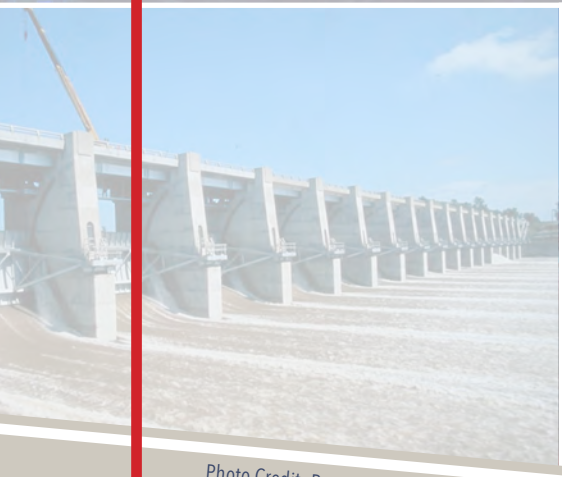
# FLINT HILLS

## Military Installation Resiliency Study & Action Plan

FLINT HILLS
REGION



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Produced by

Matrix

# FLINT HILLS

# MILITARY INSTALLATION RESILIENCY STUDY & ACTION PLAN

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# Quick Links

## UTILITIES

Evergy Utility

Bluestem Utility (BEC)

Flint Hills Rural Electric Cooperative (FHREC)

Dickinson, Saline, Ottawa Electric Cooperative (DSOEC)

Kansas Gas Service (KGS)

Black Hills Energy (BHE)

## COUNTIES

Geary County

Pottawatomie County

Riley County

Clay County

## CITIES

City of Grandview Plaza

Junction City

City of Milford

City of Wamego

City of St. George

Leonardville

Manhattan

Ogden

City of Riley

City of Clay Center

City of Wakefield

# Acronyms

| | | | |
|---|---|---|---|
| **ARPA** | American Rescue Plan Act | **kv** | Kilovolt |
| **CAIDI** | Customer Average Interruption Duration Index | **KW** | Kilowatt |
| **CCPUC** | City of Clay Center Public Utilities Commission | **MGD** | Millions of Gallons per Day |
| **CIP** | Capital Improvements Program | **MIR** | Military Installation Resilience |
| **CISA** | Cyber and Infrastructure Security Agency | **MOU** | Memorandum of Understanding |
| **CMIP6** | Coupled Model Intercomparison Project Phase 6 | **MW** | Megawatt |
| **DCIP** | Defense Critical Infrastructure Program | **NCF** | National Critical Function |
| **DoD** | Department of Defense | **NIPP** | National Infrastructure Protection Plan |
| **DSOEC** | Dickinson, Saline, Ottawa Electric Cooperative | **OEA** | Office of Economic Adjustment |
| **ESF** | Emergency Support Function | **OLDCC** | Office of Local Defense Community Cooperation |
| **FEMA** | Federal Emergency Management Agency | **PERP** | Pipeline Emergency Response Plan |
| **FHMPO** | Flint Hills Metropolitan Planning Organization | **RO** | Reverse Osmosis |
| **FHRC** | Flint Hill Regional Council | **RWD** | Rural Water District |
| **FHREC** | Flint Hills Rural Electric Cooperative | **SAIDI** | System Average Interruption Duration Index |
| **GIS** | Geospatial Information System | **SAIFI** | System Average Interruption Frequency Index |
| **IOU** | Investor-Owned Utility | **SCADA** | Supervisory Control and Data Acquisition |
| **IPCC** | Intergovernmental Panel on Climate Change | **SSP** | Shared Socioeconomic Pathway |
| **IRPF** | Infrastructure Resilience Planning Framework | **USACE** | United States Army Corps of Engineers |
| **KCP&L** | Kansas City Power & Light | **V** | Volts |
| **KGS** | Kansas Gas Service | **WCRP** | World Climate Research Program |
| **KSU** | Kansas State University | **WWTP** | Wastewater Treatment Plant |

# Acknowledgements

## Flint Hills Regional Council

The Flint Hills Regional Council served as the overall MIR project management agency and the administrator of the Office of Local Defense Community Cooperation grant that helped fund this study.

- Janna Williams
  *Regional Planner*

## MIR Consultant / Technical Advisors

Matrix Design Group, Inc, was the project consultant hired to conduct the MIR through coordination with and assistance from the Flint Hills Regional Council, surrounding community officials and other stakeholders.

- Charlie Perham, PE
  *Director of Government Consulting Services*
- Charlie Kuhl, PE
  *Project Manager*
- Chris Martin, GISP
  *Director, GIS Services*

- Ajay Sitaula, PE
  *Energy Resiliency*

- Matthew Steeves
  *Cyber & Systems Security*

- Josh Hacker, PhD
  *Climate Modeling & Analysis*

## Special Appreciation

The Flint Hills Regional Council wishes to recognize and thank all the community leaders, officials, staff members throughout the Flint Hills Region, and other stakeholders for their participation in the data gathering and meetings throughout this study.

# Executive Summary

In response to the Flint Hills Regional Council (FHRC) request for proposals, ***Matrix Design Group, Inc.*** (Matrix), in association with ***City Light & Power, Inc.*** (CLP), ***Jupiter Intelligence, Inc.*** (Jupiter), and woman-owned small business ***Chinook Systems, Inc.*** (Chinook) as subconsultant partners, presents the Military Installation Resiliency Study & Action Plan (MIR) for Fort Riley and the surrounding communities. The objective of this project is to increase the military value of Fort Riley by identifying resiliency opportunities for implementation by counties, cities, and infrastructure near the installation. The study implemented an all-hazards approach to the interdependencies of infrastructure sectors, and intra-regional relationships, with an emphasis on climate impacts, power, and cybersecurity throughout the Flint Hills Region.

## What is a Military Installation Resiliency Study?

The goal of this Military Installation Resiliency Study is to provide critical information and recommendations that enable communities to make informed decisions related to resiliency and to work in partnership with the Fort Riley Garrison Command to respond to, address, and mitigate activities that are either impairing or may impair the installation mission. The Department of Defense (DoD) Instruction 4170.11 [1] defines energy resilience as "the ability to prepare for and recover from energy disruptions that impact mission assurance on military installations." Closely related, ”military installation resilience is defined as the capability of a military installation to avoid, prepare for, minimize the effect of, adapt to, and recover from extreme weather events, or from anticipated or unanticipated changes in environmental conditions, that do, or have the potential to, adversely affect the military installation or essential transportation, logistical, or other necessary resources outside of the military installation that are necessary in order to maintain, improve, or rapidly reestablish installation mission assurance and mission-essential functions.” Ultimately, the project's outcome should increase military value of the installation by preserving military missions through the support of resilient communities.

In order to fulfill the requirements of this study, Matrix employed the tenets of the DoD Energy Program from an “all hazards” perspective and integrated the pillars of expanding supply, reducing demand, and adapting future forces and technologies throughout this effort. Matrix developed a set of mission critical requirements with options that will provide a framework for decision-making to implement the recommendations of this study. The study and plan aligned solutions to prioritize the critical needs of the community and the installation.

## Why Prepare a Military Installation Resiliency Study?

Collaboration and joint planning among military installations, local communities, agencies, and other stakeholders should occur to protect the long-term viability of existing and future military missions. Working together also enhances the health of economies, industries, and infrastructure systems of the communities before incompatible or detrimental development becomes an issue. Recognizing the symbiotic relationship that should exist between installations and adjacent communities, the Office of Local Defense Community Cooperation (OLDCC, formerly known as the Office of Economic Adjustment OEA) implemented the Installation Resiliency Authority in an effort to mitigate existing and future conflicts and enhance communication and coordination among all affected stakeholders. The program enables states and local governments to assist installations to optimize their mission and sustain their installation, while enhancing the long-term readiness and military value of Fort Riley.

## Stakeholders

A foundational step in the planning process was the identification of the study boundary and stakeholders within those boundaries. Informing and involving them early in the project was instrumental in the identification of issues, process, projects, and infrastructure systems that link the resiliency of the Flint Hills Region to Fort Riley resiliency. The primary Stakeholders involved in the Flint Hills MIR included:

- Clay County
  - City of Clay Center
  - City of Wakefield
- Geary County
  - City of Grandview Plaza
  - Junction City
  - City of Milford
- Pottawatomie County
  - City of St George
  - City of Wamego
- Riley County
  - City of Riley
  - City of Leonardville
  - City of Manhattan
  - City of Ogden
- Fort Riley
- Evergy
- Bluestem Electric Cooperative
- Kansas Gas Service
- US Army Corps of Engineers

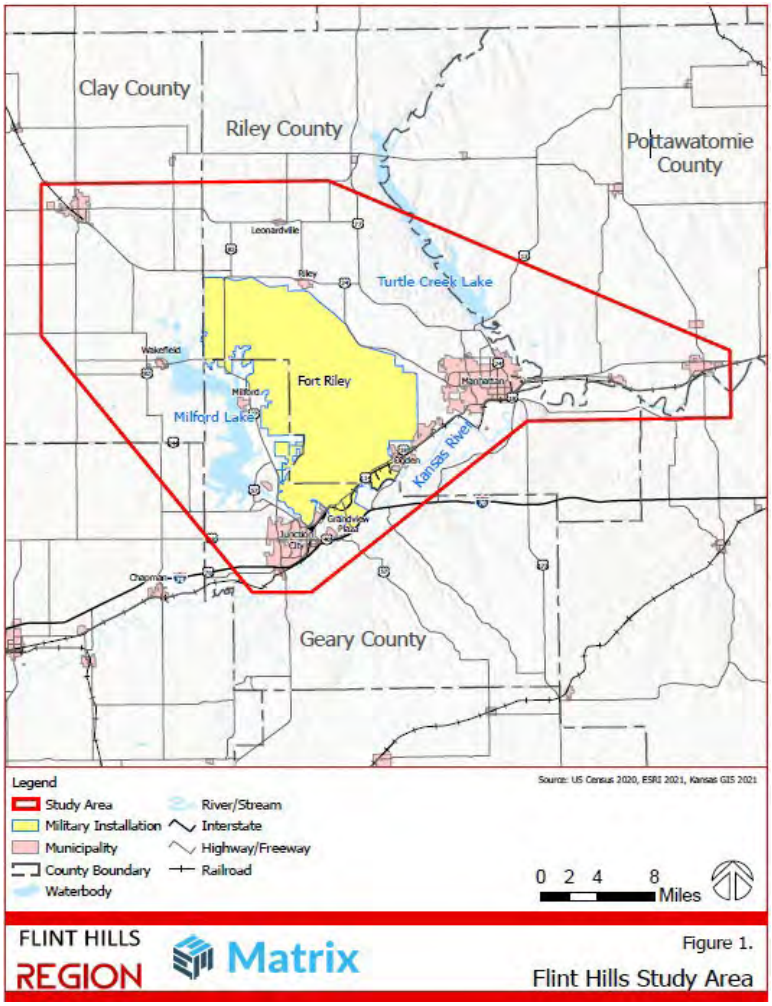
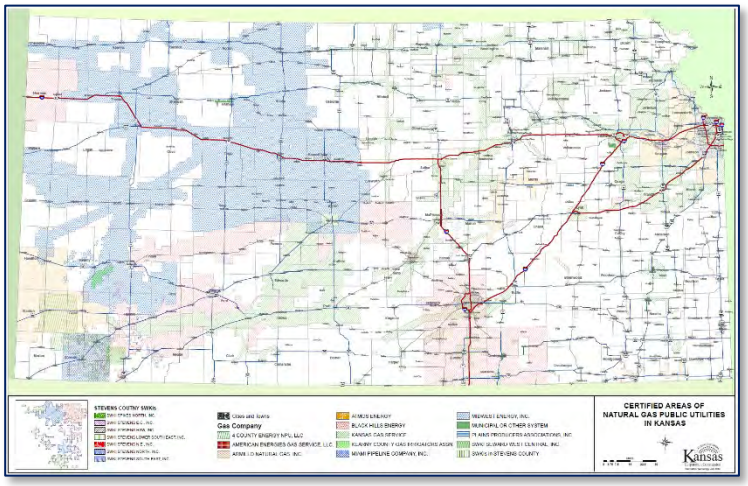



Figure 1. Flint Hills Study Area

## Planning Capabilities Summary and Analysis

Using the plans and documents that were gathered throughout this study the Matrix Team completed an analysis using a cross-functional team of engineers, planners, system operators, meteorologists, and cyber experts. The Matrix Team gained valuable insight into the intricacies of the systems and how they are intertwined throughout the region. Using the National Infrastructure Protection Plan (NIPP) Critical Infrastructure Interdependencies, assessments were completed for the identified communities throughout the Flint Hills Region. Ultimately, this analysis is intended to guide and assist the region's efforts to improve the security and resilience of the critical infrastructure of the communities surrounding Fort Riley.

## Electric Utility and Natural Gas Provider Summary and Analysis




High-level assessments, gap analysis, and recommendations were completed for the electric, natural gas, water, and wastewater systems in the counties and cities within the boundary of the Flint Hills MIR study. Summaries, assessments, vulnerabilities, and recommendations have been populated for areas and systems for which information was provided or was publicly available. GIS data was consolidated as received and utilized as an analysis tool in regard to the electrical transmission and distribution systems. Additional systems with GIS data were incorporated for analysis; however, analysis on natural gas, water and wastewater systems was reliant on supplied drawings and documents, and additional information gathered through open sources. Vulnerabilities to systems as well as solutions that are provided are based on the information available at the time of assessment.

## Municipality Summary and Analysis

Data was collected for each municipality and high-level assessments for power, natural gas, water, wastewater, emergency management, and planning within the boundary of the MIR study were developed. Summaries, gap analysis, assessments, vulnerabilities, and recommendations were developed for all areas and systems that information was provided by the stakeholders or collected through publicly available research.

## Transportation

According to the Flint Hills Metropolitan Planning Organization's (FHMPO) Regional Transit Plan adopted in December of 2020, "The US-24 corridor is one of the most heavily traveled corridors in the region." This corridor is also the primary link between the growing population in Pottawatomie County, the City of Manhattan, and Fort Riley. Throughout the data gathering and interview phase of the MIR study, a common concern brought forward by several stakeholders was the Highway 24 transportation corridor, specifically the desire for expansion of the current or addition of road connections between Manhattan and Pottawatomie County. As noted in Pottawatomie County's "Future County" plan adopted in August of 2019, "concerns over the existing single route range from emergency services access and flooding concerns to traffic congestion alleviation."

A very recent development that requires thorough consideration and study in future regional transportation planning is the Scorpion Biological Services biomanufacturing facility in western Pottawatomie County. This project will construct a 500,000 square foot facility and provide approximately 500 jobs in the region when complete and operating at full capacity. The facility will be located between Manhattan and St. George just north of Highway 24 on Excel Road. The impact this facility may have on the traffic patterns and volume in the region will have to be assessed and necessitates an in-depth study to ensure the resiliency and sustainability of the transportation network.

## Critical Facilities

One of the goals of the NIPP is to “assess and analyze threats to, vulnerabilities of and consequences to critical infrastructure to inform risk management activities.” In order to successfully meet this goal, a key portion of this resiliency study was to identify mission critical facilities throughout the Flint Hills Region. According to Cybersecurity and Infrastructure Security Agency’s Infrastructure Resiliency Planning Framework, critical infrastructure is any “system and/or physical assets critical to the regular functions of the community or region.” This includes “fundamental systems such as energy, water, wastewater, communications, transportation and any infrastructure critical to the safety, health and economic vitality of the community.”

The majority of critical infrastructure/facility data gathered through this study was provided by the respective organizations. Matrix was able to fill in gaps, when necessary, using the expertise and knowledge of the project engineers and planners. Once the data was complied, Matrix assessed 232 assets outside the boundaries of Fort Riley within the surrounding Flint Hills Region.

## Identifying, Classifying and Mapping Hazards and Threats

As stated in the 2019 Report on Effects of a Changing Climate to the Department of Defense, "The effects of climate change are a national security issue with potential impacts to Department of Defense missions, operational plans and installations." Historic floods of 1951 and 2018, tornados most recently in the Junction City/Fort Riley area in 2019, and recent subzero temperatures across the United States in February 2021 demonstrated the effects of severe weather on the country, the region, and Fort Riley. Twelve military installations in the U.S. were temporarily closed due to the freezing weather and loss of power in February. These weather patterns have lasting impacts on agriculture, infrastructure, military operations and equipment, vehicles, utilities, transportation networks, and residents. Aging infrastructure is susceptible to damage that could create lasting challenges for both the military and residents.

Along with historical information gathered from community members throughout the project, Matrix utilized standard FEMA hazard categories and types in the analysis of local threats. Combining this information with local Hazard Mitigation Plans and the data from Jupiter Intelligence, Matrix developed data and analysis for the following hazards and threats:

- 100-year flood
- 500-year flood
- Days exceeding 100 F
- Days with large hail
- Days with severe thunderstorms
- 1-day precipitation during a 10-year rain event
- 1-day precipitation during a 50-year rain event
- 1-day precipitation during a 100-year rain event
- 1-minute sustained windspeed during a 10-year wind event
- 1-minute sustained windspeed during a 50-year wind event
- 1-minute sustained windspeed during a 100-year wind event
- Drought
- Wildfire

## Climate Risk Assessment and Opportunities

Assessing the probability or likelihood of a hazard or threat event was a key element of the MIR and was critical to the overall assessment of the Flint Hills region and its ability to respond and recover from major events while ensuring the military mission of Fort Riley remains unhindered. In the case of the MIR study, these events could be a natural disaster, human-caused event, or other event affecting resiliency of the region.

The Matrix Team used proprietary, dynamic earth system models to produce local hazard estimates based on projected changes in climate. The probabilities provided in this section of the report are based on multiple key climate modeling scenarios known as Shared Socioeconomic Pathways (SSP). An SSP is a scenario of projected global changed up to the year 2100. SSPs are used to derive estimated greenhouse gas emission scenarios and their effects on climate change. For all the scenarios, the temperature change is relative to the 20th century global average. This report uses the following SSPs to assess probabilities of the identified hazard occurring:

- **Shared Socioeconomic Pathway 1-2.6 (SSP126)** – In this positive outlook-based scenario, global CO2 emissions are severely cut, but not as fast, reaching net-zero after 2050. The overall global temperature increase is estimated to be 1.8 degrees Celsius (≈3.2F) by 2100.

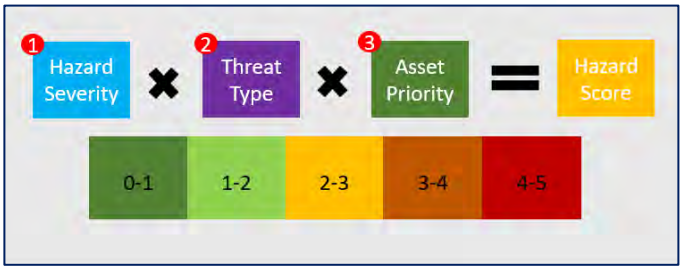
- **Shared Socioeconomic Pathway 2-4.5 (SSP245)** – In this intermediate outlook-based scenario, global CO2 emission remain nearer to the current levels but do not reach net-zero by 2100. The overall global temperature increase is estimated to be 2.7 degrees Celsius (≈4.9F) by 2100.

- **Shared Socioeconomic Pathway 5-8.5 (SSP585)** – In this worst-case outlook-based scenario, global CO2 emissions are approximately doubled by the year 2050. The overall global temperature increase is estimated to be 4.4 degrees Celsius (≈7.9F) by 2100.

## Consequence Assessment

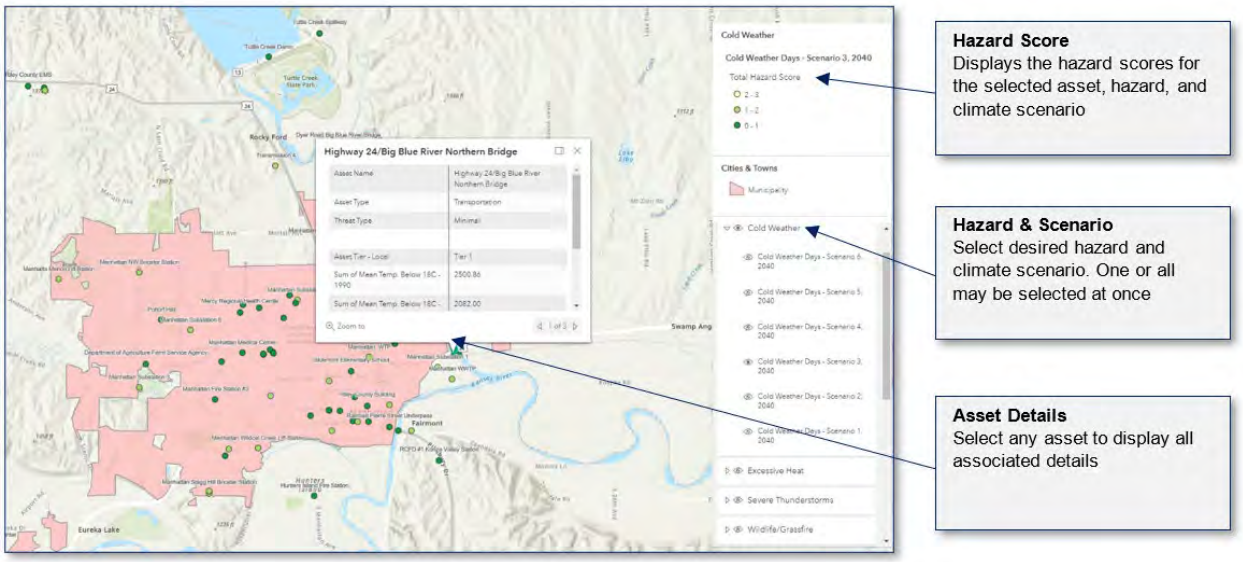
After assessing the trends in climate data further consequence analysis and assessment was performed on critical infrastructure utilizing the climate data specific to the mean values of Shared Socioeconomic Pathway 2-4.5 (SSP245/Scenario 3). This climate data set was chosen because it encompasses the most likely outcomes given the current global climate outlook. This data was then used to calculate a hazard score for each critical infrastructure asset identified during the study.

The final hazard score was then calculated for each critical facility/asset and rated using the following formula and scale:




- Hazard Severity - The change in severity of the hazard comparing conditions from 1995 to the predicted condition in 2040
- Threat Type – Direct, indirect, or Minimal impact on the critical asset's function
- Asset Priority – Loss, incapacitation, or disruption will case failure, degradation at the primary or sub-levels of a system or organization

The resulting hazard scores were provided in both a spreadsheet format as well as an interactive web viewer for critical assets. A sample asset is shown from the web viewer below and the full viewer is available at https://matrixgis.maps.arcgis.com/apps/instant/basic/index.html?appid=d0cc452e4a61468286fbf092bd71b17d




## Cybersecurity and Industrial Control Systems (ICS)

Cybersecurity is a major and growing threat to communities and installations. Due to the sensitive nature of this topic stakeholders provided little to no cyber-related information that could be analyzed under this study. Industrial Control Systems (ICS) underpin the operation of much city, county, power, gas, and other critical infrastructure and are key elements in diverse operating environments. Critical infrastructure owners and operators are uniquely positioned to manage risks to their individual operations and assets, and to determine effective strategies to make them more secure and resilient.

In partnership with Chinook Cybersecurity, Matrix outlined common cyber threats and vulnerabilities present across the United States' infrastructure network. Additionally, the common tenants of a

healthy cybersecurity program were provided to serve as a roadmap for stakeholders to implement an effective cybersecurity program across a broad range of operational levels.

## Summary of Recommended Solutions

Finally, Matrix developed a Plan of Action and Milestones by stakeholder to provide a path forward following study completion. A companion document with potential infrastructure resiliency funding sources was also developed and matched to recommended solutions for potential future project execution. Below is a summary list of the most critical recommended action items:

- Critical Facility Lists
  - Complete and/or update critical facility lists in order to facilitate the most effective possible disaster responses
- EM / First Responder Communication System
  - Equip communities with the most up-to-date communications equipment and that all equipment provides interoperability across communities
- Communications/Operations between energy providers
  - Ensure utility provides have the appropriate plans and systems in place to communicate across all providers to coordinate the best possible response to outages or disasters
- Wood to Steel Utility Pole Conversion
  - Continue on-going efforts to convert from wood to steel utility poles ensuring the utmost system resiliency to physical threats of natural disaster
- Physical Security of Utility Assets
  - Implement industry standards for physical infrastructure security is an excellent way to further improve existing measures or implement new ones all together
- Increasing well resiliency
  - Raise all well head electrical equipment above the floodplain or ensue they are appropriately protected in the event of flooding for continuous water utility operations
- Backup power for critical facilities and fuel storage
  - Install appropriately sized backup generation at select critical facilities with at least 14-days of fuel storage
- Electrical equipment spares
  - Procure or have readily available long-lead spare equipment items
- Electrical System Automation
  - Incorporate system automation (i.e., automatic reclosers)
- Cybersecurity Programs
  - Create new or reinforce existing cybersecurity programs to conform with the highest standards is critical to deterring many of the current ICS threats and providing protection for utility systems.
- Transportation Study
  - Complete a comprehensive transportation study given the rapid growth of both population and industry in the Flint Hills Region

## Plan of Action

The ultimate value of this MIR study lies in providing the Flint Hills Region with the actions which lead to the funding of resiliency projects and improvements. The Plan of Action and Funding Sources section provides the compilation of recommendations that are the result of the Flint Hills MIR. The action items were classified into seven major groupings that include Emergency Management, Electrical Infrastructure, Water Infrastructure, Wastewater Infrastructure, SCADA, Transportation, and Cybersecurity. Fifty-five distinct action items are provided that impact at least one, and in most cases multiple stakeholders. The recommendation table displays the Action Item ID, Action Item, Timeframe and which community or organization each item applies to. Additionally, each action item is linked to potential grant funding sources.

This MIR Plan of Action will serve as the primary tool to be used by the Flint Hills Regional Council Board of Directors to facilitate and track progress towards making the region more resilient and increasing the military value of Fort Riley.

# Introduction

## What is a Military Infrastructure Resiliency Study?

The goal of this Military Infrastructure Resiliency Study is to provide critical information and recommendations that enable communities to make informed decisions related to resiliency and to work in partnership with the Fort Riley Garrison Command to respond to, address, and mitigate activities that are either impairing or may impair the installation mission. The Department of Defense (DoD) Instruction 4170.11 [1] defines energy resilience as "the ability to prepare for and recover from energy disruptions that impact mission assurance on military installations." Closely related, ”military installation resilience is defined as the capability of a military installation to avoid, prepare for, minimize the effect of, adapt to, and recover from extreme weather events, or from anticipated or unanticipated changes in environmental conditions, that do, or have the potential to, adversely affect the military installation or essential transportation, logistical, or other necessary resources outside of the military installation that are necessary in order to maintain, improve, or rapidly reestablish installation mission assurance and mission-essential functions.” Ultimately, the project's outcome should increase military value of the installation by preserving military missions.

In order to fulfill the requirements of this study, Matrix has employed the tenets of the DoD Energy Program from an “all hazards” perspective and has integrated the pillars of expanding supply, reducing demand, and adapting future forces and technologies throughout this effort. Matrix developed a set of mission critical requirements with options that will provide a framework for decision-making to implement the recommendations of this study. The study will align solutions to prioritize the critical needs of the community and the installation. Ultimately, an analysis of alternatives will compare the current baseline to a future approach using energy resilient technologies and strategies.

## Why Prepare a Military Installation Resiliency Study?

Collaboration and joint planning among military installations, local communities, agencies, and other stakeholders should occur to protect the long-term viability of existing and future military missions. Working together also enhances the health of economies, industries, and infrastructure systems of the communities before incompatible/not recommended uses become an issue. Recognizing the symbiotic relationship that should exist between installations and adjacent communities, the Office of Local Defense Community Cooperation (OLDCC, formerly known as the Office of Economic Adjustment OEA) implemented the Installation Resiliency Authority in an effort to mitigate existing and future conflicts and enhance communication and coordination among all affected stakeholders. The program enables states and local governments to assist installations to optimize their mission and sustain their installation, while enhancing the long-term readiness and military value of the power projection platform.

## MIR Partners

As highlighted in the goal and objectives stated previously, the MIR process is designed to create a locally relevant study that builds consensus and obtains support from the various stakeholders involved. To achieve the MIR goal and objectives, the MIR process included a stakeholder program that provided a variety of opportunities for interested parties to contribute to its development.

## Stakeholders

A foundational step in any planning process is the identification of stakeholders. Informing and involving them early in the project is instrumental in the identification of compatibility issues to address and resolve through the development of integrated strategies. Stakeholders include individuals, groups, organizations, and governmental entities interested in, affected by, or affecting the outcome of the MIR project. Stakeholders identified for the Flint Hills MIR included, but were not limited to:

- Clay County
  - City of Clay Center
  - City of Wakefield
- Geary County
  - City of Grandview Plaza
  - Junction City
  - City of Milford
- Pottawatomie County
  - City of St George
  - City of Wamego
- Riley County
  - City of Riley
  - City of Leonardville
  - City of Manhattan
  - City of Ogden
- Fort Riley
- Evergy
- Bluestem Electric Cooperative
- Kansas Gas Service

## MIR Study Area

Fort Riley has been the heart of the Flint Hills Region for more than 160 years. The Army established Fort Riley as a 24,000-acre cavalry outpost in 1853 to protect westward travelers on the Oregon-California and Santa Fe trails, and over the years the post's mission, equipment, and weaponry have continually evolved. Fort Riley currently encompasses 100,656 acres.

Realignment of tanks, aircraft, and weapons systems, coupled with the use of more powerful weapon systems on the ranges, and the increased importance of night training all affect Fort Riley's interactions and impacts on the surrounding communities.

As shown in Figure 1, nine counties surround Fort Riley including Clay County, Riley County, and Geary County. There are 14 incorporated cities in these counties, the largest being Manhattan and Junction City. The total population for the Junction City/Manhattan Metropolitan Statistical Area is approximately 134,804 according to the 2019 Bureau of Census estimate, making it the fourth largest urban area in Kansas.

