to provide and update Emergency Action Plans to Johnson County Emergency Management	Dam and Levee Failure	Emergency Management	Low	1,2,3,4	Staff Time	Jurisdiction budget	Five years	New
Johnson County-5	Conduct a native, low water planting program for all jurisdictional owned facilities	Drought	Parks and Recreation Director	Low	1, 2	$5,000 - $50,000 per location	HMGP, BRIC, Jurisdiction budget	Five years	New
Johnson County-6	Increase tree canopy to reduce impacts of urban/suburban heat islands within park properties and reduce flooding and air pollution.	Extreme Temperatures	Public Works Director	Medium	1,2	Project size dependent	BRIC, CPRG, Department budget	Ten years	New
Johnson County-7	Incentivize construction and retrofitting of green stormwater infrastructure to reduce urban/suburban flooding and exposure to potential pollutants.	Flood/Extreme Temperature	NFIP Administrator, Public Works Director	Medium	1,2	Project size dependent	BRIC, CPRG, Jurisdiction Budget	Ten years	New
Johnson County-8	NFIP-Replace/upgrade high risk storm sewer system assets to prevent flooding and land subsidence.	Flood	NFIP Administrator, Public Works Director	Medium	1,2	Project size dependent	BRIC, CPRG, Jurisdiction Budget	Ten years	New
Johnson County-9	NFIP-Identification/Acquisition/Restoration of floodplain properties and properties	Flood	NFIP Administrator,	Medium	1,2	Project size dependent	BRIC, CPRG,	Ten years	New

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
	modeled to reduce flood risk in watershed.		Public Works Director				Jurisdiction Budget		
Johnson County-10	NFIP-Replace/upgrade high risk storm sewer system assets to prevent flooding and land subsidence.	Flood	NFIP Administrator, Public Works Director	Medium	1,2	Project size dependent	BRIC, CPRG, Jurisdiction Budget	Ten years	New
Johnson County-11	Complete low water crossing elimination projects based on risk and traffic count.	Flood	Public Works Director	Medium	1,2	Project size dependent	HMGP, BRIC, Jurisdiction budget	Five years	Carried over, lack of funding
Johnson County-12	Johnson County is committed to continued voluntary participation and compliance with the **NFIP.**	Flood	NFIP Administrator	High	1,2,3,4	Staff Time	Jurisdiction budget	Repeating	On-going
Johnson County-13	NFIP - Continued regulatory compliance and floodplain management.	Flood	NFIP Administrator	High	1,2,4	Staff Time	HMGP, BRIC, FMA, Jurisdiction budget	Repeating	Carried over due to lack of funding
Johnson County-14	NFIP- Acquisition/Demolition of flood prone properties. Identify habitable buildings in the floodplain and/or are subject to flooding, prioritize locations, and purchase buildings as Funding becomes available.	Flood	NFIP Administrator, Public Works Director	Medium	1, 2	Facility size dependent	HMGP, BRIC, FMA, Jurisdiction budget	Ten years	Carried over, lack of funding
Johnson County-15	NFIP- Identification/Acquisition/ Restoration of floodplain properties and properties modeled to reduce flood risk in watershed.	Flood	NFIP Administrator, Public Works Director	Medium	1,2	Project size dependent	BRIC, CPRG, Jurisdiction Budget	Ten years	New
Johnson County-16	Complete low water crossing elimination projects based on risk and traffic count.	Flood	Public Works Director	Medium	1,2	Project size dependent	HMGP, BRIC, Jurisdiction budget	Five years	Carried over, lack of funding
Johnson County-17	Evaluate and upgrade current flood warning system.	Flood	Public Works Director and	Medium	1,2, 4	Project size dependent	HMGP, BRIC,	Five years	Carried over,

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
			Emergency Management				Jurisdiction budget		ongoing effort.
Johnson County-18	Design and construct safe rooms in all future buildings built by the County.	Severe Weather, Tornado	Facilities Director	High	1,2	Project size dependent	HMGP, BRIC, Jurisdiction budget	Five years	On-going
Johnson County-19	Purchase and install additional outdoor warning and replace aging sirens.	Severe Weather, Tornado	Cities	High	1,2,3,4	Project size dependent	HMGP, BRIC, Jurisdiction budget	Five years	On-going
Johnson County-20	Install hail, wind, and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Tornado, Wildfire	Facilities Director	Medium	1, 2	$50,000 per location	HMGP, BRIC, Jurisdiction budget	Five years	New
Johnson County-21	Educate residents about driving in winter storms and handling winter-related health effects.	Severe Winter Weather	Director of Emergency Management	High	3,4	Staff Time	Jurisdiction budget	Repeating	New
Johnson County-22	Create defensible space buffers at all critical facilities	Wildfire	Public Works Director	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	As required	New
Johnson County-23	Develop and implement a wildfire prevention/education program.	Wildfire	Emergency Management	Medium	3,4	$1200 per year	Jurisdiction budget	Repeating	New
Johnson County-24	Provide required monthly cybersecurity training to all employees	Cybersecurity Incident	DTI/JIMS	High	1, 2	$500 per trainee	Jurisdiction budget	Five years	On-going
Johnson County-25	Provide hazardous materials management classes to all county employees handling hazardous materials.	Hazardous Materials Event	Emergency Manager	High	1, 2	$500 per trainee	HMGP, Jurisdiction budget	As required	New
Johnson County-26	Identify and map all structurally deficient bridges.	Infrastructure Failure	Public Works Director	Medium	1, 2	$1,000,000 per facility	HMGP, BRIC, Jurisdiction budget	Ten years	New

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Johnson County-27	Conduct active shooter drills and exercises for all county personnel.	Terrorism	County Sheriff	Low	1, 2	Data size dependent	Jurisdiction budget	Five years	On-going
Johnson County-28	Purchase and install new epidemiological tracking software.	Transmissible Disease	Department of Health and Environment – Public Health Director	High	1, 2	$500 per trainee	HMGP, Local budgets	As required	New
DeSoto-1	Purchase and install critical facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Mayor	High	1, 2	$25,000 - $50,000 per facility	HMGP, BRIC, Jurisdiction budget	Five years	Carried over due to lack of funding
DeSoto-2	Upgrade warning siren system to expand coverage and capabilities.	All hazards	Mayor	High	1, 2	$50,000 annually	HMGP, Jurisdiction budget	As required	New
DeSoto-3	Active building code enforcement to align with the national level.	All Hazards	Building Official	High	1,2	Staff Time	Jurisdiction budget	Repeating	On-going
DeSoto-4	Install evacuation route signage in any high hazard dam or levee failure inundation areas.	Dam/Levee Failure	Mayor	Medium	1, 2, 4	$5,000 per location	HMGP, Jurisdiction budget	Five years	New
DeSoto-5	Conduct a native, low water planting program for all jurisdictional owned facilities	Drought	Facilities Director	Medium	1, 2	$5,000 - $20,000 per facility	HMGP, BRIC, Jurisdiction budget	Ten years	New
DeSoto-6	Identify and prepare local facilities to serve as heating/cooling centers.	Extreme Temperatures	Facilities Director	Medium	1, 2	$3,000 per facility	HMGP, Jurisdiction budget	Five years	New
DeSoto-7	Continue to participate meet requirements of the NFIP.	Flood	NFIP Coordinator	High	1, 2	Staff time	Jurisdiction budget	Continuous	On-going
DeSoto-8	Construct rainwater retention/detention ponds or other flood control projects at strategic locations.	Flood	Mayor	Low	1, 2	Location and size dependent	HMGP, BRIC, Jurisdiction budget	As required	Carried over due to lack of funding
DeSoto-9	Clean and repair drainage ditches to maintain capacity.	Flood	Mayor	Low	1, 2	Location, length, and	HMGP, BRIC,	Ten years	New

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
						size dependent	Jurisdiction budget		
DeSoto-10	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Facilities Director	Low	1, 2	$50,000 per location	HMGP, BRIC, Jurisdiction budget	Five years	New
DeSoto-11	Conduct public education program for driving in winter conditions.	Severe Winter Weather	Mayor	Low	4	Staff Time	Jurisdiction budget	Five years	New
DeSoto-12	Construct community saferooms in select jurisdictional buildings.	Tornado	Mayor	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	Carried over due to lack of funding
DeSoto-13	Create defensible space buffers at all critical facilities	Wildfire	Fire Chief	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	As required	New
Edgerton-1	Purchase and install critical facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Mayor	High	1, 2	$25,000 - $50,000 per facility	HMGP, BRIC, Jurisdiction budget	Five years	Carried over lack of funding
Edgerton-2	Upgrade warning siren system to expand coverage and capabilities.	All hazards	Mayor	High	1, 2	$50,000 annually	HMGP, Jurisdiction budget	As required	New
Edgerton-3	Active building code enforcement to align with the national level.	All Hazards	Building Official	High	1,2	Staff Time	Jurisdiction budget	Repeating	On-going
Edgerton-4	Dam infrastructure repair and upgrade at Edgerton and South Lakes, including a floodgate in the Big Bull Creek.	Dam/Levee Failure	Mayor	Medium	1, 2, 4	$5,000 per location	HMGP, Jurisdiction budget	Five years	Carried over lack of funding
Edgerton-5	Conduct a native, low water planting program for all jurisdictional owned facilities	Drought	Facilities Director	Medium	1, 2	$5,000 - $20,000 per facility	HMGP, BRIC, Jurisdiction budget	Ten years	New
Edgerton-6	Identify and prepare local facilities to serve as heating/cooling centers.	Extreme Temperatures	Facilities Director	Medium	1, 2	$3,000 per facility	HMGP, Jurisdiction budget	Five years	New

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Edgerton-7	Continue to participate meet requirements of the NFIP.	Flood	NFIP Coordinator	High	1, 2	Staff time	Jurisdiction budget	Continuous	On-going
Edgerton-8	Construct and complete Edgerton Marias des Cygnes Watershed storm water infrastructure: replace culverts on both 1st and 2nd Street, raise 2nd Street by 1.2 feet for 200 feet, and improve 1,700 feet of flood channel.	Flood	Mayor	Low	1, 2	$679,200	HMGP, BRIC, Jurisdiction budget	As required	Carried over lack of funding
Edgerton-9	Clean and repair drainage ditches to maintain capacity.	Flood	Mayor	Low	1, 2	Location, length, and size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	New
Edgerton-10	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Facilities Director	Low	1, 2	$50,000 per location	Facility size dependent	Five years	New
Edgerton-11	Conduct public education program for driving in winter conditions.	Severe Winter Weather	Mayor	Low	4	Staff Time	Jurisdiction budget	Five years	New
Edgerton-12	Construct community saferooms in select jurisdictional buildings.	Tornado	Mayor	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	Carried over lack of funding
Edgerton-13	Create defensible space buffers at all critical facilities	Wildfire	Fire Chief	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	As required	New
Fairway-1	Purchase and install critical facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Mayor	High	1, 2	$25,000 - $50,000 per facility	HMGP, BRIC, Jurisdiction budget	Five years	Carried over lack of funding
Fairway-2	Upgrade warning siren system to expand coverage and capabilities.	All hazards	Mayor	High	1, 2	$50,000 annually	HMGP, Jurisdiction budget	As required	New
Fairway-3	Active building code enforcement to align with the national level.	All Hazards	Building Official	High	1,2	Staff Time	Jurisdiction budget	Repeating	On-going

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Fairway-4	Install evacuation route signage in any high hazard dam or levee failure inundation areas.	Dam/Levee Failure	Mayor	Medium	1, 2, 4	$5,000 per location	HMGP, Jurisdiction budget	Five years	New
Fairway-5	Conduct a native, low water planting program for all jurisdictional owned facilities	Drought	Facilities Director	Medium	1, 2	$5,000 - $20,000 per facility	HMGP, BRIC, Jurisdiction budget	Ten years	New
Fairway-6	Identify and prepare local facilities to serve as heating/cooling centers.	Extreme Temperatures	Facilities Director	Medium	1, 2	$3,000 per facility	HMGP, Jurisdiction budget	Five years	New
Fairway-7	Continue to participate meet requirements of the NFIP.	Flood	NFIP Coordinator	High	1, 2	Staff time	Jurisdiction budget	Continuous	On-going
Fairway-8	Design and complete flood control projects and storm sewer upgrades, including open channels and flood plain modifications, or through a combination of below-ground storm sewers and above ground swales.	Flood	Mayor	Low	1, 2	Location and size dependent	HMGP, BRIC, Jurisdiction budget	As required	Carried over lack of funding
Fairway-9	Clean and repair drainage ditches to maintain capacity.	Flood	Mayor	Low	1, 2	Location, length, and size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	New
Fairway-10	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Facilities Director	Low	1, 2	$50,000 per location	HMGP, BRIC, Jurisdiction budget	Five years	New
Fairway-11	Conduct public education program for driving in winter conditions.	Severe Winter Weather	Mayor	Low	4	Staff Time	Jurisdiction budget	Five years	New
Fairway-12	Construct community saferooms in select jurisdictional buildings.	Tornado	Mayor	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	Carried over lack of funding
Fairway-13	Create defensible space buffers at all critical facilities	Wildfire	Fire Chief	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	As required	New

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Gardner-1	Purchase and install critical facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Mayor	High	1, 2	$25,000 - $50,000 per facility	HMGP, BRIC, Jurisdiction budget	Five years	Carried over lack of funding
Gardner-2	Upgrade warning siren system to expand coverage and capabilities.	All hazards	Mayor	High	1, 2	$50,000 annually	HMGP, Jurisdiction budget	As required	New
Gardner-3	Active building code enforcement to align with the national level.	All Hazards	Building Official	High	1,2	Staff Time	Jurisdiction budget	Repeating	On-going
Gardner-4	Install evacuation route signage in any high hazard dam or levee failure inundation areas.	Dam/Levee Failure	Mayor	Medium	1, 2, 4	$5,000 per location	HMGP, Jurisdiction budget	Five years	New
Gardner-5	Conduct a native, low water planting program for all jurisdictional owned facilities	Drought	Facilities Director	Medium	1, 2	$5,000 - $20,000 per facility	HMGP, BRIC, Jurisdiction budget	Ten years	New
Gardner-6	Identify and prepare local facilities to serve as heating/cooling centers.	Extreme Temperatures	Facilities Director	Medium	1, 2	$3,000 per facility	HMGP, Jurisdiction budget	Five years	New
Gardner-7	Continue to participate meet requirements of the NFIP.	Flood	NFIP Coordinator	High	1, 2	Staff time	Jurisdiction budget	Continuous	On-going
Gardner-8	Complete a storm watershed master plan study which identifies stream buffer policies, detention requirements, grading plan requirements, and minimum development standards for stormwater	Flood	Mayor	Low	1, 2	$400,000	HMGP, BRIC, Jurisdiction budget	Ten years	Carried over, lack of funding
Gardner-9	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Facilities Director	Low	1, 2	$50,000 per location	HMGP, BRIC, Jurisdiction budget	Five years	New
Gardner-10	Conduct public education program for driving in winter conditions.	Severe Winter Weather	Mayor	Low	4	Staff Time	Jurisdiction budget	Five years	New
Gardner-11	Construct community saferooms in select jurisdictional buildings.	Tornado	Mayor	High	1, 2	Facility size dependent	HMGP, BRIC,	Ten years	Carried over, lack of funding

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
							Jurisdiction budget		
Gardner-12	Create defensible space buffers at all critical facilities	Wildfire	Fire Chief	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	As required	New
Gardner-13	Design and complete the Doublegate Culvert Replacement flood control project.	Flood	Mayor	Low	1, 2	$1,200,000	HMGP, BRIC, Jurisdiction budget	Ten years	Complete
Lake Quivira-1	Purchase and install critical facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Mayor	High	1, 2	$25,000 - $50,000 per facility	HMGP, BRIC, Jurisdiction budget	Five years	Carried over lack of funding
Lake Quivira-2	Upgrade warning siren system to expand coverage and capabilities.	All hazards	Mayor	High	1, 2	$50,000 annually	HMGP, Jurisdiction budget	As required	New
Lake Quivira-3	Active building code enforcement to align with the national level.	All Hazards	Building Official	High	1,2	Staff Time	Jurisdiction budget	Repeating	On-going
Lake Quivira-4	Install evacuation route signage in any high hazard dam or levee failure inundation areas.	Dam/Levee Failure	Mayor	Medium	1, 2, 4	$5,000 per location	HMGP, Jurisdiction budget	Five years	New
Lake Quivira-5	Conduct a native, low water planting program for all jurisdictional owned facilities	Drought	Facilities Director	Medium	1, 2	$5,000 - $20,000 per facility	HMGP, BRIC, Jurisdiction budget	Ten years	New
Lake Quivira-6	Identify and prepare local facilities to serve as heating/cooling centers.	Extreme Temperatures	Facilities Director	Medium	1, 2	$3,000 per facility	HMGP, Jurisdiction budget	Five years	New
Lake Quivira-7	Continue to participate meet requirements of the NFIP.	Flood	NFIP Coordinator	High	1, 2	Staff time	Jurisdiction budget	Continuous	On-going
Lake Quivira-8	Construct rainwater retention/detention ponds or other flood control projects at strategic locations.	Flood	Mayor	Low	1, 2	Location and size dependent	HMGP, BRIC, Jurisdiction budget	As required	New

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Lake Quivira-9	Clean and repair drainage ditches to maintain capacity.	Flood	Mayor	Low	1, 2	Location, length, and size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	New
Lake Quivira-10	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Facilities Director	Low	1, 2	$50,000 per location	HMGP, BRIC, Jurisdiction budget	Five years	New
Lake Quivira-11	Conduct public education program for driving in winter conditions.	Severe Winter Weather	Mayor	Low	4	Staff Time	Jurisdiction budget	Five years	New
Lake Quivira-12	Construct community saferooms in select jurisdictional buildings.	Tornado	Mayor	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	New
Lake Quivira-13	Create defensible space buffers at all critical facilities	Wildfire	Fire Chief	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	As required	New
Leawood-1	Undergrounding of power lines within the city to protect power grid during weather events and disasters. Partial progress but current efforts are delayed due to budget constraints unless the project includes shared costs with Evergy. The shared projects will mostly be arterial reconstruction and new installations.	All hazards	Public Works Director	High	1, 2	$2M/mile	HMGP, Jurisdiction budget	Dependent on budget	Ongoing
Leawood-2	Active building code enforcement to align with the national level.	All Hazards	Building Official	High	1,2	Staff Time	Jurisdiction budget	Repeating	On-going
Leawood-3	Emergency management staffing position to facilitate community risk reduction planning and implementation	All Hazards	City Administrator	High	1,2,3,4	$200k / year	Jurisdictional budget	Calendar year when approved	Requested – budget dependent
Leawood-4	Build a dedicated, purpose-built, Emergency Operations Center (EOC) for the city. Allow for active management of disasters and large-scale events with real-	All Hazards	City Administrator	High	1,2,3,4	Dependent upon project inclusion.	Jurisdictional CIP	2026	Ongoing. Initial design in 2024.