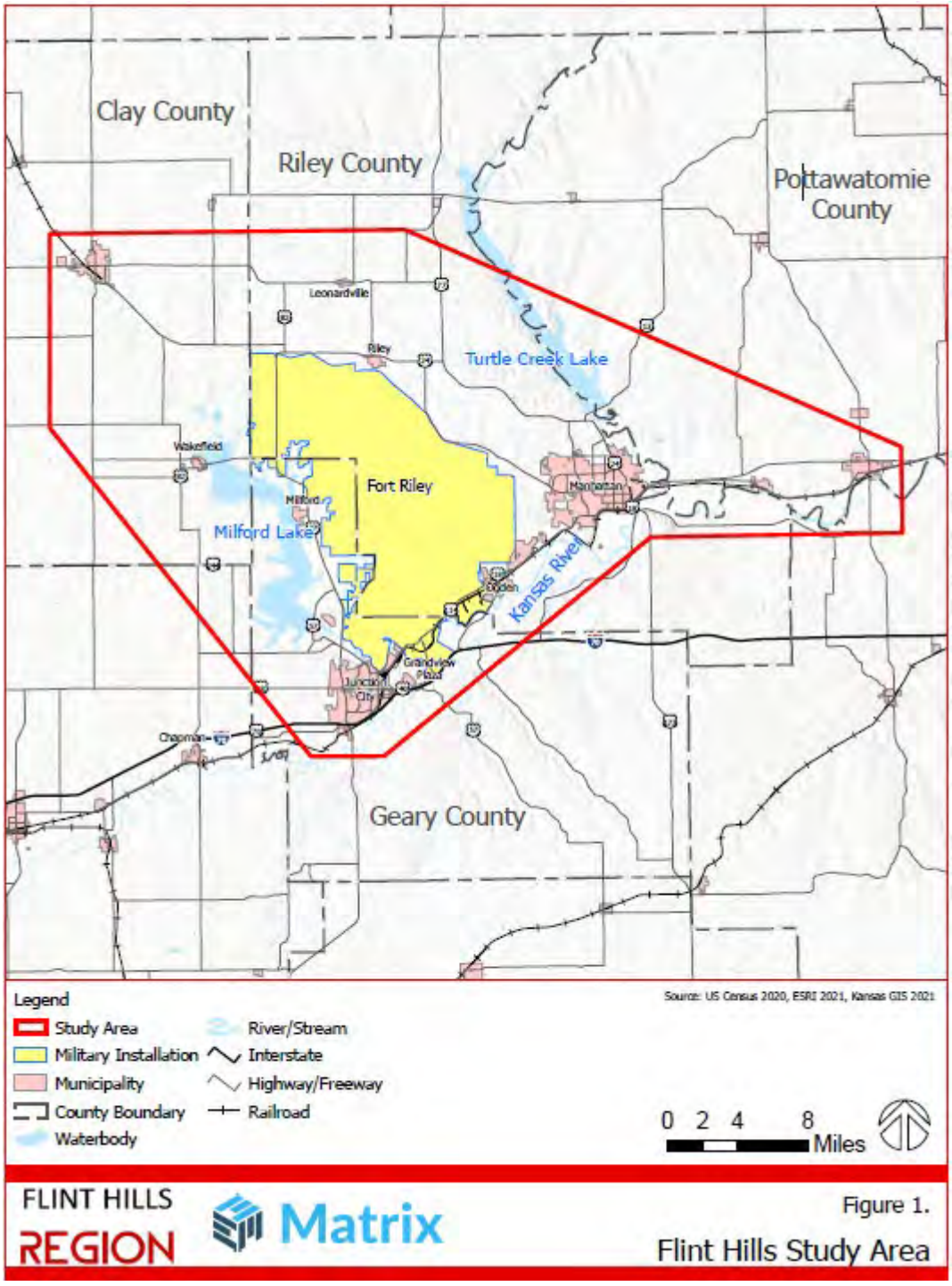



Figure 1.
Flint Hills Study Area

# Community Profile

## Clay County

According to the 2019 Development Opportunity Profile, Clay County is rural in character but adjacent to growing urban centers including Junction City and Manhattan. Clay County benefits from increasing economic activity associated with both the Interstate 70 and Interstate 80 transportation corridors. Additional location factors that help create development opportunities for Clay County are Fort Riley, Junction City, and Milford Reservoir which offer numerous employment opportunities and amenities. The communities within Clay County that are included in this MIR are the City of Clay Center and the City of Wakefield. The graphic below, also from the 2019 Development Opportunity Profile, shows Clay County as it relates to major population centers in the region.

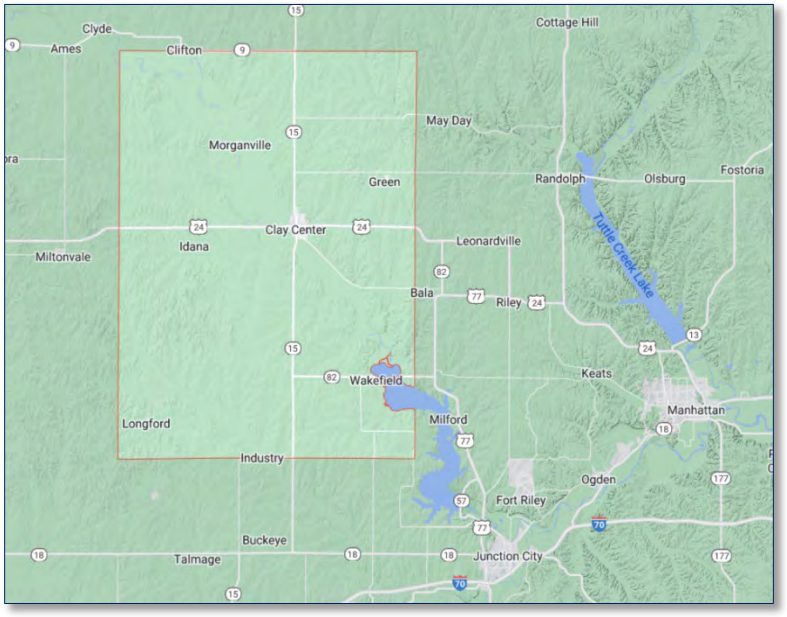



*Figure 1. Clay County*

According to the population forecast from the 2005 Comprehensive Land Use Plan, the general trend shows a slow population decrease within Clay County over time. This trend has proven accurate as data from the 2020 U.S. Census shows the population of Clay County to have decreased from 8,535 in 2010 to 8,117 in 2020.

### Table 1. Population Forecast and Projections for Clay County to 2020

| Series | 2000 | 2005 | 2010 | 2015 | 2020 |
|---|---|---|---|---|---|
| **Linear Model** | **8822** | **8580** | **8338** | **8141** | **8050** |
| **Woods & Poole** | **8822** | **8720** | **8630** | **8560** | **8500** |
| **KS Water Office** | **8822** | | **9333** | | **9418** |

*Source: Phillips & Assoc., 2004; Woods & Poole Associates, 2003.*

## Geary County

According to the 2017 Junction City/Geary County Comprehensive Plan, Junction City and Geary County stand alone with regard to areas of similar size in Kansas. While other communities have struggled to maintain populations and develop new economic opportunities, Junction City has grown as a vibrant center for housing, commerce, and employment. As of the writing of the comprehensive plan, Geary County experienced the most rapid population growth of any county in Kansas due to its strong center of employment at Fort Riley, nearby natural resources and amenities, and excellent visibility along Interstate 70. The communities within Geary County that are included in this MIR are Junction City, the City of Grandview Plaza, and the City of Milford. Figure 3 shows Geary County and the communities within the county.


The population projections from the 2017 Comprehensive Plan show a general trend of increasing population for Geary County out to the year 2030. This trend has proven accurate as data from the 2020 U.S. Census shows that the population of Geary County has increased from 34,362 in 2010 to 36,739 in 2020.

### Table 2. Population Projection Scenarios for Junction City and Geary County

| | 2010 | 2015 | 2020 | 2025 | 2030 |
|---|---|---|---|---|---|
| **Junction City** | | | | | |
| .5% AGR | 23,353 | 23,943 | 24,547 | 25,167 | 25,803 |
| 1% AGR | 23,353 | 24,544 | 25,796 | 27,112 | 28,495 |
| 2% AGR | 23,353 | 25,784 | 28,467 | 31,430 | 34,701 |
| Natural Pop Change | 23,353 | 24,461 | 25,435 | 26,150 | 26,685 |
| **Rural Geary County** | | | | | |
| .5% AGR | 5,171 | 5,302 | 5,435 | 5,573 | 5,713 |
| 1% AGR | 5,171 | 5,435 | 5,712 | 6,003 | 6,310 |
| 2% AGR | 5,171 | 5,709 | 6,303 | 6,959 | 7,684 |
| Natural Pop Change | 5,171 | 11,604 | 12,129 | 12,573 | 13,006 |
| **Total Geary County** | | | | | |
| Junction City at 1% | 23,353 | 24,544 | 25,796 | 27,112 | 28,495 |
| Geary County at 0.5% | 5,171 | 5,302 | 5,435 | 5,573 | 5,713 |
| Fort Riley | 5,838 | 5,838 | 5,838 | 5,838 | 5,838 |
| Total | 34,362 | 35,684 | 37,069 | 38,523 | 40,046 |

*Source: US Census, RDG Planning & Design*

## Pottawatomie County

According to the 2019 Future County Report, Pottawatomie County has been growing at one of the highest growth rates in the state of Kansas. The majority of growth is concentrated in the Green Valley Area and along the U.S. Highway 24 corridor. Certain portions of the county are becoming increasingly urbanized while much of the county remains rural with agriculture being an integral part of the area. However, Pottawatomie County's growth is directly tied to the growth of the City of Manhattan, according to the same report. The communities within Pottawatomie County that are included in this MIR are St. George and Wamego. Figure 4 depicts Pottawatomie County and the communities within the county.

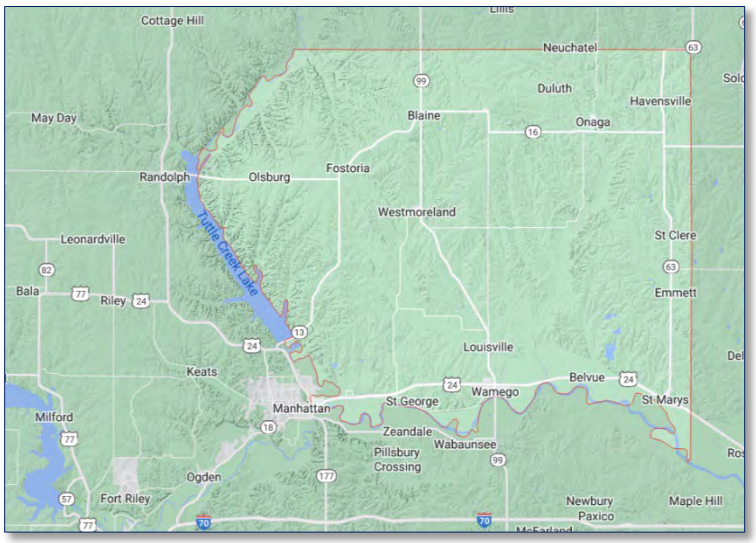



*Figure 3. Pottawatomie County*

The population projections from Pottawatomie County from the 2019 Green Valley Future Area Plan are shown below. The general population trend for the county is shown to be increasing through the year 2040. This trend has proven accurate as data from the 2020 U.S. Census shows that the population of Pottawatomie County has increased from 21,604 in 2010 to 25,348 in 2020.

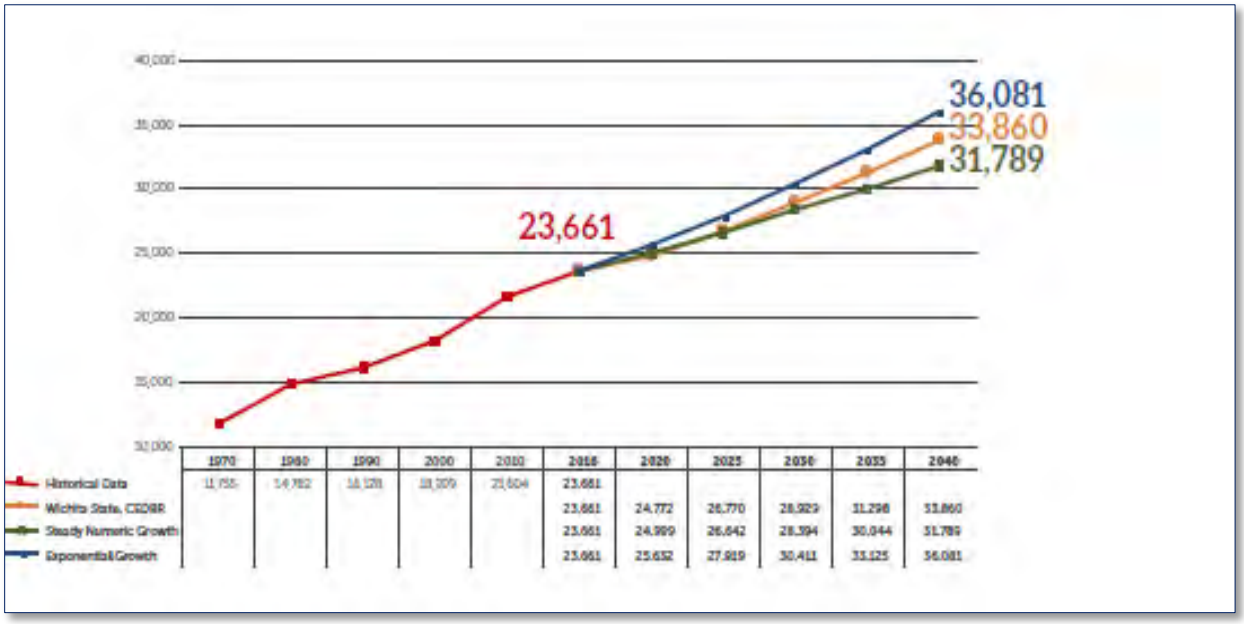



*Figure 4. Pottawatomie Growth Projections, Source: 2019 Green Valley Future Area Plan*

## Riley County

According to the 2009 Riley County Comprehensive Plan, Riley County Encompasses 622 square miles, including approximately 81,647 acres of Fort Riley. Excluding Fort Riley, approximately 87% of Riley County is cropland and grassland. The plan also states that Riley County is an integral part of the regional economy through its agricultural land and rural character. Both Fort Riley and Kansas State University are major contributors to the Riley County population, with the City of Manhattan being the main housing area for both entities. The communities within Riley County that are included in this MIR are Leonardville, Manhattan, Ogden, and Riley City. The adjacent map shows Riley County as a whole and the communities within the County.


*Figure 5. Riley County*

According to the 2009 Comprehensive Plan, the overall population of Riley County is expected to increase through the year 2025. This trend has proven accurate, although the total numbers are smaller, as data from the 2020 U.S. Census shows that the population of Riley County has increased from 71,115 in 2010 to 71,959 in 2020.

### Table 3. Population Trends and Projections: Riley County

| Year | Population | Change | Total | Annualized |
|---|---|---|---|---|
| 1970 | 56,788 | -- | -- | -- |
| 1980 | 63,505 | 6,717 | 11.8% | 1.12% |
| 1990 | 67,139 | 3,634 | 5.7% | 0.56% |
| 2000 | 62,843 | -4,296 | -6.4% | -0.66% |
| 2007* | 69,083 | 6,240 | 9.9% | 0.95% |
| 2010 | 72,949 | 2,093 | 5.6% | 1.83% |
| 2015 | 76,670 | 3,631 | 5.1% | 1.00% |
| 2020 | 80,581 | 3,816 | 5.1% | 1.00% |
| 2025 | 84,691 | 4,010 | 5.1% | 1.00% |

*Source: Census of Population, 2000; 2009 Riley County Comprehensive Plan*
**2007 Estimated population U.S. Census*

# Military Profile

## Installation Setting

Fort Riley is a United States Army installation located in North Central Kansas, on the Kansas River, also known as the Kaw River, between Junction City and Manhattan. The installation's southern boundary is at the confluence of the Smoky Hill and Republican rivers, which combine to form the Kansas River. Milford Lake, a 15,000-acre impoundment of the Republican River, is located at the installation's western boundary. Tuttle Creek Lake is approximately eight miles northeast of the installation boundary. Portions of the installation are bounded by the city limits of Riley, Milford, Junction City, and the unincorporated towns of Keats and Ogden. The City of Manhattan is located approximately two miles east of the installation, although the Manhattan Regional Airport and Manhattan Corporate Technology Park are located adjacent to the installation boundary. Fort Riley is approximately 95 miles west of Kansas City and 90 miles northeast of Wichita.

## Mission

Fort Riley is home to the acclaimed 1st Infantry Division known as "The Big Red One." According to the Fourth Quarter FY21 Demographic Snapshot, Fort Riley has 15,096 active-duty military members, with an accompanying 15,177 family members, and 5,439 civilians who help support and execute the mission. The installation has workday population of approximately 32,800 personnel.

Fort Riley is also a focal point for both veterans and retired military throughout the Flint Hills Region which includes the study counties of Clay, Geary, Pottawatomie, and Riley, as well as Dickinson, Morris, Saline, and Wabaunsee. The total supported veteran population is 27,941 with 4,752 military retirees. Table 4 shows the military retiree and veteran populations within the MIR study area.

### Table 4. Military Retiree and Veteran Population within MIR Study Area

| Population Type | Clay County | Geary County | Pottawatomie County | Riley County |
|---|---|---|---|---|
| **Military Retiree** | **231** | **1,835** | **252** | **1,381** |
| **Veteran** | **840** | **11,033** | **1,619** | **7,318** |

*Source: Fort Riley FY 21 Economic Impact Summary*

Another key aspect to highlight for this MIR study are the missions of the installation as a whole. The garrison mission of Fort Riley is to "integrate and deliver base support to enable readiness for a globally-responsive Army. The mission of the 1st Infantry Division is to "build and maintain combat ready forces; on order deploys in an expeditionary manner to conduct decisive action to fight and win in complex environments as members of a Joint, Inter-organizational, and Multinational (JIM) team. Other crucial mission partners on the installation include the 10th Air Support Operations Squadron, Detachment 2-3rd Weather Squadron, and the 902nd Military Intelligence Group.

According to the 2017 Joint Land Use Study (JLUS), Fort Riley is classified as a Tier 1 installation, meaning that it has significant training value to the US Army Major Commands and has high range and land capability.

Using this high-level understanding of the garrison mission as a whole, Matrix is able to identify and assess key interdependencies within the surrounding communities and how to best leverage infrastructure resilience as a tool to support Fort Riley and its mission success.

# Planning Capabilities Summary and Analysis

Using the plans and documents that have been gathered throughout this study, as identified in the following table, the Matrix Team completed the following in-depth analysis using our cross-functional team of engineers, planners, system operators, meteorologists, and cyber experts. The Matrix Team gained valuable insight into the intricacies of each utility system and how they are intertwined throughout the region. Using the National Infrastructure Protection Plan (NIPP) Critical Infrastructure Interdependencies, we completed assessments for the identified communities throughout the Flint Hills Region. Ultimately, the following analysis will help guide and assist the region's efforts to improve the security and resilience of the critical infrastructure of the communities surrounding Fort Riley, thereby preserving the mission of the installation and the utmost military value into the future.

### Table 5. Planning Capabilities

| Location | Comprehensive Plan | Critical Facilities Plan | Debris Management Plan | Emergency Operations Plan | Evacuation Plan | Firewise \Fire Mitigation Plan | Emergency Water Plan | Recovery Plan | Development Opportunity Plan | Land Use Plan/Zoning |
|---|---|---|---|---|---|---|---|---|---|---|
| Clay County | X[2] | X[2] | X[2] | X[2] | X[2] | | | | X[1] | X[1] |
| City of Clay Center | X[2] | | | | | X[2] | X[1] | | | |
| City of Wakefield | X[1] | | | X[2] | | | | | | X[1] |
| | | | | | | | | | | |
| Geary County | X[1] | X[1] | | X[1] | | | | | | X[1] |
| Grandview Plaza | | | | X[2] | | | | | | |
| Junction City | X[1] | | X[2] | X[2] | | | | | | |
| Milford | X[2] | | | X[2] | | | | | | |
| Milford Dam | | | | X[1] | | | | | | |
| | | | | | | | | | | |
| Pottawatomie County | X[2] | X[2] | X[2] | X[1] | | | | | | X[1] |
| St. George | X[1] | | | | | | | | | |
| Wamego | X[2] | | X[2] | X[2] | | | X[1] | | | |
| | | | | | | | | | | |
| Riley County | X[1] | X[1] | X[1] | X[1] | | X[2] | | X[2] | | X[1] |
| Leonardville | | | | X[2] | | | | | | X[1] |
| Manhattan | X[1] | X[1] | X[2] | X[2] | X[1] | | | | | X[1] |
| Ogden | X[1] | | X[2] | X[2] | | | | | | X[1] |
| Randolph | | | | X[2] | | | | | | |
| Riley | X[1] | | | X[2] | | | X[1] | | | X[1] |
| | | | | | | | | | | |
| Fort Riley | | | | | | | | | | X[1] |

[1]*Plan Received through Matrix MIR Study*

[2]*Plan Exists according to Respective Regional Hazard Mitigation Plan, but was not received by Matrix for Study.*

The NIPP specific sectors used throughout our analysis highlight the threats to electrical power as well as oil and gas. Additionally, we looked at the interdependencies identified in water, wastewater, emergency response systems, and other mechanisms throughout the region based on the information gathered throughout the study.

Additionally, the Cyber and Infrastructure Security Agency (CISA) has developed a set of National Critical Functions (NCF) that assists in identifying key activities within the Flint Hills Region that are vital to the Unites States as a whole. “Disruption, corruption or dysfunction of these activities along with the identified interdependencies would have a sever effect on general security, national economic security, national public health or safety, or any combination of these.” (Apr 2019 National Critical Functions Set) Given the relationship of Fort Riley to national security with its mission “to integrate and deliver base support to enable readiness for a globally responsive Army”, Matrix can assess that the NCF present in the Flint Hills Region and their resiliency are critical to the overall installation resiliency. (Fort Riley Mission Statement) Matrix also took into account the local populations of each county and city within the study area to help assess infrastructure criticality as it related to Fort Riley. This data was adopted from the 4$^{th}$ quarter FY21 “Fort Riley Demographics” report provided to Matrix. The men, women and families that live in the communities surrounding Fort Riley and commute to Fort Riley are a critical asset to the overall mission function. The critical infrastructure supporting the day-to-day life sustaining operations off-installation plays a key role in the overall military installation resilience of Fort Riley. To further assist with analysis Matrix used the Infrastructure Resilience Planning Framework (IRPF) created by CISA. The IRPF is a tool that allows for:

- Understanding how infrastructure resilience contributes to community resilience
- Identifying threats and hazards that can affect normal function of community infrastructure
- Preparing the region to withstand and adapt to evolving threats and hazards
- Integration of infrastructure and resilience considerations
- Quick recovery from disruptions and restoration of operations (Oct 2021 IRPF)

The Critical Facilities Plans and Emergency Operations Plans of the Flint Hills Region are key components to ensuring the resiliency and recovery of critical activities and infrastructure within this region. Existence, thoroughness, and reliability of these plans are vital to ensuring the resilience of the regional NCF, which ultimately support Fort Riley mission success.

# Electric Power and Natural Gas Providers Summary and Analysis

This section outlines the high-level assessments, gap analysis, and recommendations for the electric, natural gas, water and wastewater systems and utilities in the counties and cities within the boundary of the Flint Hills MIR study. Summaries, assessments, vulnerabilities, and recommendations have been populated for all areas and systems that information was provided by the responsible parties or publicly available. GIS data was consolidated as received from the responsible parties and utilized as an analysis tool in regard to the electrical transmission and distribution systems. Additional systems with GIS data were incorporated for analysis; however, analysis on natural gas, water and wastewater systems was reliant on supplied drawings and documents from the responsible parties, and additional information gathered through open sources.

Vulnerabilities to systems as well as solutions that are provided are based on the information available at the time of assessment. Additional vulnerabilities may exist that are unknown at this time and further study may be necessary as more data is uncovered or provided.

The map below shows the various electric utility provider service areas throughout the Flint Hills Region:

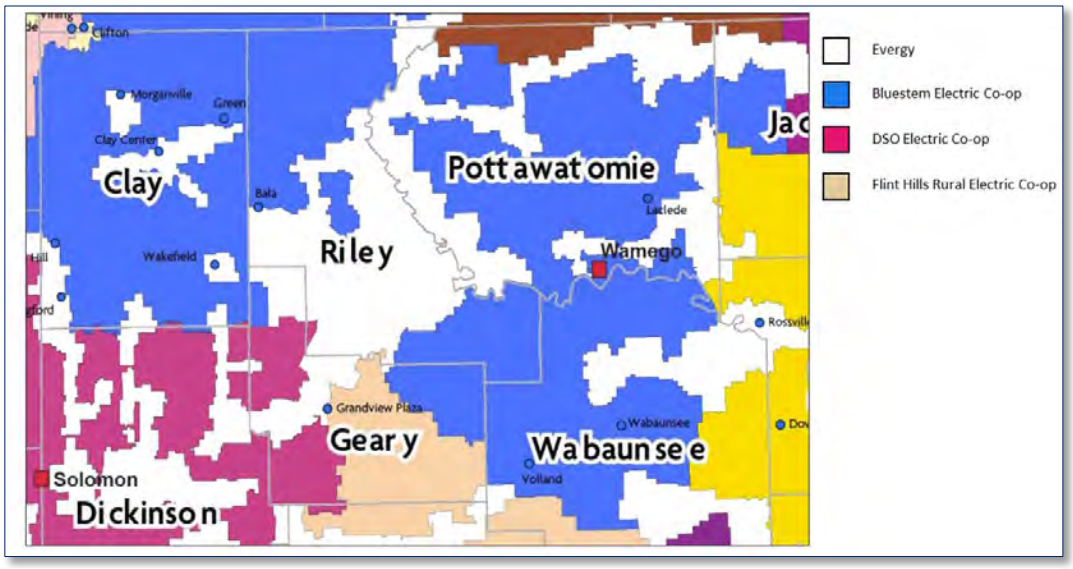



*Figure 6. Flint Hills Region Electric Utility Providers*
*Source: Kansas Electric Cooperatives, Inc.*

## Evergy

Evergy is an investor-owned utility (IOU) headquartered in Topeka, KS. They are the largest electric company in Kansas serving more than 1.6 million customers in the eastern half of the state. Their 28,130 square mile service footprint ranges from Wichita, Kansas to Salisbury, Missouri covering most areas in between. Evergy was the result of a merger between Kansas City Power and Light (KCP&L) and Westar Energy in 2018.

### *Infrastructure*

Evergy has a generating capacity of 16GW from 40 power plants on their system feeding 13,700 miles of transmission lines and 52,000 miles of distribution lines. Evergy comprises the bulk of the transmission systems throughout Clay, Riley, Geary, and Pottawatomie counties, as well as the distribution systems in the cities of Manhattan, Junction City, Ogden, Wakefield, Milford, Leonardville, Riley, and St. George. The Evergy transmission system consists of 230kV, 115kV, 69kV and 34.5kV transmission lines. The transmission system architecture is comprised of multiple sources or loop connections between substations. The Evergy distribution systems are primarily 12.47kV in the cities with small areas of legacy systems still operating at 2.4kV and 7.2kV. All of the regional Evergy transmission system is overhead. There are approximately 390 miles of overhead distribution lines and 230 miles of underground distribution within the boundaries of the study. Approximately 62% of the assessed Evergy distribution systems are overhead with 38% underground. The Evergy systems reliability and redundancy appears to be robust for most of the cities and allows for flexibility in the event of outages on both the transmission systems and distribution systems. City specific sections of the Evergy system are discussed in more detail in the corresponding city sections.

### *Vulnerabilities*

Evergy utility has a robust transmission system that is systematically resilient in regard to maintaining services to the larger cities. The smaller cities serviced by Evergy have transmission and/or distribution vulnerabilities that are discussed in more detail in the individual City or County breakout section later in this report.

The overall Evergy transmission system has redundancy and switching capabilities that allow for overcoming all but the most catastrophic of events (e.g., wide-spread flooding, multiple tornados, 500-year ice storms, etc..) that damage major sections and prevent back feeding areas. The Evergy distribution systems also have redundancy and switching flexibility to prevent wide-spread systemic outages across the majority of their distribution systems.

The Evergy 12.47kV line servicing the City of Riley is an exception as there is no redundancy for this single service to the city, exposing the city to risk of complete outage. A tornado or similar event that could take out a long section of line would create a long-term (potentially weeks) outage for the City of Riley.

Communication between neighboring utilities and coordination of switching operations is the most prevalent systemic issue at this time. During efforts to gather data about the electrical distribution systems, it was noted by providers that channels of communication between power distributors and knowledge of neighboring utility operations are dated or non-existent. Regional communication and knowledge across providers are key factors in the success or failure of utility restoration following any type of major disaster; therefore, it is critical that this is addressed in future planning efforts.

Evergy is currently evaluating a project to construct a substation south of Ogden and a 115kV transmission line that would route through the City of Ogden to provide additional redundancy to the Ogden area.

### *Recommendations*

- Improve coordination between Evergy, Bluestem Electric Cooperative, and Flint Hills Rural Electric Cooperative. This effort is critical to safe and successful operations during and following major events that would affect regional reliability and resiliency.
- Develop and implement regional emergency restoration plans between Evergy, BEC, FHREC, Wamego and Clay Center. Evergy should be the owner/maintainer of these plans to ensure they stay accurate and up to date as they are the primary utility in the region and have the most impact across the system.
- Standardize switching operations and ensure communication with the local cities and utilities ensures safe and timely system restoration for any event. Coordinated switching is also prudent to prevent large loads being reintroduced into the Evergy system too quickly (Load Stepping) which can have ripple effects and create even larger longer-term outages or rolling blackouts.
- Implement or improve the coordination of support crews between the utility providers. This action is also critical to the success of the region for the safe and timely restoration of the systems following any outage event.

## Bluestem (BEC)

Bluestem Electric Cooperative (BEC) is a Rural Utility that serves parts of Pottawatomie, Riley, Geary, Clay, Wabaunsee, Jackson, Washington, Cloud, Ottawa, Dickinson, and Marshall counties. Bluestem primarily focuses on the distribution of electricity; however, they do not directly service the larger cities in this study area and primarily interfaces with Evergy. The largest city Bluestem services is the City of Green which is just outside the study area. Bluestem owns transmission and distribution lines, as well as substations that interface with the larger cities and Evergy. There are 5,300 members with 7,300 meters within the Bluestem co-op with an average of 2.5 people per mile of line.

### *Infrastructure*

The vast majority of Bluestem's system is comprised of overhead distribution lines. They own and operate approximately 12 miles of transmission lines, 2,783 miles of overhead distribution lines and 77 miles of underground distribution that are primarily servicing residential subdivisions. They own and operate six substations in the region; two in Clay County, one in Riley County, and three in Pottawatomie County. BEC has operating voltages of 35kV, 12.47kV, and 7.2kV. Additionally, BEC operates a mix of single and multiple feed substations. Rebuilding and upgrading substations is currently on the Bluestem project priority list. A limited number of substations currently have backup transformers with the additional caveat that not all parts are located on site. BEC has completed the process of surveying the entire system and is currently working to upload data to the appropriate software linking the information to Bluestem's system. There are also plans to upgrade all meters to improve data collection. System upgrades and maintenance are directly tied to rate cases. It is worth noting that the last rate increase was approximately 6 years ago. Rate cases and funds are approved by the board of directors, with co-op members voting on the cases. We are able to assess the resilience of Bluestem's system based on historical extreme weather events. The 2007 ice

storm, which constitutes the largest historical threat to the system since overhead lines comprise 97% of the system, interrupted power for approximately two weeks. During the freeze of February 2021, the system fared without incident; however, Evergy shut down substations in order to provide power to affected areas out of Kansas.

### *Vulnerabilities*

There are a few critical vulnerabilities that were identified during this study. The first is the lack of substation backup transformers. This is a critical component in the ability to restore power following an outage and should be addressed as soon as possible. The second is the lack of automation and visibility of major system components. Introducing Supervisory Control and Data Acquisition (SCADA) and other automation functions would greatly improve the operability of the BEC system. Finally, BEC also identified a shortage of operations and maintenance vehicles and crews as a potential hindrance to their system operation and recovery abilities.

Bluestem substations are constructed mainly of overhead structure, overhead bus, and fusing with drop connections to singular pad mounted transformers. The Bluestem systems were out for an extended period of time following the 2007 ice storm. The utility is currently actively mitigating tornado threats by replacing wood poles with direct bury steel poles. This is an ongoing process and is has yet to be completed system wide. Additionally, Bluestem does not have GIS mapped assets which increases the time and effort required for asset tracking and maintenance.

### *Recommendations*

The vulnerabilities identified principally revolve around the size of Bluestem utility as a company. They are a smaller rural cooperative utility with a large service footprint. BEC does not have the funds or the manpower to address the system needs on the scale that the larger utilities do.

- Update and upgrade substations and convert from overhead structure to underground to increase substation resiliency against weather events and wildlife.
- Procure backup transformers that are either on site or mobile (trailered). Additional substation automation can be addressed by installing overhead or pad mounted reclosers at the substations instead of overhead fuses.
- Introduce automated restoration schemes with reclosers. This will allow for the ability to track events on the system and obtain better data for analysis. Fusing does not allow for this flexibility.
- Implement GIS database software and system mapping to actively track system assets and develop better maintenance plans to help prevent equipment loss due to weather events. This will also aid in identify aging infrastructure that is more prone to failure from events such as tornados and ice storms.
- Finish pole upgrade program
- Complete study to determine number of additional vehicles

## Flint Hills Rural Electric Cooperative Association (FHREC)

FHREC is a rural electrical utility cooperative that is part of the Touchstone Energy Cooperatives brand and services primarily rural customers. The cooperative services 1,559 customers in Geary County, 4 customers in Riley County, and 127 customers in Wabaunsee County.

### *Infrastructure*

FHREC serves 6,700 meters in parts of eleven counties in Kansas including Riley, Geary, Wabaunsee, and Morris counties. FHREC owns 2,530 miles of distribution lines and 30 miles of sub-transmission lines and is headquartered in Council Grove, Kansas approximately 35 miles south of Fort Riley. FHREC primarily focuses on the distribution of electricity in the rural areas of the aforementioned counties but also serves 1,036 electric meters in Grandview Plaza next to the Ft. Riley military base. The substation serving the City of Grandview Plaza and parts of rural Geary County consists of an overhead steel structure and fusing, overhead bus, a single pad mount substation transformer, and a set of 3 single phase voltage regulators on the transformer load side. The majority of the Grandview Plaza and rural Geary County electric service is overhead.

### *Vulnerabilities*

There is currently only one transmission line bringing power to the single substation that serves electricity to Grandview Plaza and portions of rural Geary County. When outages occur on transmission lines, which are not owned by FHREC, or when an outage occurs on FHREC substation, it leaves the entire city of Grandview Plaza, and portions of rural Geary without power. The duration from these types of outages can be from a few minutes to several days.

Utility/Infrastructure failure of the distribution system can occur from extreme weather events. Many utilities, including FHREC, experienced extended durations of outages following four major ice storms within the last twenty years. Enhancing and upgrading power lines to better withstand all hazards will help mitigate the frequency and duration of extreme weather events.

### *Recommendations*

- Construct a substation at a separate location south of Grandview Plaza connected to a separate, existing source of transmission service. This will greatly mitigate the risk of long duration outages that can occur on transmission lines or when critical components of a substation occur due to weather events, lighting, or equipment failure. An independent transmission source and a redundant substation at a separate location near Grandview Plaza will significantly mitigate these types of long duration outages. It is rare that the two independent transmission sources would be out of service at the same time and a second substation at a separate location would provide added protection from localized events, such as lightning strikes, equipment failure, fires, and other hazards that can affect substations.
- Introducing Supervisory Control and Data Acquisition (SCADA) and other automation functions would greatly improve the operability of the FHREC system.
- Move forward with recommended mitigation actions listed in the Hazard Mitigation Actions Chart in the Regional Hazard Mitigation Plan.
- Introduce automated restoration schemes with reclosers.
- Complete study to determine number of additional vehicles required during emergency situations.

## DSO Electric Cooperative (DSOEC)

The Dickinson, Saline, Ottawa Electric Cooperative operates and maintains rural services in Dickinson, Saline, and Ottawa counties to the southwest of the Flint Hills region. They have some infrastructure that reaches as far north as Junction City, but due to the minimal amount of infrastructure in the study area, DSOEC was not assessed during the MIR study.

## Kansas Gas Service

Kansas Gas Service (KGS) is the largest natural gas distribution company in the state of Kansas, operating in 82 counties. They are a regulated public utility employing approximately 1,000 employees and serving 647,000 customers in 360 communities. KGS owns and operates 8 interstate pipelines, 3 intrastate pipeline connections and 13,500 miles of service lines. They are headquartered in Overland Park, Kansas and were formed in 1997 via former company acquisition by ONEOK. KGS is a division of ONE Gas, Inc. which is a publicly traded, regulated natural gas utility that serves over 2 million customers across the country.

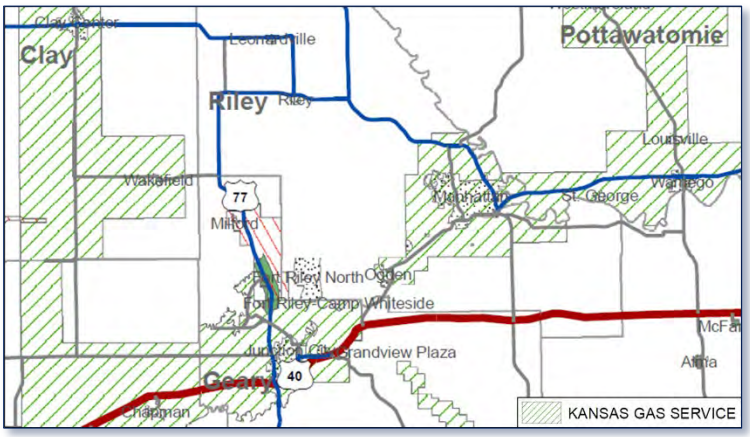



*Figure 7. Kansas Gas Service Within Study Area*
*Source: Kansas Corporation Commission*

### *Service Summary*

KGS is the primary gas supplier to all the areas that utilize natural gas in the analysis with the exception of the town of Milford which is serviced by Black Hills Energy. KGS owns and operates a transmission system interconnected with eight interstate and three intrastate pipelines along with 13,500 miles of service lines. KGS notes emergency response times within 30 minutes of notification to the gas company. The following chart summarizes the customer distribution within the study area.

### Table 6. Kansas Gas Service Customer Population

| Location | Number of Customers |
|---|---|
| Clay Center | 2,040 |
| Fort Riley | 3,382 |
| Grandview Plaza | 407 |
| Junction City | 8,302 |
| Leonardville | 0 |
| Manhattan | 17,518 |
| Ogden | 685 |
| Riley | 0 |
| St. George | 604 |
| Wakefield | 374 |
| Wamego | 2,463 |
| **Total** | **35,775** |

*Source: KGS Customer Population Data.*

### Vulnerabilities

According the 2015 NIPP Energy Sector plan, threats to gas systems are similar to those of other infrastructure systems. Particular to the nature of this study, the NIPP highlights the threats of natural disaster, extreme weather, transportation constraints, aging infrastructure and workforce, as well as cybersecurity threats. This spectrum of threats requires a variety of actions and systems to be in place in order to successfully mitigate and counter when necessary. The Pipeline Emergency Response Plan (PERP) which KGS maintains likely covers many, if not all, of these threats and details appropriate responses. However, Matrix cannot provide a complete assessment of the ability and readiness of KGS due to the sensitive nature of much of this type of data.

Another key threat to address, although not as obvious as many physical threats, is that of regulatory and legislative changes that can have far reaching effects on gas production and distribution systems. A specific item raised by KGS in this regard is that of new gas leak detection technology that has been developed to substantially increase the fidelity and sensitivity of leak detection throughout a system in a much shorter amount of time. The current Kansas regulation gives KGS a 48-hour response window to any detected leak. This new detection technology and increased number of leaks detected may make it virtually impossible for KGS to meet the current response time regulation. An additional measure in place through regulation is that KGS is not permitted to have an energy efficiency policy. This type of policy is key to the future of sustainable and resilient infrastructure, especially across a system as large as KGS maintains. KGS would like to see these gaps closed through the appropriate policy changes. This would allow them to invest in this new technology and be able to implement the appropriate policies to create the most resilient infrastructure possible throughout their system.

Through data collection and interviews during the study it is evident that natural gas is a critical resource in the region. Natural gas is a key contributor of multiple interdependencies throughout the critical infrastructure network. From being the source of fuel for backup power for critical facilities, to the primary source of heating, to key pieces of infrastructure that allow the community to function natural gas is clearly a major link in the Flint Hills Region resiliency chain. Safeguarding this resource is critical to meeting the vision of the NIPP where “physical and cyber critical infrastructure remain secure and resilient, with vulnerabilities reduced, consequences minimized, threats identified and disrupted, and response and recovery hastened.” Investing in the utility infrastructure and companies which support it creates more resilient systems today and a robust recover if required.

### Recommendations

Matrix is unable to provide an assessment of the KGS natural gas system given the sensitivity of much of the system details. The following was provided from KGS. *“KGS has developed, and continually reviews, an extensive Pipeline Emergency Response Plan (PERP). KGS’s PERP clearly defines emergencies the company may face, responses necessary to minimize personal injury and property damage, and sets out comprehensive post-incident / post-emergency review procedures. At nearly 50 pages in length, KGS’s PERP outlines roles and responsibilities for company personnel based on their position in the company and function during an emergency. KGS’s PERP sets out notification requirements, general response principles, and tactical plans for responding to over a dozen different scenarios (e.g., flooding). Additionally, KGS’s PERP contains audit guidelines to ensure accurate record keeping.”*

## Natural Gas Emergency Response Case study

On December 30th, 2021, the Marshall Fire burned through approximately 6,219 acres of residential and commercial properties in Boulder County, Colorado. By the following day, nearly 1,000 homes and multiple commercial structures were confirmed lost in what is now the most destructive fire in Colorado history. Kansas Gas Service answered the call for Mutual Aid assistance in Boulder by sending a dozen employees, including 10 Field Operations service techs, one Field Operations supervisor and one Environment, Safety and Health coordinator. Field techs provided relight services and assessment assistance to some of the affected Xcel customers during a five-day span.

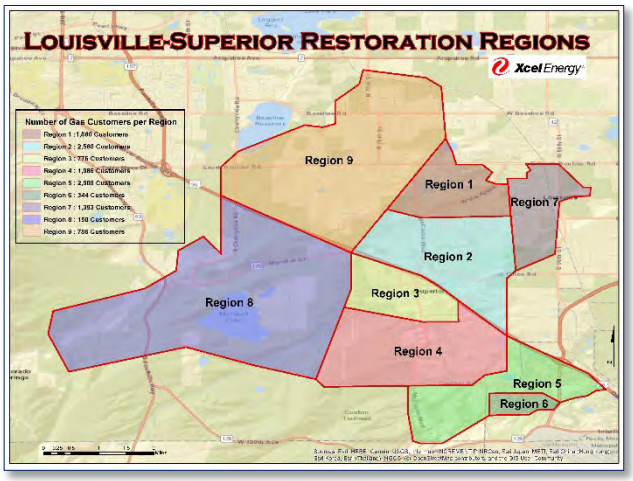



*Figure 8. Louisville CO Case Study Restoration Regions*
*Source: Excel Energy*

As this was a highly populated areas, utilities and the respective providers were key during the emergency response to ensure the safety of all personnel and remaining property. Xcel Energy, as the local natural gas provider, deployed hundreds of crews in response to the Marshall Fire. According to an Xcel Energy press release on January 5th, 2022, "As a result of the fires and windstorm, followed by snow and sub-freezing temperatures, more than 100,000 electric customers lost service, and as a safety precaution natural gas service was turned off for 13,000 customers in the Superior and Louisville area. In the days that followed, hundreds of crew members worked around the clock to get the lights and heat back on for customers." Due, to the widespread natural gas outage that resulted, Excel Energy had to perform a complete purge of all systems affected, followed by depressurization and re-light procedures. Excel energy showed a great display of their ability to prepare and execute emergency response procedures following this disaster and can very well be used as example of best practices for this type of response.

Among press conferences and other media releases, Excel Energy also provided a restoration region map as well as a natural gas outage relight process information sheet to all those affected, proving to be very beneficial tools during the response. These documents are excellent examples for continued improvement of any existing emergency response plans. These lessons learned from this recent event in nearby Colorado, should be reviewed, and where appropriate incorporated into KGS' PERP.

## Black Hills Energy

Black Hills Energy is a natural gas distribution company that operates in Kansas, Colorado, Wyoming, Nebraska, Iowa, and Arkansas. After approval from local voters and authorization from the Kansas Corporation Commission, the Kansas Gas division of Black Hills Energy purchased the municipal natural gas system from the City of Milford in 2012. They also provide electricity and other services to areas outside the Flint Hills Region. The City of Milford is the only Black Hills supplied city/area in the Flint Hills assessment. The adjacent map shows the Black Hills Energy Service area in the Flint Hills Region. Due to the size of Black Hills Energy as a company, they are able to offer advantages that the city was unable to provide at a reasonable cost to customers.

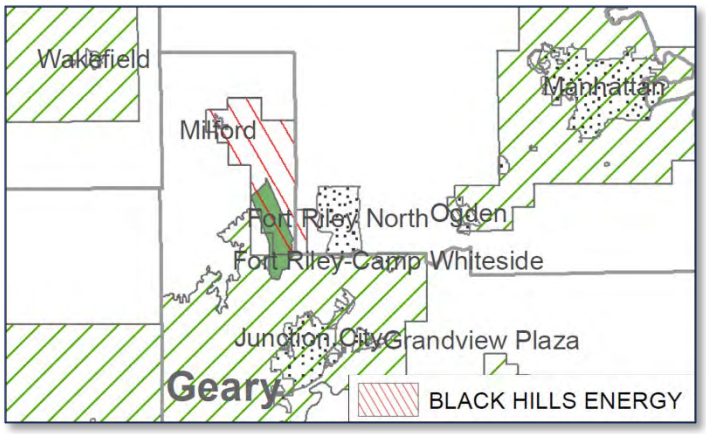



*Figure 9. Black Hills Energy Service Within Study Area*
*Source: Kansas Corporation Commission*

Black Hills Energy is currently updating the aging natural gas lines throughout Kansas. “The new gas lines require less maintenance, improve our ability to precisely locate natural gas lines, and are installed using the latest materials and methods,” according to their website.
https://www.blackhillsenergy.com/our-company/delivering-energy/kansas-natural-gas-line-update

# Municipality Summaries and Analysis

This section outlines the high-level assessments, gap analysis, and recommendations for each city, by county, for power, natural gas, water and wastewater systems, and emergency management and planning within the boundary of the MIR study. Summaries, assessments, vulnerabilities, and recommendations have been populated for all areas and systems that information was provided by the responsible parties or collected through publicly available research.

## Geary County


County is located west and south of Fort Riley and encompasses part of Fort Riley, Grandview Plaza, Junction City, and the City of Milford. The county covers an area of approximately 404 square miles and per the 2020 census has a population of 36,739. Geary County is home to approximately 2,624 military families and Department of the Army Civilians. Geary county relies on Evergy, DSO, FHREC, and BEC to manage and operate their respective transmission and distribution systems. The county does assist in the facilitation and coordination of emergency restoration and critical facility reenergization. Geary county rural water services are provided by two rural water districts that are not operated by Junction City. Rural Water District #1 provides water for residents west of Junction City and the City of Milford and the surrounding areas. Dwight Water District supplies water to the rural customers in the southern part of the county outside of the Junction City water system.

### *Emergency Management / Planning*

This Geary County Emergency Operations Plan covers Junction City, Grandview Plaza and Milford. This is an excellent Emergency Operations plan which is clearly presented and will facilitate effective Command and Control operations if a disaster or emergency were to occur. This plan could be used as a template for any other County or City in the region to update or supplement current plans. Coupling this plan with Geary County's use of the Kansas Planner online tool, makes them extremely well prepared for disaster and hazard response and mitigation. Additionally, the clear outline of current Memorandums of Understanding (MOUs) relating to each Emergency Support Function (ESF) set Geary County up for operational success. Geary County also has a well-defined list of critical infrastructure and essential facilities. Additionally, the Hazard Mitigation plan dated July 2020 provides a wealth of resources to assist Geary County in preparing for and responding to any catastrophic event. The attached list of recommended mitigation actions is very thorough and is an excellent foundation for planning future actions. Completing these items is critical to ensure the NIPP's "call to action" for identifying, assessing, and responding to cascading effects during and following incidents is achieved. Incident response initiatives are in place to help maintain a robust, secure, and reliable energy infrastructure that is also resilient—i.e., able to restore services rapidly in the event of any disaster. Recommended action items are as follows:

- Refine critical facilities list with backup power capabilities
- Merge critical facilities data into GIS for streamlined response operations
- Move forward with recommended mitigation actions "Hazard Mitigation Actions" Chart from the Regional Hazard Mitigation Plan

## City of Grandview Plaza

Grandview Plaza has a population of 1,697 per the 2020 Census. It is located directly south of Fort Riley and directly east of Junction City. The city is accessed via highway 40 and I-70.

### *Power*

The City of Grandview Plaza electrical distribution system is owned and maintained by FHREC. There is one substation servicing the city on the south side just north of I-70 on the east side of the elementary school. The substation is serviced by a single transmission line that runs parallel to US-40 from Junction City. The substation consists of an overhead steel structure and fusing, overhead bus, one pad mount substation transformer, and a set of 3 single phase voltage regulators on the transformer load side. The majority of the Grandview Plaza distribution system is overhead.

#### Critical Facilities

Critical facilities can currently operate for 3 days without commercial power. A recent power outage left 75% of the city without power which highlighted existing backup power capability limitations.

#### Vulnerabilities

There is currently only one substation transformer on site as well as only three of the single-phase voltage regulators, leaving the town vulnerable to a long-term outage in the event of transformer/regulator failure. Additionally, there appears to be little to no automation at the substation and on the distribution system. Finally, Critical facilities can only operate for 72 hours without commercial power.

#### Recommendations

- Purchase necessary backup equipment and parts. There is existing room within the substation for on-site storage of a backup or replacement substation transformer, voltage regulators, and additional equipment as well. It is critical to have these additional assets on-hand for restoration activities.
- Install overhead or pad mounted reclosers at the substation instead of overhead fuses. Automated restoration schemes can be introduced with the reclosers as well as being able to track events on the system and obtain better data for analysis. Fusing does not allow for this restoration, tracking, analysis, or flexibility.
- Increase fuel storage capacity for critical facilities to allow operation for 14 days without commercial power is a critical aspect to address to increase system resiliency.

### *Natural Gas*

Serviced by Kansas Gas Service company per the Certified Areas of Natural Gas Public Utilities in Kansas service area map. 50% of critical facilities and 80% of residents rely on natural gas for heating.

#### Vulnerabilities

There are currently no local liquefied natural gas (LNG) storage facilities nor a mobile natural gas supply system in place.

#### Recommendations

- Install local LNG storage and implement a mobile natural gas supply system.

### *Water*

Grandview Plaza has a single water service that it purchases from Junction city. There is one water treatment plant located at 416 Witt Street. The city system has a holding capacity of 155,000 gallons. The water treatment plant is equipped with a back-up generator. The water system is not currently equipped with a SCADA system.

#### Vulnerabilities

The water system for Grandview Plaza relies on Junction City to be up and operational and providing water. If a regional event takes out the Junction City water service, Grandview Plaza will be without water regardless of their backup generation capabilities. Additionally, there is no automation on the Grandview Plaza water system.

#### Recommendations

- Drill a backup or reserve well and install pumps to provide an alternate water source while increasing system redundancy.
- Explore implementing the capability to pump water back to Junction City to provide increased resiliency in their system.
- Implement SCADA and system automation to ensure timely system response to events such as switching over to the potential back up well from the primary Junction City service.

### *Wastewater*

Grandview plaza wastewater treatment consists of four stabilization ponds located at 801 State Avenue. The wastewater system is currently equipped with only partial back-up power. The wastewater treatment system is also not currently equipped with a SCADA system.

#### Vulnerabilities

The wastewater system only has partial back-up power and may not be able to operate during an extended power outage. Additionally, the system is not automated and requires manual intervention when problems occur throughout the system.

#### Recommendations

- Upgrade the wastewater treatment facility back-up power to allow complete operation in the event of an extended outage.
- Upgrade water systems with SCADA or automation to allow for system flexibility in emergency situations.

### *Emergency Management and Planning*

According to the July 2020 Regional Hazard Mitigation Plan, the City of Grandview Plaza does not have a Critical Facilities Plan. This is a critical resource for disaster or emergency response that should be completed as soon as possible to ensure effective execution of the emergency management cycle. Emergency response plans, to include the Critical Facilities Plan, are critical to meeting the NIPP's "call to action" item of identifying, assessing and responding to cascading effects during and following incidents. Recommended action items are as follows:

- Create Critical Facilities Plan to include backup power capabilities
- Move forward with recommended mitigation actions “Hazard Mitigation Actions” Chart from the Regional Hazard Mitigation Plan

## Junction City

Junction City has a population of 22,932 per the 2020 Census. It is located directly South of Fort Riley and West of Grandview Plaza. Primary access to the city is via highway 77 and I-70. Junction City is home to approximately 2,445 military families and Department of the Army civilians.

### *Power*

Power is distributed through Junction City from four substations owned and operated by Evergy utility. The four substations are interconnected via a 115kV transmission line circuit. One substation has a 69kV transmission line circuit. Transmission lines are well dispersed and provide high service redundancy from outside of the city. The primary distribution voltage is 12.47kV Wye, with various feeder tie points between substations on the distribution system. Currently, 72% of the distribution system is overhead while 28% of the system underground. The majority of the underground system is in residential areas. The Junction City electrical system outperformed both Kansas State and national averages for System Average Interruption Duration Index (SAIDI, SAIFI and CAIDI from 2015 to 2020. There are no concerns regarding electrical reliability at this time. In addition to utility power, Junction City is equipped with a 1MW solar farm. Connectivity between the solar farm and critical facilities is unknown at this time.

#### Critical Facilities

Currently only 70% of Junction City critical facilities are equipped with Natural Gas or Diesel back-up generators which allow them to operate for 10 days without commercial power.

#### Vulnerabilities

The main vulnerability identified is that not all of Junction City critical facilities are equipped with Natural Gas or Diesel back-up generators. The ones that are equipped do not have fuel storage to last for 14 days or more without commercial power.

#### Recommendations

- The first recommendation is to Install back-up generation capabilities for 100% of critical facilities based on priority. This is followed by an increase in fuel storage capacity to allow critical facilities to operate for 14 days without commercial power.

### *Natural Gas*

Junction City is serviced by Kansas Gas Service company per the Certified Areas of Natural Gas Public Utilities in Kansas service area map. All critical facilities and 95% of residents rely on natural gas for heating.

#### Vulnerabilities

There are currently no local liquefied natural gas storage facilities nor a mobile natural gas supply system in place.

### Recommendations

- Install local liquified natural gas (LNG) storage and implement a mobile natural gas supply system.

## *Water*

The Junction City water system is operated and maintained by a partnership between the city and Veolia Water. Raw water is pumped from 9 operational underground wells adjacent to the water treatment plant. The firm capacity of the operational wells is 5.2 million gallons per day (MGD) with the total firm capacity of the 10 wells at 6.2 MGD. The 10 wells have a maximum capacity of 10.8 MGD; however, prolonged pumping over the firm capacity will cause damage to the existing wells. Junction City's average single day pumping rate for 2012 was 4.61 MGD and the peak pumping rate was 8.43 MGD.

The water treatment plant is located at 2101 N Jackson St and was built in the 1970's, with upgrades as recently as 1996 and 2003. The WTP has a maximum capacity of 10 MGD with plant storage capacity of 1 million gallons. Average daily water system flow is approximately 3.7 to 4.4 MGD. The non-water treatment plant storage system consists of two water towers, two underground storage tanks and one concrete reservoir with a total storage capacity of 2.85 million gallons. The total city water storage is 3.85 million gallons. There are 147 miles of water mains, with 75 miles of high-pressure mains and 72 miles of low-pressure mains. There is also a supplemental booster pump station. Currently the water system is being upgraded with a SCADA system. There is backup generation for the water treatment plant and pumping station on site. The Junction City water system also supplies Grandview Plaza and Rural Water District Number 4.

### Vulnerabilities

The main vulnerability identified for this system is that with all wells being co-located within the water treatment plant the potential for widespread ground water contamination is higher than a more distributed well system. Additionally, the data gathered does not confirm the duration of backup generation capabilities for the water treatment plant and pumping station.

### Recommendations

- Implement coordination between neighboring water utilities as potential backup sources. Additionally, backup wells should be drilled in another aquifer or water source to introduce redundancy for the system. Finally, it is recommended to ensure that the water treatment facility and pumping station backup generation can run the facilities for extended commercial electric utility outages.

## *Wastewater*

Wastewater is operated and maintained by a partnership between the city and Veolia Water. Junction city wastewater is served by two wastewater treatment plants. The East WWTP is located at 427 Grant Avenue, and the Southwest WWTP is located at 3200 Industrial Street. The East WWTP is a 2.5 MGD dry weather, 7.0 MDG wet weather plant that treats an average of 1.7 MDG domestic sanitary wastewater discharge for the city. The East plant was built in 1954 with upgrades and updating approximately every 15 years. The last update was in 2000. The Southwest WWTP was built in 1996 and is a 2.5 MGD dry, 5.0 wet weather plant that provides treatment of approximately 0.25 MDG domestic and 0.5 MGD industrial sanitary wastewater discharge for the city. Backup electricity generation for the WWTPs is provided by portable generators. There are

approximately 124 miles of gravity drain sewer lines with 4 miles of force mains and 23 wastewater lift stations. SCADA capabilities of the plants are unknown at this time.

### Vulnerabilities

The first vulnerability identified is that backup electricity generation for the WWTPs is currently only portable generators. Not having permanent onsite backup generation increases system restoration times and cannot ensure that backup generation can maintain the system during extended commercial electric utility outages.

Additionally, the interconnection between WWTPs is currently unknown. If the Southwest plant has an outage there is potentially no treatment for industrial water waste.

Finally, the redundancy of the WWTP plants to process all of the city wastewater is potentially in question during dry weather processing (drought conditions).

### Recommendations

- Establish connectivity between the plants for wastewater processing redundancy
- Ensure the East WWTP can process industrial wastewater
- Upgrade backup generation systems to ensure WWTP plants can run on natural gas or diesel for 14 days during a long duration commercial electric utility power outage
- Upgrade SCADA and automation system for increased operational success.

## *Emergency Management and Planning*

According to the July 2020 Regional Hazard Mitigation Plan, Junction City does not have a Critical Facilities Plan. This is a critical resource for disaster or emergency response that should be completed as soon as possible to ensure effective execution of the emergency management cycle. Emergency response plans, to include the Critical Facilities Plan, are critical to meeting the NIPP's "call to action" item of identifying, assessing and responding to cascading effects during and following incidents. Recommended action items are as follows:

- Create Critical Facilities Plan to include backup power capabilities
- Move forward with recommended mitigation actions "Hazard Mitigation Actions" Chart from the Regional Hazard Mitigation Plan.

# City of Milford

The City of Milford has a population of 1,463 per the 2020 Census. It is located 8 miles directly north of Fort Riley and on the east bank of Milford Lake. Primary access to the city is via highway 77. Milford is home to approximately 179 military families and Department of the Army civilians.

## *Power*

Power is distributed through Milford from a single substation owned and operated by Evergy. The substation is fed via a short 0.5-mile radial tap off of the 34.5kV transmission loop that runs North-South, along Highway 77. The loop runs from Junction city up around the cities of Leonardville and Riley. The Milford substation is an overhead structure substation with a single pad mount transformer and an overhead capacitor bank. The capacitor bank is on the line side of the transformer. The primary distribution voltage is 12.47kV Wye. The distribution system consists of

79% of overhead lines, with two small sections of underground feeders accounting for 21% of the underground portion of the system.

### Critical Facilities

No information was received from Milford in regard to critical facilities and their backup generation capabilities.

### Vulnerabilities

The main vulnerability identified is that the Milford distribution system relies on a single substation and a 0.5 mile 34.5kV radial transmission line for power. There are currently no alternate sources to feed the city in the event of a fault, equipment failure, or weather event. Damage to this transmission line or substation could result in an extended citywide outage. Additionally, there appears to be little to no sectionalizing or automated restoration on the distribution system.

### Recommendations

- Install distribution system generator backup or a secondary substation on the south side of the city in order to increase overall city distribution system resiliency.
- Install reclosers at the services or automated switching in order to increase system flexibility and resiliency to wildlife, minor weather events, and city distribution system faults.
- Implement backup generation capabilities for critical infrastructure in order to maintain operations for a minimum of 14 days in the event of a commercial power outage if not already existing.

## *Natural Gas*

Milford is serviced by Black Hills Energy per the Certified Areas of Natural Gas Public Utilities in Kansas service area map. Geary county gas pipeline maps indicate a radial gas service tap off of the KGS system on the southwestern edge of Fort Riley.

### Vulnerabilities

The natural gas service is assumed to be a radial service off the larger KGS natural gas system. Pertinent data of the pipeline is unknown at this time.

### Recommendations

- Establish a secondary source of natural gas to increase the resiliency of the City of Milford against natural gas outages.

## *Water and Wastewater*

Milford Township is serviced by Rural Water District #4 in Geary County and the City of Milford service is provided by the city. No further details on the Milford water or wastewater systems were made available.

### Vulnerabilities & Recommendations

No specific vulnerabilities or recommendations noted due to lack of available data.

### *Emergency Management and Planning*

The 2018 Emergency Action Plan produced by USACE is a very effective plan that will ensure highest chance of reducing risk to life, property and the environment following a breach or release of the dam. Only recommendation would be to ensure information, specifically individual contact information, is updated on a recurring basis. According to the July 2020 Regional Hazard Mitigation Plan, Milford does not have a Critical Facilities Plan. This is a critical resource for disaster or emergency response that should be completed as soon as possible to ensure effective execution of the emergency management cycle. Recommended action items are as follows:

- Create Critical Facilities Plan with backup power capabilities
- Move forward with recommended mitigation actions “Hazard Mitigation Actions” Chart from the Regional Hazard Mitigation Plan.