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
	time communication and coordination with partner entities.					Projected as part of $19M budget for new Fire Administration facility.			
Leawood-5	Improve cellular coverage for citizens in the southern part of Leawood to allow for enhanced and redundant communications and data availability for situational awareness and hazard communication.	All Hazards	Planning Official	High	1,2,4	Staff time. Vendor paid improvements.	Jurisdictional budget for staff time. Vendor budgeting for infrastructure	2026	Planning ongoing.
Leawood-6	Addition of AED SaveStations to all major Leawood parks and outdoor recreation spaces to enhance cardiac arrest survivability through bystander intervention. Allow public access to lifesaving equipment during or after a disaster. One park is done, 5 more needed	All Hazards	Fire Chief	High	1,2	$20k	Jurisdictional budget	EOY 2024	In progress. Equipment received and installation in progress
Leawood-7	Conduct a native, low water planting program for all jurisdictional owned facilities	Drought	Parks Director	Med	1, 2	$5,000 - $20,000 per facility	HMGP, BRIC, Jurisdiction budget	Ten years	New
Leawood-8	Identify and prepare local facilities to serve as heating/cooling centers.	Extreme Temperatures	City Administrator	Med	1, 2	$3,000 per facility	HMGP, Jurisdiction budget	Five years	New
Leawood-9	NFIP – continued regulatory compliance and pursue CRS membership as staffing allows. Current minimum federal requirements allow fill in the floodplain and rising of the water surface elevation.	Flood	Public Works Director	High	1, 2	Staff time	Jurisdiction budget	Continuous. CRS membership	On-going

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
	Restrict/eliminate development in the existing and future conditions floodplains and acquire land if necessary. Working with elected officials to updated floodplain ordinance restricting increase in floodplain elevation unless fully contained to applicant's property.							projected for 2025.	
Leawood-10	Natural Resource protection for flooding along Indian Creek west of state line road. The drainage waterway that runs into the business park, spills into Indian Creek from the North. This causes repetitive flooding at a commercial building park. Conduct a feasibility study to determine an appropriate course of action which might include a stormwater project to address improvements to the creek, erosion control, and floodproofing of businesses, etc. Agreement in development with CORP for the 3D model to be followed by the study.	Flood	Public Works Director	High	1, 2	$470,000	HMGP, BRIC, Jurisdiction budget	Study completion estimated by EOY 2025. Construction estimated 24 – 60 months after study and funding.	Ongoing
Leawood-11	Natural Resource protection for flooding along Tomahawk Creek Pkwy from College Blvd to Roe Ave. The Tomahawk Creek drainage waterway runs parallel to Tomahawk Creek Pkwy north to Indian Creek. This causes repetitive flooding along Tomahawk Creek Pkwy which slows emergency response as the Justice Center is located along Tomahawk Creek Pkwy. It also creates congestion issues as traffic along this route has to detour to Roe Ave.	Flood	Public Works Director	High	1,2	$12M	The City has received $3.76M federal funds and $4M County funds for the reconstruction and raising of Tomahawk Creek Pkwy	Oct 2025	Ongoing

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
							above the 100-year storm.		
Leawood-12	Natural Resource Protection of Tomahawk & Indian Creeks resulting from flooding over the years that has severely eroded this area. Areas adjacent to the creeks, including parks, trails, and natural habitats continue to be impacted. Provide protection to creek banks and adjacent areas to prevent further damage. Natural Resource Protection – Stream Corridor Restoration, Erosion & Sediment Control, and Forest & Vegetation Management	Flood	Parks & Recreation Director	Med	1, 2	$1M	HMGP, BRIC, Jurisdiction budget	Five years - Up to 12 months for feasibility study and 12 – 36 months for construction after funding received.	Ongoing
Leawood-13	Conduct public education program for driving in flood conditions	Flood	Mayor	Med	4	Staff time	Jurisdictional budget	Five years	Ongoing
Leawood-14	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Public Works Director	Med	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	Ongoing
Leawood-15	Conduct public education program for driving in winter weather	Severe Winter Weather	Mayor	Med	4	Staff time	Jurisdictional budget	Five years	Ongoing
Leawood-16	Upgrade of existing warning sirens to solar power with encrypted data connection activation systems for all eleven Leawood sirens. Allow for operation independent of the power grid.	Tornados	Fire Chief	High	1, 2	$40,000 annually	HMGP, Jurisdiction budget	June 2025	Ongoing
Leawood-17	Construct community saferooms in select jurisdictional buildings.	Tornado	Public Works Director	Med	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	Ongoing
Leawood-18	Create defensible space buffers at all critical facilities.	Wildfire	Fire Chief	Med	1,2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	As required	Ongoing

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Lenexa-1	Purchase and install critical facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Municipal Services Director	High	1, 2	$25,000 - $50,000 per facility	HMGP, BRIC, Jurisdiction budget	Five years	Carried over lack of funding
Lenexa-2	Updating backup power system for the outdoor warning sirens.	All hazards	Police Chief	High	1, 2	$50,000 annually	HMGP, Jurisdiction budget	As required	New
Lenexa-3	Active building code enforcement to align with the national level.	All Hazards	Community Development Director	High	1, 2	Staff Time	Jurisdiction budget	Repeating	On-going
Lenexa-4	Provide a $200 reimbursement match per property to find replacement of dead or diseased/dying ash street trees due to Emerald Ash Borer (EAB)	Agricultural Infestation	Emergency Management Director	Low	1, 3	$350 to $500 per tree	HMGP, Jurisdiction budget	On-going	New
Lenexa-5	Conduct agricultural education program on water reduction methods.	Agricultural Infestation, Drought	Parks and Recreation Director	Medium	1, 3	Staff time	Jurisdiction budget	Five years	New
Lenexa-6	Install evacuation route signage in any high hazard dam or levee failure inundation areas.	Dam/Levee Failure	Municipal Services Director	Medium	1, 2, 4	$5,000 per location	HMGP, Jurisdiction budget	Five years	New
Lenexa-7	Conduct a native, low water planting program for all jurisdictional owned facilities	Drought	Community Development and Municipal Services Directors	Medium	1, 2	$5,000 - $20,000 per facility	HMGP, BRIC, Jurisdiction budget	Ten years	New
Lenexa-8	Separate cooling controls will be desirable/preferred in all city-owned data closets.	Extreme Temperatures	IT Director	High	1, 2	$3,000 per closet	HMGP, Jurisdiction budget	Five years	New
Lenexa-9	Conduct an extreme temperature awareness seminar to educate on risks and mitigation methods.	Extreme Temperatures	Emergency Management Director	Medium	3	$500	HMGP, Jurisdiction budget	Five years	New
Lenexa-10	Continue to participate meet requirements of the NFIP.	Flood	Community Development and Municipal	High	1, 2	Staff time	Jurisdiction budget	Continuous	On-going

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
			Services Directors						
Lenexa-11	Construct rainwater retention/detention ponds or other flood control projects at strategic locations.	Flood	Community Development and Municipal Services Directors	Low	1, 2	Location and size dependent	HMGP, BRIC, Jurisdiction budget	As required	New
Lenexa-12	Complete Studies of each of Lenexa's three watersheds to identify priority flood control	Flood	Community Development and Municipal Services Directors	High	1, 2, 4	Staff time	Johnson County project	-2027	On-going
Lenexa-13	Complete Projects to upgrade Storm Sewer Infrastructure	Flood	Community Development and Municipal Services Directors	High	1, 2, 4	$2,000,000 per year	HMGP, BRIC, Jurisdiction budget	Continuous	On-going
Lenexa-14	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Facilities Director	Low	1, 2	$50,000 per location	HMGP, BRIC, Jurisdiction budget	Five years	New
Lenexa-15	Conduct public education program for driving in winter conditions.	Severe Winter Weather	Mayor	Low	4	Staff Time	Jurisdiction budget	Five years	New
Lenexa-16	Construct community saferooms in select jurisdictional buildings.	Tornado	Mayor	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	Carried over lack of funding
Lenexa-17	Create defensible space buffers at all critical facilities	Wildfire	Fire Chief	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	As required	New
Lenexa-18	Purchase cloud storage backup for all jurisdictional electronic records.	Cybersecurity Incident	It Director	High	1,2	Data size dependent	Jurisdiction budget	On-going	New
Lenexa-19	Acquire and demolish structures located in floodplains.	Flood	-	-	-	-	-	-	Deleted, no properties

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Merriam-1	Purchase and install critical facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Mayor	High	1, 2	$25,000 - $50,000 per facility	HMGP, BRIC, Jurisdiction budget	Five years	Carried over lack of funding
Merriam-2	Upgrade warning siren system to expand coverage and capabilities.	All hazards	Mayor	High	1, 2	$50,000 annually	HMGP, Jurisdiction budget	As required	New
Merriam-3	Active building code enforcement to align with the national level.	All Hazards	Building Official	High	1,2	Staff Time	Jurisdiction budget	Repeating	On-going
Merriam-4	Install evacuation route signage in any high hazard dam or levee failure inundation areas.	Dam/Levee Failure	Mayor	Medium	1, 2, 4	$5,000 per location	HMGP, Jurisdiction budget	Five years	New
Merriam-5	Conduct a native, low water planting program for all jurisdictional owned facilities	Drought	Facilities Director	Medium	1, 2	$5,000 - $20,000 per facility	HMGP, BRIC, Jurisdiction budget	Ten years	New
Merriam-6	Identify and prepare local facilities to serve as heating/cooling centers.	Extreme Temperatures	Facilities Director	Medium	1, 2	$3,000 per facility	HMGP, Jurisdiction budget	Five years	New
Merriam-7	Continue to participate meet requirements of the NFIP.	Flood	NFIP Coordinator	High	1, 2	Staff time	Jurisdiction budget	Continuous	On-going
Merriam-8	Acquire and demolish structures located in floodplains.	Flood	Mayor	Low	1, 2	Location and size dependent	HMGP, BRIC, Jurisdiction budget	As required	Carried over lack of funding
Merriam-9	Complete a storm watershed master plan study which identifies stream buffer policies, detention requirements, grading plan requirements, and minimum development standards for stormwater.	Flood	Mayor	Low	1, 2	$400,000	HMGP, BRIC, Jurisdiction budget	Ten years	Carried over lack of funding
Merriam-10	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Facilities Director	Low	1, 2	$50,000 per location	HMGP, BRIC, Jurisdiction budget	Five years	New

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Merriam-11	Conduct public education program for driving in winter conditions.	Severe Winter Weather	Mayor	Low	4	Staff Time	Jurisdiction budget	Five years	New
Merriam-12	Construct community saferooms in select jurisdictional buildings.	Tornado	Mayor	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	Carried over lack of funding
Merriam-13	Create defensible space buffers at all critical facilities	Wildfire	Fire Chief	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	As required	New
Mission-1	Purchase and install critical facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Mayor	High	1, 2	$25,000 - $50,000 per facility	HMGP, BRIC, Jurisdiction budget	Five years	Carried over lack of funding
Mission-2	Upgrade warning siren system to expand coverage and capabilities.	All hazards	Mayor	High	1, 2	$50,000 annually	HMGP, Jurisdiction budget	As required	New
Mission-3	Active building code enforcement to align with the national level.	All Hazards	Building Official	High	1,2	Staff Time	Jurisdiction budget	Repeating	On-going
Mission-4	Install evacuation route signage in any high hazard dam or levee failure inundation areas.	Dam/Levee Failure	Mayor	Medium	1, 2, 4	$5,000 per location	HMGP, Jurisdiction budget	Five years	New
Mission-5	Conduct a native, low water planting program for all jurisdictional owned facilities	Drought	Facilities Director	Medium	1, 2	$5,000 - $20,000 per facility	HMGP, BRIC, Jurisdiction budget	Ten years	New
Mission-6	Identify and prepare local facilities to serve as heating/cooling centers.	Extreme Temperatures	Facilities Director	Medium	1, 2	$3,000 per facility	HMGP, Jurisdiction budget	Five years	New
Mission-7	Continue to participate meet requirements of the NFIP.	Flood	NFIP Coordinator	High	1, 2	Staff time	Jurisdiction budget	Continuous	On-going
Mission-8	Construct rainwater retention/detention ponds or other flood control projects at strategic locations.	Flood	Mayor	Low	1, 2	Location and size dependent	HMGP, BRIC, Jurisdiction budget	As required	Carried over lack of funding

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Mission-9	Clean and repair drainage ditches to maintain capacity.	Flood	Mayor	Low	1, 2	Location, length, and size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	New
Mission-10	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Facilities Director	Low	1, 2	$50,000 per location	HMGP, BRIC, Jurisdiction budget	Five years	New
Mission-11	Conduct public education program for driving in winter conditions.	Severe Winter Weather	Mayor	Low	4	Staff Time	Jurisdiction budget	Five years	New
Mission-12	Design and construct Sylvester Powell Jr. Community Center disaster preparedness project.	Tornado	Mayor	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	Carried over lack of funding
Mission-13	Create defensible space buffers at all critical facilities	Wildfire	Fire Chief	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	As required	New
Mission Hills-1	Purchase and install critical facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Mayor	High	1, 2	$25,000 - $50,000 per facility	HMGP, BRIC, Jurisdiction budget	Five years	Carried over lack of funding
Mission Hills-2	Upgrade warning siren system to expand coverage and capabilities.	All hazards	Mayor	High	1, 2	$50,000 annually	HMGP, Jurisdiction budget	As required	New
Mission Hills-3	Active building code enforcement to align with the national level.	All Hazards	Building Official	High	1,2	Staff Time	Jurisdiction budget	Repeating	On-going
Mission Hills-4	Conduct a native, low water planting program for all jurisdictional owned facilities	Drought	Facilities Director	Medium	1, 2	$5,000 - $20,000 per facility	HMGP, BRIC, Jurisdiction budget	Ten years	New
Mission Hills-5	Identify and prepare local facilities to serve as heating/cooling centers.	Extreme Temperatures	Facilities Director	Medium	1, 2	$3,000 per facility	HMGP, Jurisdiction budget	Continuous	On-going

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Mission Hills-6	Continue to participate meet requirements of the NFIP.	Flood	NFIP Coordinator	High	1, 2	Staff time	Jurisdiction budget	Continuous	On-going
Mission Hills-7	Hire a firm to forecast flood events and then use the City's Code Red (reverse 911) to notify those that would likely be affected so they can take precautions /evacuate the area.	Flood	Mayor	Low	1, 2	$1,400,000	HMGP, BRIC, Jurisdiction budget	As required	Complete
Mission Hills-8	Install automatic bollards that come out of the roadway to block traffic when the creek sensors indicate that the roadway will be overtopped with water.	Flood	Mayor	Low	1, 2	$1,400,000	HMGP, BRIC, Jurisdiction budget	Ten years	Carried over lack of funding
Mission Hills-9	Hire a firm to forecast flood events and then use the City's Code Red (reverse 911) to notify those that would likely be affected so they can take precautions /evacuate the area.	Flood	Mayor	Medium	1,2	$1,400,000	HMGP, BRIC, Jurisdiction budget	Five years	Complete
Mission Hills-10	Realign Brush Creek in Hiawassee Park.	Flood	Mayor	Medium	1,2	$138,600	HMGP, BRIC, Jurisdiction budget	Five years	Carried over lack of funding
Mission Hills-11	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Facilities Director	Low	1, 2	$50,000 per location	HMGP, BRIC, Jurisdiction budget	Five years	New
Mission Hills-12	Conduct public education program for driving in winter conditions.	Severe Winter Weather	Mayor	Low	4	Staff Time	Jurisdiction budget	Five years	New
Mission Hills-13	Advocate for the construction personal buildings.	Tornado	Mayor	High	1, 2	Staff Time	HMGP, BRIC, Jurisdiction budget	Ten years	New
Mission Hills-14	Provide public education on wildfire preparedness.	Wildfire	Fire Chief	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	As required	New

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Mission Woods-1	Active building code enforcement to align with the national level.	All Hazards	Building Official	High	1,2	Staff Time	Jurisdiction budget	Repeating	On-going
Mission Woods-2	Continue to participate meet requirements of the NFIP.	Flood	NFIP Coordinator	High	1, 2	Staff time	Jurisdiction budget	Continuous	On-going
Mission Woods-3	Obtain entry into CRS program.	Flood	Mayor	High	3,4	Staff time	Jurisdiction budget	Five years	Carried over lack of staff
Mission Woods-4	Conduct public education program for driving in winter conditions.	Severe Winter Weather	Mayor	Low	4	Staff Time	Jurisdiction budget	Five years	New
Olathe-1	Purchase and install elevated backup power generator at Water Collector Well #3. Currently this site does not have back-up power for storm or emergency events.	All hazards	Emergency Preparedness Coordinator, Infrastructure Engineering	High	Goals 1,2	$1,582,000	HMGP, BRIC, Jurisdiction budget	One Year	New
Olathe-2	Purchase and Install Curtis Street Reservoir Emergency Generator	All hazards	Emergency Preparedness Coordinator, Infrastructure Engineering	High	Goals 1,2	$900,000	HMGP, BRIC, Jurisdiction budget	One Year	New
Olathe-3	Purchase and Installation of Back-up Battery Power at 8 new and 6 existing traffic signal locations.	All Hazards	Emergency Preparedness Coordinator, Infrastructure Engineering	High	Goals 1,2	$123,000	HMGP, BRIC, Jurisdiction budget	One Year	New
Olathe-4	Design, purchase, and install microgrids that utilize renewable power at critical infrastructure locations such as city water plant and community-based health care facilities to provide redundancy to backup power generation systems.	All-Hazards	Emergency Preparedness Coordinator	High	Goals 1,2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	Five Years	New
Olathe-5	Conduct a native, low water planting program for all jurisdictional owned facilities	Drought	Facilities Director	Low	1, 2	$5,000 - $20,000 per facility	HMGP, BRIC, Jurisdiction budget	Ten years	New

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Olathe-6	Install New Spillway at Lake Olathe Dam	Dam/Levee Failure	Emergency Preparedness Coordinator, Infrastructure Engineering	Medium	1, 2, 4	$5,000 per location	BRIC, HMGP, Jurisdiction budget	Five years	New
Olathe-7	Prepare and deliver education campaign to public on effects and mitigation strategies for extreme temperatures.	Extreme Temperatures	Fire Department	Medium	1, 2	$1,000 per class	Jurisdiction budget	Five years	New
Olathe-8	Construct New Bridge to replace Low-Water crossing at Lake Olathe	Flooding	Emergency Preparedness Coordinator, Infrastructure Engineering	High	Goals 1,2	$1,392,000	HMGP, BRIC, Jurisdiction budget	One Year	New
Olathe-9	Continue to participate meet requirements of the NFIP.	Flood	NFIP Coordinator	High	1, 2	Staff time	Jurisdiction budget	Continuous	On-going
Olathe-10	Construct community saferooms in select jurisdictional buildings, schools, and faith-based organizations.	Severe Weather, Tornado	Emergency Preparedness Coordinator	High	Goals 1,2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	Five Years	New
Olathe-11	Conduct public education program for winter storm preparedness	Severe Winter Weather	Emergency Preparedness Coordinator	Medium	4	Staff Time	HMGP, BRIC, Jurisdiction budget	Five Years	New
Olathe-12	Create defensible space buffers at all critical facilities	Wildfire	Fire Chief, Emergency Preparedness Coordinator	Medium	1,2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	Ten Years	New
Olathe-13	Identify and prepare local facilities to serve as heating/cooling centers.	Extreme Temperatures	Fire Department	Medium	1, 2	$3,000 per facility	Jurisdiction budget	Five years	Complete
Olathe-14	Design and construct the Cedar Creek Wastewater Treatment Plan flood wall modifications.	Flood	Infrastructure Engineering	High	1, 2	$1,000,000	Jurisdiction budget	Five years	Complete
Olathe-15	Purchase and demolish targeted, single-family structures identified in the updated flood plain maps.	Flood	Infrastructure Engineering	High	1, 2	$750,000 for five structures	Jurisdiction budget	Ten years	Complete

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Olathe-16	Design and complete storm drainage culvert expansion at 147/Brougham Dr.	Flood	Infrastructure Engineering	High	1, 2	$200,000	Jurisdiction budget	Five years	Complete
Olathe-17	Purchase and upgrade computers for the Olathe EOC & DOC.	Cybersecurity Event	IT Director	High	1, 2	$7,000	Jurisdiction budget	Five years	Complete
Olathe-18	Complete the Water Plant 2 chlorine gas retrofit to sodium hypochlorite.	Hazardous Materials	Environmental Services Director	High	1, 2	$250,000	Jurisdiction budget	Five years	Complete
Overland Park-1	Purchase and install critical facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Mayor	High	1, 2	$25,000 - $50,000 per facility	HMGP, BRIC, Jurisdiction budget	Five years	Carried over lack of funding
Overland Park-2	Purchase electronic plan review and recording software and conduct building code enforcement	All hazards	Code Administrator	Medium	1, 2	$400,000	HMGP, Jurisdiction budget	Five years	Carried over lack of funding
Overland Park-4	Deliver public education of city businesses, homeowners and residents and all city staff in OP for disaster preparedness, mitigation and recovery.	All Hazards	Emergency Management Coordinator	Medium	4	$100,000	HMGP, Jurisdiction budget	Five years	Carried over lack of funding
Overland Park-5	Active building code enforcement to align with the national level.	All Hazards	Building Official	High	1,2	Staff Time	Jurisdiction budget	Repeating	On-going
Overland Park-6	Install evacuation route signage in any high hazard dam or levee failure inundation areas.	Dam/Levee Failure	Mayor	Medium	1, 2, 4	$5,000 per location	HMGP, Jurisdiction budget	Five years	New
Overland Park-7	Conduct a native, low water planting program for all jurisdictional owned facilities	Drought	Facilities Director	Medium	1, 2	$5,000 - $20,000 per facility	HMGP, BRIC, Jurisdiction budget	Ten years	New
Overland Park-8	Retrofit four of the five fire stations in Overland Park with wind resistant/energy efficient doors. All large surface area windows would be fitted with storm panels or shutters.	Extreme Temperatures, Severe Weather	Fire Chief	Medium	1, 2	$400,000	BRIC, HMGP, Jurisdiction budget	Five years	Carried over lack of funding
Overland Park-9	Continue to participate meet requirements of the NFIP.	Flood	NFIP Coordinator	High	1, 2	Staff time	Jurisdiction budget	Continuous	On-going

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Overland Park-10	Complete flood control projects and storm sewer upgrades throughout the city. Projects are prioritized based on engineering and economic feasibility; severity of flooding; availability of city funds to pursue the project; and degree of interest in the project by property owners as manifested by the donation to the city of easements necessary to construct the project.	Flood	Director, Public Works, Floodplain Manager, Engineering Division	Medium	1, 2	Location and size dependent	Stormwater Utility Fund, JOCO Stormwater Mgt. Program, FEMA mitigation and repetitive loss grants.	Five years	Carried over lack of funding
Overland Park-11	Design and construction of regional storm water detention facilities to control and/or reduce runoff generated by redevelopment of the downstream area.	Flood	Director, Public Works, Floodplain Manager, Engineering Division	Medium	1, 2	Location, and size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	Carried over lack of funding
Overland Park-12	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Facilities Director	Low	1, 2	$50,000 per location	HMGP, BRIC, Jurisdiction budget	Five years	New
Overland Park-13	Conduct public education program for driving in winter conditions.	Severe Winter Weather	Mayor	Low	4	Staff Time	Jurisdiction budget	Five years	New
Overland Park-14	Construct community saferooms in select jurisdictional buildings.	Tornado	Mayor	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	Carried over lack of funding
Overland Park-15	Create defensible space buffers at all critical facilities	Wildfire	Fire Chief	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	As required	New
Prairie Village-1	Purchase and install critical facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Public Works Director	High	1, 2	$25,000 - $50,000 per facility	HMGP, BRIC,	Five years	Carried over lack of funding

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
							Jurisdiction budget		
Prairie Village-2	Bury underground utility cables.	-	-	-	-	-	-	-	Deleted, not feasible
Prairie Village-3	Active building code enforcement to align with the national level.	All Hazards	Building Official	High	1,2	Staff Time	Jurisdiction budget	Repeating	On-going
Prairie Village-4	Conduct a native, low water planting program for all jurisdictional owned facilities	Drought	Public Works Director	Medium	1, 2	$5,000 - $20,000 per facility	HMGP, BRIC, Jurisdiction budget	Ten years	New
Prairie Village-5	Identify and prepare local facilities to serve as heating/cooling centers.	Extreme Temperatures	Facilities Director	Medium	1, 2	$3,000 per facility	HMGP, Jurisdiction budget	Five years	New
Prairie Village-6	Continue to participate meet requirements of the NFIP.	Flood	NFIP Coordinator	High	1, 2	Staff time	Jurisdiction budget	Continuous	On-going
Prairie Village-7	Construct rainwater retention/detention ponds or other flood control projects at strategic locations.	Flood	Public Works Director	Low	1, 2	Location and size dependent	HMGP, BRIC, Jurisdiction budget	As required	Carried over lack of funding
Prairie Village-8	Acquisition and demolition of structures with repetitive flood losses.	Flood	Public Works Director	Medium	1, 2	Location dependent	HMGP, BRIC, Jurisdiction budget	Ten years	New
Prairie Village-9	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Public Works Director	Low	1, 2	$50,000 per location	HMGP, BRIC, Jurisdiction budget	Five years	New
Prairie Village-10	Conduct public education program for driving in winter conditions.	Severe Winter Weather	Emergency Management Director	Low	4	Staff Time	Jurisdiction budget	Five years	New
Prairie Village-11	Construct community saferooms in select jurisdictional buildings.	Tornado	Public Works Director	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	Carried over lack of funding

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Prairie Village-12	Create defensible space buffers at all critical facilities	Wildfire	Fire Chief	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	As required	New
Roeland Park-1	Purchase and install critical facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Mayor	High	1, 2	$25,000 - $50,000 per facility	HMGP, BRIC, Jurisdiction budget	Five years	New
Roeland Park-2	Upgrade warning siren system to expand coverage and capabilities.	All hazards	Mayor	High	1, 2	$50,000 annually	HMGP, Jurisdiction budget	As required	New
Roeland Park-3	Active building code enforcement to align with the national level.	All Hazards	Building Official	High	1,2	Staff Time	Jurisdiction budget	Repeating	On-going
Roeland Park-4	Install evacuation route signage in any high hazard dam or levee failure inundation areas.	Dam/Levee Failure	Mayor	Medium	1, 2, 4	$5,000 per location	HMGP, Jurisdiction budget	Five years	New
Roeland Park-5	Conduct a native, low water planting program for all jurisdictional owned facilities	Drought	Facilities Director	Medium	1, 2	$5,000 - $20,000 per facility	HMGP, BRIC, Jurisdiction budget	Ten years	New
Roeland Park-6	Identify and prepare local facilities to serve as heating/cooling centers.	Extreme Temperatures	Facilities Director	Medium	1, 2	$3,000 per facility	HMGP, Jurisdiction budget	Five years	New
Roeland Park-7	Continue to participate meet requirements of the NFIP.	Flood	NFIP Coordinator	High	1, 2	Staff time	Jurisdiction budget	Continuous	On-going
Roeland Park-8	Construct rainwater retention/detention ponds or other flood control projects at strategic locations.	Flood	Mayor	Medium	1, 2	Location and size dependent	HMGP, BRIC, Jurisdiction budget	As required	New
Roeland Park-9	Acquisition and demolition of structures with repetitive flood losses.	Flood	Mayor	Medium	1, 2	Location dependent	HMGP, BRIC, Jurisdiction budget	Ten years	Carried over lack of funding

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Roeland Park-10	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Facilities Director	Low	1, 2	$50,000 per location	HMGP, BRIC, Jurisdiction budget	Five years	New
Roeland Park-11	Conduct public education program for driving in winter conditions.	Severe Winter Weather	Mayor	Low	4	Staff Time	Jurisdiction budget	Five years	New
Roeland Park-12	Construct community saferooms in select jurisdictional buildings.	Tornado	Mayor	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	Carried over lack of funding
Roeland Park-13	Create defensible space buffers at all critical facilities	Wildfire	Fire Chief	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	As required	New
Shawnee-1	Purchase and install critical facility backup generators in conjunction with hardening existing electrical systems.	All hazards	City Manager/Facilities Program Manager	High	1, 2	$25,000 - $50,000 per facility	HMGP, BRIC, Jurisdiction budget	Five years	On-going
Shawnee-2	Upgrade warning siren system to expand coverage and capabilities.	All Hazards	Mayor	High	1, 2	$50,000 annually	HMGP, Jurisdiction budget	As required	New
Shawnee-3	Active building code enforcement to align with the national level.	All Hazards	Building Official	High	1,2	Staff Time	Jurisdiction budget	Repeating	On-going
Shawnee-4	Replace aging public safety radios with new P25, encrypted radios to be used for disaster response, CERT volunteers, and special events.	All Hazards	Emergency Manager	Medium	4	$150,000	Jurisdiction budget	Three years	New
Shawnee-5	Work with private dam owners to exercise their evacuation route plans in any high hazard dam or levee failure inundation areas.	Dam/Levee Failure	Emergency Manager	Medium	1, 2, 4	$5,000 per location	HMGP, Jurisdiction budget	Five years	New
Shawnee-6	Assess the need for a native, low water planting program for all jurisdictional owned facilities	Drought	Facilities Program Manager	Medium	1, 2	$5,000 - $20,000 per facility	HMGP, BRIC, Jurisdiction budget	Ten years	New

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Shawnee-7	Educate and inform residents about Contain the Rain program	Drought	Parks Director	Low	1, 2	$4,000/yr	Jurisdiction budget, Johnson County Stormwater budget	Ten years	On-going
Shawnee-8	Identify and prepare local facilities to serve as heating/cooling centers.	Extreme Temperatures	City Manager/Emergency Manager	Medium	1, 2	$3,000 per facility	HMGP, Jurisdiction budget	Five years	New
Shawnee-9	Continue to participate meet requirements of the NFIP.	Flood	NFIP Coordinator	High	1, 2	Staff time	Jurisdiction budget	Continuous	On-going
Shawnee-10	Update the BSEGS to meet the required 5/4 BSEGS rating to improve CRS rating	Flood	Emergency Manager	High	1, 2, 3	Staff time	Jurisdiction budget	Two years	New
Shawnee-11	Conduct system wide stormwater drainage maintenance and repair.	Flood	Public Works Director	High	1, 2	Location, length, and size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	On-going
Shawnee-12	Work with the USACE Silver Jackets to increase Turn Around Don't Drown signage throughout the city.	Flood	Emergency Manager/NFIP Coordinator	High	1, 2,4	Staff time	Jurisdiction budget	Five years	On-going
Shawnee-13	Work with developers and property owners to implement water quality streamway corridors to help improve water quality.	Flood	Environmental Coordinator	High	1, 2	Staff time	HMGP, BRIC, Jurisdiction budget	As required	New
Shawnee-14	Design and retrofit flood proof building in identified floodplains. Identify habitable buildings in the floodplain and/or are subject to flooding, prioritize locations, install/complete flood proofing techniques for buildings as Funding becomes available if buyout is not an option.	Flood	Public Works Director	High	1, 2, 4	Location, length, and size dependent	HMGP, BRIC, Jurisdiction budget	Five years	New
Shawnee-15	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Facilities Director	Low	1, 2	$50,000 per location	HMGP, BRIC,	Five years	New

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
							Jurisdiction budget		
Shawnee-16	Conduct public education program for driving in winter conditions.	Severe Winter Weather	Communications Director	Low	4	Staff Time	Jurisdiction budget	Five years	New
Shawnee-17	Construct community education on tornado safety and notification.	Tornado	Emergency Manager	High	1, 2	$5,000/yr	HMGP, BRIC, Jurisdiction budget	Ten years	On-going
Shawnee-18	Identify and educate owners of critical facilities about the need to create defensible space buffers.	Wildfire	Fire Chief	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	As required	New
Shawnee-19	Cybersecurity training and exercise	Cybersecurity	IT Director	High	1, 2, 3, 4	$25 ,000	Jurisdictional	Three years	New
Shawnee-20	Educate, equip, and train fire crews to keep inland oil/hydrocarbon spills from train derailment or tanker truck spills out of waterways.	Hazardous Materials	Fire Chief	High	1, 2,3, 4	$20,000	Jurisdiction budget	Three years	New
Shawnee-21	Meridian Beam Gate and deployable Vehicle Barriers. Moveable, reusable barriers are used to provide protection/deterrence for Hostile Vehicle Mitigation at multiple special events held each year in Shawnee.	Terrorism	Police Chief	High	1, 2	$150,000	Jurisdictional	Three years	New
Shawnee-22	Install removeable bollards on Johnson Drive in front of City Hall to prevent vehicle ramming at multiple events each year.	Terrorism	Police Chief	High	1, 2	$250,000	Jurisdictional	Four Years	New
Spring Hill-1	Purchase and install critical facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Mayor	High	1, 2	$25,000 - $50,000 per facility	HMGP, BRIC, Jurisdiction budget	Five years	Carried over due to lack of funding
Spring Hill-2	Upgrade warning siren system to expand coverage and capabilities.	All hazards	Mayor	High	1, 2	$50,000 annually	HMGP, Jurisdiction budget	As required	New

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Spring Hill-3	Active building code enforcement to align with the national level.	All Hazards	Building Official	High	1,2	Staff Time	Jurisdiction budget	Repeating	On-going
Spring Hill-4	Install evacuation route signage in any high hazard dam or levee failure inundation areas.	Dam/Levee Failure	Mayor	Medium	1, 2, 4	$5,000 per location	HMGP, Jurisdiction budget	Five years	New
Spring Hill-5	Conduct a native, low water planting program for all jurisdictional owned facilities	Drought	Facilities Director	Medium	1, 2	$5,000 - $20,000 per facility	HMGP, BRIC, Jurisdiction budget	Ten years	New
Spring Hill-6	Identify and prepare local facilities to serve as heating/cooling centers.	Extreme Temperatures	Facilities Director	Medium	1, 2	$3,000 per facility	HMGP, Jurisdiction budget	Five years	New
Spring Hill-7	Continue to participate meet requirements of the NFIP.	Flood	NFIP Coordinator	High	1, 2	Staff time	Jurisdiction budget	Continuous	On-going
Spring Hill-8	Acquisition and demolition of flood prone properties.	Flood	Mayor	Low	1, 2	Location and size dependent	HMGP, BRIC, Jurisdiction budget	As required	Carried over lack of funding
Spring Hill-9	Clean and repair drainage ditches to maintain capacity.	Flood	Mayor	Low	1, 2	Location, length, and size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	New
Spring Hill-10	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Facilities Director	Low	1, 2	$50,000 per location	HMGP, BRIC, Jurisdiction budget	Five years	New
Spring Hill-11	Conduct public education program for driving in winter conditions.	Severe Winter Weather	Mayor	Low	4	Staff Time	Jurisdiction budget	Five years	New
Spring Hill-12	Construct community saferooms in select jurisdictional buildings.	Tornado	Mayor	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	Carried over lack of funding
Spring Hill-13	Create defensible space buffers at all critical facilities	Wildfire	Fire Chief	High	1, 2	Facility size dependent	HMGP, BRIC,	As required	New

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
							Jurisdiction budget		
Westwood-1	Purchase and install critical facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Mayor	High	1, 2	$25,000 - $50,000 per facility	HMGP, BRIC, Jurisdiction budget	Five years	Carried over due to lack of funding
Westwood-2	Upgrade warning siren system to expand coverage and capabilities.	All hazards	Mayor	High	1, 2	$50,000 annually	HMGP, Jurisdiction budget	As required	New
Westwood-3	Active building code enforcement to align with the national level.	All Hazards	Building Official	High	1,2	Staff Time	Jurisdiction budget	Repeating	On-going
Westwood-4	Install evacuation route signage in any high hazard dam or levee failure inundation areas.	Dam/Levee Failure	Mayor	Medium	1, 2, 4	$5,000 per location	HMGP, Jurisdiction budget	Five years	New
Westwood-5	Conduct a native, low water planting program for all jurisdictional owned facilities	Drought	Facilities Director	Medium	1, 2	$5,000 - $20,000 per facility	HMGP, BRIC, Jurisdiction budget	Ten years	New
Westwood-6	Identify and prepare local facilities to serve as heating/cooling centers.	Extreme Temperatures	Facilities Director	Medium	1, 2	$3,000 per facility	HMGP, Jurisdiction budget	Five years	New
Westwood-7	Continue to participate meet requirements of the NFIP.	Flood	NFIP Coordinator	High	1, 2	Staff time	Jurisdiction budget	Continuous	On-going
Westwood-8	Acquisition and demolition of flood prone properties.	Flood	Mayor	Low	1, 2	Location and size dependent	HMGP, BRIC, Jurisdiction budget	As required	Carried over lack of funding
Westwood-9	Clean and repair drainage ditches to maintain capacity.	Flood	Mayor	Low	1, 2	Location, length, and size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	New
Westwood-10	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Facilities Director	Low	1, 2	$50,000 per location	HMGP, BRIC, Jurisdiction budget	Five years	New

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Westwood-11	Conduct public education program for driving in winter conditions.	Severe Winter Weather	Mayor	Low	4	Staff Time	Jurisdiction budget	Five years	New
Westwood-12	Construct community saferooms in select jurisdictional buildings.	Tornado	Mayor	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	Carried over lack of funding
Westwood-13	Create defensible space buffers at all critical facilities	Wildfire	Fire Chief	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	As required	New
Westwood Hills-1	Purchase and install critical facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Mayor	High	1, 2	$25,000 - $50,000 per facility	HMGP, BRIC, Jurisdiction budget	Five years	Carried over due to lack of funding
Westwood Hills-2	Upgrade warning siren system to expand coverage and capabilities.	All hazards	Mayor	High	1, 2	$50,000 annually	HMGP, Jurisdiction budget	As required	New
Westwood Hills-3	Active building code enforcement to align with the national level.	All Hazards	Building Official	High	1,2	Staff Time	Jurisdiction budget	Repeating	On-going
Westwood Hills-4	Install evacuation route signage in any high hazard dam or levee failure inundation areas.	Dam/Levee Failure	Mayor	Medium	1, 2, 4	$5,000 per location	HMGP, Jurisdiction budget	Five years	New
Westwood Hills-5	Conduct a native, low water planting program for all jurisdictional owned facilities	Drought	Facilities Director	Medium	1, 2	$5,000 - $20,000 per facility	HMGP, BRIC, Jurisdiction budget	Ten years	New
Westwood Hills-6	Identify and prepare local facilities to serve as heating/cooling centers.	Extreme Temperatures	Facilities Director	Medium	1, 2	$3,000 per facility	HMGP, Jurisdiction budget	Five years	New
Westwood Hills-7	Continue to participate meet requirements of the NFIP.	Flood	NFIP Coordinator	High	1, 2	Staff time	Jurisdiction budget	Continuous	On-going
Westwood Hills-8	Acquisition and demolition of flood prone properties.	Flood	Mayor	Low	1, 2	Location and size dependent	HMGP, BRIC, Jurisdiction budget	As required	Carried over lack of funding

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Westwood Hills-9	Clean and repair drainage ditches to maintain capacity.	Flood	Mayor	Low	1, 2	Location, length, and size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	New
Westwood Hills-10	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Facilities Director	Low	1, 2	$50,000 per location	HMGP, BRIC, Jurisdiction budget	Five years	New
Westwood Hills-11	Conduct public education program for driving in winter conditions.	Severe Winter Weather	Mayor	Low	4	Staff Time	Jurisdiction budget	Five years	New
Westwood Hills-12	Construct community saferooms in select jurisdictional buildings.	Tornado	Mayor	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	Carried over lack of funding
Westwood Hills-13	Create defensible space buffers at all critical facilities	Wildfire	Fire Chief	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	As required	New
Johnson County Community College-1	Purchase and install school facility backup generators in conjunction with hardening existing electrical systems.	All hazards	President	High	1, 2	$10,000 - $50,000 per facility	HMGP, BRIC, School Budget	Five years	Carried over due to lack of funding
Johnson County Community College -2	Conduct hazard mitigation education programs for students.	All hazards	President	Medium	1, 2, 3	$2,000	School Budget	As required	New
Johnson County Community College -3	Conduct a low water planting program for all school buildings.	Drought	President	Low	1, 2	$10,000 - per location	HMGP, BRIC, School Budget	Ten years	New
Johnson County Community College -4	Conduct an extreme temperature awareness seminar to educate on risks and mitigation methods.	Extreme Temperatures, Severe Winter Weather	President	Medium	1, 2	$500	HMGP, Jurisdiction budget	Five years	New

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Johnson County Community College -5	Construct rainwater gardens adjacent to paved areas.	Flood	President	Low	1, 2	Location and size dependent	HMGP, BRIC, School Budget	As required	New
Johnson County Community College -6	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	President	Low	1, 2	$100,000 per location	Facility size dependent	Five years	New
Johnson County Community College -7	Construct safe rooms in all school buildings to required standards.	Tornado	President	High	1, 2	$1,000,000 -per location	HMGP, BRIC, School budget	Ten years	Carried over lack of funding
Johnson County Community College -8	Conduct regular staff and student active shooter trainings.	Terrorism	President	High	1, 2, 3	Location and size dependent	HMGP, School Budget	As required	New
Kansas School Deaf-1	Purchase and install school facility backup generators in conjunction with hardening existing electrical systems.	All hazards	President	High	1, 2	$10,000 - $50,000 per facility	HMGP, BRIC, School Budget	Five years	Carried over lack of funding
Kansas School Deaf -2	Purchase and install mass notification system for deaf (visual notice) and for blind (audio) individuals to provide warnings for intruders, hazards, natural disasters, bomb and civil disorder events.	All hazards	President	High	1, 2	$800,000	HMGP, School Budget	Five years	Carried over lack of funding
Kansas School Deaf -3	Conduct hazard mitigation education programs for students.	All hazards	President	Medium	1, 2, 3	$2,000	School Budget	As required	New
Kansas School Deaf -4	Conduct a low water planting program for all school buildings.	Drought	President	Low	1, 2	$10,000 - per location	HMGP, BRIC, School Budget	Ten years	New
Kansas School Deaf -5	Conduct an extreme temperature awareness seminar to educate on risks and mitigation methods.	Extreme Temperatures, Severe Winter Weather	President	Medium	1, 2	$500	HMGP, Jurisdiction budget	Five years	New