## Pottawatomie County

Pottawatomie County is located northeast of Fort Riley and encompasses the City of St. George and the City of Wamego. The county covers an area of approximately 862 square miles and per the 2020 census has a population of 25,348. Pottawatomie County is home to approximately 150 military families and Department of the Army Civilians.

### *Emergency Management and Planning*

The July 2020 Regional Hazard Mitigation Plan highlights that Pottawatomie County has both a Critical Facilities Plan and Emergency Operations Plan. The county should continue to move forward with the recommended mitigation actions from the “Hazard Mitigation Actions” chart from the Regional Hazard Mitigation Plan.

## City of Wamego

Wamego, KS has a population of 5,670 per the 2020 Census. The city is located approximately 29 miles to the east of Fort Riley along the Kansas River and is accessed via highways 24 and 99. Wamego is home to approximately 86 military families and Department of the Army civilians.

### *Power*

The City of Wamego owns, operates, and maintains its own electrical distribution system. Evergy is the primary commercial power provider for Wamego. The city’s electrical distribution system consists of approximately 40 miles of overhead and underground primary lines. The majority of the system has an operating voltage of 7200 volts, but some 2400-volt lines still exist. In addition to a connection to the utility grid, the city owns and operates its own power plant. The plant consists of (9) dual fuel (natural gas/diesel) generators, with a total capacity of 15,360 KW.

The distribution system and generators are connected to the Evergy system via a step-down transformer at a single substation located at 909 Sandusky Ave. The overhead substation consists of overhead structure and fusing, overhead bus, a single pad mounted transformer, one overhead capacitor bank, and free-standing pad mount outdoor circuit breakers. The substation is fed radially 0.75 miles from an Evergy 34.5kV transmission line. The generating station is co-located with the substation is typically used in emergency and reserve situations but is not used for peak shaving or base loading. The generation facility has black start capability which utilizes a battery bank. The

power plant has a maximum, on-site storage of 62,530 gallons of diesel fuel which will allow for approximately 7-10 days of generation in absence of commercial power. There are no renewable energy systems owned or operated by the city. Adding additional distribution capability through Evergy would be an option for system capability expansion. Based on historical data, the city typically peaks around 14.3MW. Electric distribution is one of the primary ceilings on industrial business expansion/development for the city.

Backup power generation for the entire city, including critical facilities, is primarily handled by the city generation facility, although the police department has backup generation fueled by natural gas. Approximately 5% of customers are all electric. The city does not currently have an Emergency Restoration Plan. During the 2007 ice storm, widespread power outages were prevalent, but all city customers had power restored within 5 days.

### Critical Facilities

The city of Wamego currently implements its distribution level backup generation capabilities in the event of commercial power outages. There are no details as of the time of this assessment in regard to localized backup generation for the critical facilities.

### Vulnerabilities

The first vulnerability identified is that the automation at the primary substation appears to be centered on the aging exposed pad mount breakers with no automation upstream of the substation transformer. Next, generator fuel storage is on site, but the full duration is less than the recommended 14 days.

Additionally, the generation facility is undersized for future islanding capabilities in regard to desired industrial customer growth as currently the city owned generators would be operated at 93.1% of nameplate capacity when compared to historical city maximum loading.

Finally, the critical facilities currently utilize the distribution level backup generation to cover N+1 (single component) failures of the commercial power. This is acceptable but places the critical infrastructure at the mercy of the reliability of the centralized power production.

### Recommendations

- Install automated restorative and interrupting devices (reclosers) on the high side of the substation transformer. This would provide better equipment protection and coordination as well as city system islanding control
- Implement system automation via reclosers on the distribution system. This would be beneficial when addressing step loading the generators during a commercial electric utility outage, especially when accounting for industrial customers
- Update or add generation units to ensure city islanding capabilities for anticipated/desired industrial growth
- Ensure all fuel storage requirements and natural gas supply can support operation for a minimum of 14 days to account for worst case commercial power outages
- Implement localized backup generators at the critical facilities is key to ensure that the loss of the distribution power plant and commercial utilities does not take out city critical infrastructure

### Natural Gas

Serviced by Kansas Gas Service company per the Certified Areas of Natural Gas Public Utilities in Kansas service area map. Approximately 35% of the city critical facilities rely on NG heating and 95% of the residences utilize NG heating. There is no history of significant system damage and there is no city LNG storage. During the 2021 winter storm the city ran the generation facility on diesel fuel to offset the extreme natural gas prices during the storm. The city would like to upsize the natural gas lines to add additional generation capacity due to three of the generators being categorized for emergency use only. Further assessment could not be completed during this study due to sensitivity of KGS system data.

### Water

Wamego provides water to about 2,000 customers within city limits and 40 customers outside of the city. The city water department operates and maintains five wells with 33.5 miles of distribution water mains and two 500,000-gallon storage towers. Four of the five wells tap into the Kansas River aquifer and have experienced minimal impacts from drought conditions. All wells can operate independently of each other. Water is chlorinated and treated at each wellhead and consistently exceeds state standards. The system is in fair condition with the current limiting factors on the water utility being the pumping capacity and age of some of the infrastructure reaching 120 years old. System water and pressure losses are currently within acceptable parameters while pump and flow disruptions are circumvented with the secondary water tower. The city would also like to add another well bringing the total up to six. Four of the existing wells are located in the industrial park district with the fifth well on the north side of town near the middle school.

#### Vulnerabilities

Pumping capacity has been identified by the utility as the predominant weak point in the water system. The city currently utilizes five wells; however, four of the wells are in the same area on the east side of the city. These wells potentially tap the same aquifer or water source and reduce water source redundancy. Finally, city wells are reliant on heating to prevent freezing.

#### Recommendations

- Add pumping stations to increase pumping capabilities and redundancy. There is potential to add a well on the west side of the city or look into the viability and rights in using the Kansas river as a primary water source
- Ensure adequate heat sources are installed to address potential electric or gas outage impacts on the heating requirements of the wells to prevent freezing in cold weather

### Wastewater

The city water department operates and maintains the wastewater treatment plant. The plant is located on the southeast corner of the city along the Kansas River at 18200 Valley Road. It has a capacity of 750,000 gallons per day and process on average 400,000 to 520,000 gallons daily. There is no backup generation on site at the WWTP or for the lift or pump stations. The WWTP does not have a SCADA system, but recent upgrades (sledge aeration system) could be integrated into a future SCADA system. The WWTP design capacity is not anticipated to be reached within the next 15 years. The city also manages 27 miles of sewer mains with the overall system is considered fair to good with some significant areas of 6” pipes with shifts and root incursion. There is no recent history of significant wastewater system or service disruptions.

### Vulnerabilities

The first vulnerability identified is the lack of backup generation for the WWTP and lift/pump stations. This makes the wastewater system reliant on the primary generation facility for backup power. Next, the holding capacity is limited to a wet well at the lift station, which only has a capacity of a couple of hours causing the need for pump trucks during emergencies. The bar screen mechanism and management of biosolids have also been identified as vulnerabilities in the system. Additionally, sections of the system have significant pipe shifts and root incursion. Finally, there are no formal restoration or backup plans.

### Recommendations

- Develop and implement formal emergency response and restoration plans
- Coordinate with the electric service and generation facility for commercial electric service disruptions to ensure lift and pump stations are not overloaded
- Install backup generation at the WWTP and lift/pump station to allow for response time of pumping trucks along with the generation station or upgrade holding systems to increase the amount of time available for response to outages
- Upgrade or replace existing sections of lines that have shifted or experiencing root incursion.
- Implement a SCADA system at the WWTP to increase response capabilities

### *Emergency Management and Planning*

The City of Wamego provided an Emergency Water Supply Plan that is up to date and can ensure adequate water supply for the sustainment of human life, pets, and basic sanitation operations. This is a very robust and well-defined plan that ensures that the City of Wamego can appropriately execute the emergency management cycle during a water related emergency or disaster. According to the July 2020 Regional Hazard Mitigation Plan, the City of Wamego does not have a Critical Facilities Plan. This is a critical resource for disaster or emergency response that should be completed as soon as possible to ensure effective execution of the emergency management cycle. Emergency response plans, to include the Critical Facilities Plan, are critical to meeting the NIPP's "call to action" item of identifying, assessing and responding to cascading effects during and following incidents. Recommended action items are as follows: (1) Create Critical Facilities Plan to include backup power capabilities

## City of St. George

The City of St. George has a population of 1,054 per the 2020 Census. It is located 22 miles east of Fort Riley and on the Kansas River. Primary access to the city is via highway 24. St. George appears to be primarily residential with limited commercial and almost no industrial customers. St George is home to approximately 56 military families and Department of the Army civilians.

### *Power*

St George is serviced by Evergy. St. George also appears to have a secondary potential service via a single BEC substation north of the city. The substation consists of an overhead structure with fusing and a substation step down transformer to convert the 34.5kV transmission voltage to 12.47kV distribution voltage. The service from Evergy appears to be a 12.47kV distribution feeder on the west side of town from the Evergy Manhattan system. The majority of the St. George distribution system is overhead and is owned and operated by Evergy.

### Critical Facilities

Critical facilities in St. George have gas backup power generation that can last for approximately 3 to 4 days without commercial power.

### Vulnerabilities

The primary power source from Evergy needs to be confirmed, however, it appears that the St. George Evergy distribution is fed from 12.47kV lines originating from the Manhattan system to the west. The data is unclear as to if the St. George distribution system could be energized via the BEC substation in the event that the Evergy source is experiencing a long-term outage. Since there is no substation transformer redundancy in the BEC substation, equipment failure would result in a long-term outage while waiting for temporary or replacement equipment. Additionally, there are no automated restoration devices within the BEC substation. There also appears to be minimal sectionalizing and restorative interrupting devices on the distribution system. The city does not currently have an emergency restoration plan or activities in place. Finally, the backup power generation fuel storage for critical facilities at best allows for four days of operation in the event of commercial power loss.

### Recommendations

- BEC purchase and maintain a replacement substation transformer in stock for expedited replacement in the event of an equipment failure.
- Implement reclosers on the system for automated recovery schemes, better equipment protection and coordination with upstream devices and neighboring utilities.
- Develop and implement an emergency restoration plan that is coordinated with Evergy.
- Upgrade backup generation fuel storage to accommodate 14 days of operation without commercial power.

## *Natural Gas*

Serviced by Kansas Gas Service company per the Certified Areas of Natural Gas Public Utilities in Kansas service area map. Approximately 80% of the city critical facilities rely on gas heating. Assessment could not be completed during this study due to sensitivity of KGS system data.

## *Water*

St. George provides water via four ground water wells. Planning is in place for an additional water tower in the future; however, there is not an immediate need. Pumping stations have backup generators with fuel storage. The water system is connected to a SCADA system, but the system has minimal capabilities. The city notes there are two water treatment plants, but due to the size of the city it is assumed these are water treatment systems implemented at the well heads. The system is noted as being in good condition without any major concerns by the city at this time.

### Vulnerabilities

Given the lack of details on backup generators for pumping stations and wells, this may be another system vulnerability. Additionally, coordination of water service emergency response due to commercial electrical service outage is unknown at this time.

### Recommendations

- Install additional storage, pumping capacities and/or wells to prevent long term issues if the water supply is contaminated.
- Install backup generators for wells and pumps to ensure continued water service in the event of a commercial utility outage.
- Develop an emergency response and action plan that includes coordination with neighbors and additional source water options.

### *Wastewater*

The St. George wastewater system does implement lift and pumping stations that have backup generation. The wastewater system does not have any SCADA. According to city documents, the overall wastewater system is described as being in good shape. There are no known sewer capacity issues noted during this study.

### Vulnerabilities

If not already implemented, backup generation fuel storage is a vulnerability to ensuring power for at least 14 days in the event of a commercial outage.

### Recommendations

- Verify or upgrade the wastewater backup generators to be capable of operating without commercial power for a minimum of 14 days.

### *Emergency Management and Planning*

According to the July 2020 Regional Hazard Mitigation Plan, the City of St. George does not have a Critical Facilities Plan or an Emergency Operations Plan. These are critical resources for disaster or emergency response that should be completed as soon as possible to ensure effective execution of the emergency management cycle. Recommended action items are as follows: (1) Create Critical Facilities Plan to include backup power capabilities (2) Create Emergency Operations Plan

## Riley County

Riley County encompasses part of Fort Riley along with areas north and east of the installation. The cities within Riley County that are part of this study include Leonardville, Riley, Manhattan, and Ogden. The county covers an area of approximately 622 square miles, and according to the 2020 census has a population of 71,959. Riley county houses two of the largest employers in the state, Kansas State University and Fort Riley. Riley County is home to approximately 1,967 military families and Department of the Army civilians. The county also encompasses the Manhattan Regional Airport to the southeast of the City of Manhattan.

### *Power*

County power requirements and assessments are broken out in the corresponding city sections. Riley County does not have a written County Emergency Restoration Plan; emergency restoration activities are handled by the utilities and cities, but the county does help with coordination efforts. There is no commercial renewable energy generation that is county owned.

### Vulnerabilities

The main vulnerability identified is that Riley County does not currently have a county level Emergency Response Plan.

### Recommendations

- Implement an Emergency Response Plan to coordinate County, City, and Utility restoration/response efforts.

## *Critical Facilities*

Riley County has some critical facilities equipped with backup power generation capabilities. The County estimates about 40% of critical facilities have backup generators. The duration of fuel storage for the backup generators ranges from a few days to a few weeks. The fuels utilized include propane, natural gas, and diesel fuel.

### Vulnerabilities

The first vulnerability identified is that not all county critical facilities have backup generation in the event of a commercial power outage. An additional vulnerability is that fuel storage for backup generators is mixed. Some can last weeks, others can only last a few days.  Any dependency between facilities will be controlled by the backup generation with the least amount of fuel storage

### Recommendations

- Implement backup generation at all county critical facilities as well as standardize and implement fuel storage for backup generation for a minimum of 14 days without commercial power.

## *Natural Gas*

Residents outside of the cities primarily utilize on site propane storage. 90% of county critical facilities rely on natural gas for heating.

## *Water*

County works with city and rural water districts. Further water system details provided in city water sections.

## *Wastewater*

Riley County Public Works is the county office for wastewater. Wastewater treatment systems are covered in more detail in each city section.

## *Emergency Management and Planning*

Riley County was also covered in the July 2020 Hazard Mitigation Plan. Additionally, Matrix was able to complete valuable one-on-one meetings with the Riley County Emergency management staff. From these interactions Matrix was able to assess that regional 911 center provides good level of cooperation and communication between counties. The staff did identify that one of the current limitations is the ability for emergency organizations to seamlessly communication across various radio systems that are utilized by counties and cities. One specific issue highlighted by Riley County is the need to co-locate KSU police department dispatch with Riley County dispatch to ensure seamless call transition between agencies. Utilizing a common communication system would

enhance interoperability for responses across the region. Another limitation and area of improvement identified is the current size of the current Emergency Operations Center. There is currently a single dispatch center for the county which could potentially present a resiliency risk relating to executing emergency and disaster response.

Matrix would like to highlight the completion of exercises and participation in Fort Riley emergency response exercises to ensure a high-level preparedness for Riley County. These exercises are key to building a robust response mechanism and encouraging seamless communication flow between organizations to ensure mission continuation for all organizations.

The Riley County online GIS viewer is an excellent tool for emergency and disaster response that allows for well executed Incident Command as well as overall Command and Control during disaster and emergency response. The Emergency Operations Plan also contains a clear and current training and exercise plan. Also contained within this plan is a list of critical facilities, however, this list could be updated to be more robust.

Overall, this is an excellent Emergency Operations Plan following the same format as Geary County. This plan is clearly able to guide Riley County officials in executing the previously outlined emergency management cycle. Completing remaining actions from previous assessments items is critical to ensure the NIPP's "call to action" item of identifying, assessing, and responding to cascading effects during and following incidents is achieved. Incident response initiatives are in place to help maintain a robust, secure, and reliable energy infrastructure that is also resilient—i.e., able to restore services rapidly in the event of any disaster.

### Recommendations

- Conduct study for regional 911 centers to assess effectiveness of command and control between counties.
- Assess current EOC facility and space requirements for addition of project to Community Infrastructure Plan or other funding
- Refine critical facilities list to include backup power capabilities
- Merge critical facilities data into GIS for streamlined response operations
- Move forward with recommended mitigation actions "Hazard Mitigation Actions" Chart from the Regional Hazard Mitigation Plan.

## City of Leonardville

Leonardville has a population of 432 per the 2020 Census. It is located 20 miles north of Fort Riley. Primary access to the city is via highway 24. Leonardville is home to approximately 8 military families and Department of the Army civilians.

### *Power*

The City of Leonardville is serviced through an Evergy substation on the east side of town that is fed via a 34.5kV transmission line loop that comes from Milford on the west and continues into Manhattan in the east. There is also a BEC 34.5kV step down substation on the west side of town that is fed from the same transmission loop. Satellite imagery suggests that the BEC feeder on the west side of town may be able to service the town in the event the 12.47kV Evergy service from the eastern substation is lost. The BEC substation appears to potentially have an on-site generator that

needs to be confirmed since satellite imagery is conflicting. The Evergy substation is the normal source for Leonardville and also services the 12.47kV radial feed to the City of Riley. The distribution system through the town between the two substations is 12.47kV and is primarily overhead. There appears to be minimal sectionalizing capabilities on the system. Leonardville electrical customers experienced significantly more frequent service interruptions than Kansas and National averages, as well as other cities included in this study. Further system information and analysis is necessary to identify outage causes and possible solutions.

### Critical Facilities

City responses note there is on site backup generation at the city shop. No other backup generation data is noted and the run times in the event of commercial power loss, fuel type, and storage quantities were not provided.

### Vulnerabilities

The first vulnerability is based on the assumption that Leonardville can only be fed radially from the Evergy substation. If this is the case, there are minimal restorative and sectionalizing capabilities on the 12.47kV distribution system. The Evergy substation is the primary source for Leonardville and Riley so if the substation is deenergized, both towns are subject to outage. An additional vulnerability is that backup generation for critical facilities is minimal. Generators are assumed to only be able to provide power for a few days in the event of a commercial power outage.

### Recommendations

- Explore the potential of BEC to provide a redundant 12.47kV source from the west. Coordination between the utilities is critical for this action.
- Implement automated interrupting and restoration devices at the substation and on the 12.47kV distribution lines to increase resiliency of the distribution system.
- Verify and upgrade backup generation systems to account for all critical infrastructure facilities and ensure localized fuel storage that allows for 14 days of backup power in the event of commercial power outage.

## *Natural Gas*

Natural gas pipelines not shown in this region of the Certified Areas of Natural Gas Public Utilities in Kansas service area map.

### Vulnerabilities

It is assumed that dispersed liquified propane is utilized based on location and size of the community. Large scale disasters require long lead times to get the dispersed liquified propane resupplied by truck.

### Recommendations

- Ensure liquified propane storage in town is large enough for long term gas requirements in the event that regional storage and supply are hampered by large scale events.

## *Water and Wastewater*

No specific vulnerabilities or recommendations noted due to lack of available data.

### *Emergency Management and Planning*

According to the July 2020 Regional Hazard Mitigation Plan, the City of Leonardville does not have a Critical Facilities Plan. This is a critical resource for disaster or emergency response that should be completed as soon as possible to ensure effective execution of the emergency management cycle. Emergency response plans, to include the Critical Facilities Plan, are critical to meeting the NIPP's "call to action" item of identifying, assessing and responding to cascading effects during and following incidents. Recommended action items are as follows:

- Create Critical Facilities Plan to include backup power capabilities
- Move forward with recommended mitigation actions "Hazard Mitigation Actions" Chart from the Regional Hazard Mitigation Plan.

## City of Manhattan

Manhattan, KS has a population of 54,100 according to the 2020 Census. The city is located approximately 14 miles to the northeast of Fort Riley and is accessed via highways 18, 24 and 177. Manhattan is the largest city in the Fort Riley region and is home to Kansas State University as well as the Manhattan Regional Airport. Manhattan is home to approximately 1,754 military families and Department of the Army civilians.

### *Power*

The city of Manhattan has a total of seven distribution substations and one transmission substation located north of the city. The transmission and distribution systems are owned and operated by Evergy. The 230kV transmission line is to the northeast and connects one of the Manhattan distribution substations as well as the transmission substation to the north. All of the Manhattan substations are on a 115kV transmission loop with one 69kV transmission line and one 34.5kV transmission line that connect substations across the city. All substations appear to have redundant pad mount transformers for the distribution system with standard protection and automation incorporated. The bulk of the distribution is 12.47kV with 52% consisting of overhead lines and 48% being underground. There also appears to be various 12.47kV distribution interconnections throughout the system as well as tying into the neighboring cities St. George and Ogden. The system appears to be very robust and have a significant amount of redundancy. The City of Manhattan electrical system outperformed both Kansas State and National averages for SAIDI, SAIFI and CAIDI indices from 2015 to 2020. There are no concerns regarding electrical reliability at this time. The City Hall IT systems and all Manhattan fire stations are equipped with back-up power generation. The Manhattan Regional Airport appears to have redundant transmission services from Manhattan system and the Junction City or Ogden system. There also are 12.47kV distribution feeders that connect from the Manhattan distribution system. Backup power at the airport is currently unknown but assumed to be in place in order to meet FAA requirements.

#### Critical Facilities

Currently 90% of critical facilities have back-up power. Using diesel back-up generators these facilities can operate for 7-10 days without commercial power.

### Vulnerabilities

The first vulnerability identified is that not all critical facilities have backup generation capabilities. The facilities that do have backup generators are only able to maintain power for approximately seven days. There are no systemic transmission or distribution issues at this time.

### Recommendations

- Install additional back-up power generation to reach 100% of critical facilities having back-up power capabilities.
- Increase diesel/fuel storage capacity to allow critical facilities to operate for at least 14 days without commercial power.

## *Natural Gas*

Serviced by Kansas Gas Service company per the Certified Areas of Natural Gas Public Utilities in Kansas service area map. There are no local natural gas storage systems. Assessment could not be completed during this study due to sensitivity of KGS system data.

## *Water*

There is one water treatment plant located at 1200 N 3rd St. The Manhattan water system has a fully operational SCADA system. If an electrical outage occurs there are back-up generators and fuel storage to keep the water treatment plant operational. There are six water towers which can store a total of 7.95 million gallons. The water treatment plant is not in the flood plain and has partial water system redundancy. The water treatment plant currently has enough backup generation to run at minimum load (10-15MGD), approximately 1/3 of current production capacity. The city has 20 vertical wells in 3 different wellfields with a combined theoretical capacity of 30.7 MGD and an actual capacity of 26.7 MGD coupled with 2.6 billion gallons of water rights. The majority of water wells are located in the flood plain and are currently levee protected but could also be raised out of the floodplain. The wells can also be isolated, if necessary, to prevent contamination. There are approximately 276 miles of water distribution mains and 5.4 miles of raw water mains within the City of Manhattan.

### Vulnerabilities

The first vulnerability identified is that the majority of the water system wells are located in the flood plain. The well heads are all above the 1% FEMA flood elevations; however, there are some electrical components that are located below this level and should be raised or relocated. Additionally, the water main system has suffered from breaks recently that have caused water-boil advisories. While these breaks are not vulnerabilities by themselves, they do highlight the potential effects of aging infrastructure that are present across the entire county, reinforcing the importance of ensuring appropriate infrastructure funding. The water distribution system is currently limited to 23 million gallons, which creates some potential future service issues in the northwest portion of the community. It is key to ensure that the appropriate planning and funding for growth are completed in order to avoid any issues.

### Recommendations

- Raise well head electrical infrastructure out of the flood plain or above flood levels to ensure system resiliency against flooding.
- Investigate the water main system and determine where the most at risk or aging infrastructure is in order to assess replacement and updating.
- Expand the water distribution systems in the northwest of the city to prevent bottlenecking of the system and decreased level of service to customers in that portion of the system.

### *Wastewater*

There is one wastewater treatment plant located at 1201 Levee Dr with a capacity of 11.7 MGD. There is a fully operational SCADA system installed. The system has a capacity of 2 million gallons at the holding station. Wastewater treatment relies on electrical power as well as natural gas. The current back-up power system only provides power to parts of the wastewater facility. The WWTP is levee protected although access can be impeded if the area floods. The WWTP has overhead and underground electrical feeds that can be back fed from another substation if necessary. Future plans include expansion of both the levee and backup power capabilities for the entire plant. The city owns and maintains 1.27 million feet of gravity mains, 72,130 feet of force mains, 34,060 feet of discharge piping, and 3,050 feet of biosolids pipeline.

### Vulnerabilities

The first vulnerability identified is that the wastewater facility is located in an area where flooding is possible. Additionally, the wastewater treatment plant only has partial back-up power that may not be sufficient during a prolonged power outage.

### Recommendations

- Upgrade the wastewater treatment plant back-up power to provide back-up power to the entire facility.
- Expand levees and pumping capabilities to reduce flooding risks to the WWTP. Pumping capabilities may be permanently procured or made available through emergency contract methods as required by local Emergency Management plans and officials

### *Emergency Management and Planning*

According to the July 2020 Regional Hazard Mitigation Plan, the City of Manhattan has both a Critical Facilities Plan and Emergency Operations Plan

## City of Ogden

The City of Ogden has a population of 1,661 per the 2020 Census. It is located 6 miles east of Fort Riley and on the Kansas River. Primary access to the city is via highway 18. Ogden is home to approximately 178 military families and Department of the Army civilians.

### *Power*

The city of Ogden notes that they have three substations and that the distribution system and substations are owned and operated by Evergy. One substation is on the eastern side of town at the north end of 15$^{th}$ street and consists of overhead structure with fuses, and a single substation transformer. The second substation is on the southeastern edge of town at the end of Elm Street and consists of overhead structure, fusing, and a single pad mount transformer. The GIS data shows

these as 12.47kV primary voltage, 2.4kV secondary voltage step down substations with the Ogden distribution system operating at 2.4kV. Interconnectivity at 2.4kV between substations and among the distribution feeders is unclear but is assumed to exist. The 12.47kV primaries originate from the Manhattan Airport region of the Evergy 12.47kV Manhattan distribution system. Approximately 85% of the distribution system is overhead and 15% of the system is underground. There appears to be some manual sectionalizing capabilities with almost no automated system restoration devices on the distribution system. Evergy and the city are said to be assessing the future conversion and updating of the distribution system. Evergy currently has a project in planning stages to build a new substation close to Funston Lake. This project would also extend a 115kV transmission line from a new substation across the southern side of Ogden interconnecting to the Anzio substation. Additionally, Evergy has tentative plans to update the town distribution system to 12.47kV.

### Critical Facilities

The city does not have backup generation capability on their critical facilities at this time outside of one water well and one wastewater lift station.

### Vulnerabilities

The first vulnerability identified is that substations do not have backup replacement transformers on site. Additionally, the distribution system has little to no automated restoration capabilities. Service is only available from the northeast Manhattan 12.47kV distribution system, pending the Evergy 115kV project plans. Another vulnerability is that the 2.4kV Ogden distribution system is outdated. The lower distribution voltage is also inefficient and incurs a large waste in energy distribution. Finally, the critical facilities do not have backup generation capabilities.

### Recommendations

- Design and procure on-site or trailered backup transformers for substations, although Evergy may already have an action plan for these small city substations.
- Update and add SCADA and automation capabilities to substations and the distribution feeders.
- Install reclosers that are self-contained without communications will increase system capabilities drastically.
- Update and modernize the distribution system to a minimum of 4.16kV with efforts to put the system underground.
- Implement backup generation with fuel storage at all critical facilities with fuel storage that accommodates maintaining backup power for a minimum of 14 days without commercial to ensure system resiliency.

## *Natural Gas*

Serviced by Kansas Gas Service company per the Certified Areas of Natural Gas Public Utilities in Kansas service area map. Assessment could not be completed during this study due to sensitivity of KGS system data.

## *Water*

The city of Ogden water system is designed to serve 5,000 residents with three ground-source wells and one 200,000-gallon water tower serving as the primary components. The. There is no SCADA

for the water system; however, Ogden has implemented an alarm system that notifies the on-call city foreman via cell phone in in event of water tower high or low levels alarms, as well as power failures and chlorine alarms. Power outages that result in a complete draining of the water tower result in the loss of static water pressure in the system. This results in boil-orders and entire system flushes to restore normal water services. The city notes that the water system is in average condition and is one of the highest priority systems for upgrade. They are working towards upgrading the main line from the water tower via ARPA (American Rescue Plan Act) funding. They also recognize the need to implement appropriate fencing around the water tower for better site physical security.

#### Vulnerabilities

The first vulnerability identified is that only the main water well currently has a backup generator that is fueled by a directly connected natural gas line. The other two wells do not have backup generation capabilities. Additionally, physical security at the water tower needs to be upgraded.

#### Recommendations

- Implement backup generation with a minimum of 14 days of fuel reserves at the other two well sites to ensure water systems can remain in service during an extended commercial utility outage.
- Install industry standard security fencing and gating at the water tower.

### *Wastewater*

Ogden wastewater is served by a discharging, three-cell lagoon system, and three lift stations that were constructed in 1967. The lagoon system has two active cells and one overflow cell that are 11 acres each and cover a total area of 33 acres. The wastewater system includes approximately 50,000 linear feet of collection piping. The wastewater system does not have SCADA; however, like the water system, a remote alarming notifies the on-call city foreman's cell phone when high, low, and loss of power alarms occur. The wastewater system operations rely on natural gas as well as electric power. The system is in average condition but is considered one of the higher priority systems for upgrade.

#### Vulnerabilities

The first vulnerability identified is that the wastewater system is over 50 years old and requires updating, automating, and backup generation capabilities. Additionally, only one of the wastewater lift stations has backup generation with an unknown fuel reserve

#### Recommendations

- Perform a system survey to determine what parts of the wastewater treatment system need to be updated as well as where automation can increase the resiliency of the system. Further action should follow upon completion of that study.
- Implement backup generation with 14 days of fuel reserves at all lift station sites to ensure wastewater system can remain in service during an extended commercial utility outage.

### *Emergency Management and Planning*

According to the July 2020 Regional Hazard Mitigation Plan, the City of Ogden does not have a Critical Facilities Plan. This is a critical resource for disaster or emergency response that should be completed as soon as possible to ensure effective execution of the emergency management cycle.

Emergency response plans, to include the Critical Facilities Plan, are critical to meeting the NIPP's "call to action" item of identifying, assessing and responding to cascading effects during and following incidents. Recommended action items are as follows:

- Create Critical Facilities Plan to include backup power capabilities
- Move forward with recommended mitigation actions "Hazard Mitigation Actions" Chart from the Regional Hazard Mitigation Plan.

## City of Riley

The City of Riley has a population of 938 per the 2020 Census. It is located 14 miles north of Fort Riley. Primary access to the city is via highway 24 and highway 77. Riley is home to approximately 19 military families and Department of the Army civilians.