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Kansas School Deaf -6	Construct rainwater gardens adjacent to paved areas.	Flood	President	Low	1, 2	Location and size dependent	HMGP, BRIC, School Budget	As required	New
Kansas School Deaf -7	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	President	Low	1, 2	$100,000 per location	Facility size dependent	Five years	New
Kansas School Deaf -8	Construct safe rooms in all school buildings to required standards.	Tornado	President	High	1, 2	$1,000,000 -per location	HMGP, BRIC, School budget	Ten years	Carried over lack of funding
Kansas School Deaf -9	Conduct regular staff and student active shooter trainings.	Terrorism	President	High	1, 2, 3	Location and size dependent	HMGP, School Budget	As required	New
Kansas School Deaf -10	Provide vaccination services at on-site clinic using the qualified medical staff.	Transmissible Disease	President	High	1, 2, 3	Staff Time	School Budget	As required	
KU Edwards-1	Conduct hazard mitigation education programs for students.	All hazards	President	Medium	1, 2, 3	$2,000	School Budget	As required	New
KU Edwards - 2	Conduct a low water planting program for all school buildings.	Drought	President	Low	1, 2	$10,000 - per location	HMGP, BRIC, School Budget	Ten years	New
KU Edwards - 3	Conduct an extreme temperature awareness seminar to educate on risks and mitigation methods.	Extreme Temperatures, Severe Winter Weather	President	Medium	1, 2	$500	HMGP, Jurisdiction budget	Five years	New
KU Edwards - 4	Construct rainwater gardens adjacent to paved areas.	Flood	President	Low	1, 2	Location and size dependent	HMGP, BRIC, School Budget	As required	New
KU Edwards - 5	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	President	Low	1, 2	$100,000 per location	Facility size dependent	Five years	New

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
KU Edwards - 6	Construct safe rooms in all school buildings to required standards.	Tornado	President	High	1, 2	$1,000,000 -per location	HMGP, BRIC, School budget	Ten years	Carried over lack of funding
KU Edwards - 7	Conduct regular staff and student active shooter trainings.	Terrorism	President	High	1, 2, 3	Location and size dependent	HMGP, School Budget	As required	New
KU Edwards - 8	Conduct hazard mitigation education programs for students.	All hazards	President	Medium	1, 2, 3	$2,000	School Budget	As required	New
USD229-1	Purchase and install school facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Superintendent	High	1, 2	$10,000 - $50,000 per facility	HMGP, BRIC, School Budget	Five years	Carried over lack of funding
USD229-2	Conduct hazard mitigation education programs for students.	All hazards	Superintendent	Medium	1, 2, 3	$2,000	School Budget	As required	Carried over lack of funding
USD229-3	Conduct a low water planting program for all school buildings.	Drought	Superintendent	Low	1, 2	$10,000 - per location	HMGP, BRIC, School Budget	Ten years	New
USD229-4	Conduct an extreme temperature awareness seminar to educate on risks and mitigation methods.	Extreme Temperatures, Severe Winter Weather	Superintendent	Medium	1, 2	$500	HMGP, Jurisdiction budget	Five years	New
USD229-5	Construct rainwater gardens adjacent to paved areas.	Flood	Superintendent	Low	1, 2	Location and size dependent	HMGP, BRIC, School Budget	As required	New
USD229-6	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Superintendent	Low	1, 2	$100,000 per location	Facility size dependent	Five years	New
USD229-7	Construct safe rooms in all school buildings to required standards.	Tornado	Superintendent	High	1, 2	$1,000,000 -per location	HMGP, BRIC, School budget	Ten years	Carried over lack of funding

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
USD229-8	Conduct regular staff and student active shooter trainings.	Terrorism	Superintendent	High	1, 2, 3	Location and size dependent	HMGP, School Budget	As required	New
USD230-1	Purchase and install school facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Superintendent	High	1, 2	$10,000 - $50,000 per facility	HMGP, BRIC, School Budget	Five years	Carried over lack of funding
USD230-2	Conduct hazard mitigation education programs for students.	All hazards	Superintendent	Medium	1, 2, 3	$2,000	School Budget	As required	Carried over lack of funding
USD230-3	Conduct a low water planting program for all school buildings.	Drought	Superintendent	Low	1, 2	$10,000 - per location	HMGP, BRIC, School Budget	Ten years	New
USD230-4	Conduct an extreme temperature awareness seminar to educate on risks and mitigation methods.	Extreme Temperatures, Severe Winter Weather	Superintendent	Medium	1, 2	$500	HMGP, Jurisdiction budget	Five years	New
USD230-5	Construct rainwater gardens adjacent to paved areas.	Flood	Superintendent	Low	1, 2	Location and size dependent	HMGP, BRIC, School Budget	As required	New
USD230-6	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Superintendent	Low	1, 2	$100,000 per location	Facility size dependent	Five years	New
USD230-7	Construct safe rooms in all school buildings to required standards.	Tornado	Superintendent	High	1, 2	$1,000,000 -per location	HMGP, BRIC, School budget	Ten years	Carried over lack of funding
USD230-8	Conduct regular staff and student active shooter trainings.	Terrorism	Superintendent	High	1, 2, 3	Location and size dependent	HMGP, School Budget	As required	New
USD231-1	Purchase and install school facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Superintendent	High	1, 2	$10,000 - $50,000 per facility	HMGP, BRIC,	Five years	Carried over lack of funding

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
							School Budget		
USD231-2	Conduct hazard mitigation education programs for students.	All hazards	Superintendent	Medium	1, 2, 3	$2,000	School Budget	As required	Carried over lack of funding
USD231-3	Conduct a low water planting program for all school buildings.	Drought	Superintendent	Low	1, 2	$10,000 - per location	HMGP, BRIC, School Budget	Ten years	New
USD231-4	Conduct an extreme temperature awareness seminar to educate on risks and mitigation methods.	Extreme Temperatures, Severe Winter Weather	Superintendent	Medium	1, 2	$500	HMGP, Jurisdiction budget	Five years	New
USD231-5	Construct rainwater gardens adjacent to paved areas.	Flood	Superintendent	Low	1, 2	Location and size dependent	HMGP, BRIC, School Budget	As required	New
USD231-6	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Superintendent	Low	1, 2	$100,000 per location	Facility size dependent	Five years	New
USD231-7	Construct safe rooms in all school buildings to required standards.	Tornado	Superintendent	High	1, 2	$1,000,000 -per location	HMGP, BRIC, School budget	Ten years	Carried over lack of funding
USD231-8	Conduct regular staff and student active shooter trainings.	Terrorism	Superintendent	High	1, 2, 3	Location and size dependent	HMGP, School Budget	As required	New
USD232-1	Purchase and install school facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Superintendent	High	1, 2	$10,000 - $50,000 per facility	HMGP, BRIC, School Budget	Five years	Carried over lack of funding
USD232-2	Conduct hazard mitigation education programs for students.	All hazards	Superintendent	Medium	1, 2, 3	$2,000	School Budget	As required	Carried over lack of funding

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
USD232-3	Conduct a low water planting program for all school buildings.	Drought	Superintendent	Low	1, 2	$10,000 - per location	HMGP, BRIC, School Budget	Ten years	New
USD232-4	Conduct an extreme temperature awareness seminar to educate on risks and mitigation methods.	Extreme Temperatures, Severe Winter Weather	Superintendent	Medium	1, 2	$500	HMGP, Jurisdiction budget	Five years	New
USD232-5	Construct rainwater gardens adjacent to paved areas.	Flood	Superintendent	Low	1, 2	Location and size dependent	HMGP, BRIC, School Budget	As required	New
USD232-6	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Superintendent	Low	1, 2	$100,000 per location	Facility size dependent	Five years	New
USD232-7	Construct safe rooms in all school buildings to required standards.	Tornado	Superintendent	High	1, 2	$1,000,000 -per location	HMGP, BRIC, School budget	Ten years	Carried over lack of funding
USD232-8	Conduct regular staff and student active shooter trainings.	Terrorism	Superintendent	High	1, 2, 3	Location and size dependent	HMGP, School Budget	As required	New
USD233-1	Purchase and install school facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Superintendent	High	1, 2	$10,000 - $50,000 per facility	HMGP, BRIC, School Budget	Five years	Carried over lack of funding
USD233-2	Conduct hazard mitigation education programs for students.	All hazards	Superintendent	Medium	1, 2, 3	$2,000	School Budget	As required	Carried over lack of funding
USD233-3	Conduct a low water planting program for all school buildings.	Drought	Superintendent	Low	1, 2	$10,000 - per location	HMGP, BRIC, School Budget	Ten years	New

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
USD233-4	Conduct an extreme temperature awareness seminar to educate on risks and mitigation methods.	Extreme Temperatures, Severe Winter Weather	Superintendent	Medium	1, 2	$500	HMGP, Jurisdiction budget	Five years	New
USD233-5	Construct rainwater gardens adjacent to paved areas.	Flood	Superintendent	Low	1, 2	Location and size dependent	HMGP, BRIC, School Budget	As required	New
USD233-6	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Superintendent	Low	1, 2	$100,000 per location	Facility size dependent	Five years	New
USD233-7	Construct safe rooms in all school buildings to required standards.	Tornado	Superintendent	High	1, 2	$1,000,000 -per location	HMGP, BRIC, School budget	Ten years	Carried over lack of funding
USD233-8	Conduct regular staff and student active shooter trainings.	Terrorism	Superintendent	High	1, 2, 3	Location and size dependent	HMGP, School Budget	As required	New
USD512-1	Purchase and install school facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Superintendent	High	1, 2	$10,000 - $50,000 per facility	HMGP, BRIC, School Budget	Five years	Carried over lack of funding
USD512-2	Conduct hazard mitigation education programs for students.	All hazards	Superintendent	Medium	1, 2, 3	$2,000	School Budget	As required	Carried over lack of funding
USD512-3	Conduct a low water planting program for all school buildings.	Drought	Superintendent	Low	1, 2	$10,000 - per location	HMGP, BRIC, School Budget	Ten years	New
USD512-4	Conduct an extreme temperature awareness seminar to educate on risks and mitigation methods.	Extreme Temperatures, Severe Winter Weather	Superintendent	Medium	1, 2	$500	HMGP, Jurisdiction budget	Five years	New

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
USD512-5	Construct rainwater gardens adjacent to paved areas.	Flood	Superintendent	Low	1, 2	Location and size dependent	HMGP, BRIC, School Budget	As required	New
USD512-6	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Superintendent	Low	1, 2	$100,000 per location	Facility size dependent	Five years	New
USD512-7	Construct safe rooms in all school buildings to required standards.	Tornado	Superintendent	High	1, 2	$1,000,000 -per location	HMGP, BRIC, School budget	Ten years	Carried over lack of funding
USD512-8	Conduct regular staff and student active shooter trainings.	Terrorism	Superintendent	High	1, 2, 3	Location and size dependent	HMGP, School Budget	As required	New
Fire District No. 1-1	Purchase and install facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Fire Chief	High	1, 2	$25,000 - $50,000 per facility	HMGP, BRIC, Fire budgets	Five years	New
Fire District No. 1-2	Design, purchase and retrofit fire stations within the Fire District with wind resistant / energy efficient doors. All large surface area windows would be fitted with storm panels.	Extreme Temperature, Severe Weather	Fire Chief	High	1,2	$60,000	HMGP, BRIC, Fire budgets	Five Years	Carried over lack of funding
Fire District No. 1-3	Reduce hazardous fuels in prioritized wildfire risk areas.	Wildfire	Fire Chief	Medium	1,2	$105.00 an acre	Federal WUI grant dollars, Fire budget	On going	New
Fire District No. 1-4	Conduct Wildland Urban Interface fire prevention and response training for public and firefighters.	Wildfire	Fire Chief	Medium	1,2,3	$30 per student per training	Federal WUI grant dollars, Fire budget	On going	New
Consolidated Fire District No. 2-1	Purchase and install facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Fire Chief	High	1, 2	$25,000 - $50,000 per facility	HMGP, BRIC, Fire budgets	Five years	New

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Consolidated Fire District No. 2-2	Design, purchase and retrofit fire stations within the Fire District with wind resistant / energy efficient doors. All large surface area windows would be fitted with storm panels.	Extreme Temperature, Severe Weather	Fire Chief	High	1,2	$60,000	HMGP, BRIC, Fire budgets	Five Years	Carried over lack of funding
Consolidated Fire District No. 2-3	Reduce hazardous fuels in prioritized wildfire risk areas.	Wildfire	Fire Chief	Medium	1,2	$105.00 an acre	Federal WUI grant dollars, Fire budget	On going	New
Consolidated Fire District No. 2-4	Conduct Wildland Urban Interface fire prevention and response training for public and firefighters.	Wildfire	Fire Chief	Medium	1,2,3	$30 per student per training	Federal WUI grant dollars, Fire budget	On going	New
Johnson County Fire District No. 2-1	Purchase and install facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Fire Chief	High	1, 2	$25,000 - $50,000 per facility	HMGP, BRIC, Fire budgets	Five years	New
Johnson County Fire District No. 2-2	Design, purchase and retrofit fire stations within the Fire District with wind resistant / energy efficient doors. All large surface area windows would be fitted with storm panels.	Extreme Temperature, Severe Weather	Fire Chief	High	1,2	$60,000	HMGP, BRIC, Fire budgets	Five Years	Carried over lack of funding
Johnson County Fire District No. 2-3	Reduce hazardous fuels in prioritized wildfire risk areas.	Wildfire	Fire Chief	Medium	1,2	$105.00 an acre	Federal WUI grant dollars, Fire budget	On going	New
Johnson County Fire District No. 2-4	Conduct Wildland Urban Interface fire prevention and response training for public and firefighters.	Wildfire	Fire Chief	Medium	1,2,3	$30 per student per training	Federal WUI grant dollars, Fire budget	On going	New
Northwest Consolidated Fire District-1	Purchase and install facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Fire Chief	High	1, 2	$25,000 - $50,000 per facility	HMGP, BRIC, Fire budgets	Five years	New

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Northwest Consolidated Fire District-2	Design, purchase and retrofit fire stations within the Fire District with wind resistant / energy efficient doors. All large surface area windows would be fitted with storm panels.	Extreme Temperature, Severe Weather	Fire Chief	High	1,2	$60,000	HMGP, BRIC, Fire budgets	Five Years	Carried over lack of funding
Northwest Consolidated Fire District-3	Reduce hazardous fuels in prioritized wildfire risk areas.	Wildfire	Fire Chief	Medium	1,2	$105.00 an acre	Federal WUI grant dollars, Fire budget	On going	New
Northwest Consolidated Fire District-4	Conduct Wildland Urban Interface fire prevention and response training for public and firefighters.	Wildfire	Fire Chief	Medium	1,2,3	$30 per student per training	Federal WUI grant dollars, Fire budget	On going	New
Water District #7-1	Purchase emergency generators for facilities to ensure continued operations. Loss of power could potentially curtail services to the community.	All Hazards	Director	High	1,2	$100,000	Jurisdiction budget, State grant, Federal grant	Two years	New
Water District #7-2	Replace and upgrade pump stations and water lines.	Drought, Wildfire	Director	High	1,2	Location and size dependent	Jurisdiction budget, State grant, Federal grant	Ten years	New
WaterOne-1	Purchase emergency generators for facilities to ensure continued operations. Loss of power could potentially curtail services to the community.	All Hazards	Director	High	1,2	$100,000	Jurisdiction budget, State grant, Federal grant	Two years	New
WaterOne-2	Replace and upgrade pump stations and water lines.	Drought, Wildfire	Director	High	1,2	Location and size dependent	Jurisdiction budget, State grant, Federal grant	Ten years	New
WaterOne1-1	Purchase and installation of emergency generators for facilities to	All Hazards	Director	High	1,2	$30,195,001	Jurisdiction budget,	Five Years	On the previous

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
	ensure continued operations. Loss of power could potentially curtail services to the community.						Federal grant		plan (amendment)
WaterOne1-2	Replace and upgrade pump stations to provide additional water capacity for fire and emergency storage.	Drought, Wildfire, Infrastructure Failure	Director	High	1,2	$41,047,108	Jurisdiction budget, Federal grant	Five to Ten Years	On the previous plan
WaterOne1-3	Kansas River replacement of vertical wells to minimize the impacts of river icing and improve the functionality of the wellfield.	Extreme Temperatures, Infrastructure Failure	Director	High	1,2	$5,850,584	Jurisdiction budget, Federal grant	Two to Three Years	New
WaterOne1-4	Addition of Kansas River horizontal collector well to alleviate the load of water on the Kansas Presedimentation Facility	Extreme Temperatures, Drought, Infrastructure Failure	Director	High	1,2	$4,508,332	Jurisdiction budget, Federal grant	Four Years	New
WaterOne1-5	Addition of the Wolcott Collector Well to increase water supply sourcing and maximize redundancy	Drought, Infrastructure Failure	Director	High	1,2	$17,209,169	Jurisdiction budget, Federal grant	One to Two Years	New
WaterOne1-6	Improvements to Facility 1 Water Treatment Plant to minimize infrastructure failure	Infrastructure Failure	Director	High	1,2	$4,054,539	Jurisdiction budget, Federal grant	Two to Three Years	New
WaterOne1-7	Zebra Mussel mitigation to minimize growth and infestation at the Missouri River Intake, reducing risk for infrastructure failure	Extreme Temperatures; Infrastructure Failure	Director	High	1,2	$1,213,288	Jurisdiction budget, Federal grant	Three Years	New
WaterOne1-8	Missouri Riverbed Degradation Study	Extreme Temperatures; Drought	Director	High	1,2	Location and size dependent	Jurisdiction budget, Federal grant	Five to Ten Years	New
WaterOne1-9	Transmission Main projects increasing resiliency, expanding connectivity of water	Drought; Wildfire;	Director	High	1,2	Location and size dependent	Jurisdiction budget,	Five Years	New

Johnson County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
		Infrastructure Failure					Federal grant		
Evergy-1	Encourage long-term decrease in consumer energy use.	All Hazards	Director	High	1, 2, 3, 4	Staff Time	Evergy budget	As required	New

Leavenworth County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Leavenworth County-1	Identify the county's most at-risk critical facilities and evaluate potential mitigation techniques for protecting each facility to the maximum extent possible.	All Hazards	Emergency Manager	Medium	1,2	$10,000-$15,000 per lift station	Jurisdiction budget Seeking grant funding	Five years	On Call pumper truck in case of disaster. Review Annually.
Leavenworth County-2	Conduct an inventory/survey for the county's emergency response services to identify any existing needs or shortfalls in terms of personnel, equipment or required resources.	All Hazards	Emergency Manager	Medium	1	Staff Time	Jurisdiction budget	Five years	Carried over, lack of staff
Leavenworth County-3	Develop cross-departmental information collection capabilities and incorporate cadastral (building/parcel) data utilizing a GIS for purposes of conducting more detailed hazard risk assessments and for tracking permitting / land use patterns, buildings and infrastructure replacement costs, and overall structural accounting for the county.	All Hazards	Emergency Manager	Medium	4	Staff Time	Jurisdiction budget	Five years	Accomplished and reviewed monthly.
Leavenworth County-4	Research and recommend appropriate building codes for the jurisdiction that includes wind resistant design techniques for new construction.	All Hazards	Emergency Manager	High	1,4	Staff Time	Jurisdiction budget	Five years	Updating to 2012 standards. No wind resistance at this time.
Leavenworth County-5	The Leavenworth Water Department will continue to assess the impact of natural hazards on water distribution lines, systems, and equipment. The Department will also seek additional funding sources to mitigate damage to critical infrastructure.	All Hazards	Water Department Director	Medium	1,2	Staff Time and Project Dependent	HMGP, BRIC, Jurisdiction budget	Five years	On-going

Leavenworth County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Leavenworth County-6	Collect educational materials on individual and family preparedness / mitigation measures for property owners, and display at both the library and routinely visited	All Hazards	Emergency Manager	High	3	Staff Time	Jurisdiction budget	Continuous	Carried over, lack of staff
Leavenworth County-7	Annually host a public “hazards workshop” in combination with local festivals, fairs, or other appropriate events.	All Hazards	Emergency Manager	High	3,4	Staff Time	Jurisdiction budget	Continuous	Carried over, lack of staff
Leavenworth County-8	Establish, promote, and fund continuity of water systems between rural water districts to larger water departments to manage future growth in the county.	All Hazards	Emergency Manager	Medium	4	Staff Time	Jurisdiction budget	Five years	Carried over, lack of staff
Leavenworth County-9	Prepare and adopt an Outdoor Warning Sirens Plan for the county, including consideration of the unique geographical locations, technical requirements, system types and operational procedures of each local jurisdiction.	All Hazards	Emergency Manager	Medium	1,2	Staff Time	Jurisdiction budget	Five years	Look into changing building regulations. Possible special assessment to new developme nts. Reviewed annually/as developme nts develop.
Leavenworth County-10	Mail updated information to all agricultural producers concerning emerging threats.	Agricultural Infestation	Emergency Manager	High	1, 2	Staff Time and $500	Jurisdiction budget	Five years	Refer to KS extension office
Leavenworth County-11	Conduct agricultural education program on water reduction methods.	Agricultural Infestation, Drought	Emergency Manager	High	1, 3	Staff Time	Jurisdiction budget	Five years	Refer to KS extension office

Leavenworth County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Leavenworth County-12	Develop an annex to the Local Emergency Operations Plan (LEOP) for dam/levee failure response and evacuation plans for high hazard dams/levees in Leavenworth County.	Dam/Levee Failure	Emergency Manager	High	1,2	Staff Time	Jurisdiction budget	Five years	Carried over, lack of staff
Leavenworth County-13	Research and contact all owners of high hazard dams in the county and inform them of their responsibility to provide Emergency Action Plans to the Leavenworth County Emergency Management. Additionally, Levee owners should be contacted regarding potential PM 43 requirements for continued validation of protected areas behind the levees.	Dam/Levee Failure	Emergency Manager	High	3,4	Staff Time	Jurisdiction budget	Continuous	Carried over, lack of staff
Leavenworth County-14	NFIP - Identify levee owners in the jurisdiction.	Dam/Levee Failure	Planner, Emergency Manager, Levee District Directors	High		Staff Time	Jurisdiction budget	Five years	Completed within the next 5 years. Will place Levee locations on GIS Maps.
Leavenworth County-15	Revise building codes to require low water flow toilets and faucets.	Drought	Administrator	High	1, 2	Staff Time	Jurisdiction budget	Five years	Will approach concept with building codes to BOCC.
Leavenworth County-16	Conduct a native, low water planting program for all jurisdictional owned facilities	Drought	Facilities Director	Low	1, 2	$5,000 - $50,000 per location	HMGP, BRIC, Jurisdiction budget	Five years	Buffalo Grass planted. Utilized KS River Rock

Leavenworth County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
									to maintain water retention.
Leavenworth County-17	Modernization HVAC systems in jurisdictional facilities.	Extreme Temperatures	Facilities Director	Low	1, 2	$2.5 Million per facility	HMGP, BRIC, Jurisdiction budget	Ten years	All HVAC systems are aging. Continue with maintenance monthly. Seek funding when necessary.
Leavenworth County-18	Identify and prepare county building for usage as heat/cold shelters.	Extreme Temperatures	Facilities Director	Low	1, 2	$2,000 per facility	Jurisdiction budget	Ten years	Annex in Tonganoxie set up for shelter. Any public building can be utilized during normal business hours. Seek MOU for faith base for shelters.
Leavenworth County-19	Conduct debris removal in Big Stranger Creek that is located within the Drainage District.	Flood	Big Strange Drainage District Director	Medium	1,2	$200,000	HMGP, Jurisdiction budget	Five years	On-going
Leavenworth County-20	Continued operation and management of jurisdictional NFIP activities.	Flood	Floodplain Manager	High	1,2	Staff Time	Jurisdiction budget	Continuous	Currently doing.

Leavenworth County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Leavenworth County-21	NFIP - Acquire and demolish or preserve parcels of land subject to repetitive flooding from willing and voluntary property owners.	Flood	Emergency Management Planner	High	1,2	Size and location dependent	HMGP, BRIC, FMA, Jurisdiction budget	Five years	Voluntary to forward extending parcels.
Leavenworth County-22	NFIP - Regularly calculate and document the amount of flood prone property that is preserved as open space to reduce flood insurance burden to the county.	Flood	Planner, Flood Plain Administrator	High	1,2	Staff Time	Jurisdiction budget	Continuous	Voluntary basis. Will continue to review annually.
Leavenworth County-23	NFIP - Identify flash-flood prone areas to consider flood reduction measures to county planners.	Flood	Planner	High	1,2	Staff Time	Jurisdiction budget	10 Years	Flood Depth Mapping. FEMA Grant needed for Hydrology study.
Leavenworth County-24	NFIP - Amend the Floodplain Management Ordinance to include an increase in free board requirement subject to board approval.	Flood	Planning Commission, Planner	High	1,2	Staff Time	Jurisdiction budget	Five years	Per approval of county board.
Leavenworth County-25	NFIP - Research and design an appropriate stream buffer ordinance to further protect the jurisdiction’s water resources and to limit future flood damages adjacent to major waterways.	Flood	Planning Commission, Planner	High	1,2	Staff Time	Jurisdiction budget	Five years	Would require approval by BOCC.
Leavenworth County-26	NFIP - Implement a study to determine the residual flood risk in levee-protected areas.	Flood	Planner, Levee Districts	Medium	1,2,3	Staff Time	HMGP, BRIC, Jurisdiction budget	Five Years	Identify protected areas.
Leavenworth County-27	NFIP - Seek Funding to complete a stormwater drainage study for Leavenworth County that will lead to a stormwater management ordinance	Flood	Planner, Public Works	Medium	1,2	$5 Million	HMGP, BRIC, Jurisdiction budget	Ten years	As the entire county is not

Leavenworth County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
	that maintains pre-development runoff rates.								attainable. Portions could be looked at regarding higher density. Specific water shed.
Leavenworth County-28	NFIP - Contact owners identified in high-risk flood areas and inform them of potential availability of assistance through the FEMA program, in addition to other flood protection measures.	Flood	County Planners, City Officials	High	3	Staff Time	Jurisdiction budget	Continuous	Bi-Annual basis meeting with residents. Review on an annual basis. Possibly use local events.
Leavenworth County-29	NFIP - Advertise and promote the availability of flood insurance to property owners by social media and public gathering points.	Flood	County Planners, City Officials	High	3	Staff Time	Jurisdiction budget	Continuous	Review Annually
Leavenworth County-30	NFIP - The County and local governments will work with the Kansas Dept. of Ag - Division of Water Resources to educate and promote local jurisdictional participation in the NFIP CRS.	Flood	Emergency Management, City Officials	High	3	Staff Time	Jurisdiction budget	Five years	Seek CRS program per county. Review status annually.
Leavenworth County-31	Design and construct safe rooms in all future buildings built by the County.	Severe Weather, Tornado	Facilities Director	High	1,2	Project size dependent	HMGP, BRIC, Jurisdiction budget	Five years	Seek BOCC approval.

Leavenworth County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Leavenworth County-32	Fund the construction of safe rooms and storm shelters in public and private schools, day care centers and senior care facilities.	Severe Weather, Tornado	Facilities Director	High	1,2	Project size dependent	HMGP, BRIC, Jurisdiction budget	Five years	Will attempt to educate facility owners of importance. Review Annually.
Leavenworth County-33	Research, develop, and recommend an ordinance/resolution to require installation of tornado shelters for major manufactured and/or mobile home parks with more than 10 mobile home spaces.	Severe Weather, Tornado	Facilities Director	High	1,2	Staff Time	Jurisdiction budget	Five years	BOCC approval needed. Will consider planning regulations amendments.
Leavenworth County-34	Install hail, wind, and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Tornado, Wildfire	Facilities Director	Medium	1, 2	$750,000 per location	HMGP, BRIC, Jurisdiction budget	Five years	Upgrades are needed. Implementation will be considered.
Leavenworth County-35	Educate residents about driving in winter storms and handling winter-related health effects.	Severe Winter Weather	Director of Emergency Management	High	3,4	Staff Time	Jurisdiction budget	Repeating	Social media conducted for education purposes.
Leavenworth County-36	Evaluate the firefighting water supply resources within the County.	Wildfire	Fire Chiefs, Director of Emergency Management	Medium	1,2	Staff Time	Jurisdiction budget	Five Years	Will review subdivision guidelines. Review annually.
Leavenworth County-37	Create defensible space buffers at all critical facilities	Wildfire	Fire Chiefs, Director of	High	1,2	Facility size dependent	HMGP, BRIC,	As required	Maintained by building

Leavenworth County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
			Emergency Management				Jurisdiction budget		and grounds.
Leavenworth County-38	Develop and implement a wildfire prevention/education program.	Wildfire	Fire Chiefs, Director of Emergency Management	Medium	3,4	$1,200 per year	Jurisdiction budget	Repeating	Working with contractor regarding CWPP contractor.
Leavenworth County-39	Examine the current agreements within the county and assess the need to expand or update cooperative agreements for firefighting resources.	Wildfire	Fire Chiefs, Director of Emergency Management	High	4	Staff Time	Jurisdiction budget	Repeating	Working with contractor regarding CWPP contractor.
Leavenworth County-40	Appoint a rural fire committee to schedule meetings with the Kansas Forest Service to map suspected hazardous wildfire areas in the county for potential participation in the Community Wildfire Protection Program (CWPP).	Wildfire	Fire Chiefs, Director of Emergency Management	Medium	3,4	Staff Time	Jurisdiction budget	Four Years	Working with contractor regarding CWPP contractor.
Leavenworth County-41	Incorporate wildfire maps, develop actions and projects for wildfire prevention, and complete an assessment report to meet CWPP requirements for submittal to the Kansas Forest Service.	Wildfire	Fire Chiefs, Director of Emergency Management	Medium	1,4	Staff Time	Jurisdiction budget	Four Years	Working with contractor regarding CWPP contractor.
Leavenworth County-42	Education employees on cyber protocols.	Cybersecurity Incident	IT Director	High	1, 2	Minimal	Jurisdiction budget	Five years	New
Leavenworth County-43	Provide hazardous materials management classes to all county employees handling hazardous materials.	Hazardous Materials Event	Emergency Manager	High	1, 2	$500 per trainee	HMGP, Jurisdiction budget	As required	New
Leavenworth County-44	The Leavenworth County Consolidated Rural Water District (RWD) No. 1 will continue to assess	Infrastructure Failure	Director	Medium	1,2	Staff Time	Jurisdiction budget	Continuous	On-going

Leavenworth County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
	the impact of natural hazards on water distribution lines, systems, and equipment. The Water District will also seek Funding sources to mitigate damage to critical infrastructure and seek Funding for various water main improvement projects.								
Leavenworth County-45	Coordinate county and local government mitigation efforts with Rural Electric Cooperatives (REC's), encourage identification of hazards potentially affecting their infrastructure, assessment of the vulnerabilities of the infrastructure to these hazards, and identification of mitigation strategies.	Infrastructure Failure	Emergency Manager, Rural Electric Cooperative Directors	Medium	1,2,4	Staff Time	Jurisdiction budget	Continuous	On-going
Leavenworth County-46	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	Emergency Manager	High	1,2,3,4	Staff Time	Jurisdiction budget	Continuous	On-going
Leavenworth County-47	Conduct active shooter drills and exercises for all county personnel.	Terrorism	County Sheriff	Low	1, 2	Data size dependent	Jurisdiction budget	Five years	New
Basehor-1	Purchase and install critical facility backup generators in conjunction with hardening existing electrical systems.	All hazards	City Superintendent	High	1, 2	$25,000 - $50,000 per facility	HMGP, BRIC, Jurisdiction budget	Five years	Carried over due to lack of funding
Basehor-2	Develop a radio communications plan between the City of Basehor Public Works Department / Street Department and City Hall to ensure interoperability between entities.	All hazards	City Superintendent	High	1, 2	Staff Time	Jurisdiction budget	Five years	Carried over due to lack of funding

Leavenworth County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Basehor-3	Purchase of equipment to assist in the removal of debris and assist with cleanups after major storms.	All Hazards	City Superintendent	High	1,2	$400,000	HMGP, Jurisdiction budget	Five years	Carried over due to lack of funding
Basehor-4	Install evacuation route signage in any high hazard dam or levee failure inundation areas.	Dam/Levee Failure	City Superintendent	Medium	1, 2, 4	$5,000 per location	HMGP, Jurisdiction budget	Five years	New
Basehor-5	Conduct a native, low water planting program for all jurisdictional owned facilities	Drought	City Superintendent	Medium	1, 2	$5,000 - $20,000 per facility	HMGP, BRIC, Jurisdiction budget	Ten years	New
Basehor-6	Identify and prepare local facilities to serve as heating/cooling centers.	Extreme Temperatures	City Superintendent	Medium	1, 2	$3,000 per facility	HMGP, Jurisdiction budget	Five years	New
Basehor-7	Continue to participate meet requirements of the NFIP.	Flood	NFIP Coordinator	High	1, 2	Staff time	Jurisdiction budget	Continuous	On-going
Basehor-8	Construct rainwater retention/detention ponds or other flood control projects at strategic locations.	Flood	City Superintendent	Low	1, 2	Location and size dependent	HMGP, BRIC, Jurisdiction budget	As required	Carried over due to lack of funding
Basehor-9	Clean and repair drainage ditches to maintain capacity.	Flood	City Superintendent	Low	1, 2	Location, length, and size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	New
Basehor-10	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	City Superintendent	Low	1, 2	$50,000 per location	HMGP, BRIC, Jurisdiction budget	Five years	New
Basehor-11	Purchase a brine applicator and mixer to apply chemicals to roads within the City of Basehor prior to major winter storm events, including ice storms.	Severe Winter Weather	City Superintendent	Low	4	$200,000	HMGP, Jurisdiction budget	Five years	Carried over due to lack of funding
Basehor-12	Construct community saferooms in select jurisdictional buildings.	Tornado	City Superintendent	High	1, 2	Facility size dependent	HMGP, BRIC,	Ten years	Carried over due to

Leavenworth County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
							Jurisdiction budget		lack of funding
Basehor-13	Create defensible space buffers at all critical facilities	Wildfire	Fire Chief	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	As required	New
Easton-1	Purchase and install critical facility backup generators in conjunction with hardening existing electrical systems.	All hazards	City Manager	High	1, 2	$25,000 - $50,000 per facility	HMGP, BRIC, Jurisdiction budget	Five years	Carried over due to lack of funding
Easton-2	Install evacuation route and high ground signage in any high hazard dam or levee failure potential inundation areas.	Dam/Levee Failure	City Manager	Medium	1, 2, 4	$5,000 per location	HMGP, Jurisdiction budget	Five years	New
Easton-3	Conduct a xeriscaping program for all jurisdictional owned facilities	Drought	City Manager	Medium	1, 2	$5,000 - $20,000 per facility	HMGP, BRIC, Jurisdiction budget	Ten years	New
Easton-4	Conduct a personal water use education program.	Drought	City Manager	Low	3	Staff time	HMGP, BRIC, Jurisdiction budget	Five years	New
Easton-5	Identify and prepare local facilities to serve as heating/cooling centers.	Extreme Temperatures	City Manager	Medium	1, 2	$3,000 per facility	HMGP, Jurisdiction budget	Five years	New
Easton-6	Continue to participate meet requirements of the NFIP.	Flood	NFIP Coordinator	High	1, 2	Staff time	Jurisdiction budget	Continuous	On-going
Easton-7	Construct rainwater retention/detention ponds or other flood control projects at strategic locations.	Flood	City Manager	High	1, 2	Location and size dependent	HMGP, BRIC, Jurisdiction budget	As required	Carried over due to lack of funding
Easton-8	Seek funding to raise the casings around the potable water wells utilized by the City of Easton to protect them from flood water contamination.	Flood	City Manager	Medium	1, 2	Location, length, and size dependent	HMGP, BRIC, Jurisdiction budget	Five years	Carried over due to lack of funding

Leavenworth County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Easton-9	Purchase and install control valves for the City of Easton Water Treatment Plant and storage facility in the event of flooding events.	Flood	City Manager	Medium	1, 2	$150,000	HMGP, BRIC, Jurisdiction budget	Five years	Carried over due to lack of funding
Easton-10	Conduct an engineering study and complete the project to raise the State highway 300 yards east of First Street to the twin bridges over Stranger Creek.	Flood	City Manager	Medium	1, 2	$50,000	HMGP, BRIC, Jurisdiction budget	Five years	Carried over due to lack of funding
Easton-11	Construct community saferooms in select jurisdictional buildings.	Severe Weather, Tornado Wildfires	City Manager	Low	1,2	$1,000,000 per facility	Local, State, Federal	Ten years	Carried over due to lack of funding
Easton-12	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	City Manager	Low	1, 2	$50,000 per location	Facility size dependent	Five years	New
Easton-13	Conduct public education program for driving in winter conditions.	Severe Winter Weather	City Manager	Low	4	Staff Time	Jurisdiction budget	Five years	New
Easton-14	Create defensible space buffers at all critical facilities	Wildfire	Fire Chief	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	As required	New
Lansing-1	Purchase and install critical facility backup generators in conjunction with hardening existing electrical systems.	All hazards	City Manager	High	1, 2	$25,000 - $50,000 per facility	HMGP, BRIC, Jurisdiction budget	Five years	Carried over due to lack of funding
Lansing-2	Install evacuation route signage in any high hazard dam or levee failure inundation areas.	Dam/Levee Failure	City Superintendent	Medium	1, 2, 4	$5,000 per location	HMGP, Jurisdiction budget	Five years	New
Lansing-3	Conduct a native, low water planting program for all jurisdictional owned facilities	Drought	City Superintendent	Medium	1, 2	$5,000 - $20,000 per facility	HMGP, BRIC, Jurisdiction budget	Ten years	New
Lansing-4	Identify and prepare local facilities to serve as heating/cooling centers.	Extreme Temperatures	City Superintendent	Medium	1, 2	$3,000 per facility	HMGP, Jurisdiction budget	Five years	New

Leavenworth County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Lansing-5	Continue to participate meet requirements of the NFIP.	Flood	NFIP Coordinator	High	1, 2	Staff time	Jurisdiction budget	Continuous	On-going
Lansing-6	Construct rainwater retention/detention ponds or other flood control projects at strategic locations.	Flood	City Superintendent	Low	1, 2	Location and size dependent	HMGP, BRIC, Jurisdiction budget	As required	Carried over due to lack of funding
Lansing-7	Clean and repair drainage ditches to maintain capacity.	Flood	City Superintendent	Low	1, 2	Location, length, and size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	New
Lansing-8	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	City Superintendent	Low	1, 2	$50,000 per location	HMGP, BRIC, Jurisdiction budget	Five years	New
Lansing-9	Conduct public education program for driving in winter conditions.	Severe Winter Weather	City Superintendent	Low	4	Staff Time	Jurisdiction budget	Five years	Carried over due to lack of staff
Lansing-10	Construct community saferooms in select jurisdictional buildings.	Tornado	City Superintendent	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	Carried over due to lack of funding
Lansing-11	Create defensible space buffers at all critical facilities	Wildfire	Fire Chief	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	As required	New
Lansing-12	Construct community saferooms in select jurisdictional buildings and in mobile home parks currently without a shelter.	Tornado	City Manager	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	Carried over due to lack of funding
Lansing-13	Create defensible space buffers at all critical facilities	Wildfire	Fire Chief	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	As required	New

Leavenworth County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Leavenworth-1	Purchase and install critical facility backup generators in conjunction with hardening existing electrical systems.	All hazards	City Manager	High	1, 2	$25,000 - $50,000 per facility	HMGP, BRIC, Jurisdiction budget	Five years	Carried over due to lack of funding
Leavenworth-2	Install evacuation route and high ground signage in any high hazard dam or levee failure potential inundation areas.	Dam/Levee Failure	City Manager	Medium	1, 2, 4	$5,000 per location	HMGP, Jurisdiction budget	Five years	New
Leavenworth-3	Conduct a native, low water planting program for all jurisdictional owned facilities	Drought	City Manager	Medium	1, 2	$5,000 - $20,000 per facility	HMGP, BRIC, Jurisdiction budget	Ten years	New
Leavenworth-4	Conduct a personal water use education program.	Drought	City Manager	Low	3	Staff time	HMGP, BRIC, Jurisdiction budget	Five years	New
Leavenworth-5	Identify and prepare local facilities to serve as heating/cooling centers.	Extreme Temperatures	City Manager	Medium	1, 2	$3,000 per facility	HMGP, Jurisdiction budget	Five years	New
Leavenworth-6	Continue to participate meet requirements of the NFIP.	Flood	NFIP Coordinator	High	1, 2	Staff time	Jurisdiction budget	Continuous	On-going
Leavenworth-7	Construct rainwater retention/detention ponds at strategic locations.	Flood	City Manager	Low	1, 2	Location and size dependent	HMGP, BRIC, Jurisdiction budget	As required	Carried over due to lack of funding
Leavenworth-8	Acquire and demolish flood prone properties within the city.	Flood	City Manager	Low	1, 2	Location, and size dependent	HMGP, BRIC, FMA, Jurisdiction budget	Ten years	Carried over due to lack of funding
Leavenworth-9	Purchase a portable dam system to reduce exposure from flooding to the Leavenworth Community Center.	Flood	City Manager	Low	1, 2	$200,000	HMGP, BRIC, FMA, Jurisdiction budget	Five years	Carried over due to lack of funding