### *Power*

The distribution system for the City of Riley is owned and maintained by Evergy. Riley is serviced radially from a single 34.5kV:12.47kV substation approximately 4.25 miles to the north that also services Leonardville. The substation is fed from the 34.5kV transmission loop that circles from Milford to Leonardville, and then to Manhattan. The primary distribution voltage in the city is 12.47kV Wye. The distribution system consists of approximately 13 miles of overhead lines and approximately two miles of underground lines. There are potential secondary sources from the 34.5kV transmission lines approximately 4 miles to the east and west of the city. There is no distribution generation in the city and there appears to be minimal sectionalizing and automated restoration capabilities. The City of Riley electrical system outperformed both Kansas State and National averages for SAIDI, SAIFI, and CAIDI from 2015 to 2020.

#### Critical Facilities

The city notes that critical facilities have backup generation on site and they also implement portable generators as needed. Fuel sources are propane and diesel; however, fuel storage capacity and duration are not known. It is assumed that based on typical portable generation abilities, that these are not designed for longer duration run times.

#### Vulnerabilities

The first vulnerability identified is that the Riley distribution system relies on a single substation and 12.47kV radial for power. There are currently no alternate sources to feed the city in the event of a fault or equipment failure. Damage to this 12.47kV line or substation could result in a long-term citywide outage. A single 12.47kV line spanning over 4 miles may not be adequate to support additional loads on the system. Additional demand may lead to voltage drop that will negatively impact reliability of the system and customer services. Additionally, distribution automation and sectionalizing capabilities appear to be non-existent. Finally, backup generators are a mix of on-site permanent and portable units with fuel storage assumed to be at a minimum and is a mix of propane and diesel fuel.

#### Recommendations

- The options below to improve overall system service redundancy:

- Option 1: Addition of a step-down substation where the 12.47kV feeder runs underneath the 230kV transmission line just north of the city.
- Option 2: Addition of a 34.5kV:12.47kV step down substation to the east or west of the city tying into the 34.5kV transmission line loop.
- Option 3: Verify maximum and minimum loading of the city to analyze the implementation of diesel generators to carry the system in the event the commercial utility is lost.

- Implement overhead reclosers on the system to increase automation and sectionalizing capabilities.
- Standardize and implement onsite backup generators for all critical facilities as well as standardized fuel reserves to maintain backup power for a minimum of 14 days.

### *Natural Gas*

Natural gas pipelines are not shown in this region of the Certified Areas of Natural Gas Public Utilities in Kansas service area map.

#### Vulnerabilities

The assumption is that dispersed liquified propane is utilized based on location and size of the community. Large scale disasters require long lead times to get the dispersed liquified propane resupplied by truck.

#### Recommendations

- Ensure liquified propane storage in town is large enough for long term gas requirements in the event that regional storage and supply are hampered by large scale events.

### *Water*

The water supply for the City of Riley is obtained from six wells distributed throughout the city that are capable of providing a maximum of 285 gallons per minute (approximately 410,000 GPD maximum). There are on-site backup generators for wells #7 and #8 and one portable generator available for well house #6. Chlorine is administered to the system at the wells, and there is a 50,000-gallon elevated storage tank on the system. Water demand of the city is unknown at this time. The city has an established water emergency operating plan that is regularly maintained.

#### Vulnerabilities

The first vulnerability identified is that there are no automated systems for the city water system. All restorative and emergency actions are performed manually along with startup of the backup generators for the wells and pumps. Another vulnerability is that backup generator requirements and respective fuel supplies and storage are unknown.

#### Recommendations

- Implement on-site automated backup generators for the wells and pumping stations that can operate for extended durations without the need for manual refueling.
- Ensure backup generator fuel storage is sufficient to maintain the wells and pumps for 14 days without commercial electric service.

### *Wastewater*

The city owns and maintains the wastewater system. There are lift and pump stations with backup generators. They do not have a wastewater treatment plant; however, they implement wastewater sewer ponds. The wastewater treatment system is monitored via a telemetry system. The city notes the wastewater system as being in generally good condition.

#### Vulnerabilities

Given backup generator fuel storage details are currently unknown and assuming that current storage capacity is only a few days at most, this is the first vulnerability identified. An additional vulnerability is that the city does not have emergency restoration or backup plans.

#### Recommendations

- Verify and implement fuel storage to ensure the wastewater system can maintain operations for a minimum of 14 days without commercial power.
- Develop and establish emergency restoration plans.

### *Emergency Management and Planning*

The City of Riley provided an Emergency Water Supply Plan that is up to date and can ensure adequate water supply for the sustainment of human life, pets and basic sanitation operations in the event of a disaster or emergency. According to the July 2020 Regional Hazard Mitigation Plan, Riley City does not have a Critical Facilities Plan. This is a critical resource for disaster or emergency response that should be completed as soon as possible to ensure effective execution of the emergency management cycle. Emergency response plans, to include the Critical Facilities Plan, are critical to meeting the NIPP's "call to action" item of identifying, assessing and responding to cascading effects during and following incidents. Recommended action items are as follows:

- Create Critical Facilities Plan to include backup power capabilities
- Move forward with recommended mitigation actions "Hazard Mitigation Actions" Chart from the Regional Hazard Mitigation Plan.

## Clay County

Clay County is located northwest of Fort Riley and encompasses the Cities of Clay Center and Wakefield which are included in this study. The county covers an area of approximately 656 square miles and per the 2020 census has a population of 8,117. Clay County is home to approximately 179 military families and Department of the Army Civilians. Clay county is served by four rural water districts not operated by the cities under assessment. Total rural population covered by the rural water districts is approximately 1200 people. Wastewater management for rural residences not connected to city waste systems is localized to each residence (septic systems).

### *Emergency Management and Planning*

The most recent Regional Hazard Mitigation plan was completed in November 2019 and provides a wealth of resources to assist Clay County in preparing for and responding to any catastrophic event. Based on the provided Regional Hazard Mitigation Plan, Clay County has a clear understanding of

what the regional threats are and has created a list of action items to address shortfalls affecting Emergency Management. Completing these items is critical to ensure the NIPP's "call to action" item of identifying, assessing, and responding to cascading effects during and following incidents is achieved. Incident response initiatives are in place to help maintain a robust, secure, and reliable energy infrastructure that is also resilient—i.e., able to restore services rapidly in the event of any disaster. Recommended action items are:

- Update Critical Facilities Plan to include backup power capabilities
- Move forward with recommended mitigation actions "Hazard Mitigation Actions" Chart from the Regional Hazard Mitigation Plan.

## City of Clay Center

The City of Clay Center has a population of 4,199 per the 2020 Census. The city is located approximately 26 miles to the northwest of Fort Riley and is accessed via highways 15 and 24. Clay Center is home to approximately 53 military families and Department of the Army civilians. City of Clay Center Public Utilities Commission (CCPUC) regulates the electrical and water distribution systems for the city. They serve approximately 2,500 customers in City of Clay Center, rural areas near Green, Broughton, and Idana as well as the town of Idana. CCPUC consists of approximately 30 personnel, 18 of which are lineman.

### *Power*

The CCPUC is a municipal utility overseen by city council members that owns and maintains the 13.2kV distribution system for the city as well their 23MW power generation plant. CCPUC funding is entirely from utility rates and they receive no funding from the city budget. The CCPUC distribution system is fed from a 115kV transmission line from Evergy on the south side of the city where two switching stations are co-located. CCPUC owns 2 miles of 115kV transmission line to the main substation and power generation facility located at 420 4$^{th}$ Street. The main substation appears to have redundant step-down pad mount transformers with an additional step-down transformer for the generation facility.

CCPUC can power the entire city in the event of an Evergy service outage via the 23MW generation facility. The generation facility has black start capability and be at load carrying capability in approximately 20 minutes. The on-site fuel storage is 30,000-gallons of diesel fuel. Automated system restoration and sectionalizing capabilities of the system are unknown at this time. Typical peak summer load on the CCPUC distribution system is approximately 16MW. Future redundancy plans are noted to try and interconnect with the 230kV transmission line 7 miles north of the city, but they are currently still paying off the 115kV line. Approximately 85% of the electrical distribution system was replaced with FEMA funding from the 2007 ice storm.

#### Critical Facilities

CCPUC utilizes the primary city distribution power plant for the immediate backup power needs for critical facilities. Some critical facilities have local backup generation.

#### Vulnerabilities

The first vulnerability identified is that CCPUC is fed radially from the Evergy 115kV transmission system and is islanded from the rest of the utilities in the area. Additionally, CCPUC distribution

system automation and sectionalizing capabilities along with duration of backup diesel fuel supplies are currently unknown. Finally, only some critical facilities have local backup generation while most rely on the city distribution backup generators.

### Recommendations

- Plan and construct a 230kV:12.47kV substation on the north side of the city to tie into the 230kV transmission system and provide service redundancy.
- Implement automated interrupting and sectionalizing devices that can be remotely operated to aid in fault clearing, load shedding and load stepping operations for the generation facility.
- Verify or implement expansion of the diesel fuel storage at the generation facility to ensure a minimum of 14 days of runtime in the event of an extended commercial utility outage.
- Verify or implement local backup generators at all critical facilities.
- Ensure fuel supplies are able to maintain backup generation for 14 days without commercial power.

## *Natural Gas*

The City of Clay Center is serviced by Kansas Gas Service company per the Certified Areas of Natural Gas Public Utilities in Kansas service area map. Assessment could not be completed during this study due to sensitivity of KGS system data.

## *Water*

CCPUC owns and operates the water utility for the city and local rural area including Morganville and the Clay County Rural Water District. They have four primary wells with one emergency well. CCPUC currently operates one water treatment plant capable of 2 MGD, and 1.5 million gallons of storage between two 500,000-gallon water towers and one WTP 500,000-gallon storage tank. Water is treated at the water treatment plant before distribution throughout the CCPCU water system. The water treatment plant has an on-site 750kW diesel backup generator with a 1000-gallon diesel fuel storage. CCPUC owns enough water rights for considerable future growth and all water intake facilities are well above the 100-year floodplain.

### Vulnerabilities

The only vulnerability identified at this time is that CCPUC provides water to the surrounding areas but there are no details on pumping stations to deliver that water and if they have backup generation capabilities.

### Recommendations

- Verify that standard emergency action plans ensure Morganville and Clay County Rural Water #1 services are maintained in the event of a commercial electric utility outage. If they are not, implement backup generators at pumping sites to prevent loss of water service due to power outages.

## *Wastewater*

CCPUC notes they operate and maintain a wastewater treatment plant, but no details were provided in the responses from the city.

### Vulnerabilities and Recommendations

No specific vulnerabilities or recommendations noted due to lack of available data.

### *Emergency Management and Planning*

The most recent Regional Hazard Mitigation plan was completed in November 2019 and provides a wealth of resources to assist Clay County in preparing for and responding to any catastrophic event. Based on the Regional Hazard Mitigation Plan, Clay County has a clear understanding of what the regional threats are and has created a list of action items to address shortfalls affecting Emergency Management. Completing these items is critical to ensure the NIPP's "call to action" item of identifying, assessing, and responding to cascading effects during and following incidents is achieved. Incident response initiatives are in place to help maintain a robust, secure, and reliable energy infrastructure that is also resilient—i.e., able to restore services rapidly in the event of any disaster. Recommended action item are as follows:

- Update Critical Facilities Plan to include backup power capabilities
- Move forward with recommended mitigation actions "Hazard Mitigation Actions" Chart from the Regional Hazard Mitigation Plan.

## City of Wakefield

Wakefield has a population of 858 per the 2020 Census. The city is located on the Northwestern shore of Milford Lake approximately 14 miles to the northwest of Fort Riley and is accessed via highway 82. Wakefield is home to approximately 120 military families and Department of the Army civilians. Approximately 35% of Wakefield employed residents work at Fort Riley. Portions of Wakefield are located within the Milford Lake flood plain and experienced flooding in 2019.

### *Power*

The Wakefield electric distribution system and substation are owned and maintained by Evergy. The City of Wakefield has one substation that is on a short radial off of the 34.5kV transmission line that runs through town. It is located on the west side of town at 581 2nd St. and steps the 34.5kV transmission down to 12.47kV distribution. The substation consists of a wood overhead structure, fusing and a single substation transformer with load side voltage regulators. There appears to be moderate manual switching capabilities on the distribution system, automated restoration and switching is unknown. The distribution system is 12.47kV and the majority of the system is overhead. There are no ties to neighboring areas outside of the 34.5kV transmission line and there are no known backup generation capabilities at this time. GIS data is unclear if the 34.5kV transmission line is a loop or a radial. The Wakefield substation is potentially an 8.5-mile radial from the next closest 115kV:34.5kV substation to the west. There is potentially a 34.5kV substation 14.4 miles south that needs to be confirmed.

### Critical Facilities

The City of Wakefield notes it does not have backup generation at the non-utility critical facilities.

### Vulnerabilities

The first vulnerability identified is that the City of Wakefield may be unable to operate if islanded from Evergy services. Additionally, the substation does not have a spare transformer on site for equipment replacement, it also appears to be an older substation that will need to be upgraded in

the near future. GIS data shows minimal automation and sectionalizing capabilities on the system as another system vulnerability. The next vulnerability identified is that not all critical facilities have backup generation and that durations for fuel storage are unknown.

### Recommendations

- Pending the verification that the 34.5kV Evergy line that runs through town is indeed a loop feed tying the two substations together, assess if there are additional generation assets that are able to be utilized in the event that commercial power is lost.
- Procure and store a spare transformer ready for quick implementation at the substation for quick recovery of the system in the event of equipment failure.
- Add reclosers to the distribution system to expand automated protection and sectionalizing capabilities.
- Install backup generators at all critical facilities and ensure all backup generators have fuel storage to operate for a minimum of 14 days without commercial power.

## *Natural Gas*

Serviced by Kansas Gas Service company per the Certified Areas of Natural Gas Public Utilities in Kansas service area map. Assessment could not be completed during this study due to sensitivity of KGS system data.

## *Water*

The city of Wakefield owns and operates three ground water wells. There are pumping stations with backup generation capabilities and a 75,0000-gallon water tower. There is no water treatment plant or SCADA for the water distribution system. No maps or GIS files were available at the time of assessment. Comprehensive city plan mention improving water quality in city. Currently the city notes there is a water well project in progress.

### Vulnerabilities

The first vulnerability identified is that there is no water treatment plant. It is also assumed that water treatment is performed manually, directly at the well heads. The next vulnerability identified is that there is no water system SCADA and that all operations are performed manually. The final vulnerability identified is that backup generator fuel type and capacity unknown.

### Recommendations

- For future city growth, construct a water treatment plant to control the quality of the water in the system. This will also allow for the city to better administer treatment and test the water regularly.
- Implement a SCADA system to automate certain functions of the water system and allow for better controls and procedures for reaction to water contamination and unforeseen events.
- Verify or upgrade the backup generators and fuel storage to ensure operations can be maintained for a minimum of 14 days without commercial power.

## *Wastewater*

The wastewater system is managed by the city superintendent. There are backup generators for the lift/pump stations, but there is no SCADA or automation on the system. There is no wastewater

treatment plant or holding tanks/ponds as noted by the city. The current assumption is the city pumps their wastewater to a neighboring municipality for treatment and that most of the city is on septic systems. There are no noted historical disruptions to the city wastewater system at this time. Comprehensive city plan mentions addressing sewer issues in older neighborhoods.

### Vulnerabilities

The first vulnerability identified is that the wastewater system backup generators fuel and capacities are unknown. The next vulnerability identified is that system operations are all performed manually due to a lack of SCADA and automation. The final vulnerability identified is that there is no wastewater treatment plant and the means by which the city treats or disposes of their wastewater was not provided.

### Recommendations

- Verify or upgrade backup generator fuel supplies to ensure wastewater system is able to operate for a minimum of 14 days without commercial power.
- Implement levels of automation along with a SCADA system to increase system resiliency against failure or outages.
- Implement a wastewater treatment facility with holding tanks/ponds to increase resiliency against neighboring utilities system outages.

## *Emergency Management and Planning*

According to the November 2019 Regional Hazard Mitigation Plan, the City of Wakefield does not have a Critical Facilities Plan. This is a critical resource for disaster or emergency response that should be completed as soon as possible to ensure effective execution of the emergency management cycle. Emergency response plans, to include the Critical Facilities Plan, are critical to meeting the NIPP's "call to action" item of identifying, assessing and responding to cascading effects during and following incidents. Recommended action items are as follows:

- Create Critical Facilities Plan to include backup power capabilities
- Move forward with recommended mitigation actions "Hazard Mitigation Actions" Chart from the Regional Hazard Mitigation Plan.

# Transportation Summary

According to the Flint Hills Metropolitan Planning Organization's (FHMPO) Regional Transit Plan titled "Connect 2040," adopted in December of 2020, "The US-24 corridor is one of the most heavily traveled corridors in the region." This corridor is also the primary link between Pottawatomie County and the City of Manhattan. Throughout the data gathering and interview phase of the MIR study, a common concern brought forward by multiple localities was the Highway 24 transportation corridor, specifically the desire for expansion of the current or addition of road connections between Manhattan and Pottawatomie County. The Pottawatomie County "Future County" plan adopted in August of 2019, describes "concerns over the existing single route range from emergency services access and flooding concerns to traffic congestion alleviation." Since 2009 multiple studies have been completed to include following:

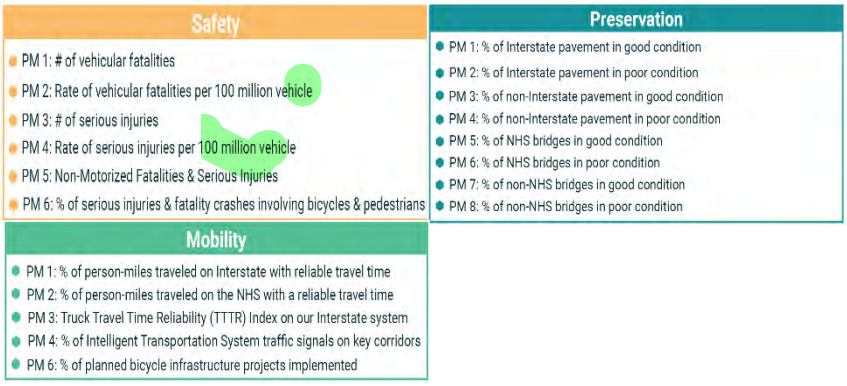
- US-24 Corridor Study which contained a series of long-term projects, one of which was a second connection to Manhattan with Junietta Road
- Pottawatomie County Marlatt-Junietta Link Study which provided engineering assessments of six different route options
- The 2015 FHMPO Bluetooth Origin and Destination Study which collected traffic information along US-24 in Pottawatomie County and Tuttle Creek Boulevard in Manhattan. This study ultimately found that nine percent of the trips originating at Green Valley Road and US-24 intersection are seen at the intersection of Tuttle Creek Boulevard and Marlatt Road
- 2019 KSU Student Project that developed alignments and estimates for two crossing locations.
- FHMPO Connect 2040

Of note from the FHMPO Connect 2040 Plan, under a "no-build" plan, two main scenarios were assessed in relation the US-24 corridor capacity limitations with the current assessed demand of 34,000 Vehicles per day. The first scenario assumes most new development will occur in the Green Valley area. This scenario assessed an increased demand of 4,000 vehicles per day. The second scenario assumes more growth than the previous scenario, but more of the development occurring within Manhattan. This scenario assessed a reduction in demand along US-24 to under 34,000 vehicles per day. It is important that any project undertaken to alleviate congestion or provide alternate routes can be successful and provide a good economic investment under both of the growth scenarios.

Another possible option for future action is the modernization of current roadways through four-lane urbanization of the US-24 Bridge and through paving of Blue River Road from Junietta to Dyer. Executing these less expensive modernization projects would increase the US-24 capacity by approximately 2% and the Blue River Road Capacity by approximately 92%. Additionally, by modernizing these two areas, specifically Blue River Road, this would provide more reliable alternate and emergency routes between Manhattan and Pottawatomie County without the economic commitment of additional studies and construction of new bridges.

The following table shows a summary of the projects relating to the US-24 Corridor from the BG Consultants study, Kansas State University student study, and the FHMPO Connect 2040 Plan. The

summary table incorporates the assessment of each project through the application of the Regional Transit Plan's performance measures of safety, preservation, mobility, and prosperity.




## Table 7. Transportation Study Summary

| Flint Hills Transporation Study Summary Table | | | | | | |
|---|---|---|---|---|---|---|
| **Source** | **Propsed Project** | **Description** | **Safety** | **Preservation** | **Mobility** | **Estimated Cost** |
| BGC | Junietta Rd to Marlatt Ave Connection Opt #1 | US 24 - Hopkins Creek Rd - Harvest Rd -Junietta Rd - Marlatt Ave (Paved Two Lane w w/New Bridge) | | | ✓ | $41,158,000* |
| BGC | Junietta Rd to Marlatt Ave Connection Opt #2 | US 24 - Hopkins Creek Rd - Junietta Rd - Marlatt Ave (Paved Two Lane w/New Bridge) | | | ✓ | $42,370,000* |
| BGC | Junietta Rd to Marlatt Ave Connection Opt #3 | US 24 - Lake Elbo Rd - Junietta Rd - Marlatt Ave (Paved Two Lane w/New Bridge) | | | ✓ | $34,000,000* |
| BGC | Junietta Rd to Marlatt Ave Connection Opt #4 | US 24 - Lake Elbo Rd - Harvest Rd - Junietta Rd - Marlatt Ave (Paved Two Lane w/New Bridge) | | | ✓ | $34,345,000* |
| BGC | Junietta Rd to Marlatt Ave Connection Opt #5 | US 24 - Flush Rd - Junietta Rd - Marlatt Ave (Paved Two Lanew/New Bridge) | | | ✓ | $49,325,000* |
| BGC | Junietta Rd to Marlatt Ave Connection Opt #6 | US 24 - Flush Rd - Alayna Rd - Junietta Rd - Marlatt Ave (Paved Two Lane w/New Bridge) | | | ✓ | $50,298,000* |
| KSU | Marlatt/Junietta Bridge Northern Alignment | Junietta Rd- Blue River Rd - Casement Rd - Marlatt Ave (Paving and Bridge Work) | | | ✓ | $10,373,153* |
| KSU | Marlatt/Junietta Bridge Southern Alignment | Junietta Rd - Marlatt Rd (Paving and Bridge Work) | | | ✓ | $11,474,132* |
| MPO Connect 2040 | Harvest Road Paving | Paving of 3 Lane Harvest Road from Lake Elbo to Excel (MPO Priority A; Year 2025) | | | | $5,300,000 |
| MPO Connect 2040 | Moody Road Paving | Paving of 3 Lane Moody Rd from Harvest to Junietta (MPO Prioirty A; Year 2025) | | | | $2,800,000 |
| MPO Connect 2040 | Casement Road | Construct 3-Lane Road from Brookmont to Allen/Knox (MPO | ✓ | | ✓ | $4,200,000 |
| MPO Connect 2040 | US 24 4-lane Urbanization | Addition of Multi-Modal Transportation to existing US 24 Lanes (MPO Priority B; Year 2025) | ✓ | ✓ | ✓ | $3,000,000 |
| MPO Connect 2040 | Pave Excel Road | Paving of 3 Lane Excel Road from Harvest to Cara's Way (MPO Priority B; Year 2025) | | | | $2,300,000 |
| MPO Connect 2040 | Blue River Road Paving | Pave from Junietta Rd to Dyer Rd | | | | $4,500,000 |
| MPO Connect 2040 | Junietta Rd Paving | Pave State Lake Rd to Blue River Road | | | | $700,000 |
| MPO Connect 2040 | Junietta Rd Paving | Pave 3 Lanes from Green Valley Rd to State Lake Road | | | | $5,800,000 |
| MPO Connect 2040 | US 24 Expansion | Expand US 24 to Six Lanes from Mall Entrance to Excel Rd | ✓ | ✓ | ✓ | $20,000,000 |
| MPO Connect 2040 | Blue River Bridge Crossing | Construct Bridge Connecting Casement Rd to Blue River Road | ✓ | | ✓ | $6,000,000 |

Estimated Cost with "*"– Denotes cost estimate is sourced from outdated study
All costs estimates should be reevaluated based on current economic conditions
BGC - BG Consultants Bridge Study
KSU - Kansas State University Student Study
MPO RTP - FHMPO Regional Transit Plan

A recent development that requires thorough consideration in future regional transportation planning and resiliency efforts is a large biomanufacturing development in western Pottawatomie County. On April 18, 2022, the Governor announced that Scorpion Biological Services will construct a state-of-the-art 500,000 square foot facility that will enable the quick response to biological threats with its 48 bioreactors. This 650-million-dollar investment will create over 500 jobs in the region when complete and operating at full capacity. The facility will be located between Manhattan and St. George just north of Highway 24 on Excel Road.

A major factor in the decision to construct the facility in the Flint Hills Region is the central location within the United States, and the access to transportation networks. The selected location provides direct access to Highway 24 and is within minutes of Interstate 70. Additionally, the 2021 DCIP project at the Manhattan Regional Airport will reconstruct the runway to support heavy military airlift. These airport improvements not only benefit Fort Riley but will enable mass quantity air transport of biopharmaceutical products as well.

This development will require periodic assessment to ensure the level of service and traffic congestion along both Highway 24 and I-70 is not impacted. Initial traffic modeling projects minimal changes and impacts to the current levels of service. Due to the potential criticality of this new facility that reaches beyond the region, it will be important to assess all factors of transportation resiliency for the future.

The Scorpion facility adds another variable to the transportation resiliency equation in the region. Ultimately, as the Pottawatomie Future County Report concludes, “discussions about a potential second route are ongoing and questions about cost, final location, economic impact and traffic congestion relief have yet to be fully answered.”

# Critical Facilities

One of the goals of the NIPP is to "assess and analyze threats to, vulnerabilities of and consequences to critical infrastructure to inform risk management activities." In order to successfully meet this goal, a key portion of this resiliency study was to identify mission critical facilities throughout the Flint Hills Region. Once identified, we can then begin to "enhance critical infrastructure resilience by minimizing the adverse consequences of incidents through advance planning and mitigation efforts, as well as effective responses to save lives and ensure the rapid recovery of essential services." (NIPP)

According to CISA's IRPF, critical infrastructure is any "system and/or physical assets critical to the regular functions of the community or region." This includes "fundamental systems such as energy, water, wastewater, communications, transportation and any infrastructure critical to the safety, health and economic vitality of the community."

The majority of critical infrastructure/facility data gathered through this study was provided by the respective organization. Matrix was able to fill in gaps, when necessary, using the expertise and knowledge of the project engineers and planners. Once the data was complied, Matrix was able to validate and assess each items criticality as it relates to the surrounding Flint Hills Region.

When assessing the criticality of a facility in relation to the respective local entity, Matrix used the following Critical Asset Tier system adopted from the Defense Critical Infrastructure Program (DCIP). Additionally, when assessing criticality, Matrix used the following missions as the basis for evaluation; (1) Geary County – "provide our citizens with the highest quality service in as timely, efficient and courteous a manner possible." (2) Clay County – "To provide for the safety and well-being of our citizens." (3) – Manhattan - "Sustain order and protect public safety, promote public health, preserve the built and natural environment and enhance economic vitality." (4) – Junction City – "to improve and maintain infrastructure, maintain a safe and secure environment and promote public health." (5) Bluestem Electric – "To provide safe and reliable electric energy and other services to our consumers as efficiently and economically as possible." This list does not exhaust the full scope of locations covered but represents the missions of each organization in order to apply the below definitions.

### Table 8. Local Critical Asset Tier Definitions

| Definitions | |
|---|---|
| **Tier 1** | An asset the loss, incapacitation, or disruption of which could result in the operational failure of the county, City or organization. |
| **Tier 2** | An asset the loss, incapacitation, or disruption of which could result in the operational degradation of the County, City or organization. |
| **Tier 3** | An asset the loss, incapacitation, or disruption of which could result in the function or failure at the department or lower organizational level but not degrade overall operations of the County, City or organization. |

*Source: Definitions adopted from Defense Critical Infrastructure Plan*

# Identifying, Classifying and Mapping Hazards and Threats

The Federal Emergency Management Agency (FEMA) utilizes three major categories to classify hazards: natural, technological, and adversarial. Each of these three categories are defined in the table below.

### Table 9. Types of Hazards

| Natural | Technological | Adversarial or Human Caused |
|---|---|---|
| These events are emergencies caused by forces extraneous to man in elements of the natural environment. Natural hazards cannot be managed and are often interrelated. Natural hazards can occur and cause no damage to humans of the built environment; however, when a hazard and development intersect, significant damage to the built environment occurs, causing a natural disaster. | These events are emergencies that involve materials created by man and that pose a unique hazard to the general public and environment. The jurisdiction needs to consider events that are caused by accident (e.g., mechanical failure, system or process breakdowns) or result from an emergency caused by another hazard (e.g., flood, storm) or are caused intentionally. | These are disasters created by man, either intentionally or by accident. Examples of such hazards are acts of terrorism, school violence, and cyber events. |

*Source: FEMA*

### Table 10. FEMA Hazard Types by Category

| Types of Hazards | | | |
|---|---|---|---|
| Natural | | Technological | Adversarial or Human Caused |
| Agricultural Infestation | Landslide | Cyber Attack | Civil Disorder |
| Dam and Levee Failure | Lightning | Utility Failure | Hazardous Material Event |
| Drought | Precipitation Event (Rain) | Infrastructure Failure | Major Disease Outbreak |
| Earthquake | Severe Thunderstorm | | Radiological Event |
| Expansive Soils | Soil Erosion & Dust | | Terrorism, Agri-Terrorism |
| Extreme Temperature | Tornado | | Utility / Infrastructure Failure |
| Flood | Wildfire | | |
| Hailstorm | Windstorm | | |
| Land Subsidence | Winter Storm | | |

*Source: FEMA*

# Climate Risk Assessment and Opportunities

Assessing the probability or likelihood of a hazard or threat event is a key portion of the MIR and is critical to the overall assessment of the Flint Hills region and its ability to respond and recover from major events while ensuring the military mission of Fort Riley remains unhindered. In the case of the MIR study, these events could be a natural disaster, human-caused event, or other event affecting resiliency of the region. This section of the report will address the probability of the occurrence of majorevents identified throughout the study and combine that data with a consequence assessment to characterize overall risk to resiliency of the region.