Leavenworth County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Leavenworth-10	Purchase a portable dam system to reduce exposure from flooding to the City of Leavenworth Wastewater Treatment Plant.	Flood	City Manager	Low	1, 2	$200,000	HMGP, BRIC, FMA, Jurisdiction budget	Five years	Carried over due to lack of funding
Leavenworth-11	Seek Funding to construct a new City of Leavenworth Animal Control Shelter Building to replace the existing structure which is susceptible to repeated flooding events.	Flood	City Manager	Low	1, 2	$2,000,000	HMGP, BRIC, FMA, Jurisdiction budget	Five years	Carried over due to lack of funding
Leavenworth-12	Encourage the construction of safe rooms and storm shelters in public and private schools, day care centers and senior care facilities and early alert systems.	Severe Weather, Tornado	City Manager	Low	1,2	Staff Time	Local, State, Federal	Repeating	Modified
Leavenworth-13	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	City Manager	Low	1, 2	$50,000 per location	Facility size dependent	Five years	New
Leavenworth-14	Conduct public education program for driving in winter conditions.	Severe Winter Weather	City Manager	Low	4	Staff Time	Jurisdiction budget	Five years	Carried Over, Ongoing
Leavenworth-15	Create defensible space buffers at all critical facilities	Wildfire	Fire Chief	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	As required	New
Linwood-1	Purchase and install critical facility backup generators in conjunction with hardening existing electrical systems.	All hazards	City Manager	High	1, 2	$25,000 - $50,000 per facility	HMGP, BRIC, Jurisdiction budget	Five years	Carried over due to lack of funding
Linwood-2	Active building code enforcement to align with the national level.	All Hazards	Building Official	High	1,2	Staff Time	Jurisdiction budget	Repeating	New
Linwood-3	Install evacuation route signage in any high hazard dam or levee failure inundation areas.	Dam/Levee Failure	City Manager	Medium	1, 2, 4	$5,000 per location	HMGP, Jurisdiction budget	Five years	New

Leavenworth County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Linwood-4	Conduct a native, low water planting program for all jurisdictional owned facilities	Drought	City Manager	Medium	1, 2	$5,000 - $20,000 per facility	HMGP, BRIC, Jurisdiction budget	Ten years	New
Linwood-5	Identify and prepare local facilities to serve as heating/cooling centers.	Extreme Temperatures	City Manager	Medium	1, 2	$3,000 per facility	HMGP, Jurisdiction budget	Five years	New
Linwood-6	Continue to participate meet requirements of the NFIP.	Flood	NFIP Coordinator	High	1, 2	Staff time	Jurisdiction budget	Continuous	On-going
Linwood-7	Construct rainwater retention/detention ponds or other flood control projects at strategic locations.	Flood	City Manager	Low	1, 2	Location and size dependent	HMGP, BRIC, Jurisdiction budget	As required	Carried over due to lack of funding
Linwood-8	Clean and repair drainage ditches to maintain capacity.	Flood	City Manager	Low	1, 2	Location, length, and size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	New
Linwood-9	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	City Manager	Low	1, 2	$50,000 per location	HMGP, BRIC, Jurisdiction budget	Five years	New
Linwood-10	Conduct public education program for driving in winter conditions.	Severe Winter Weather	City Manager	Low	4	Staff Time	Jurisdiction budget	Five years	New
Linwood-11	Construct community saferooms in select jurisdictional buildings.	Tornado	City Manager	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	New
Linwood-12	Create defensible space buffers at all critical facilities	Wildfire	Fire Chief	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	As required	New
Tonganoxie-1	Develop and fund professional services to augment the City of Tonganoxie's GIS capability.	All hazards	City Manager	High	1, 2	$65,000	HMGP, BRIC, Jurisdiction budget	Five years	Carried over due to lack of funding

Leavenworth County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Tonganoxie-2	Create a working group to assess the county's firefighting / EMS resources to identify any existing needs or shortfalls in terms of personnel, equipment or additional required resources. Complete all recommendations.	All Hazards	Fire Chief	High	1,2	Staff Time, $30,000	Jurisdiction budget	Five years	Carried over due to lack of funding
Tonganoxie-3	Install evacuation route signage in any high hazard dam or levee failure inundation areas.	Dam/Levee Failure	City Manager	Medium	1, 2, 4	$5,000 per location	HMGP, Jurisdiction budget	Five years	New
Tonganoxie-4	Conduct a native, low water planting program for all jurisdictional owned facilities	Drought	City Manager	Medium	1, 2	$5,000 - $20,000 per facility	HMGP, BRIC, Jurisdiction budget	Ten years	New
Tonganoxie-5	Identify and prepare local facilities to serve as heating/cooling centers.	Extreme Temperatures	City Manager	Medium	1, 2	$3,000 per facility	HMGP, Jurisdiction budget	Five years	New
Tonganoxie-6	Continue to participate meet requirements of the NFIP.	Flood	NFIP Coordinator	High	1, 2	Staff time	Jurisdiction budget	Continuous	On-going
Tonganoxie-7	Design and complete and construction of stream bank stabilization on Tonganoxie Creek within the city limits of Tonganoxie.	Flood	City Engineer	Medium	1, 2	$25,000	HMGP, BRIC, Jurisdiction budget	Five years	Carried over due to lack of funding
Tonganoxie-8	Identify flash-flood prone areas to consider flood reduction measures to city planners. Flood zone mapping has provided initial identification of potential hazard areas that can be reviewed with other data sources, such as the watershed districts goals and objectives, in developing long range planning activities for flood prevention, or other planning steps to reduce exposure to this hazard.	Flood	City Engineer	Low	1, 2	$100,000	HMGP, BRIC, Jurisdiction budget	Five years	New

Leavenworth County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Tonganoxie-9	Research and fund engineering services for a city-wide storm water infrastructure-needs assessment.	Flood	City Engineer	Low	1, 2	$25,000	HMGP, BRIC, Jurisdiction budget	Five years	Carried over due to lack of funding
Tonganoxie-10	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	City Manager	Low	1, 2	$50,000 per location	HMGP, BRIC, Jurisdiction budget	Five years	New
Tonganoxie-11	Incorporate the inspection and management of trees into the city maintenance program that may pose a threat to the electrical lines that could result in power outages during ice storms.	Severe Winter Weather	City Manager	Low	1,2	$10,000	Jurisdiction budget	Five years	Carried over due to lack of funding
Tonganoxie-12	Construct community saferooms in select jurisdictional buildings.	Tornado	City Manager	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	New
Tonganoxie-13	Create defensible space buffers at all critical facilities	Wildfire	Fire Chief	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	As required	New
USD207-1	Conduct hazard mitigation education programs for students.	All hazards	Superintendent	Medium	1, 2, 3	$2,000	School Budget	As required	New
USD207-2	Conduct a native, low water planting program for all school owned facilities	Drought	Superintendent	Low	1, 2	$10,000 -per location	HMGP, BRIC, School Budget	Ten years	New
USD207-3	Conduct an extreme temperature awareness seminar to educate on risks and mitigation methods.	Extreme Temperature, Severe Winter Weather	Superintendent	Medium	1, 2	$500	HMGP, Jurisdiction budget	Five years	New
USD207-4	Construct rainwater gardens adjacent to paved areas.	Flood	Superintendent	Low	1, 2	Location and size dependent	HMGP, BRIC,	As required	New

Leavenworth County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
							School Budget		
USD207-5	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Superintendent	Low	1, 2	$100,000 per location	Facility size dependent	Five years	New
USD207-6	The safe room for the new school will be located on the lower level; however, it will have an on-grade entrance/exit due to the terrain of the site. Three walls are below grade. The elevator will allow the 2nd and 3rd floor staff and students with disabilities (and wheelchair bound students) to access the safe room.	Tornado	Superintendent	High	1, 2	$28,600,000	HMGP, BRIC, School Budget	Five years	Carried over due to lack of funding
USD207-7	Construct safe rooms in all school buildings to required standards.	Tornado	Superintendent	High	1, 2	$1,000,000 - per location	HMGP, BRIC, School budget	Ten years	Carried over due to lack of funding
USD207-8	Conduct regular staff and student active shooter trainings.	Terrorism	Superintendent	High	1, 2, 3	Location and size dependent	HMGP, School Budget	As required	New
USD449-1	Purchase and install school facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Superintendent	High	1, 2	$10,000 - $50,000 per facility	HMGP, BRIC, School Budget	Five years	Carried over due to lack of funding
USD449-2	Conduct hazard mitigation education programs for students.	All hazards	Superintendent	Medium	1, 2, 3	$2,000	School Budget	As required	New
USD449-3	Conduct a native, low water planting program for all school owned facilities	Drought	Superintendent	Low	1, 2	$10,000 -per location	HMGP, BRIC, School Budget	Five years	New
USD449-4	Conduct an extreme temperature awareness seminar to educate on risks and mitigation methods.	Extreme Temperature, Severe Winter Weather	Superintendent	Medium	1, 2	$500	HMGP, Jurisdiction budget	Five years	New

Leavenworth County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
USD449-5	Construct rainwater gardens adjacent to paved areas.	Flood	Superintendent	Low	1, 2	Location and size dependent	HMGP, BRIC, School Budget	As required	New
USD449-6	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Superintendent	Low	1, 2	$100,000 per location	Facility size dependent	Five years	New
USD449-7	Construct safe rooms in all school buildings to required standards.	Tornado	Superintendent	High	1, 2	$1,000,000 - per location	HMGP, BRIC, School budget	Ten years	Carried over due to lack of funding
USD449-8	Conduct regular staff and student active shooter trainings.	Terrorism	Superintendent	High	1, 2, 3	Location and size dependent	HMGP, School Budget	As required	New
USD453-1	Purchase and install school facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Superintendent	High	1, 2	$10,000 - $50,000 per facility	HMGP, BRIC, School Budget	Five years	Carried over due to lack of funding
USD453-2	Conduct hazard mitigation education programs for students.	All hazards	Superintendent	Medium	1, 2, 3	$2,000	School Budget	As required	New
USD453-3	Conduct a native, low water planting program for all school owned facilities	Drought	Superintendent	Low	1, 2	$10,000 -per location	HMGP, BRIC, School Budget	Five years	New
USD453-4	Conduct an extreme temperature awareness seminar to educate on risks and mitigation methods.	Extreme Temperature, Severe Winter Weather	Superintendent	Medium	1, 2	$500	HMGP, Jurisdiction budget	Five years	New
USD453-5	Construct rainwater gardens adjacent to paved areas.	Flood	Superintendent	Low	1, 2	Location and size dependent	HMGP, BRIC, School Budget	As required	New
USD453-6	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Superintendent	Low	1, 2	$100,000 per location	Facility size dependent	Five years	New

Leavenworth County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
USD453-7	Construct safe rooms in all school buildings to required standards.	Tornado	Superintendent	High	1, 2	$1,000,000 - per location	HMGP, BRIC, School budget	Ten years	Carried over due to lack of funding
USD453-8	Conduct regular staff and student active shooter trainings.	Terrorism	Superintendent	High	1, 2, 3	Location and size dependent	HMGP, School Budget	As required	New
USD458-1	Purchase and install school facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Superintendent	High	1, 2	$10,000 - $50,000 per facility	HMGP, BRIC, School Budget	Five years	Carried over due to lack of funding
USD458-2	Conduct hazard mitigation education programs for students.	All hazards	Superintendent	Medium	1, 2, 3	$2,000	School Budget	As required	New
USD458-3	Conduct a native, low water planting program for all school owned facilities	Drought	Superintendent	Low	1, 2	$10,000 -per location	HMGP, BRIC, School Budget	Five years	New
USD458-4	Conduct an extreme temperature awareness seminar to educate on risks and mitigation methods.	Extreme Temperature, Severe Winter Weather	Superintendent	Medium	1, 2	$500	HMGP, Jurisdiction budget	Five years	New
USD458-5	Assess elevations and water flow in the district to qualify the benefit of flood control projects in the district. Complete recommended projects.	Flood	Superintendent	Low	1, 2	Location and size dependent	HMGP, BRIC, School Budget	As required	Carried over due to lack of funding
USD458-6	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Superintendent	Low	1, 2	$100,000 per location	Facility size dependent	Five years	New
USD458-7	Construct safe rooms in all school buildings to required standards.	Tornado	Superintendent	High	1, 2	$1,000,000 - per location	HMGP, BRIC, School budget	Ten years	Carried over due to lack of funding
USD458-8	Conduct regular staff and student active shooter trainings.	Terrorism	Superintendent	High	1, 2, 3	Location and size dependent	HMGP, School Budget	As required	New

Leavenworth County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
USD464-1	Purchase and install school facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Superintendent	High	1, 2	$10,000 - $50,000 per facility	HMGP, BRIC, School Budget	Five years	Carried over due to lack of funding
USD464-2	Conduct hazard mitigation education programs for students.	All hazards	Superintendent	Medium	1, 2, 3	$2,000	School Budget	As required	New
USD464-3	Conduct a native, low water planting program for all school owned facilities	Drought	Superintendent	Low	1, 2	$10,000 -per location	HMGP, BRIC, School Budget	Five years	New
USD464-4	Conduct an extreme temperature awareness seminar to educate on risks and mitigation methods.	Extreme Temperature, Severe Winter Weather	Superintendent	Medium	1, 2	$500	HMGP, Jurisdiction budget	Five years	New
USD464-5	Construct rainwater gardens adjacent to paved areas.	Flood	Superintendent	Low	1, 2	Location and size dependent	HMGP, BRIC, School Budget	As required	New
USD464-6	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Superintendent	Low	1, 2	$100,000 per location	Facility size dependent	Five years	New
USD464-7	Construct safe rooms in all school buildings to required standards.	Tornado	Superintendent	High	1, 2	$1,000,000 - per location	HMGP, BRIC, School budget	Ten years	Carried over due to lack of funding
USD464-8	Conduct regular staff and student active shooter trainings.	Terrorism	Superintendent	High	1, 2, 3	Location and size dependent	HMGP, School Budget	As required	Carried over due to lack of funding
USD469-1	Purchase and install school facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Superintendent	High	1, 2	$10,000 - $50,000 per facility	HMGP, BRIC, School Budget	Five years	Carried over due to lack of funding
USD469-2	Conduct hazard mitigation education programs for students.	All hazards	Superintendent	Medium	1, 2, 3	$2,000	School Budget	As required	New

Leavenworth County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
USD469-3	Conduct a native, low water planting program for all school owned facilities	Drought	Superintendent	Low	1, 2	$10,000 -per location	HMGP, BRIC, School Budget	Five years	New
USD469-4	Conduct an extreme temperature awareness seminar to educate on risks and mitigation methods.	Extreme Temperature, Severe Winter Weather	Superintendent	Medium	1, 2	$500	HMGP, Jurisdiction budget	Five years	New
USD469-5	Construct rainwater gardens adjacent to paved areas.	Flood	Superintendent	Low	1, 2	Location and size dependent	HMGP, BRIC, School Budget	As required	New
USD469-6	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Superintendent	Low	1, 2	$100,000 per location	Facility size dependent	Five years	New
USD469-7	Construct safe rooms in all school buildings to required standards.	Tornado	Superintendent	High	1, 2	$1,000,000 -per location	HMGP, BRIC, School budget	Ten years	Carried over due to lack of funding
USD469-8	Conduct regular staff and student active shooter trainings.	Terrorism	Superintendent	High	1, 2, 3	Location and size dependent	HMGP, School Budget	As required	Carried over due to lack of funding
U. St. Mary-1	Incorporate the inspection and management of trees into the University's routine maintenance process to remove trees that may increase the risk of power failure throughout the campus infrastructure.	All hazards	President	Medium	1, 2	$10,000	HMGP, School Budget	Five years	Carried over due to lack of funding
U. St. Mary -2	Appoint a committee to develop a radio communications plan between campus security units and outside agencies of Leavenworth County and the City of Leavenworth to ensure interoperability between all communities.	All hazards	President	Medium	4	Staff Time	School budget	Five years	Carried over due to lack of funding

Leavenworth County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
U. St. Mary -3	Appoint a committee to research and implement enhancement to the University's early warning systems for students and staff for weather alerts and campus emergencies.	All hazards	President	Medium	1, 2, 4	Staff Time	School Budget	As required	New
U. St. Mary -4	Conduct a native, low water planting program for all university owned facilities	Drought	President	Low	1, 2	$10,000 -per location	HMGP, BRIC, School Budget	Ten years	New
U. St. Mary -5	Conduct an extreme temperature awareness seminar to educate on risks and mitigation methods.	Extreme Temperature, Severe Winter Weather	President	Medium	1, 2	$500	HMGP, Jurisdiction budget	Five years	New
U. St. Mary -6	Construct rainwater gardens adjacent to paved areas.	Flood	President	Low	1, 2	Location and size dependent	HMGP, BRIC, School Budget	As required	New
U. St. Mary -7	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	President	Low	1, 2	$100,000 per location	Facility size dependent	Five years	New
U. St. Mary -8	Conduct regular staff and student active shooter trainings.	Terrorism	President	High	1, 2, 3	Location and size dependent	HMGP, School Budget	As required	New
Leavenworth Rural Water District #7-1	Replace and upgrade pump stations and water lines.	Drought, Wildfire	Director	High	1,2	Location and size dependent	BRIC, HMGP, Jurisdiction budget	Ten years	New
Leavenworth Rural Water District #7-2	Maintain, repair, and collect GPS locations of fire hydrants within the area served by Leavenworth RWD#7.	Wildfire	Director	High	1,2	Staff time	Jurisdiction budget,	Ten years	Carried over due to lack of funding
RWD #12-1	Water line enhancements/upgrades to protect critical infrastructure.	All hazards	Operations Manager	High	1,2	$1,500,000	State or local bank	6 months	Planning
RWD #12-2	GPS the district's water meter, valves, lines, and other district property to	All hazards	Operations Manager	High	1,2	$5,000	State or local bank	6 months	Planning

Leavenworth County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
	ensure all relevant parties have the locations of district infrastructure.								
RWD #12-3	Upgrade SCADA (Supervisory Control & Data Acquisition) system to cellular technologies in order to make a more reliable water service for the public and to protect critical infrastructure.	All hazards	Operations Manager	High	1,2	$50,000	State or local bank	4 months	Planning
RWD #12-4	Build fence(s) around RWD #12 property to protect assets against theft, tampering and other threats.	All hazards	Operations Manager	High	1,2	$3,000	State or local bank	1 year	Planning
RWD #12-5	Install security systems and lights on RWD property to prevent theft, tampering and other threats.	All hazards	Operations Manager	High	1,2	$110,000	State or local bank	1 year	Planning
RWD #12-6	Assistance to replace patron's lead and copper lines, valves, etc. due to the EPA and KDHE mandated Lead and Copper updated rule.	All hazards	Operations Manager	High	1,2	1,000,000	State or local bank	1 year	Planning
Leavenworth Waterwork Board-1	The Leavenworth Waterworks will continue to assess the impact of natural hazards on water distribution lines, systems, and equipment. The Waterworks will also seek additional funding sources to mitigate damage to critical infrastructure.	All Hazards	General Manager	High	1,2	Staff time and Project dependent	HMGP, BRIC, Jurisdiction budget, State grant, Federal grant	Continuous	New
Leavenworth Waterwork Board-2	Expand South Treatment Plant's capacity through the construction of an additional treatment train to address both River flooding and drought conditions exacerbated by riverbed degradation.	Flooding, Drought	General Manager	High	1,2	$40 million	BRIC, SRF Loan, Jurisdiction budget, State Grant, Federal Grant	4Q 2028	New
Leavenworth Waterwork Board-3	Maintain participation in KMU's mutual aid program, KSMAP	All Hazards	General Manager	Medium	1,2,3,4	Staff time and incident dependent	Jurisdiction budget	Continuous	New

Leavenworth County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Leavenworth Waterwork Board-4	Expand South Treatment Plant's capacity through the construction of an additional treatment train to address both River flooding and drought conditions exacerbated by riverbed degradation.	Flooding, Drought	General Manager	High	1,2	$40 million	BRIC, SRF Loan, Jurisdiction budget, State Grant, Federal Grant	4Q 2028	New
WaterOne1-1	Purchase and installation of emergency generators for facilities to ensure continued operations. Loss of power could potentially curtail services to the community.	All Hazards	Director	High	1,2	$30,195,001	Jurisdiction budget, Federal grant	Five Years	On the previous plan (amendment)
WaterOne1-2	Replace and upgrade pump stations to provide additional water capacity for fire and emergency storage.	Drought, Wildfire, Infrastructure Failure	Director	High	1,2	$41,047,108	Jurisdiction budget, Federal grant	Five to Ten Years	On the previous plan
WaterOne1-3	Kansas River replacement of vertical wells to minimize the impacts of river icing and improve the functionality of the wellfield.	Extreme Temperatures, Infrastructure Failure	Director	High	1,2	$5,850,584	Jurisdiction budget, Federal grant	Two to Three Years	New
WaterOne1-4	Addition of Kansas River horizontal collector well to alleviate the load of water on the Kansas Presedimentation Facility	Extreme Temperatures, Drought, Infrastructure Failure	Director	High	1,2	$4,508,332	Jurisdiction budget, Federal grant	Four Years	New
WaterOne1-5	Addition of the Wolcott Collector Well to increase water supply sourcing and maximize redundancy	Drought, Infrastructure Failure	Director	High	1,2	$17,209,169	Jurisdiction budget, Federal grant	One to Two Years	New
WaterOne1-6	Improvements to Facility 1 Water Treatment Plant to minimize infrastructure failure	Infrastructure Failure	Director	High	1,2	$4,054,539	Jurisdiction budget, Federal grant	Two to Three Years	New
WaterOne1-7	Zebra Mussel mitigation to minimize growth and infestation at the Missouri	Extreme Temperatures;	Director	High	1,2	$1,213,288	Jurisdiction budget,	Three Years	New