The Matrix Team, in concert with Jupiter Intelligence, used proprietary, dynamic earth system models, combined with data-driven downscaling techniques to produce local hazard estimates based on projected changes in climate. The climate modeling used to assess the identified threats is based on the World Climate Research Program's (WCRP) Coupled Model Intercomparison Project Phase 6 (CMIP6) study. The probabilities provided in this section of the report are based on multiple key climate modeling scenarios known as Shared Socioeconomic Pathways (SSP). An SSP is a scenario of projected global changed up to the year 2100. SSPs are used to derive estimated greenhouse gas emission scenarios and their effects on climate change. Additionally, these SSPs have been used to help develop the Intergovernmental Panel on Climate Change Six Assessment Report (IPCC 6) through which much ofthe climate analysis methodology is derived. For all the scenarios, the temperature change is relative to the 20th century global average. This report uses the following SSPs to assess probabilities of the identified hazard occurring:

- **Shared Socioeconomic Pathway 1-2.6 (SSP126)** – In this positive outlook-based scenario, global$CO_2$ emissions are severely cut, but not as fast, reaching net-zero after 2050. The overall global temperature increase is estimated to be 1.8 degrees Celsius (≈3.2F) by 2100.
- **Shared Socioeconomic Pathway 2-4.5 (SSP245)** – In this intermediate outlook-based scenario, global $CO_2$ emission remain nearer to the current levels but do not reach net-zero by 2100. Theoverall global temperature increase is estimated to be 2.7 degrees Celsius (≈4.9F) by 2100.
- **Shared Socioeconomic Pathway 5-8.5 (SSP585)** – In this worst-case outlook-based scenario,global $CO_2$ emissions are approximately doubled by the year 2050. The overall global temperature increase is estimated to be 4.4 degrees Celsius (≈7.9F) by 2100.

Using proprietary climate modeling software, Matrix analyzed the probability of below threats and hazards. Scenarios 1, 3 and 5 show the Mean of Distribution or average value and more likely events to occur. Scenarios 2,4 and 6 show the 95th Percentile of Distribution or the highest value remaining after the top 5% ofdata points are removed and the more extreme outcomes of each event.

| | | |
|---|---|---|
| Scenario 1* = SSP126, Mean of Distribution | Scenario 3 = SSP245, Mean of Distribution | Scenario 5 = SSP585, Mean of Distribution |
| Scenario 2 = SSP126, 95th Percentile of Distribution | Scenario 4 = SSP245, 95th Percentile of Distribution | Scenario 6 = SSP585, 95th Percentile of Distribution |
| * = Baseline | | |

## Flooding

This data set shows that the overall proportion of flooded land during a 100-year flood event will trend downward towards the year 2100. The proportion of flooded land during this event ranges from approximately 27% down to 9%. At first glance, this may seem counterintuitive but additional climate modeling data that is presented later in this section also shows that one-day precipitation amounts in a given rain event will increase over time, ultimately spreading out the amount of rainfall over a longer period of time leading to an overall decrease in the severity of flooding during these major events. The data also shows that the more severe the SSP, the greater the decrease in proportion of flooded land.

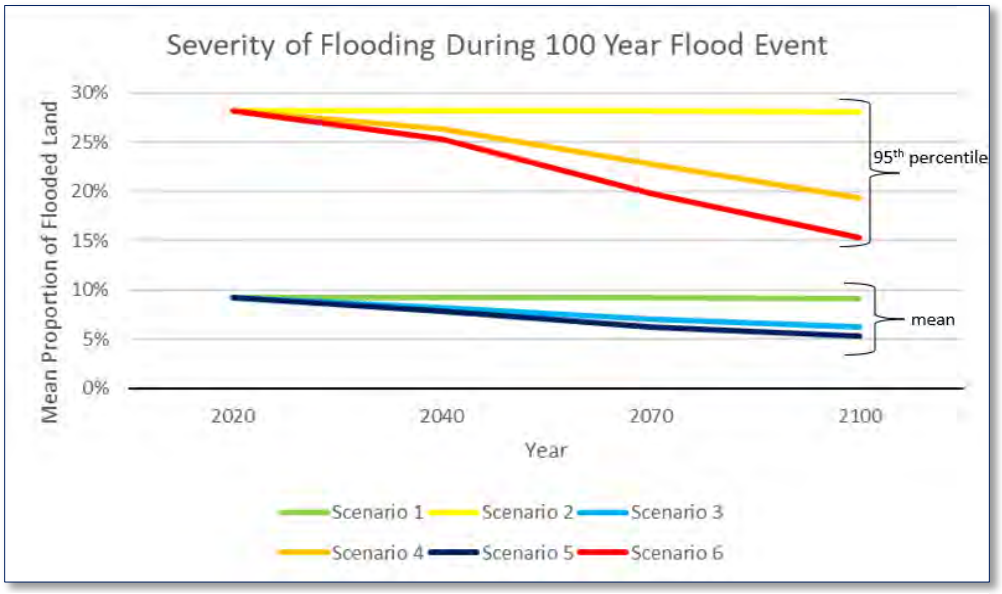



*Figure 10. Severity of Flooding During a 100 Year Event*

Similar to the 100-year flood event, the data set for a 500-year flood event shows that the overall proportion of flooded land during a 500-year flood event will trend downward towards the year 2100. The proportion of flooded land during this event ranges from approximately 45% down to 13%. As withthe previous data set, this may seem counterintuitive but additional climate modeling data that is presented later in this section also shows that one-day precipitation amounts in a given rain event will increase over time, ultimately spreading out the amount of rainfall over a longer period of time leadingto an overall decrease in the severity of flooding during these major events. The data also shows that the more severe the SSP, the greater the decrease in proportion of flooded land.

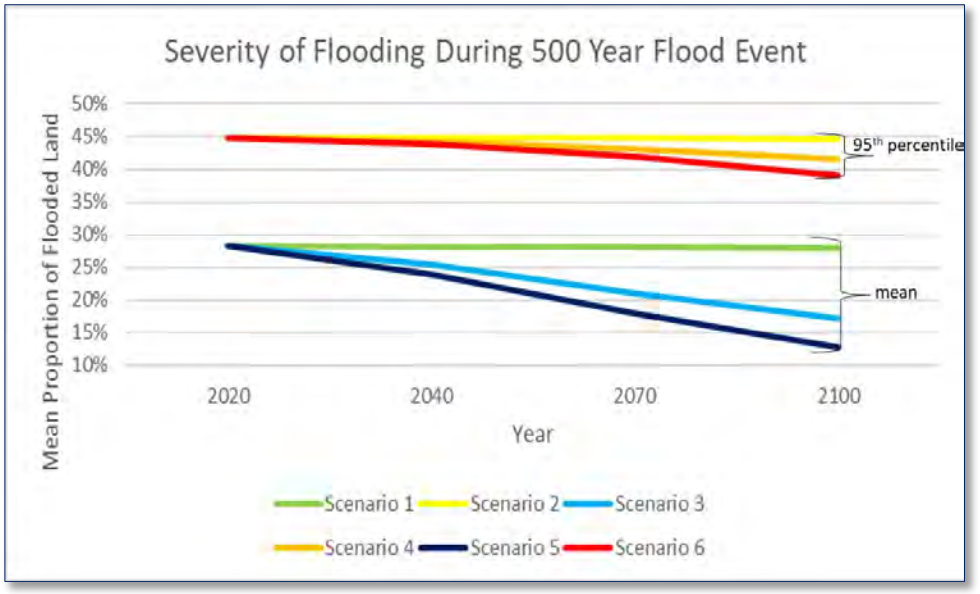



*Figure 11. Severity of Flooding During a 500 Year Event*

Finally, it is important to recognize the current flooding risks associated with the Wildcat Creek Watershed as well as the overflow of Tuttle Creek Dam. With regards to Wildcat Creek, two recent flooding events have interrupted major traffic routes and displaced soldiers and families from the West side of Manhattan. A recent study recommended the addition of two detention ponds on the East of the city to mitigate similar events in the future. A Tuttle Creek Dam overtopping event presents risk to large parts of Manhattan, as well as levee breaches. USACE is actively contracting an effort to raise the levee along the East and Southeast sectors around Manhattan to prevent overflow of these areas.

## High Temperatures

The temperature modeling data shows that the number of days throughout the year that will exceed 100F will increase slightly up to the year 2040 followed by another increase between 2040 and 2070. The number of days exceeding 100F range from approximately 25 (6.8%) up to 69 (18.9%). This data set also shows that if the most severe SSP occurs, the number of days exceeding 100F in a given year will dramatically increase by 2100. If the positive outlook or intermediate outlook SSPs occur, the number of days exceeding 100F will level off around the year 2070. Regardless of the SSP that occurs in the future, the general trend will be upward from our current state due to the projected increase in overall global temperature.

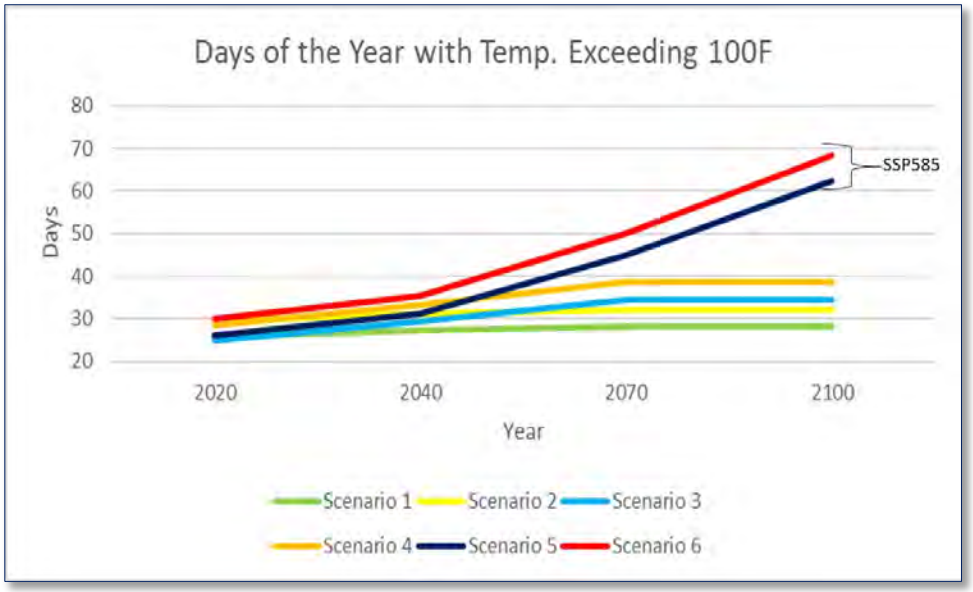



*Figure 12. Days of the Year with Temperature Exceeding 100F*

Increasing temperatures, both in terms of number of days at higher temperatures, and the increase in high daily ambient temperatures will have multiple effects on the regional electrical distribution systems. Higher overall temperatures will result in increased demand from building HVAC systems. HVAC systems will increase in size and number, resulting in increased loading on the electrical systems. The power quality on the electrical distribution systems will also be affected due to the amount of reactive power required by the increase in motor loads from each HVAC system. Increased ambient temperatures will also result in less load carrying capacity on the electrical distribution circuits, further affecting the capabilities of the systems to absorb the increased HVAC demand. However, if the municipality owned generation assets increase in size in tandem with the increased HVAC loads, then the increase in generation capability will aid in reducing the stress on the regional system.

Overall, the regional distribution and transmission infrastructure currently appears designed to handle the anticipated load changes in regard to increasing number of days at increased temperatures. Increased demand duration will affect generation assets to a greater degree than distribution assets and future plans for the system must account for generation reserves, renewable energy portfolios, and energy storage capabilities.

## Hail

The following graph shows a general downward trend of the number of days of the year with possible large hail. The number of days with large hail possible range from approximately 5 days (1.4%) down to 1.5days (0.4%). The intermediate and severe SSP outlooks show a larger reduction in the number of dayswith large hail compared to the reduction of the positive outlook SSP.

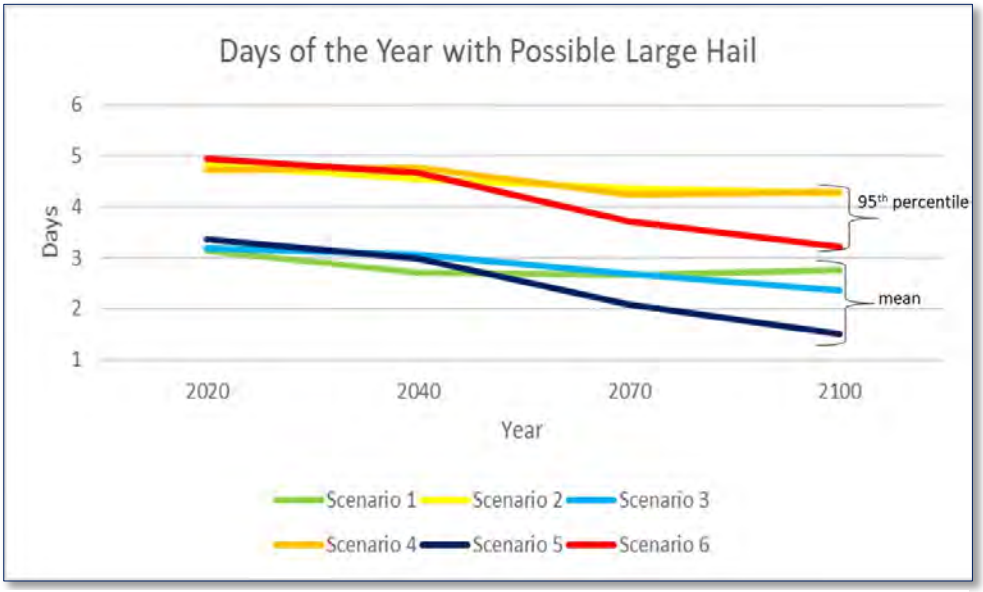



*Figure 13. Days of the Year with Possible Large Hail*

## Thunderstorms

Figure 15 shows a slight, generally upward, trend in the number of days of severe thunderstorms occurring throughout the year with the range from approximately 36 days (9.8%) to 57 days (15.6%). These severe thunderstorm days also encompass the possibility of tornado activity within the given storm. The region employs primarily overhead distribution systems throughout the rural and smaller municipalities. These systems are susceptible to damage from extreme weather events such as severe lightning storms and tornados. It is recommended to harden the overhead system and underground them where possible.

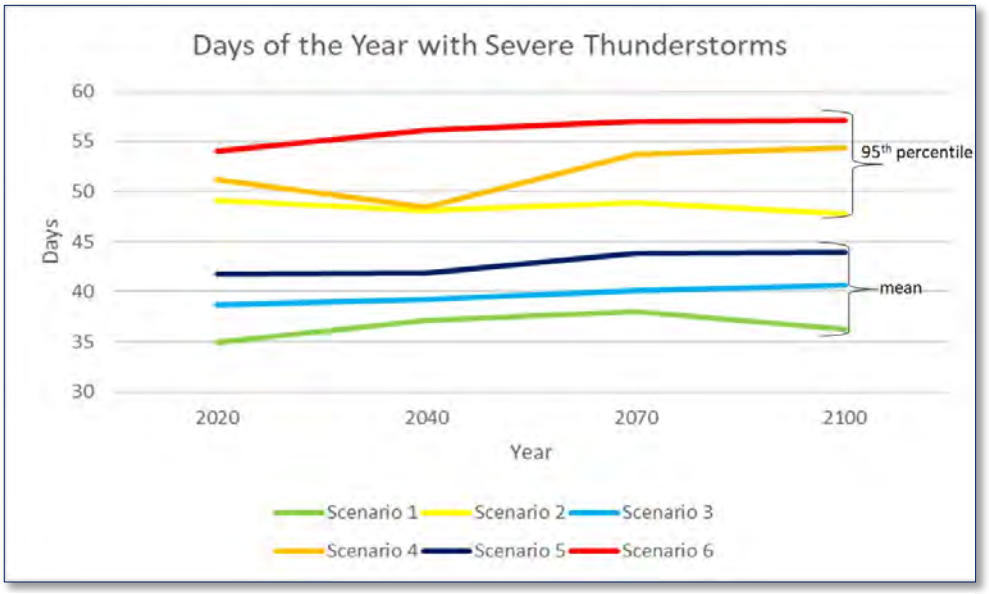



*Figure 14. Days of the Year with Severe Thunderstorms*

## Precipitation

This precipitation data set shows a general upward trend in the level of total one day precipitation levels during a 10-year event. The total water equivalent ranges from approximately 102mm (4 inches) of water up to 150mm (5.9 inches) of water. Moderate increases are observed across all scenarios for 20-year projections and then leveling out between 2040 to 2070, apart from SSP585. The most dramatic increases up to the year 2100 are seen in the severe SSP scenarios.

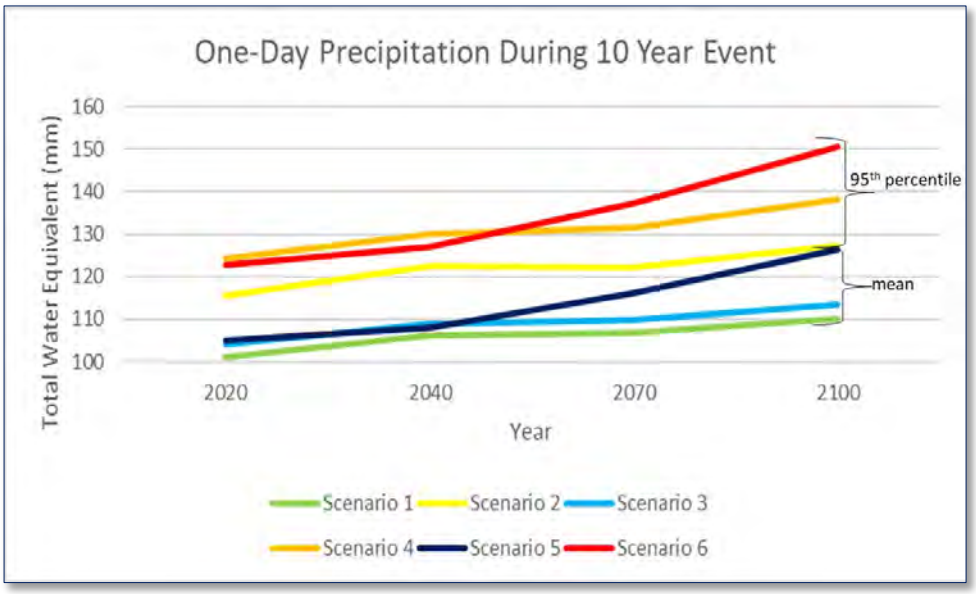



*Figure 15. One-Day Precipitation Levels During a 10-Year Event*

Figure 17 demonstrates a general upward trend in the level of total one day precipitation levels during a 50- year event. The total water equivalent ranges from approximately 130mm (5.1 inches) of water up to 222mm (8.7 inches) of water. Moderate increases are observed across all scenarios for 20-year projections and then leveling out between 2040 to 2070, apart from SSP585. The most dramatic increases up to the year 2100 are seen in the severe SSP scenarios.

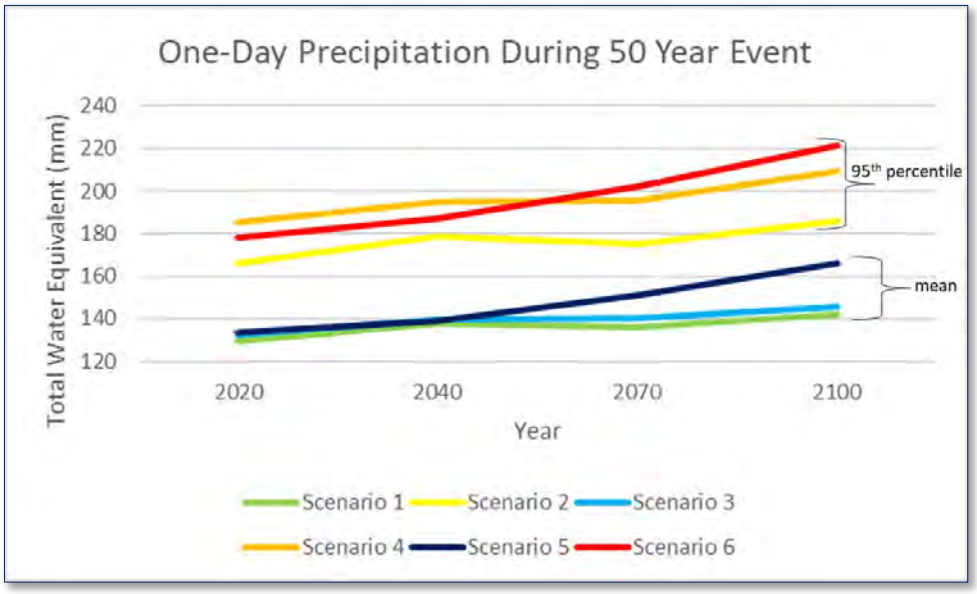



*Figure 16.One-Day Precipitation Levels During a 50-Year Event*

The 100-year event precipitation data set shows a general upward trend in the level of total one day precipitation levels. The total water equivalent ranges from approximately 140mm (5.5 inches) of water upto 260mm (10.2 inches) of water. Moderate increases are observed across all scenarios for 20-year projections and then leveling out between 2040 to 2070, apart from SSP585. The most dramatic increases up to the year 2100 are seen in the severe SSP scenarios.

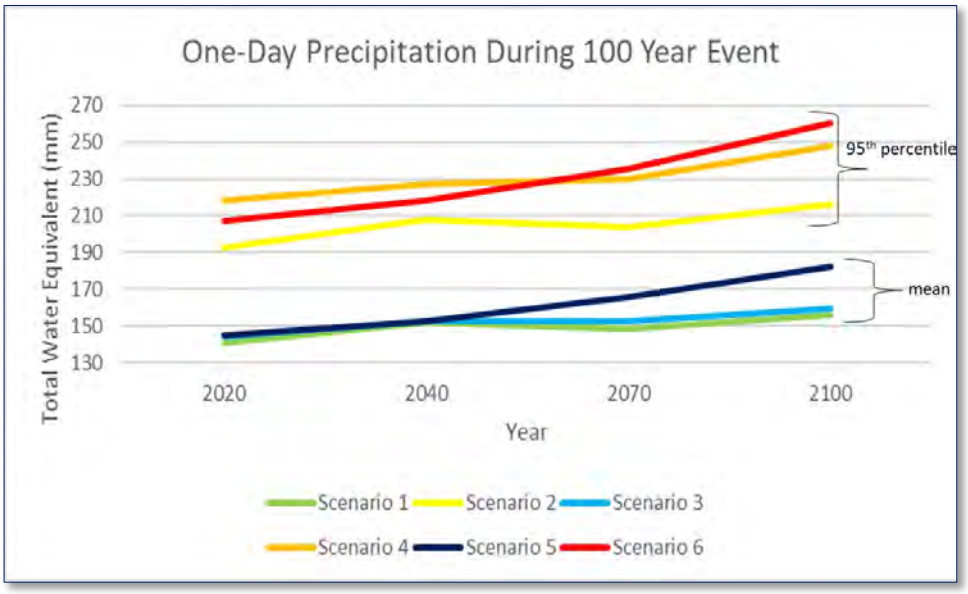



*Figure 17. One-Day Precipitation Levels During a 100-Year Event*

## Wind

This data set shows to different trends occurring for the 1-minute sustained windspeeds during a 10- year wind event. These sustained windspeeds range from approximately 74.5 mph to 83 mph. These wind events can serve as proxies for tornados as a F1 tornado has wind speeds ranging from 73-122mph. The first is a generally level wind speed from years 2020 to 2070 in all climate scenarios. The data then splits into an general increase and decrease from year 2070 to year 2100 depending upon the climate scenario. The intermediate SSP scenario shows an increase in sustained windspeed with the most sever wind events by 2100, while the positive and severe SSP scenarios show a downward trend in sustained windspeed from year 2070 to year 2100. It is also worth noting that the mean data set and 95th percentile data set are the main drivers in outcomes for wind events as opposed to the SSP scenarios.

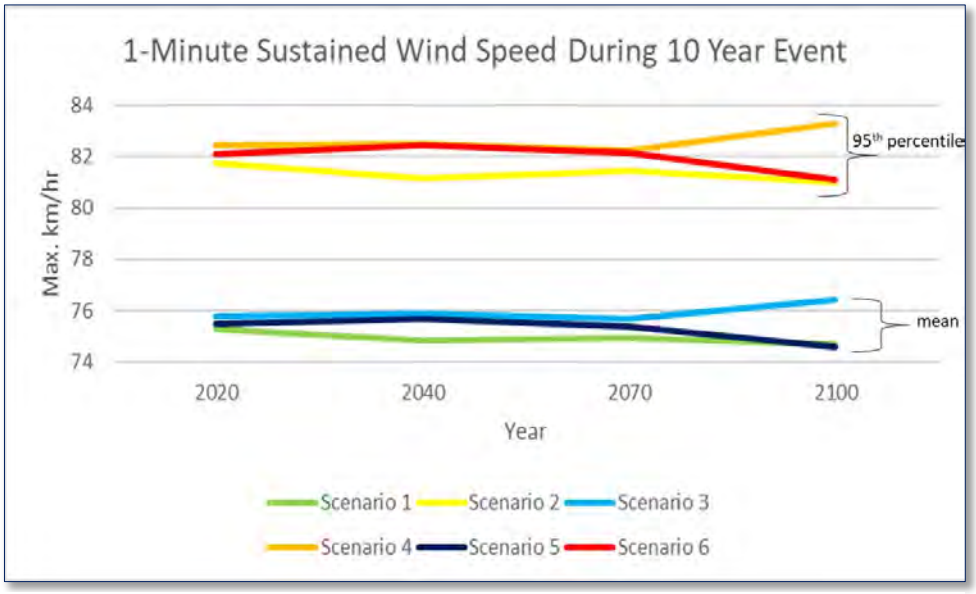



*Figure 18. 1-minute Sustained Windspeed During a 10-year Event*

The following graph shows to different trends occurring for the 1-minute sustained windspeeds during a 50- year wind event. These sustained windspeeds range from approximately 80 mph to 93.5 mph. The first is a generally level wind speed from years 2020 to 2070 in all scenarios. The data then splits from year 2070 to year 2100 depending upon the climate scenario. The intermediate SSP scenario shows an increase in sustained windspeed while the positive and severe SSP scenarios show a downward trend in sustained windspeed from year 2070 to year 2100.

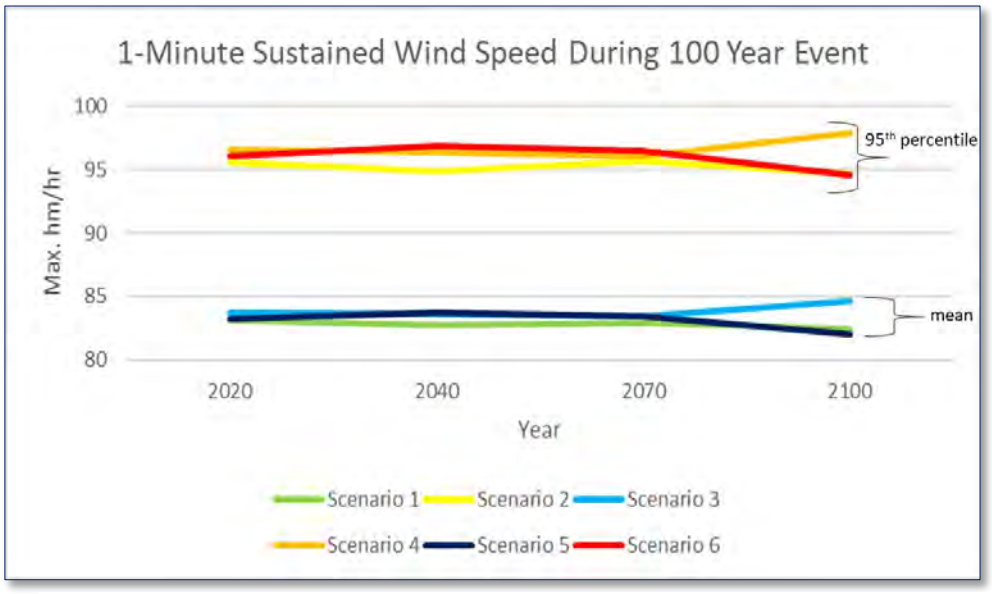



*Figure 19. 1-minute Sustained Windspeed During a 100-year Event*

This data set shows to different trends occurring for the 1-minute sustained windspeeds during a 100- year wind event. These sustained windspeeds range from approximately 82 mph to 97.5 mph. The first is a generally level wind speed from years 2020 to 2070 in all scenarios. The data then splits from year 2070 to year 2100 depending upon the climate scenario. Theintermediate SSP scenario shows an increase in sustained windspeed while the positive and severe SSP scenarios show a downward trend in sustained windspeed from year 2070 to year 2100.

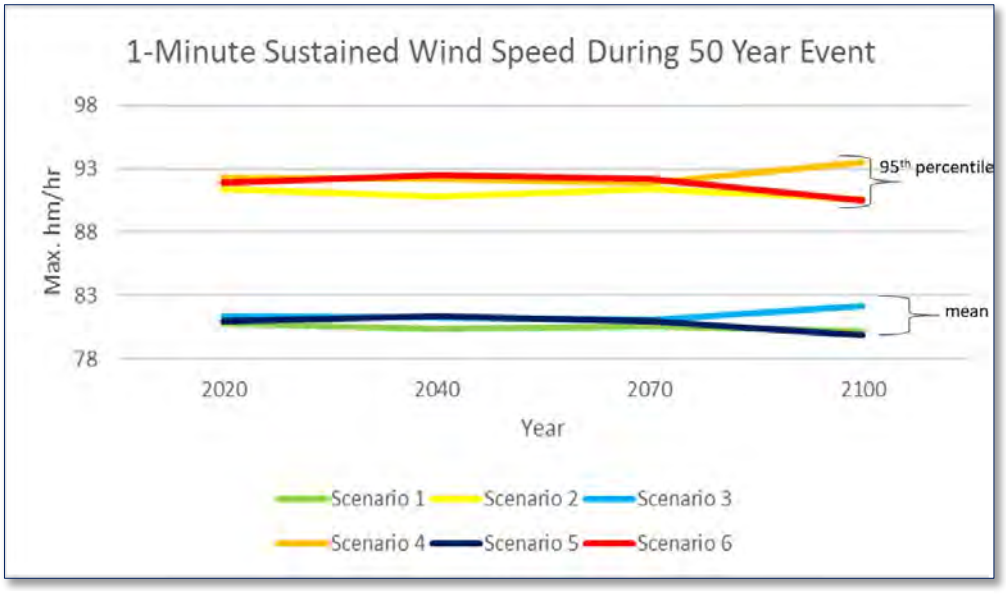



*Figure 20. 1-minute Sustained Windspeed During a 50-year Event*

## Evapotranspiration – Drought & Wildfire

As a preface to the following data set, the Standardized Precipitation Evapotranspiration Index (SPEI) is a multi-scalar drought index based on climate data that can measure drought severity according to its intensity and duration as well as being able to identify the onset and end of drought episodes. The SPEI scale is defined in the chart below:

### Table 11. Standardized Precipitation Evapotranspiration Index

| Moisture Category | SPEI Value |
|---|---|
| **Extremely Wet (EW)** | **2.00 and above** |
| **Very Wet (VW)** | **1.50 to 1.99** |
| **Moderately Wet (MW)** | **1.00 to 1.49** |
| **Near Normal (NN)** | **-0.99 to 0.99** |
| **Moderately Dry (MD)** | **-1.00 to -1.49** |
| **Severely Dry (SD)** | **-1.50 to -1.99** |
| **Extremely Dry (ED)** | **-2.00 and below** |

*Source: Li, Binquan & Zhou, Wei & Zhao, Yaoyang & Ju, Qin & Yu, Zhongbo & Liang, Zhongmin & Acharya, Kumud (2015). Using the SPEI to Assess Recent Climate Change in the Yarlung Zangbo River Basin, South Tibet. Water. 7. 5474-5486. 10.3390/w7105474.*

This data set shows two different sets of trends that differ mainly between the average SPEI value and the 95th percentile SPEI value. The average SPEI values show a general steady state of between approximately .1 and .21 which are all values within the Near Normal moisture category. Within the 95thpercentile data, the positive and intermediate outlook SSPs show a slight decrease in SPEI value between 2020 and 2100 with values ranges from just above the Moderately Wet category to the Near Normal category. The data also shows a divergence in year 2040 where the positive outlook is Near Normal, and the intermediate outlook is Moderately Wet. The worst-case outlook SSP shows an upward trend with SPE values remaining within the Moderately Wet category.