Leavenworth County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
	River Intake, reducing risk for infrastructure failure	Infrastructure Failure					Federal grant		
WaterOne1-8	Missouri Riverbed Degradation Study	Extreme Temperatures; Drought	Director	High	1,2	Location and size dependent	Jurisdiction budget, Federal grant	Five to Ten Years	New
WaterOne1-9	Transmission Main projects increasing resiliency, expanding connectivity of water	Drought. Wildfire. Infrastructure Failure	Director	High	1,2	Location and size dependent	Jurisdiction budget, Federal grant	Five Years	New

Wyandotte County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Wyandotte County-1	Work with large venues to ascertain the best available locations to direct their visitors/fans to in case of the need for sheltering. Emphasize the need for each large venue (and those to be constructed) to provide adequate sheltering from storms (tornados, hail, lightning, etc.,) as a minimum within their design or added as a retrofit.	All Hazards	Emergency Management Director	High	1,2	Staff Time	Jurisdiction budget	Ten years	Carried over due to lack of funding
Wyandotte County-2	Provide back-up generators for critical facilities within the county. The County has 57 facilities that require backup power to function should line power be lost.	All Hazards	Emergency Management Director	High	1,2	$3,000,000	HMGP, BRIC, Jurisdiction Budget	Continuous	Carried over due to lack of funding
Wyandotte County-3	Continue Participation in the StormReady Community Certification Program thru the National Weather Service.	All Hazards	Emergency Management Director	High	3,4	Staff Time	HMGP, BRIC, Jurisdiction Budget	Continuous	On-going
Wyandotte County-4	Promote NOAA all-hazards weather radios and support the KC Metro Region's "Project Community Alert" all-hazards weather radio program.	All Hazards	Emergency Management Department Director	High	1,2,3,4	Program Size Dependent	HMGP, BRIC, Jurisdiction Budget	Continuous	Carried over due to lack of funding
Wyandotte County-5	Provide public education sessions to encourage ALL citizens to have a disaster kit which contains food, water, flashlight, batteries, battery operated radio, medications, etc.	All Hazards	Emergency Management Department Director	High	1,2,3	Program Size Dependent	HMGP, BRIC, Jurisdiction Budget	Continuous	On-going
Wyandotte County-6	Continue review / revision of the Wyandotte County Emergency Operations Plan (EOP).	All Hazards	Emergency Management Department Director	High	4	Staff Time	Jurisdiction budget	Continuous	On-going

Wyandotte County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Wyandotte County-7	Develop and maintain a Continuity of Operations Plan (COOP) for the Unified Government.	All Hazards	Wyandotte County emergency management Director	High	1,2,3,4	Staff Time	Jurisdiction budget	Five years	On-going
Wyandotte County-8	Develop and maintain a Multi-Hazards Evacuation Plan.	All Hazards	Wyandotte County Emergency Management Director	High	1,2,3,4	$400,000	HMGP, BRIC, Jurisdiction Budget	Five years	Carried over due to lack of funding
Wyandotte County-9	Coordinate with NASCAR to develop a formal emergency response plan for the Kansas Speedway…	All Hazards	Emergency Management Director	High	1,2	$30,000	HMGP, BRIC, Jurisdiction Budget	Five years	Carried over due to lack of funding
Wyandotte County-10	Construct a boat ramp to the Kansas River near the I-435 Bridge for joint use by KDOT, local law enforcement and fire departments, and other potential first responders.	All Hazards	UG Public Works Department Director	High	1,2	$100,000	HMGP, BRIC, Jurisdiction Budget	Five years	Carried over due to lack of funding
Wyandotte County-11	Construct a boat ramp to the Kansas River beneath the Turner Diagonal Bridge and 7th St. for joint use by KDOT, local law enforcement and fire departments, and other potential first responders.	All Hazards	UG Public Works Director	High	1,2	$60,000	HMGP, BRIC, Jurisdiction Budget	Five years	Carried over due to lack of funding
Wyandotte County-12	Establish periodic reviews / updates of Wyandotte County Multi-Jurisdictional All-Hazards Mitigation Plan, conducting a major review every five years.	All Hazards	Wyandotte County Emergency Management Director	High	1,2	Staff Time	Jurisdiction budget	On-going	Carried over due to lack of staff
Wyandotte County-13	Offer / provide Damage Assessment Team training annually for designated damage assessment personnel.	All Hazards	Wyandotte County Emergency management Director	High	4	Staff Time	Jurisdiction budget	Continuous	Carried over due to lack of staff

Wyandotte County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Wyandotte County-14	Partner with local school districts to ensure they have coordinated, well-prepared plans for school evacuations and sheltering-in-place.	All Hazards	Wyandotte County Emergency Management Director	High	1,2,3,4	Staff Time	Jurisdiction budget	Continuous	Carried over due to lack of staff
Wyandotte County-15	Support the continuation of Tabletop, Functional and Full-Scale Exercises and other training events for responders and support personnel.	All Hazards	Wyandotte County Emergency management Director	High	1,2,4	Staff Time	Jurisdiction budget	Continuous	On-going
Wyandotte County-16	Create a method for parents to reach their children during disaster emergencies.	All Hazards	Wyandotte County Emergency Management Director	High	4	$250,000 annually	HMGP, BRIC, Jurisdiction Budget	Continuous	Carried over due to lack of funding
Wyandotte County-17	Involve the Local Emergency Planning Committee (LEPC) in all hazard identification and response / recovery / mitigation planning.	All Hazards	Wyandotte County Emergency Management Director	High	4	Staff Time	Jurisdiction budget	Continuous	On-going
Wyandotte County-18	Develop / improve early warning system and work with Media Partners / Outlets to ensure that the same, clear, consistent message is being sent out by everyone	All Hazards	Wyandotte county Emergency Management Director	High	3,4	Staff Time	Jurisdiction budget	Continuous	Carried over due to lack of staff
Wyandotte County-19	Create and deliver seminars / training on planning for special event venues to include all hazard events, emergency response plans and continuity of business plans.	All Hazards	Wyandotte County emergency Management Director	High	1,2,4	$20,000	HMGP, BRIC, Jurisdiction Budget	Five years	On-going
Wyandotte County-20	Develop / maintain an Early Warning System to notify	All Hazards	Wyandotte County	High	1,2,4	$150,000 annually	HMGP, BRIC,	Five years	Carried over due to

Wyandotte County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
	Hospitals and other critical facilities of impending hazard threats integrating it with existing early warning capabilities.		Emergency Management Director				Jurisdiction Budget		lack of funding
Wyandotte County-21	Implement usage of electronic signs on highways to notify motorists of weather warnings and other hazards.	All Hazards	Wyandotte County Emergency Management Director	High	1,2, 4	Staff Time	HMGP, BRIC, Jurisdiction Budget	Five years	On-going
Wyandotte County-22	Develop a Memorandum of Understanding (MOU) with/between area building departments for post-disaster damage assessment.	All Hazards	Wyandotte County Emergency Management Director	Medium	4	Staff Time	Jurisdiction budget	Five years	On-going
Wyandotte County-23	Map all geological hazards countywide and make this information available. Identify and map specific underground void space areas prone to collapse failure and limit future development in these areas.	All Hazards	Wyandotte County emergency Management Director	Medium	1,2	$50,000 annually	HMGP, BRIC, Jurisdiction Budget	Continuous	Carried over due to lack of funding
Wyandotte County-24	Provide preparedness planning training and information for small business owners.	All Hazards	Wyandotte County Emergency Management Director	Medium	3	$5,000	HMGP, Jurisdiction Budget	Five years	Carried over due to lack of funding
Wyandotte County-25	Identify critical businesses and public service agencies and work to ensure their Continuity of Operations during / following a disaster.	All Hazards	Wyandotte County Emergency Management Director	Medium	4	$100,000 annually	HMGP, BRIC, Jurisdiction Budget	Five years	Carried over due to lack of funding
Wyandotte County-26	Create / develop and maintain a plan for pet and livestock rescue, care and sheltering during / following disasters.	All Hazards	Wyandotte County Emergency	Medium	2	Staff Time	Jurisdiction budget	Five years	Carried over due to lack of staff

Wyandotte County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
			Management Director						
Wyandotte County-27	Develop and enforce building restrictions in dam inundation areas.	Dam and Levees	Wyandotte County Emergency Management Director	Medium	1,2	Staff Time	Jurisdiction budget	Five years	On-going
Wyandotte County-28	Develop / review / update EAPs for High & Significant hazard dams in Wyandotte County.	Dams and Levees	Owner of Dam – UG Urban Planning and KS Dept of AG	Medium	1,2	Staff Time	Jurisdiction budget	Five years	On-going
Wyandotte County-29	Develop low water plans for utilities, businesses and organizations dependent on the water supply from the rivers.	Drought	Emergency Management Department director	High	1,2,4	$100,000 annually	HMGP, BRIC, Jurisdiction Budget	Five years	Carried over due to lack of funding
Wyandotte County-30	Provide public education sessions on extreme temperature (heat / cold) conditions.	Extreme Temperature	Emergency Management & Public Health Departments Directors	High	1,2,3,4	Program Size Dependent	HMGP, BRIC, Jurisdiction Budget	Continuous	Carried over due to lack of funding
Wyandotte County-31	Continued operation and management of jurisdictional **NFIP** activities.	Flood	Flood Plain Manager (Planning Department), County Emergency Management	High	1,2	Staff Time	Jurisdiction budget	Continuous	On-going
Wyandotte County-32	Develop alternative ways to better monitor, in real-time, water levels of the Kansas & Missouri Rivers, Turkey Creek and other smaller streams / tributaries throughout the county for the purposes of advance planning, response & warning.	Flood	Emergency Management Director	High	1,2, 4	$10,000	HMGP, BRIC, FMA, Jurisdiction Budget	Five years	Carried over due to lack of funding

Wyandotte County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Wyandotte County-33	Purchase flood prone properties. Especially repetitive loss properties.	Flood	Wyandotte county Emergency Management Director	High	1,2	Project dependent	HMGP, BRIC, FMA, Jurisdiction Budget	Continuous	Carried over due to lack of funding
Wyandotte County-34	Protect or relocate flood prone critical facilities.	Flood	Emergency Management Department Director	High	1,2	Project dependent	HMGP, BRIC, FMA, Jurisdiction Budget	Five years	Carried over due to lack of funding
Wyandotte County-35	Build bridges and/or raise roads in low-lying areas.	Flood	UG Public Works Street Department Director	High	1,2	Project dependent	HMGP, BRIC, FMA, Jurisdiction Budget	Continuous	Carried over due to lack of funding
Wyandotte County-36	Conduct removal of debris from floodways to mitigate floodwater back-up.	Flood	Public Works Department Director	High	1,2	Project dependent	HMGP, BRIC, FMA, Jurisdiction Budget	Continuous	Carried over due to lack of funding
Wyandotte County-37	Continue Participation in the Community Emergency Response Team (CERT) program by recruiting, training, equipping and fielding CERT Teams.	Flood	Emergency Management Director	High	1,2,3	$4,000 per class of 25	HMGP, Jurisdiction Budget	Continuous	Carried over due to lack of funding
Wyandotte County-38	Upgrade / expand / improve storm water Management Systems.	Flood	UG Water Pollution Control, Public Works Departments of Bonner springs, Edwardsville, and Lake Quivira	High	1,2	$50,000,000	HMGP, BRIC, FMA, Jurisdiction Budget	Continuous	Carried over due to lack of funding
Wyandotte County-39	Update all Flood Insurance Maps.	Flood	UG Planning Department Director	High	1,2	$250,000	HMGP, BRIC, FMA,	Five years	Carried over due to lack of funding

Wyandotte County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
							Jurisdiction Budget		
Wyandotte County-40	Notify all homeowners and businesses in flood prone areas of their possible risk.	Flood	UG Planning and Zoning Department; Bonner springs and Edwardsville Planning Departments	High	1,2	Staff Time	Jurisdiction budget	Five years	Carried over due to lack of staff
Wyandotte County-41	Install and maintain flood warning flashing lights and flash flood warnings (lights and signs) in low-lying and flood prone areas.	Flood	Wyandotte County Emergency Management Director	Medium	1,2	$100,000 per crossing	HMGP, BRIC, FMA, Jurisdiction Budget	Five years	Carried over due to lack of funding
Wyandotte County-42	Provide an early warning system on streams with the most potential for flood damage to structures.	Flood	Wyandotte County Emergency Management Director	Medium	1,2	$50,000 annually	HMGP, BRIC, FMA, Jurisdiction Budget	Five years	Carried over due to lack of funding
Wyandotte County-43	Provide public education sessions on the dangers of lightning.	Severe Weather	Emergency Management Department Director	High	1,2,3	Program Size Dependent	HMGP, BRIC, Jurisdiction Budget	Continuous	Carried over due to lack of funding
Wyandotte County-44	Adopt / implement / enforce building code standards for the installation of lightning protection systems.	Severe Weather	UG, Bonner Springs, Edwardsville Planning Departments, Director of Neighborhood Resource Center	High	1,2	Staff Time	Jurisdiction budget	Five years	Carried over due to lack of staff
Wyandotte County-45	Identify large venues, ball fields, parks and other areas countywide for installation of lightning detectors and develop a program for their installation.	Severe Weather	Wyandotte County emergency Management Director	High	1,2	$5,000,000	HMGP, BRIC, Jurisdiction Budget	Five years	Carried over due to lack of funding

Wyandotte County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Wyandotte County-46	Adopt building codes to require safe rooms in residential structures and public buildings, including schools.	Severe Weather, Tornado	UG Planning Department working with UG Commissioners and Bonner Springs, KS and Edwardsville, KS Planning and Zoning	High	1,2	Staff Time	Jurisdiction budget	Ten years	Carried over due to lack of staff
Wyandotte County-47	Expand and improve outdoor warning system network in Wyandotte County.	Severe Weather, Tornado	Emergency Management Director	High	1,2	$25,000 to $50,000	HMGP, BRIC, Jurisdiction Budget	Continuous	Carried over due to lack of funding
Wyandotte County-48	Provide public education sessions on winter weather driving.	Severe Winter Weather	Emergency Management Department Director	High	1,2,3	Program Size Dependent	HMGP, BRIC, Jurisdiction Budget	Continuous	Carried over due to lack of staff
Wyandotte County-49	Provide public education sessions on how to protect from, prepare for, respond to, and recover from tornados and severe weather.	Tornado	Emergency Management Department Director	High	1,2,3	Program Size Dependent	HMGP, BRIC, Jurisdiction Budget	Continuous	Carried over due to lack of staff
Wyandotte County-50	Provide public education sessions on aggressive smoke detector installation.	Wildfire	Kansas City, Kansas fire Department, Bonner Springs, Edwardsville, and Fire Inspector	High	3	Provided by ARC	HMGP, BRIC, Jurisdiction Budget	Continuous	On-going
Wyandotte County-51	Identify and develop a list of those areas susceptible to explosive fires, such as grain elevators, etc., and map them.	Wildfire	Wyandotte County emergency Management Director	Medium	1,2	Staff Time	Jurisdiction budget	Five years	On-going
Wyandotte County-52	Develop / maintain an Early Warning System to notify the Public on potential Haz-Mat	Hazardous Materials	Wyandotte County emergency	High	1,2,4	$150,000 annually	HMGP, BRIC,	Five years	Carried over due to

Wyandotte County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
	dangers integrating it with existing early warning capabilities.		Management Director				Jurisdiction Budget		lack of funding
Wyandotte County-53	Establish priority reconnects with local utility companies after outages created by severe storms or other type incidents.	Infrastructure Failure	County Emergency Management Director/all utilities in Wyandotte County	High	1,2	Staff Time	Jurisdiction budget	Five years	On-going
Wyandotte County-54	Require fixed HazMat facilities to have their emergency response procedures coordinated with the city and county first responder plans.	Infrastructure Failure	Wyandotte County Emergency Management Director	High	1,4	Staff Time	Jurisdiction budget	Five years	Carried over due to lack of staff
Wyandotte County-55	Invite critical organizations to be part of the KC TEW for advance notification of terrorist activity in the area.	Terrorism	Wyandotte County Sheriff's Chief & KCK Police Department	High	1,2,3,4	Staff Time	Jurisdiction budget	Continuous	On-going
Wyandotte County-56	Create a public notification system to alert the public about an epidemic and how to prevent or treat the disease.	Transmissible Disease	Wyandotte County Emergency Management Director, Wyandotte county Public Health Department Director	High	1,2,4	$500,000	HMGP, BRIC, Jurisdiction Budget	Five years	Carried over due to lack of funding
Wyandotte County-57	Develop a vaccination strategy and a hospital mass prophylaxis plan.	Transmissible Disease	County, Manager Infection Control Director, Health Department, Administrator	High	1,2	TBD	HMGP, BRIC, Jurisdiction Budget	Continuous	Carried over due to lack of funding
Bonner Springs-1	Complete Continuity of Operations plans for the City of Bonner	All Hazards	City Manager	High	1,4	$15,000	HMGP, Jurisdiction budget	Five years	Carried over due to lack of staff

Wyandotte County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
	Springs Government utilizing a contractor.								
Bonner Springs-2	Develop family preparedness handbooks in multiple languages and promote family preparedness planning with brochures, website and community outreach. Evaluate program outcomes with surveys and website	All Hazards	City Manager	High	4	$50,000	HMGP, Jurisdiction budget	Five years	Carried over due to lack of funding
Bonner Springs-3	Install evacuation route signage in any high hazard dam or levee failure inundation areas.	Dam/Levee Failure	Mayor	Medium	1, 2, 4	$5,000 per location	HMGP, Jurisdiction budget	Five years	New
Bonner Springs-4	Conduct a native, low water planting program for all jurisdictional owned facilities	Drought	Facilities Director	Medium	1, 2	$5,000 - $20,000 per facility	HMGP, BRIC, Jurisdiction budget	Ten years	New
Bonner Springs-5	Identify and prepare local facilities to serve as heating/cooling centers.	Extreme Temperatures	Facilities Director	Medium	1, 2	$3,000 per facility	HMGP, Jurisdiction budget	Five years	New
Bonner Springs-6	Continued operation and management of jurisdictional NFIP activities.	Flood	NFIP Administrator	High	1,2,4	Staff Time	Jurisdiction budget	On-going	On-going
Bonner Springs-7	Conduct a study and complete the recommended detention actions along Mission Creek north of Kaw Dr. (K-32) near Shawnee Rock.	Flood	City Manager	High	1,2	$500,000	HMGP, BRIC, Jurisdiction budget	Five years	Carried over due to lack of funding
Bonner Springs-8	Provide public education sessions on the Turn Around Don’t Drown program.	Flood	City Manager	High	1,2,3	$2,000		Five years	Carried over due to lack of funding
Bonner Springs-9	Conduct Spring Creek storm drainage improvements to address flooding that occurs as a result of inadequate drainage. Replace and construct additional culverts to reduce flooding.	Flood	City Manager	Medium	1,2	$782,700	HMGP, BRIC, Jurisdiction budget	Five years	Carried over due to lack of funding

Wyandotte County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Bonner Springs-10	Conduct Spring Creek storm drainage / Springdale Avenue to Morse Avenue stream bank improvements.	Flood	City Manager	Medium	1,2	$782,700	HMGP, BRIC, Jurisdiction budget	Five years	Carried over due to lack of funding
Bonner Springs-10	Institute a streambank setback ordinance controlling development along streambanks.	Flood	City Manager	Medium	1,2,4	Staff Time	Jurisdiction budget	Five years	Carried over due to lack of staff
Bonner Springs-12	Provide hydrologic and hydraulic analysis and storm drainage improvement design along Wolf Creek watershed.	Flood	City Manager	Low	2	$100,000	HMGP, BRIC, Jurisdiction budget	Five years	Carried over due to lack of funding
Bonner Springs-13	Conduct improvements needed to address the undersized drainage features in the Clark Area Drainage Watershed.	Flood	City Manager	Low	2	$1,753,000	HMGP, BRIC, Jurisdiction budget	Five years	Carried over due to lack of funding
Bonner Springs-14	Purchase and mount a camera at Fire Department for storm monitoring.	Severe Weather, Severe Winter Weather	Fire Chief	High	1,2	$10,000	HMGP, Jurisdiction budget	Five years	Carried over due to lack of funding
Bonner Springs-15	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Facilities Director	Low	1, 2	$50,000 per location	HMGP, BRIC, Jurisdiction budget	Five years	New
Bonner Springs-16	Conduct public education program for driving in winter conditions.	Severe Winter Weather	City Manager	Low	4	Staff Time	Jurisdiction budget	Five years	New
Bonner Springs-17	Construct community saferooms in select jurisdictional buildings.	Tornado	City Manager	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	Carried over due to lack of funding
Bonner Springs-18	Create defensible space buffers at all critical facilities	Wildfire	Fire Chief	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	As required	New

Wyandotte County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Bonner Springs-19	Develop procedures to activate the Emergency Alert System (EAS) and National Weather Service (NWS) All Hazard Radios for chemical events, exercise the program, and Review After Action and make any necessary changes	Hazardous Materials	City Administrator	Medium	1,2,4	Staff Time	Jurisdiction budget	Five years	Carried over due to lack of funding
Bonner Springs-20	Design and deliver a Shelter-in-Place program to educate individuals on how to receive notification regarding a chemical incident and necessary actions to take.	Hazardous Materials	City Administrator	Low	3	$7,500	Jurisdiction budget	Five years	Carried over due to lack of funding
Edwardsville-1	Purchase and install critical facility backup generators in conjunction with hardening existing electrical systems.	All hazards	City Administrator	High	1, 2	$25,000 - $50,000 per facility	HMGP, BRIC, Jurisdiction budget	Five years	Carried over due to lack of funding
Edwardsville-2	Development of the North Fire Station into a remote facility that will support continuation of City Services. Renovation of the facility, purchase and installation of necessary equipment to make the North Fire Station operable for all services of the city.	All hazards	City Administrator	High	1, 2	Location and size dependent	BRIC, HMGP, Jurisdiction budget	Ten years	Carried over due to lack of funding
Edwardsville-3	Install evacuation route and high ground signage in any high hazard dam potential inundation areas.	Dam/Levee Failure	City Administrator	Medium	1, 2, 4	$5,000 per location	HMGP, Jurisdiction budget	Five years	New
Edwardsville-4	Conduct a native, low water planting program for all jurisdictional owned facilities.	Drought	City Administrator	Medium	1, 2	$5,000 - $20,000 per facility	HMGP, BRIC, Jurisdiction budget	Ten years	New
Edwardsville-5	Conduct a personal water use education program.	Drought	City Administrator	Low	3	Staff time	HMGP, BRIC, Jurisdiction budget	Five years	New

Wyandotte County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Edwardsville-6	Identify and prepare local facilities to serve as heating/cooling centers.	Extreme Temperatures	City Administrator	Medium	1, 2	$3,000 per facility	HMGP, Jurisdiction budget	Five years	New
Edwardsville-7	Continue to participate meet requirements of the NFIP.	Flood	NFIP Coordinator	High	1, 2	Staff time	Jurisdiction budget	Continuous	On-going
Edwardsville-8	Acquire and demolish properties in flood prone areas	Flood	City Administrator	Low	1, 2	Location and size dependent	HMGP, BRIC, Jurisdiction budget	As required	Carried over due to lack of funding
Edwardsville-9	Clean and repair drainage ditches to maintain capacity.	Flood	City Administrator	Low	1, 2	Location, length, and size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	New
Edwardsville-10	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	City Administrator	Low	1, 2	$50,000 per location	Facility size dependent	Five years	New
Edwardsville-11	Conduct public education program for driving in winter conditions.	Severe Winter Weather	City Administrator	Low	4	Staff Time	Jurisdiction budget	Five years	New
Edwardsville-12	Construct community saferooms in select jurisdictional buildings.	Tornado	City Administrator	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	Ten years	New
Edwardsville-13	Create defensible space buffers at all critical facilities	Wildfire	City Administrator	High	1, 2	Facility size dependent	HMGP, BRIC, Jurisdiction budget	As required	New
KCKCC-1	Develop Emergency Action Plans for the dam on the Kansas City Kansas Community College's campus.	All Hazards	President	Medium	1,2,3,4	$50,000	HMGP, School Budget	Five years	Carried over due to lack of funding
KCKCC-2	Conduct a native, low water planting program for all jurisdictional owned facilities.	Drought	President	Low	1, 2	$10,000 -per location	HMGP, BRIC, School Budget	Ten years	New

Wyandotte County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
KCKCC-3	Conduct an extreme temperature awareness seminar to educate on risks and mitigation methods.	Extreme Temperature, Severe Winter Weather	President	Medium	1, 2	$500	HMGP, Jurisdiction budget	Five years	New
KCKCC-4	Design and construct groundwater control runoff projects for KCKCC Campus.	Flood	Building and Grounds Director	Low	1, 2	Location and size dependent	HMGP, BRIC, School Budget	As required	Carried over due to lack of funding
KCKCC-5	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Building and Grounds Director	Low	1, 2	Facility size dependent	HMGP, BRIC, School budge	Five years	New
KCKCC-6	Construct safe rooms in all buildings, and at outdoor locations, to required standards.	Tornado	Building and Grounds Director	High	1, 2	$1,000,000 - per location	HMGP, BRIC, School budget	Ten years	New
KS School for Deaf and Blind-1	Purchase and install school facility backup generators in conjunction with hardening existing electrical systems.	All hazards	President	High	1, 2	$10,000 - $50,000 per facility	HMGP, BRIC, School Budget	Five years	New
KS School for Deaf and Blind-2	Conduct hazard mitigation education programs for students.	All hazards	President	Medium	1, 2, 3	$2,000	School Budget	As required	New
KS School for Deaf and Blind-3	Conduct a native, low water planting program for all jurisdictional owned facilities	Drought	President	Low	1, 2	$10,000 -per location	HMGP, BRIC, School Budget	Ten years	New
KS School for Deaf and Blind-4	Conduct an extreme temperature awareness seminar to educate on risks and mitigation methods.	Extreme Temperature, Severe Winter Weather	President	Medium	1, 2	$500	HMGP, Jurisdiction budget	Five years	New
KS School for Deaf and Blind-5	Construct rainwater gardens adjacent to paved areas.	Flood	President	Low	1, 2	Location and size dependent	HMGP, BRIC, School Budget	As required	New

Wyandotte County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
KS School for Deaf and Blind-6	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	President	Low	1, 2	$100,000 per location	Facility size dependent	Five years	New
KS School for Deaf and Blind-7	Construct safe rooms in all buildings to required standards.	Tornado	President	High	1, 2	$1,000,000 - per location	HMGP, BRIC, School budget	Ten years	New
USD202-1	Purchase and install school facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Superintendent	High	1, 2	$10,000 - $50,000 per facility	HMGP, BRIC, School Budget	Five years	Carried over due to lack of funding
USD202-2	Radios that will provide communications between School District staff and local Law Enforcement to establish a common operating picture and situational awareness and to meet the new Safe and Secure standards #3	All hazards	Superintendent	High	1, 2, 3	$100,000	School Budget	Five years	Carried over due to lack of funding
USD202-3	Conduct a native, low water planting program for all jurisdictional owned facilities.	Drought	Superintendent	Low	1, 2	$10,000 -per location	HMGP, BRIC, School Budget	Ten years	New
USD202-4	Conduct an extreme temperature awareness seminar to educate on risks and mitigation methods.	Extreme Temperature, Severe Winter Weather	Superintendent	Medium	1, 2	$500	HMGP, Jurisdiction budget	Five years	New
USD202-5	Construct rainwater gardens adjacent to paved areas.	Flood	Superintendent	Low	1, 2	Location and size dependent	HMGP, BRIC, School Budget	As required	New
USD202-6	Lightning Detection which will provide advance warning of potentially life threating storms.	Severe Weather	Superintendent	High	1, 2	$100,000 per location	HMGP, BRIC, School Budget	Five years	Carried over, lack of funding

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Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
USD202-7	Construct safe rooms in all school buildings, and at outdoor locations, to required standards.	Tornado	Superintendent	High	1, 2	$1,000,000 - per location	HMGP, BRIC, School budget	Ten years	Carried over due to lack of funding
USD202-8	Purchase and install camera system (or system updates) in all school district buildings.	Terrorism	Superintendent	High	1, 2, 3	Location and size dependent	HMGP, School Budget	As required	Carried over due to lack of funding
USD203-1	Purchase and install school facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Superintendent	High	1, 2	$10,000 - $50,000 per facility	HMGP, BRIC, School Budget	Five years	New
USD203-2	Conduct hazard mitigation education programs for students.	All hazards	Superintendent	Medium	1, 2, 3	$2,000	School Budget	As required	New
USD203-3	Conduct a native, low water planting program for all jurisdictional owned facilities	Drought	Superintendent	Low	1, 2	$10,000 -per location	HMGP, BRIC, School Budget	Ten years	New
USD203-4	Conduct an extreme temperature awareness seminar to educate on risks and mitigation methods.	Extreme Temperature, Severe Winter Weather	Superintendent	Medium	1, 2	$500	HMGP, Jurisdiction budget	Five years	New
USD203-5	Construct rainwater gardens adjacent to paved areas.	Flood	Superintendent	Low	1, 2	Location and size dependent	HMGP, BRIC, School Budget	As required	New
USD203-6	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Superintendent	Low	1, 2	$100,000 per location	Facility size dependent	Five years	New
USD203-7	Construct safe rooms in all school buildings to required standards.	Tornado	Superintendent	High	1, 2	$1,000,000 - per location	HMGP, BRIC, School budget	Ten years	New

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Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
USD203-8	Purchase and install camera system (or system updates) in all school district buildings.	Terrorism	Superintendent	High	1, 2, 3	Location and size dependent	HMGP, School Budget	As required	Carried over due to lack of funding
USD204-1	Purchase and install school facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Superintendent	High	1, 2	$10,000 - $50,000 per facility	HMGP, BRIC, School Budget	Five years	New
USD204-2	Conduct hazard mitigation education programs for students.	All hazards	Superintendent	Medium	1, 2, 3	$2,000	School Budget	As required	New
USD204-3	Conduct a native, low water planting program for all jurisdictional owned facilities	Drought	Superintendent	Low	1, 2	$10,000 -per location	HMGP, BRIC, School Budget	Ten years	New
USD204-4	Conduct an extreme temperature awareness seminar to educate on risks and mitigation methods.	Extreme Temperature, Severe Winter Weather	Superintendent	Medium	1, 2	$500	HMGP, Jurisdiction budget	Five years	New
USD204-5	Construct rainwater gardens adjacent to paved areas.	Flood	Superintendent	Low	1, 2	Location and size dependent	HMGP, BRIC, School Budget	As required	New
USD204-6	Install hail and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Wildfires	Superintendent	Low	1, 2	$100,000 per location	Facility size dependent	Five years	New
USD204-7	Construct safe rooms in all school buildings to required standards.	Tornado	Superintendent	High	1, 2	$1,000,000 - per location	HMGP, BRIC, School budget	Ten years	Carried over due to lack of funding
USD204-8	Purchase and install camera system (or system updates) in all school district buildings.	Terrorism	Superintendent	High	1, 2, 3	Location and size dependent	HMGP, School Budget	As required	Carried over due to lack of funding

Wyandotte County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
USD500-1	Purchase and install school facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Superintendent	High	1, 2	$10,000 - $50,000 per facility	HMGP, BRIC, School Budget	Five years	Carried over due to lack of funding
USD500-2	Radios that will provide communications between School District staff and local Law Enforcement to establish a common operating picture and situational awareness and to meet the new Safe and Secure standards #3	All hazards	Superintendent	High	1, 2, 3	$100,000	School Budget	Five years	Carried over due to lack of funding
USD500-3	Conduct a native, low water planting program for all jurisdictional owned facilities.	Drought	Superintendent	Low	1, 2	$10,000 -per location	HMGP, BRIC, School Budget	Ten years	New
USD500-4	Conduct an extreme temperature awareness seminar to educate on risks and mitigation methods.	Extreme Temperature, Severe Winter Weather	Superintendent	Medium	1, 2	$500	HMGP, Jurisdiction budget	Five years	New
USD500-5	Construct rainwater gardens adjacent to paved areas.	Flood	Superintendent	Low	1, 2	Location and size dependent	HMGP, BRIC, School Budget	As required	New
USD500-6	Lightning Detection which will provide advance warning of potentially life threating storms.	Severe Weather	Superintendent	High	1, 2	$100,000 per location	HMGP, BRIC, School Budget	Five years	Carried over due to lack of funding
USD500-7	Construct safe rooms in all school buildings, and at outdoor locations, to required standards.	Tornado	Superintendent	High	1, 2	$1,000,000 - per location	HMGP, BRIC, School budget	Ten years	Carried over due to lack of funding
USD500-8	Purchase and install camera system (or system updates) in all school district buildings.	Terrorism	Superintendent	High	1, 2, 3	Location and size dependent	HMGP, School Budget	As required	Carried over due to lack of funding

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Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
KU Hospital-1	Conduct a xeriscaping program for all facilities	Drought	President	Low	1, 2	$10,000 -per location	HMGP, BRIC, School Budget	Ten years	New
KU Hospital-2	Construct rainwater gardens adjacent to paved areas.	Flood	President	Low	1, 2	Location and size dependent	HMGP, BRIC, School Budget	Five years	New
KU Hospital-3	Install shatter resistant film on all exterior windows.	Severe Weather, Severe Winter Storm, Tornado, Wildfire	President	High	1, 2	Location and size dependent	HMGP, BRIC, School Budget	Five years	New
KU Hospital-4	Construct safe rooms in all new facilities to required standards.	Tornado	President	High	1, 2	$1,000,000 - per location	HMGP, BRIC, School budget	Ten years	Carried over due to lack of funding
Providence Med-1	Conduct a xeriscaping program for all facilities	Drought	President	Low	1, 2	$10,000 -per location	HMGP, BRIC, School Budget	Ten years	New
Providence Med -2	Construct rainwater gardens adjacent to paved areas.	Flood	President	Low	1, 2	Location and size dependent	HMGP, BRIC, School Budget	Five years	New
Providence Med -3	Install shatter resistant film on all exterior windows.	Severe Weather, Severe Winter Storm, Tornado, Wildfire	President	High	1, 2	Location and size dependent	HMGP, BRIC, School Budget	Five years	New
Providence Med -4	Construct safe rooms in all new facilities to required standards.	Tornado	President	High	1, 2	$1,000,000 - per location	HMGP, BRIC,	Ten years	Carried over due to

Wyandotte County and Participating Jurisdictions Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
							School budget		lack of funding
Board of Public Utilities - 1	Provide public education sessions on home improvement programs to conserve water and electricity usage to lower consumption during peak demand periods.	Drought, Extreme Temperatures	Wyandotte County Emergency Management Director	High	3	Staff Time	Board Budget	On-going	Carried over due to lack of staff
Board of Public Utilities - 2	Provide public education sessions on energy consumption during extreme heat events, cooling center locations and free fan programs.	Extreme Temperatures, Infrastructure Failure	Wyandotte County Emergency Management Director	High	3	Staff Time	Board Budget	On-going	Carried over due to lack of staff
Board of Public Utilities - 3	Install additional lightning arrestors on power infrastructure.	Severe Weather	Board of Public Utilities and other utility companies	High	1,2	Size dependent	HMGP, BRIC, Board Budget	Ten years	Carried over due to lack of funding
Board of Public Utilities - 4	Create Redundancy in Utility Distribution Lines (Loops) and Key Equipment at Production Facilities.	Infrastructure Failure	Board of Public Utilities (BPU), KCP&L, Operations	High	1,2	Size dependent	HMGP, BRIC, Board Budget	Ten years	Carried over due to lack of funding
Board of Public Utilities - 5	Upgrade power distribution systems through replacement of porcelain insulators and switches with polymer components.	Infrastructure Failure	Board of Public Utilities and KCPL	Medium	1,2	Size dependent	HMGP, BRIC, Board Budget	Ten years	Carried over due to lack of funding
Board of Public Utilities - 6	Strengthen, bury and/or upgrade utility power lines / distribution systems to reduce power failures.	Infrastructure Failure	Board of Public Utilities, KCP&L, other utilities as needed	High	1,2	Size dependent	HMGP, BRIC, Board Budget	Ten years	Carried over due to lack of funding
Boy Scouts of America - 1	Purchase and install an adequate communications system(s) for Scouts, Scouters and campers at Boy Scout Camp Theodore Naish, BSA.	All Hazards	Wyandotte County Emergency Management Director	High	4	$30,000	HMGP, Scout Budget	Five years	Carried over due to lack of funding

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Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
Boy Scouts of America - 2	Flood Control Dam – To be installed on East Mission Creek above Lake of the Forest	Flooding	Wyandotte County Flood Plain Management Program	High	1,2	$2,000,000	BRIC, HMGP, Scout Budget	Ten years	Carried over due to lack of funding
Harvesters-1	Install shatter resistant film on all exterior windows.	Severe Weather, Severe Winter Storm, Tornado, Wildfire	President	High	1, 2	Location and size dependent	HMGP, BRIC, School Budget	Five years	New
Fairfax Drainage District - 1	Complete floodwall improvements at the Quindaro Power Plant owned by BPU by strengthening or replacing sections of the floodwall.	Flood, Dam and Levee	Fairfax Drainage District General Manager	High	1, 2	$9,000,000	USACE, HMGP, BRIC, System budget	Five years	Carried over due to lack of funding
Kaw Valley Drainage District - 1	Provide adequate communications & warning system(s) for Kaw Valley Drainage District.	Flood, Dam and Levee	President	High	1,2	$50,000	HMGP, District Budget	Repeating	Carried over due to lack of funding
Kaw Valley Drainage District - 2	Place/re-place riprap along the slopes of the Kaw Valley Drainage District's levees to protect them from erosive forces.	Flood, Dam and Levee	President	High	1,2	Location and size dependent	HMGP, District Budget	Ten years	Carried over due to lack of funding
Kaw Valley Drainage District - 3	Raise the top of the levees 4 – 5' in order to meet the requirements for the 500-year flood event.	Flood, Dam and Levee	President	High	1,2	250,000,000	HMGP, District Budget	Ten years	Carried over due to lack of funding
Kaw Valley Drainage District - 4	Meet FEMA requirements relating to levee 100-year certification.	Flood, Dam and Levee	President	High	1,2	$1,300,000	HMGP, District Budget	Five years	Carried over due to lack of funding
WaterOne1-1	Purchase and installation of emergency generators for facilities to ensure continued operations. Loss of power	All Hazards	Director	High	1,2	$30,195,001	Jurisdiction budget,	Five Years	On the previous plan

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Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Current Status
	could potentially curtail services to the community.						Federal grant		(amendment)
WaterOne1-2	Replace and upgrade pump stations to provide additional water capacity for fire and emergency storage.	Drought, Wildfire, Infrastructure Failure	Director	High	1,2	$41,047,108	Jurisdiction budget, Federal grant	Five to Ten Years	On the previous plan
WaterOne1-3	Kansas River replacement of vertical wells to minimize the impacts of river icing and improve the functionality of the wellfield.	Extreme Temperatures, Infrastructure Failure	Director	High	1,2	$5,850,584	Jurisdiction budget, Federal grant	Two to Three Years	New
WaterOne1-4	Addition of Kansas River horizontal collector well to alleviate the load of water on the Kansas Presedimentation Facility	Extreme Temperatures, Drought, Infrastructure Failure	Director	High	1,2	$4,508,332	Jurisdiction budget, Federal grant	Four Years	New
WaterOne1-5	Addition of the Wolcott Collector Well to increase water supply sourcing and maximize redundancy	Drought, Infrastructure Failure	Director	High	1,2	$17,209,169	Jurisdiction budget, Federal grant	One to Two Years	New
WaterOne1-6	Improvements to Facility 1 Water Treatment Plant to minimize infrastructure failure	Infrastructure Failure	Director	High	1,2	$4,054,539	Jurisdiction budget, Federal grant	Two to Three Years	New
WaterOne1-7	Zebra Mussel mitigation to minimize growth and infestation at the Missouri River Intake, reducing risk for infrastructure failure	Extreme Temperatures; Infrastructure Failure	Director	High	1,2	$1,213,288	Jurisdiction budget, Federal grant	Three Years	New
WaterOne1-8	Missouri Riverbed Degradation Study	Extreme Temperatures; Drought	Director	High	1,2	Location and size dependent	Jurisdiction budget, Federal grant	Five to Ten Years	New
WaterOne1-9	Transmission Main projects increasing resiliency, expanding connectivity of water	Drought. Wildfire. Infrastructure Failure	Director	High	1,2	Location and size dependent	Jurisdiction budget, Federal grant	Five Years	New