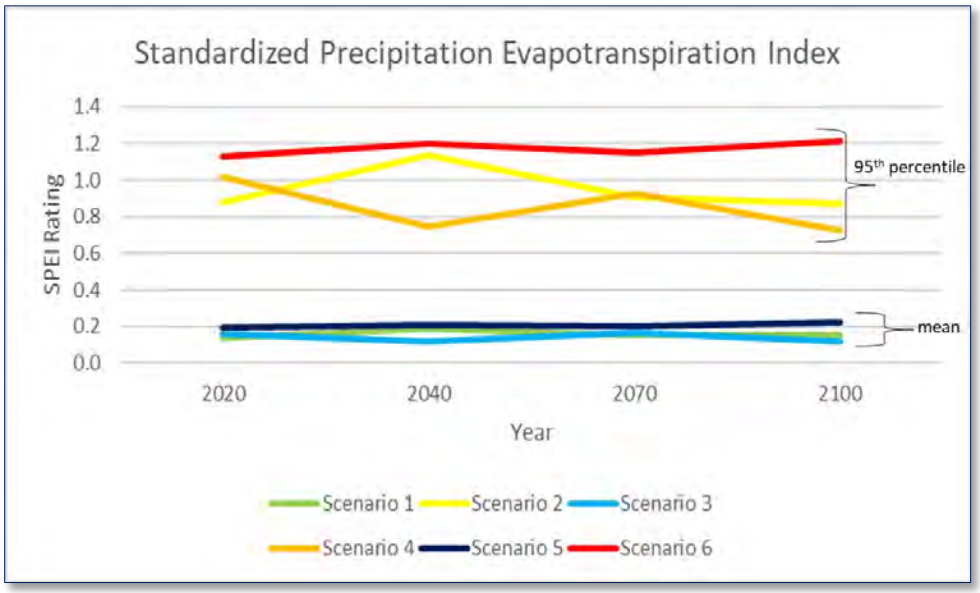



*Figure 21. Drought Index Levels Using the Standardized Precipitation Evapotranspiration Index (SPEI)*

This data set shows a general increase in probability (although relatively low) of a wildfire occurring within 100km (62 miles) of a location from year 2020 to 2100. The values range from approximately 0.4% to 3.0%. However, in the 95th percentile data of positive outlook SSP, there is a downward trend in this probability from year 2070 to year 2100.

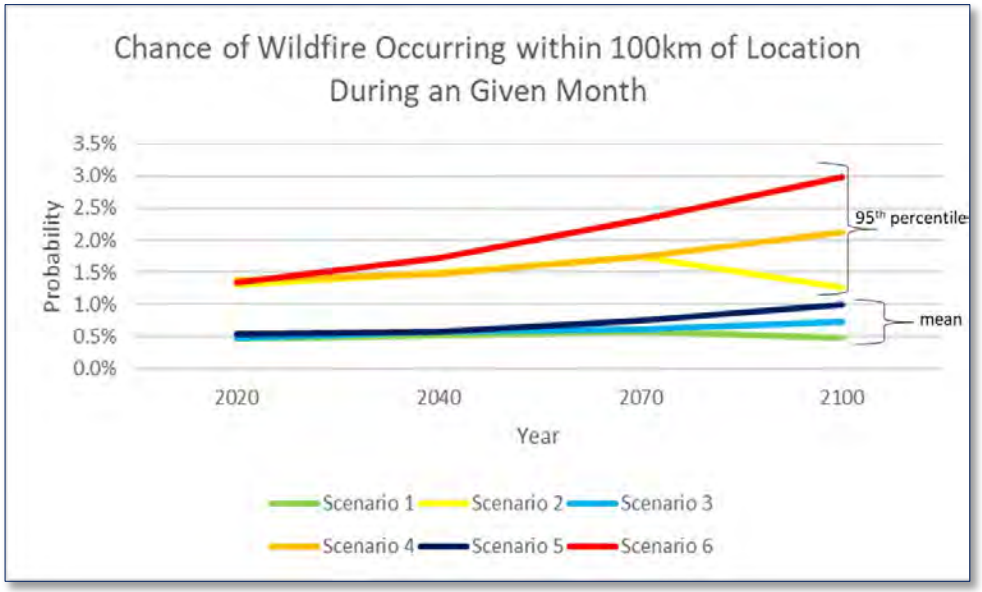



*Figure 22. Chance of Wildfire Occurring Within 62 Miles of a Location During a Given Month*

## Temperature

This data set shows a general downward trend in the number of days throughout the year where indoorheating will be required, leading to the conclusion that the average global temperature will increase from year 2020 to 2100. The amount of downward trend is dependent on each SSP scenario with the positive outlook SSP having the smallest decrease and the worst case SSP scenario having the largest decrease in days requiring indoor heating.

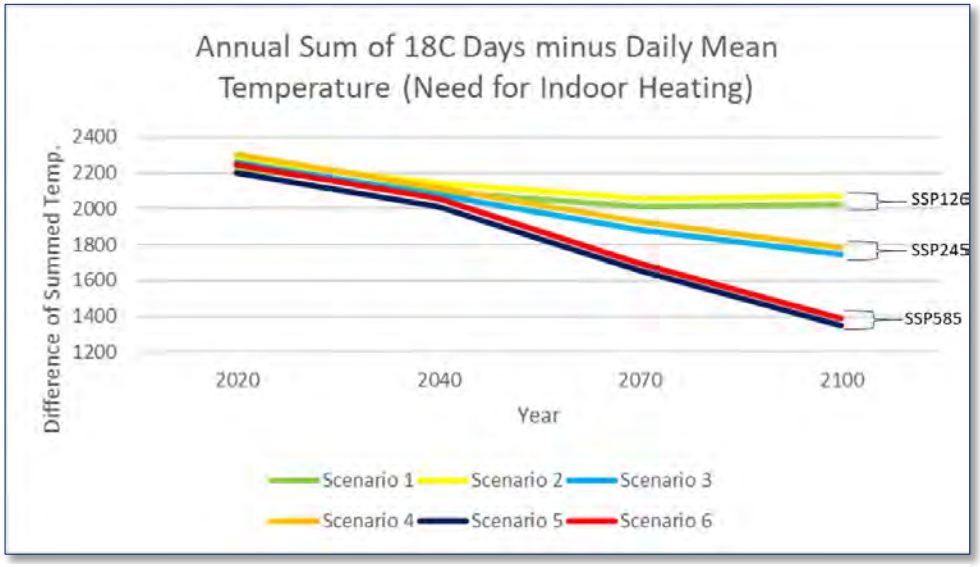



*Figure 23. Annual Sum of 18C Days Minus Daily Mean Temperature (Need for Indoor Heating)*

## Ice Storms

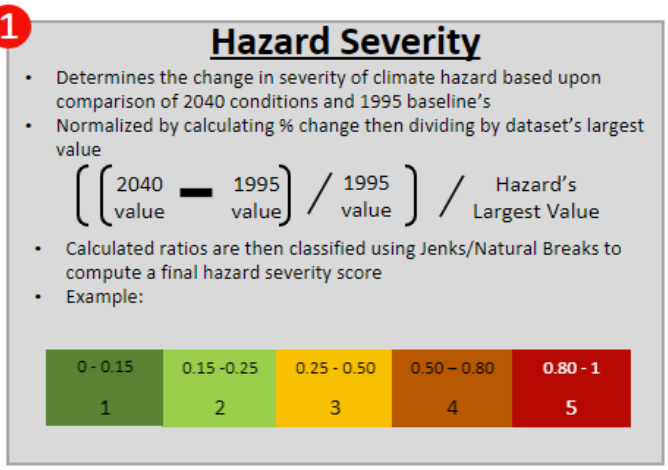
The majority of the municipality responses noted that the greatest impacts to their systems were presented during major ice storms occurring in the region. Ice storms present a very real threat to the regional distribution and transmission systems as a whole due to the footprint of the impacts on the system. Ice storms and extreme winter weather can stress overhead distribution systems by taking down sections of the system, causing regional rolling blackouts, increased demand for generation assets, and over working line crews among many other problems. During a regional ice storm, widespread overhead power line damage can create multiple-day outages for large portions of the system. Therefore, hardening of the overhead distribution system is critical when utilities are planning for system future improvements.

Ice accumulation depends heavily on the temperature, availability of moisture, winds, and vertical structure of the atmosphere. Due to the infrequent confluence of the conditions required to produce ice storms, they are very difficult to predict, and even more difficult project years into the future. Future climate changes could lead to more ice events due to the projected moderate increases in precipitation. However, the slight increase in temperatures will likely counterbalance the effects of increased moisture availability. With the myriad of variables that factor into an ice storm, the ability to project with any level of confidence concerning the change in severity or frequency of ice storms is extremely limited with today's modeling technology.

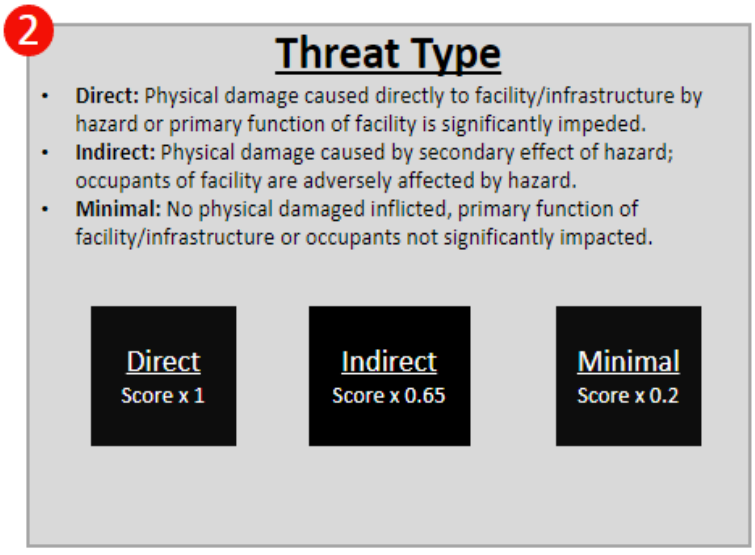
# Consequence Assessment

After assessing the trends in data shown in the previous sections, Matrix chose to perform further consequence analysis and assessment on critical energy related infrastructure and the climate data specific to the mean values of Shared Socioeconomic Pathway 2-4.5 (SSP245/Scenario 3). This data set was chosen because it encompasses the most likely outcomes given the current global climate outlook. This data was then used to calculate a hazard score for each critical infrastructure location identified during the study. The hazard score formula is shown and discussed below:

The first number used in the hazard score calculation is hazard severity. This score determines the change in severity of the hazard using the data gathered from Jupiter's weather modeling and comparing conditions from 1995 to the predicted condition in 2040. This number is then normalized by calculating the percent change between the 2040 and 1995 value and dividing by the data's largest value. Finally, the values are classified using the Jenks Natural Breaks Method to compute a hazard severity score.




The second number used in the hazard score calculation is the threat type, broken out into these three categories:




**Direct Impact** – The climate hazard may cause physical damage directly to a critical facility or infrastructure and the primary function is significantly impeded.

**Indirect Impact –** Secondary effects of the hazard may cause physical damage to a critical facility or infrastructure and will adversely affect the occupants.

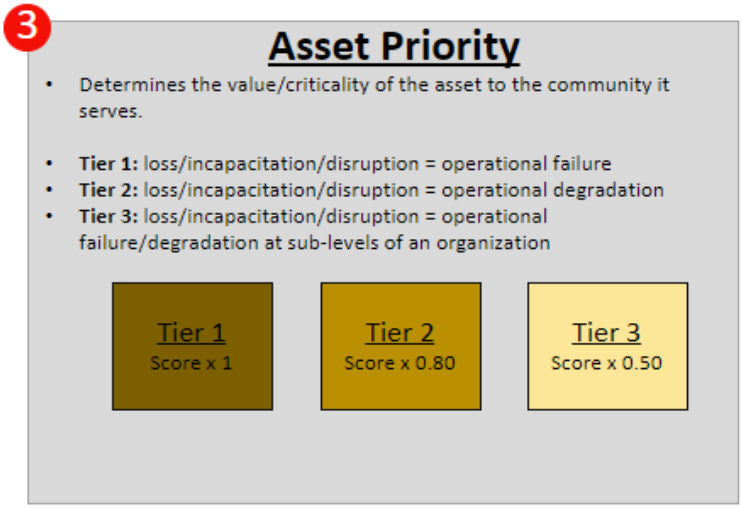
**Minimal Impact –** The hazard does not cause physical damage to the critical facility or infrastructure while the primary function and occupants are not significantly impacted.

The third number used in the hazard score calculation is the asset priority. The Tier level represents the value and criticality of each asset to the community it serves.

**Tier 1** – Loss, incapacitation, or disruption of this asset will lead to operational failure of a system or organization.

**Tier 2 –** Loss, incapacitation, or disruption of this asset will lead to operational degradation of a system or organization.

**Tier 3 –** Loss, incapacitation, or disruption of this asset will lead to operational failure or degradation at the sub-levels of a system or organization.



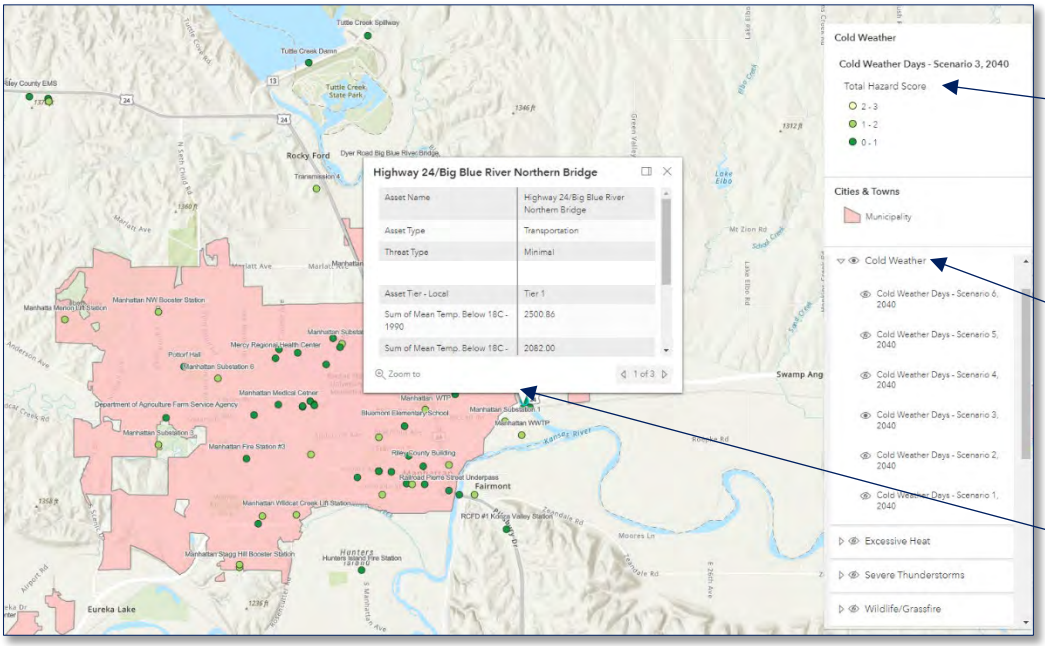

The final hazard score was then calculated for each critical facility/asset and rated using the following formula and scale:

This sample data set shows the calculated hazard scores for the cold weather hazard on select electrical utility critical infrastructure. The full data set is attached electronically to this report.

| Sample Data Set for Cold Weather Hazard | | | | | | |
|---|---|---|---|---|---|---|
| Facility ID | Facility Name | Facility Type | Hazard Severity | Threat Type | Asset Priority | Hazard Score |
| EE23 | Westar Jeffrey Energy Center | Utility Provider | 3 | 1 | 1 | 3 |
| EE03 | Junction City Substation 3 | Electrical Utility | 3 | 1 | 1 | 3 |
| EE09 | Manhattan Substation 4 | Electrical Utility | 3 | 1 | 1 | 3 |
| BE02 | Wamego Substation 4 | Electrical Utility | 3 | 1 | 1 | 3 |
| RC71 | Manhattan Municipal Court/Police Substation | Electrical Utility | 3 | 1 | 0.8 | 2.4 |
| RC12 | Riley County Police Aggieville Substation | Electrical Utility | 3 | 1 | 0.5 | 1.5 |

## Hazard Score Web Viewer

In addition to the data above, Matrix also developed an interactive web viewer for all identified critical facilities, associated hazards, climate scenarios, and hazard scores. A sample asset is shown from the web viewer below and the full viewer is available at https://matrixgis.maps.arcgis.com/apps/instant/basic/index.html?appid=d0cc452e4a61468286fbf092bd71b17d




**Hazard Score**
Displays the hazard scores for the selected asset, hazard, and climate scenario

**Hazard & Scenario**
Select desired hazard and climate scenario. One or all may be selected at once

**Asset Details**
Select any asset to display all associated details

# Cybersecurity and Industrial Control Systems (ICS)

## Industrial Control System (ICS) Cybersecurity Overview

Industrial Control Systems (ICS) underpin the operation of all city and county critical infrastructure and are key elements in diverse operating environments. Critical infrastructure owners and operators are uniquely positioned to manage risks to their individual operations and assets, and to determine effective strategies to make them more secure and resilient. Presidential Policy Directive (PPD-21), signed February 12, 2013, established national policy on critical infrastructure security and resilience. This directive identifies 16 critical infrastructure sectors, most of which are applicable to the Flint Hills Region:

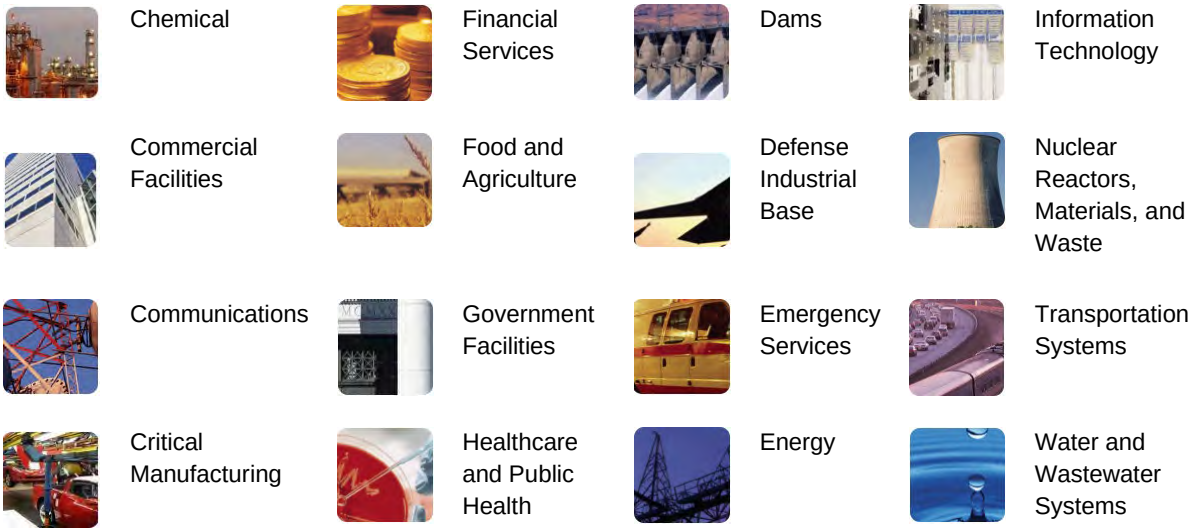



*Figure 24. Critical Infrastructure Sectors*

ICS's pose unique risks due to their interaction with the physical world. On the supply side, ICS's are prevalent and essential to the function of power, water and gas systems that enable all city and county critical systems to function. On the demand side, ICS's support transportation systems, health care services, emergency response services, telecommunications, and other critical functions. These cyber to physical interactions can have unintended and potential disastrous implications, exposing risk that an adversary could utilize not only to delay or stop critical functions of the city or county but also cause environmental and physical harm, including the loss of life.

Nation State Advanced Persistent Threat (APT) actors have resources, capability, and motivation to target a variety of U.S. and international critical infrastructure organizations, including those in the Defense Industrial Base as well as the Healthcare and Public Health, Energy, Telecommunications, and Government Facilities Sectors. In some cases, nation state-sponsored cyber operations have specifically targeted Industrial Control Systems networks.

### *Industrial Control System Networks*

The Purdue model is used in engineering to organize industrial processes into levels and can be a useful way to illustrate the Control System Architecture or Attack Surface as shown in Error! Reference source not found.**.** What makes cybersecurity for a control system challenging is the parts of the control system that do not generally resemble a standard IT system: Level 0, Level 1, Level 2A, Level 2C and the control system applications at Level 2D, Level 4A and Level 4B. These parts of the control system are referred to as the "non-standard IT" parts in order to differentiate them from the "standard IT" parts. Traditional cybersecurity tools and requirements such as vulnerability management alerts, bulletins, Secure Technical Implementation Guides (STIGs) and IT Policies are seldom applicable to these components, particularly to devices at Levels 0, 1 or 2.

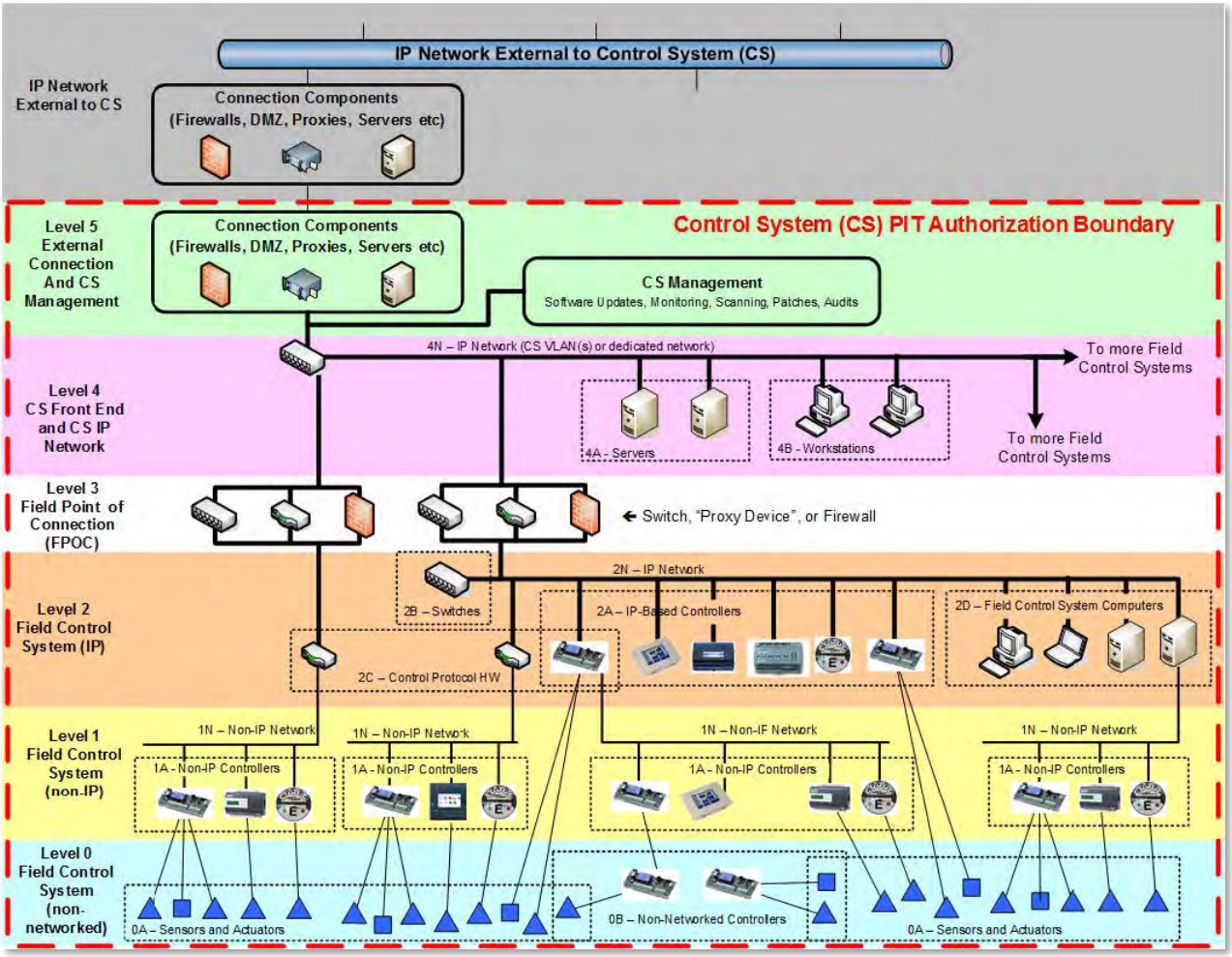



*Figure 25. 5-Level Control System Architecture (UFC 4-010-06, Change 1, 2017)*

Since control systems have historically been viewed as non-standard IT systems, these systems are often unmanaged by IT personnel. As a result, even standard IT devices such as Level 3 Network Switches, Level 4A Servers, Level 4B Workstations, and Level 2D Field Control System Computers are often unsecured. These unmanaged devices provide access points to critical infrastructure networks and host vulnerabilities that threat actors may exploit.

## Threats & Vulnerabilities

A threat is any circumstance or event with the potential to adversely impact operations through unauthorized access, denial of services, destruction, or modification of control system devices and processes. Threats can originate both internal and/or external of the organization. An external threat originates from outside the organization and can be active or passive in nature. An active external threat requires a human/machine interface and is typically performed by an adversarial nation state, previous insider or hacker looking to test out his/her skills. A passive external threat is essentially a malicious program searching the web for a specific vulnerability.

The following are examples of an external threat source exploiting vulnerabilities in Industrial Control Systems, as reported in the Joint Cybersecurity Advisory (CSA) Report:

- **ICS Advisory (ICSA-18-107-02):** The HatMan Malware, also known as TRITON and TRISIS, affects Schneider Electric Triconex Tricon safety controllers by modifying in-memory firmware to add additional programming. The extra functionality allows an attacker to read/modify memory contents and execute arbitrary code on demand through receiving specially-crafted network packets. HatMan consists of two pieces: a PC-based component to communicate with the safety controller and a malicious binary component that is downloaded to the controller. The capacity to disable, inhibit, or modify the ability of a process to fail safely could result in physical consequences.
- **Alert (TA17-163A):** CrashOverride Malware was developed by Russia to conduct a cyberattack against Ukrainian critical infrastructure. The exploit issues valid commands directly to remote terminal units (RTUs) over ICS protocols. One command sequence toggles circuit breakers in a rapid open-close-open-close pattern. This could create conditions where individual utilities may island from infected parties, potentially resulting in a degradation of grid reliability.

  In addition, the malware denies service to local serial COM ports on windows devices, therefore preventing legitimate communications with field equipment over serial from the affected device. Scans and maps ICS environment using a variety of protocols, including Open Platform Communications (OPC). This significantly improves the payload's probability of success. The exploit includes a wiper module in the platform that renders windows systems inert, requiring a rebuild or backup restoration.
- **ICS Advisory (ICSA-14-178-01):** Havex Malware is a Remote Access Trojan (RAT) that communicates with a Command and Control (C&C) server and could cause a denial-of-service effect.

  In addition to external threats, there are also insider threats which originate from inside the organization and could be a privileged insider, trusted insider, or vendor. A privileged insider is anyone with administrative or elevated privileges to the control system. A trusted insider is anyone with physical or logical access to the control system. Vendors typically have administrative or elevated privileges to the control system. The insider threat could conduct adversarial or non-adversarial attacks.

  An example of an insider non-adversarial attack is an Unintentional Maintenance Mishap (UMM) which is any action taken that results in unintentional harm to the control system. This may include connecting an infected removeable media or laptop to a control system which was once connected to an unsecured environment. The insider could unknowingly transport and install malware, such as the attacks listed above, on the control system during normal

maintenance activities. In this scenario, even if the system is “air gapped” and not connected to the internet, external threats can still penetrate the network.

### *Common Risk Assessment Findings*

Since the scope of this project did not include conducting a cybersecurity risk assessment of actual industrial control systems operating in the Flint Hills Region, the following provides a brief description of common risk assessment vulnerability findings from historical projects:

- **Active Exploits:** During vulnerability network scans, the cybersecurity team discovered an active malware exploit on a control system which was causing network disruptions. In addition, the scans detected an exploit attempt on a separate system. Both incidents were reported to the incident response team. Active exploits are common for systems that are; connected to the internet, lack network monitoring, and/or lack enforcement of cybersecurity policies and procedures.
- **Lack of Vulnerability Scanning:** Organizations that do not implement automated continuous monitoring for threat and vulnerability detection and/or conduct monthly security audits increases the likelihood that vulnerabilities will not be identified and mitigated making it easier for a threat to exploit a vulnerability.
- **Legacy Operating Systems:** It is common to discover control systems operating on legacy operating systems such as Windows XP, Windows 2000, or Windows 7. These operating systems are no longer supported by the manufacturer; therefore, there are no software updates/patches available to address known vulnerabilities. In some case, there are 500-1000 known vulnerabilities associated with these software versions which can be found in the National Vulnerability Database (NVD).
- **Missing Patches/Firmware Updates:** It is common to find control system devices running out of date firmware versions. These devices may be supported by the manufacturer and there may be an update available, but the devices have not been updated due to lack of maintenance or system administration. The HatMan Malware is one example of an exploit targeting out of date firmware of a programmable logic controller. Below is an example NVD report of vulnerabilities associated with out-of-date firmware:

| Vuln ID | Summary | CVSS Severity |
|---|---|---|
| CVE-2018-18985 | Tridium Niagara Enterprise Security 2.3u1, all versions prior to 2.3.118.6, Niagara AX 3.8u4, all versions prior to 3.8.401.1, Niagara 4.4u2, all versions prior to 4.4.93.40.2, and Niagara 4.6, all versions prior to 4.6.96.28.4 a cross-site scripting vulnerability has been identified that may allow a remote attacker to inject code to some web pages affecting confidentiality.<br>**Published:** January 29, 2019; 11:29:00 AM -05:00 | *V3.0:* 5.4 MEDIUM<br>*V2:* 3.5 LOW |
| CVE-2017-16744 | A path traversal vulnerability in Tridium Niagara AX Versions 3.8 and prior and Niagara 4 systems Versions 4.4 and prior installed on Microsoft Windows Systems can be exploited by leveraging valid platform (administrator) credentials.<br>**Published:** August 20, 2018; 05:29:00 PM -04:00 | *V3.0:* 7.2 HIGH<br>*V2:* 6.5 MEDIUM |
| CVE-2015-3974 | EasyIO EasyIO-30P-SF controllers with firmware before 0.5.21 and 2.x before 2.0.5.21, as used in Accutrol, Bar-Tech Automation, Infocon/EasyIO, Honeywell Automation India, Johnson Controls, SyxthSENSE, Transformative Wave Technologies, Tridium Asia Pacific, and Tridium Europe products, have a hardcoded password, which makes it easier for remote attackers to obtain access via unspecified vectors.<br>**Published:** September 27, 2015; 10:59:01 PM -04:00 | *V2:* 9.0 HIGH |
| CVE-2012-4701 | Directory traversal vulnerability in Tridium Niagara AX 3.5, 3.6, and 3.7 allows remote attackers to read sensitive files, and consequently execute arbitrary code, by leveraging (1) valid credentials or (2) the guest feature.<br>**Published:** February 15, 2013; 07:09:27 AM -05:00 | *V2:* 9.3 HIGH |
| CVE-2012-3025 | The default configuration of Tridium Niagara AX Framework through 3.6 uses a cleartext base64 format for transmission of credentials in cookies, which allows remote attackers to obtain sensitive information by sniffing the network.<br>**Published:** August 16, 2012; 06:38:04 AM -04:00 | *V2:* 5.0 MEDIUM |

*Figure 26. Example National Vulnerability Database Report of Outdated Firmware*

- **Non-Secured Remote Maintenance:** Some control systems have unattended third-party remote access for maintenance. These remote sessions may not be using strong authentication methods or encrypted communication. This increases the attack surface by adding an additional access point to the system. In addition, the devices used to remotely access the system have most likely been connected to other less secure systems. Lastly, performing non-local maintenance unsupervised increases the risk that undesired changes will go undetected since the individual making changes is not able to observe physical operation of the system.
- **Unsecured Network Devices:** It is common to find unmanaged switches or hubs installed instead of managed switches. This increases the likelihood of a threat penetrating and propagating the control system network and potentially exploiting multiple systems. In some cases, control systems are installed on the same network as business systems which are typically connected to the internet and provide additional access points for a threat to exploit.
- **Incomplete System Inventories:** It's very common to find a lack of control system drawings, and hardware / software inventories for control systems. This is considered a vulnerability because if the system is not properly documented it increases the likelihood that there are unknown and unmanaged devices on the network.
- **Shared User Accounts:** Maintenance staff commonly share a single user account or write down passwords which are posted on their workstation.
- **Default/Weak Passwords:** System does not enforce minimum password complexity and/or control system device still has the default username and password. If the system is connected to the internet, these devices can be found on the internet using free software which will launch the logon page of the device. A threat actor can enter the default username and password provided in the publicly available configuration guide and gain access to the network. The following are examples of default passwords for control devices:

**Table 12. Example Default Passwords**

| | | |
|---|---|---|
| **Johnson FX Niagara 14** | **jci** | **explorer** |
| | **admin** | **FacilityExpl0rer** |
| **Johnson FX JACE 3 & 6** | **jci** | **explorer** |
| | **admin** | **FacilityExplorer61** |
| **Distech EC-NET N4** | **distech** | **controls** |
| **Honeywell Webs Niagara 4** | **honeywell** | **webs** |
| **Vykon Niagara 4** | **tridium** | **niagara** |

*Source: Chinook Cybersecurity*

- **Uninspected Maintenance Tools:** Third-party vendor maintenance tools are not inspected before connecting to system. This increases the likelihood of introducing malicious software to the control system.
- **Unrestricted External Media Use:** Use of portable storage devices is not restricted. These devices are often used for personnel use and have been connected to multiple networks.
- **Lack of System Backups:** Some organizations do not capture backup configuration files of control system devices such as; servers, network switches, and programmable logic controllers. This is considered a vulnerability because in the event of device failure or exploit, lack of system backups will increase system downtime and could result in a momentary loss associated with replacing large databases.

- **End of Life Equipment**: In some case, control devices have not been updated since the building was built 20+ years ago. These devices may have known vulnerabilities and may be high risk for device failure. In the event of a device failure, end of life devices may not have a replacement which could extend system downtime.

## Components of a Healthy Cybersecurity Program

### *Program Management*

A successful ICS Cybersecurity Program starts with strong executive level leadership. It is recommended that the organization appoints a Senior Information Security Officer (SISO) with the mission and resources to coordinate, develop, implement, and maintain an organization-wide ICS Cybersecurity Program. The SISO is responsible and accountable for the cybersecurity risks associated with operating critical infrastructure in the region and should work with stakeholders to develop an ICS Cybersecurity Program Plan which addresses the overall risk management strategy, roles and responsibilities, management commitment, coordination among organizational entities, and compliance requirements.

### *Risk Assessment*

A risk assessment should be conducted at the region level to identify critical infrastructure and to evaluate the likelihood and magnitude of harm from unauthorized access, use, disclosure, disruption, modification, or destruction of critical infrastructure control systems. Investment in security control implementation should be prioritized for high and moderate risk systems.

### *System Security Planning*

A thorough and complete baseline of the ICS networks is a critical step. This should include using cyber tools, such as Wireshark, on the network to discover and characterize devices as well as physical investigation of elements and what they are physically and logically connected to. Existing network diagrams and inventories should be used for reference but confirmed and amplified with new information discovered in the investigation.

### *Continuous Monitoring*

An effective Continuous Monitoring Strategy (CMS) includes both automated and manual system checks for threats, vulnerabilities, and compliance with cybersecurity policies. Critical systems should be monitored 24/7 with automated network threat and vulnerability detection software that scans for patch levels, ports, protocols, and services that should not be accessible to users or devices, and scan for improperly configured or incorrect operation of information flow control mechanisms. In addition, a system administrator should conduct manual security audits on a monthly basis. The security audit should consist of reviewing active accounts, system logs, vulnerability scan results, and installing software and firmware updates.

### *Configuration Management*

Control systems are typically in a constant state of change in response to new, enhanced, corrected, or updated hardware and software capabilities, patches for correcting software flaws and other errors to existing components, new security threats, changing operational requirements, etc. Implementing changes almost always results in some adjustment to the system configuration. To ensure that the required adjustments to the system configuration do not adversely affect the security

of the system or the organization, a well-defined configuration management process that integrates information security is needed.

It is recommended that a Change Control Board (CCB) is established which consists of the System Owner, Facility Engineering Representative, IT Department Representative, and other control systems stakeholders. The CCB is responsible for reviewing change requests, conducting a security impact analysis of the proposed changes, and ultimately approving or rejecting the change. Typically, the CCB meets on a monthly basis to review current and upcoming projects and also discuss any cybersecurity policy and procedure updates that may be required.

### *Information Awareness Training*

As cited in audit reports, periodicals, and conference presentations, it is generally understood by the IT security professional community that people are one of the weakest links in attempts to secure systems and networks. The people factor - not technology - is key to providing an adequate and appropriate level of security. If people are the key, but are also a weak link, more and better attention must be paid to this asset.

Organizations should determine the appropriate content of security awareness training and security awareness techniques based on the specific organizational requirements and the control systems to which personnel have authorized access. The content includes a basic understanding of the need for information security and user actions to maintain security and to respond to suspected security incidents. The content also addresses awareness of the need for operations security. At minimum, the training should ensure that all people involved in using and managing control systems:

- Understand their roles and responsibilities related to the organizational mission.
- Understand the organization's cybersecurity policy, procedures, and practices.
- Have at least adequate knowledge of the various management, operational, and technical security controls required and available to protect the control system resources for which they are responsible.

Training should be completed prior to authorizing access to the control system and should be incorporated into the account request process. After the initial training is completed, the individual should complete refresher training on an annual basis and whenever there are significant changes to the control system, roles and responsibilities, or updates to policies and procedures.

### *Incident Response*

A single incident response team should be created to handle cybersecurity incidents. When an emergency occurs, the team members are contacted immediately, and those who can assist do so. The IT help desk may act as a first point of contact for incident reporting. The help desk members are trained to perform the initial investigation and data gathering and then alert the incident response team if it appears that a serious incident has occurred. The following roles should be established for the Incident Response Team:

**Table 13. Incident Response Team Roles and Responsibilities**

| Role | Responsibility |
|---|---|
| **Management** | Establishes incident response policy, budget, and staffing. Ultimately, management is held responsible for coordinating incident response among various stakeholders, minimizing damage, and reporting. |
| **Information Systems Security Manager (ISSM)** | Information security staff members may be needed during certain stages of incident handling (prevention, containment, eradication, and recovery)—for example, to alter network security controls (e.g., firewall rulesets). |
| **Technical Experts** | Technical experts (e.g., control system managers and network administrators) not only have the needed skills to assist but also usually have the best understanding of the technology they manage on a daily basis. This understanding can ensure that the appropriate actions are taken for the affected system, such as whether to disconnect an attacked system. |
| **Physical Security** | Some computer security incidents occur through breaches of physical security or involve coordinated logical and physical attacks. The incident response team also may need access to facilities during incident handling—for example, to acquire a compromised workstation from a locked office. |

*Source: Chinook Cybersecurity*

### *System and Service Acquisition*

The acquisition process is used for all new projects, existing projects, upgrade or retrofit of a project, operations and maintenance, and disposal. All acquisition practices of the control systems should follow Unified Facility Criteria (UFC) 4-010-06, Cybersecurity of Facility-Related Control Systems. Acquisition involving work that will be accomplished by external entities requires a contract between the system owner and the contractor/developer conducting the work. The Request for Proposal (RFP) language should include at a minimum:

- 1.0 Cybersecurity Requirements: The contractor shall follow Unified Facility Guide Specification (UFGS) 25 05 11, Cybersecurity of Facility-Related Control Systems for applicable components installed by this contract. The contractor shall redline and submit for approval the UFGS 25 05 11 to applicable components installed and contractor devices used to programs installed devices.
- 2.0 For ALL applicable devices installed, (network switches, field point of connections (FPOC), routers, servers, or workstations) the Contractor shall assess (scan and perform manual checks) of the control system using approved cybersecurity scanning tools (i.e., Nessus/SCAP) with current up to date definition files and applicable manual checks utilizing Defense Information Systems Assurance (DISA) Security Technical Implementation Guides (STIG) and Security Requirements Guides (SRG). All applicable STIGs and SRGs shall be applied (e.g., Windows server, SQL, Microsoft, Adobe, JAVA, or any application that has an applicable STIG or SRG).

  If vulnerabilities are found (Category (CAT) 1, 2, or 3) as the result of automated scans and manual checks, the Contractor shall remediate, mitigate, and or provide technical rationale as to why the vulnerability cannot meet compliance requirements. Upon completion of vulnerability resolution, the Contractor shall rescan the utilizing the same methods as previously stated to ensure all vulnerabilities have been properly remediated and / or properly and acceptably mitigated or documented as an open vulnerability. The Contractor shall strive to mitigate and or remediate all vulnerabilities associated with the control system to greatest extent possible. Any remaining CAT 1 and High-Risk CAT 2 vulnerability finding(s) that remain open findings are to be reported to the System Owner with supporting

rationale as to why the finding(s) cannot meet compliance measures along with any mitigations and or compensating cybersecurity measures that lower the risk of the non-compliance.

- 3.0 Cybersecurity Deliverables are defined in UFGS 25 05 11. Typical deliverables include:
  - Completed applicable STIG and SRG Checklist(s) to include Automated and Manual checks.
  - Proof of current patching/IAVA compliance of servers, workstations, network devices, etc... The contractor shall use current definition files for all scanning tools.
  - All applicable STIG/SRG Deviations list for any STIG / SRG requirement that cannot be applied.
  - Hardware & Software Inventory List
  - System/Network Topology Diagrams of the system depicting the Authorization Boundary.
- 4.0 Contractor personnel assigned to Cybersecurity functions shall possess the proper training and certifications at the Information Assurance Technical (IAT) II level.

# Priority Recommended Solutions

This section of report will provide a deeper look at high priority recommendations established through the MIR study. The goal of each recommendation is to provide action items along with key resources available to assist with final execution whether through a process that can be implemented at the local or regional level or through grants and other funding opportunities.

## Critical Facilities Lists

Creating and adopting and accurate critical facility list is crucial to improving resiliency of infrastructure systems and assets that are critical to the regular functioning of the community and region. As identified in the 2021 Infrastructure Resilience Planning Framework (IRPF), there are some key areas to look at when building this list. The IRPF notes that the list should include fundamental systems such as energy, water, and wastewater, communications and transportation as well as infrastructure that is critical to the safety, health and economic vitality of the community. When building this list, it is also important to consider what facilities and systems support others and exhibit key interdependencies.

One way to successfully build and implement a critical facilities list is to form a planning group containing all key members of community related to critical infrastructure. This group can then create a database listing all of the community's critical infrastructure in order to catalog and analyze all assets. It is important to accomplish the following items as recommended in the IRPF:

- Describe characteristics of existing infrastructure
- Form a basis for a more comprehensive infrastructure identification effort
- Develop mapping products and other visualization such as through GIS, that will aid in the implementation of the list

Once a general list of infrastructure as assets is created, the planning team can then move to prioritizing the assets. The IRPF recommends that the planning group focus on the impacts each critical infrastructure system or asset has on the community as a means of determining their criticality and priority. Below are sample criteria and key considerations outlined in the IRPF when working to prioritize infrastructure systems and assets:

### Table 14. IRPF Critical Infrastructure Considerations

| Key Considerations | Description |
|---|---|
| **Safety Impact** | **Effect of the system/asset on the loss of life, well-being of individuals in the community, the environment, and the physical condition of other infrastructure systems/assets** |
| **Context** | **Value of the system/asset to the identity of the community, region, or Nation; importance of the system/asset as a priority attribute of the community, region, or nation** |
| **Operational Impact** | **Effect of the system/asset on the overall network's ability to operate; the functional impact of the system/asset associated with dependencies that exist within and among systems/assets** |
| **Economic Impact** | **The potential effect on the economic security of the locality, region, or Nation if this infrastructure had a long-term disruption or degradation** |
| **Service Impact** | **Impact of a disruption of the system/asset on the community, region, or a larger critical infrastructure system based on the service it provides to these entities** |

*Source: 2021 IRPF*

Finally, the planning team will have to identify dependencies among the critical infrastructure and assets. The IRPF defines this as relationships of reliance within and among infrastructure systems that must be maintained for those systems to function or provide services. As an improved understanding of dependencies is gained throughout this process, this can inform risk assessment activities and lead to the identification of new priorities for enhancing resilience. It is important to consider the following when completing the dependency analysis:

- Primary and secondary sources/providers of resources and services when required or used by an infrastructure to operate
- Backup resources to sustain operations of the infrastructure asset when a damaging event occurs
- Impacts on downstream infrastructure assets and essential services upon disruption or degradation

Examples of typical dependencies as outlined in the IRPF are listed below:

**Table 15. IRPF Critical Infrastructure Dependency Examples**

| Dependency Examples |
|---|
| Drinking water systems require electricity to operate pumps |
| Financial services rely on communications to facilitate transactions and communications systems need power to operate |
| Crews needed to repair electrical distribution systems need access via roads |
| Delivery of emergency services depend on communications and roads |
| Cyber and information technology infrastructure is used to operate and monitor power systems, water/wastewater systems, transportation networks, etc. |
| Need for a resilient supply of commodities, goods, and services, and manpower to operate businesses and infrastructure |

*Source: 2021 IRPF*

The IRPF is an excellent guide when creating a critical facilities list that is effective for managing response during any type of event. The IRPF also provides planning tools for communities to assist in this process. The current IRPF is available at https://www.cisa.gov/sites/default/files/publications/Infrastructure_Resilience_Planning_Framework_IRPF.pdf

## EM / First Responder Communication System

As highlighted earlier in the Riley County Emergency Management section of the report, having communication systems across that function across all spectrums among communities is a critical capability for response to emergency events. A study to assess existing systems and provide further recommended actions to improve interoperability among the Flint Hills Region should be undertaken.

One avenue to approach this recommendation is the Public Safety Communications Research Division (PSCR) within NIST. PSCR is the primary federal laboratory conducting research, development testing, and evaluation for public safety communications technologies. PSCR works directly with first responders and the solver community to address the urgent need for new and

improved technology which enhances the public safety community's ability to respond to emergencies.

PSCR has multiple funding opportunities available to promote the development of public safety technologies externally through grants, cooperative agreements, and Open Innovation prize challenges. Current funding opportunities are listed here: https://www.nist.gov/ctl/pscr/funding-opportunities/grants-and-cooperative-agreements.

An additional avenue for improvement and modernization of emergency communications equipment is available through CISA via SAFECOM. Through collaboration with emergency responders and elected officials across all levels of government, SAFECOM works to improve emergency response providers' inter-jurisdictional and interdisciplinary emergency communications interoperability across local, regional, tribal, state, territorial, international borders, and with federal government entities. SAFECOM works with existing federal communications programs and key emergency response stakeholders to address the need to develop better technologies and processes for the coordination of existing communications systems and future networks. Funding information and opportunities are located at https://www.cisa.gov/safecom/funding. The FY21 SAFECOM Guidance on Emergency Communications Grants document is an excellent resource for this avenue and is available at https://www.cisa.gov/sites/default/files/publications/FY%202021%20SAFECOM%20Guidance_Final_508.pdf.

## Communications/Operations Between Energy Providers

A common theme through much of the Flint Hills Region electrical providers is the need for improving communications and the ability for joint operations between energy providers following emergency and disaster situations. This recommendation is critical to successful outage response and restoration activities throughout the region.

One key resource available to facilitate this action is the American Public Power Association's "Restoration Best Practices Guidebook." According to the American Public Power Association Resolution 18-04, "as community-owned public resources, public utilities are committed to improving the resiliency of their systems and responding expeditiously to disasters, including by restoring services as quickly and efficiently as possible. The purpose of the guidebook is to enhance mutual aid across public power utility providers. Below are important highlights of the components to successful restoration operations and mutual aid responses:

- Develop restoration plan
- Train and exercise their restoration plan
- Plan for full utilization of employees during restoration, including support services
- Develop well established relationships with key partners
- Prepare to activate mutual aid between utilities and local governing bodies
- Establish MOUs and contracts with potential providers of outside resources
- Maintain access to all necessary equipment and material for restoration
- Consider maintaining retired, tooled trucks for restoration operations

Using these principles, and the rest discussed through the aforementioned guidebook, a working group should be established consisting of the appropriate entities to strengthen existing or build new avenues of communication working toward the overall goal of providing successful mutual aid responses.

Restoration Guidebook is available at: https://www.publicpower.org/system/files/documents/Restoration_Best_Practices_Guidebook_2018.pdf

Another important resource to achieve improved communications and operations between energy providers in the American Public Power Association's "Mutual Aid Playbook." The Mutual Aid Playbook (MAP) provides a process for coordinating activities, information, and resources across a three-tiered national network. The MAP is intentionally flexible and scalable to enable the successful coordination of mutual aid mobilizations for restoration events resulting from all hazards, including natural and man-made disasters and security or cybersecurity events that result in utility customer outages.

Mutual Aid Playbook is available at: https://www.publicpower.org/resource/mutual-aid-playbook

## Wood to Steel Utility Pole Conversion

Another recommendation crucial to electrical system resiliency is the conversion of wood to steel utility poles. This was specifically highlighted in the study during interviews with BEC personnel as on ongoing activity within their system.

There are a few key benefits of transitioning from wood to steel utility poles:

- Safety – Steel structures do not require a full-length copper grounding wire as they are self-conducting. Additionally, steel poles will typically bend when impacted (e.g., vehicle impact), as opposed to shearing like wood poles, providing a greater likelihood of keeping energized lines upright.
- Steel poles are easier and less expensive to handle and install due to their lower weight compared to wood poles.
- After installing steel poles, you do not have to re-tighten hardware later due to pole shrinkage. Steel retains its shape and strength and isn't susceptible to damage by woodpeckers, insects, rot, or fires. There is no expensive inspection and toxic treatment programs necessary after the installation of steel poles.
- Poles can be provided either for embedded or anchor base installations, which reduces your application limitations. Steel poles can be custom designed and fabricated to support larger and heavier loadings with longer spans as well as being able to meet greater height requirements. More options can mean fewer poles to purchase and install.
- Steel poles provide greater resiliency to major storms as they can handle greater forces depending on the type of installation completed.

The Rural Utility Service (RUS) branch under the U.S. Department of Agriculture published the "Guide Specification for Standard Class Steel Transmission Pole" in order to guide RUS borrowers a basis for procuring standard class steel poles for transmission applications. This document is an excellent starting place when looking to replace wood poles with steel and is available at https://www.rd.usda.gov/files/UEP_Bulletin_1724E-214.pdf.

## Physical Security of Utility Assets

Physical security of utility assets, especially those classified as critical infrastructure, play a crucial role in the resiliency of any utility system. Below is a list of relevant guidelines to assist with identifying, prioritizing, and executing physical security improvements for utility systems:

General physical security guidelines:

- American Society for Industrial Security (ASIS) International General Risk Assessment Guidelines
- ASIS International Facilities Physical Security Measure Guideline
- ASIS International Security Management Standard: Physical Asset Protection
- Whole Building Design Guide - Threat/Vulnerability Assessments

Electrical system physical security guidelines:

- NERC Security Guideline for the Electricity Sector: Physical Security
- NERC Security Guideline: Physical Security Response

Water system physical security guidelines:

- Guidelines for the Physical Security of Water Utilities: American National Standard for Trial Use, December 2006, Draft

Wastewater and stormwater physical security guidelines:

- Guidelines for the Physical Security of Wastewater/Stormwater Utilities: American National Standard for Trial Use December 2006, Draft

## Well Resiliency – Raise Well Heads/Electrical Equipment

Often located in low lying areas, such as the Manhattan water wellheads and other locations identified throughout the study, water and wastewater utilities are particularly vulnerable to flooding. Water and debris can inundate the facility damaging equipment and structures and causing power outages. Such impacts can lead to various consequences including costly repairs, disruptions of services, hazardous situations for personnel and public health advisories.

The EPA created “Flood Resilience; A basic Guide for Water and Wastewater Utilities” to assist in identifying, prioritizing and executing actions to mitigate various hazards to water and wastewater utilities related to flooding.

Below is a list of recommended mitigation actions for groundwater utilities such as wellheads as outlined in the EPA guide:

- Procure temporary flood barriers for use in minor floods
- Re-grade land surrounding well field so that it slopes away to prevent floodwater from flowing towards wells. Ensure that the casing terminates at least twelve inches above grade and extend well casing above the flood zone.
- Relocate or elevate well field equipment or elevate to above the flood zone to include electrical power supply and backup generation equipment.

The ideal recommendation, although the more costly, is to raise existing wellheads to above the flood plain. One avenue of execution for this recommendation is the Drinking Water State Revolving Fund (DWSRF). DWSRF provides below-market rate loans to fund infrastructure improvements to water systems to protect public health and ensure compliance with the Safe Drinking Water Act. These projects may include the installation, upgrade, and replacement of treatment facilities, finished water storage facilities, and transmission and distribution systems, including the modification of existing facilities. More information on how to apply for this funding is located at https://www.epa.gov/dwsrf.

## Backup Power for Critical Facilities and Fuel Storage

There is a significant likelihood that utility power will not be available for an extended period of time during severe natural hazard events. Thus, it is necessary for critical facilities to have reliable sources of sustained electrical power and the appropriate fuel storage capabilities to achieve continued operation. The lack of critical facility backup power generation is a common finding across the Flint Hills Region, especially in some of the smaller communities. The continued operation of critical facilities is an extremely critical element to overall community resilience.

FEMA publication P-1019, "Emergency Power Systems for Critical Facilities: A Best Practice Approach to Improving Reliability," provides guidelines on backup power generation and fuel storage for both new and existing critical facilities and is available at https://www.wbdg.org/FFC/DHS/femap1019.pdf. This document examines the vulnerability of electrical power systems to natural hazards, describes what equipment in critical facilities should be supplied by emergency power sources, how long the emergency power may be needed, the specific equipment needs of different types of critical facilities, and how emergency power can be supplied. It provides guidance on how to assess the risks and vulnerabilities to the electrical power system, identifying performance goals for an emergency power system, and the importance of having realistic emergency management policies that address emergency power.

In general, the steps to applying this document to real world situations are:

- Identifying emergency power needs in a critical facility
- Selecting and designing the appropriate power sources and systems
- Selecting and designing appropriate fuel storage systems and delivery mechanisms

FEMA has multiple grant programs that fund requests for generators, varying types and sizes, including, but not limited to, gasoline, diesel, propane, natural gas, alternator, and gas turbine powered devices. Applicants are able to select the program that best fits their needs and submit a request for funding. Some applicable FEMA-related grants programs include the Emergency Management Performance Grant Program, Homeland Security Grant Program, Port Security Grant Program, State Homeland Security Grant Program, and Urban Areas Security Initiative Program.

The full list of FEMA related generator grant programs is available at https://www.fema.gov/authorized-equipment-list-item/10ge-00-genr

## Electrical Equipment Spares – Transformers and Reclosers

Maintaining the appropriate stock of spares and backup equipment is critical to bolstering system resiliency and restoration abilities across the Flint Hills Region electric providers. This recommendation also ties in with the communications and operations between energy providers as resources can be shared between utility providers as needed following any major events.

Throughout the energy industry electric companies regularly share transformers and other equipment through long existing bi/multi-lateral sharing arrangements and agreements. There are currently a few programs in place to assist with equipment sharing programs that are excellent resources to aid in executing this recommendation and improving overall power grid resiliency. The table below, from the Edison Electric Institute provides a summary of the available spare equipment resources:

## Table 16. Spare Equipment Resource Summary

| | Spare Transformer Equipment Program (STEP) | SpareConnect | Grid Assurance | Regional Sharing for Transmission Outage Restoration (RESTORE) |
|---|---|---|---|---|
| **Equipment Covered** | Transmission to transmission transformers* | Transmission to transmission transformers, transmission to sub transmission transformers, generation step-up (GSU) transformers and related equipment, including bushings, fans, and other auxiliary components | Transformers, circuit breakers, and other difficult-to-obtain equipment vital to the operation of the grid | Transformers and transmission equipment |
| **Trigger** | Act of terrorism and presidential declaration of emergency or grid security emergency | In the event of an emergency or other non-routine failure | Self-declared qualifying events like physical attacks, electromagnetic pulses, solar storms, cyberattacks, earthquakes, and severe weather events | Catastrophic event or physical attack within service territory resulting in loss of load or affecting grid stability |
| **Structure** | Each participating member enters a binding contract that provides legally enforceable rights to access hard-to-replace transformers that have been committed to STEP | Voluntary online networking tool that provides access to other transmission asset owners and operators at participating companies. Participants who are interested in providing additional information or sharing equipment work directly with each other on the specific terms and conditions of any potential equipment sale or other transaction | Industry-based initiative that owns and maintains equipment at secure, strategically located warehouses, and provides pre-planned logistics to expedite equipment transportation to impacted sites. Grid Assurance is not FERC regulated, but charges a cost-based subscription fee, the same as FERC regulated transmission tariffs, to facilitate subscribers' ability to recover expenses | Voluntary formal mutual assistance type program between transmission asset owners |
| **Participants** | Transmission owning entities | Transmission & generation-owning entities | Transmission-owning entities | Transmission-owning entities |

***Including the following 8 voltage classes: 500-230kV, 345-161 kV, 345-138 kV, 345-115 kV, 230-138 kV, 230- 115 kV, 230-069 kV, 138-069 kV**

*Source: Edison Electric Institute*

## System Automation – Reclosers

A critical recommendation for electrical system resiliency is the implementation of smart or automated protection and switching systems. One device in particular, the overhead recloser, is particularly advantageous due to the cost to implement per unit. Reclosers can be implemented on an individual basis with localized automation and control or can be implemented into a SCADA system for remote oversight and control.

Key benefits of implementing reclosers into distribution systems;

- Safety – Reclosers perform all interrupting operations up in the air away from personnel and other equipment. In the event of a recloser operation and/or failure there is minimal risk to personnel and equipment.
- Flexibility – Reclosers can be utilized for system protection, system sectionalizing, system restoration, and more. They can replace fuses, which are not automated and time-consuming to replace when they protect against an event. They can replace load break switches for system switching, while introducing capability to remotely operate the device. They can also replace fault indicating devices and provide more information for response to fault events and system restoration efforts.
- Constructability – Overhead reclosers are much less expensive to implement when compared to similar alternatives. They also provide a replacement for multiple devices in one. Reclosers can perform protection, replacing fuses, and perform switching or isolation, replacing load break switches. Recloser also can provide metering, replacing additional utility service equipment. When comparing construction costs with all the items a recloser can replace they become very cost effective.
- Visibility – When automated and communicating to a SCADA system, overhead reclosers give the utility a vast amount of information in regards to what is happening at that location. System switching status, metering, event reports, and more are capable though implementation of an overhead recloser.

Multiple systems identified within the study would immediately benefit from the implementation of overhead reclosers. The report titled “Economic Evaluation of Distribution System Smart Grid Investments” published by the U.S Department of Energy provides a more in-depth analysis and summary of the advantages of application of smart equipment on the distribution system. The report can be found at https://www.bnl.gov/isd/documents/88157.pdf.

- One upcoming funding opportunity in the energy sector to assist grid resiliency in the America COMPETES Act of 2022. This bill has been passed by the House of Representative as of February 4th, 2022, but still needs signature from the President. Under Division C of the bill, Section 20301 strategic transformer reserves and electrical grid resiliency will be provided $75 million each FY from 2022 through 2026. This section also directs the Secretary of Energy to reduce the vulnerability of the electric grid to physical attack, cyber-attack, electromagnetic pulse, geomagnetic disturbances, severe weather, climate change, and seismic events, by creating a strategic transformer reserve and by facilitating domestic manufacturing and testing, and monitoring of critical electric grid equipment. Although the bill has not been finalized, this may be a key funding opportunity to implement this recommendation as more details become available.

## Cybersecurity Programs

As discussed in the Cybersecurity and Industrial Control Systems section of the study, implementing the appropriate security measures to protect critical infrastructure assets from threats in this area is critical to providing resilience to the Flint Hills Region.

Key actions to implement a successful cybersecurity program are:

- Develop and execute cybersecurity program management through a Senior Information Security Officer (SISO), who can coordinate, develop, and maintain an organization wide cybersecurity system to include Industrial Control Systems.
- Conduct a cybersecurity risk assessment at the regional level to identify critical infrastructure and evaluate the likelihood of harm to applicable systems.
- Implement the use of cyber tools on applicable networks to discover and characterize devices on the network and how that are physically and logically connected to each other and the systems they support.
- Implement a Continuous Monitoring Strategy to ensure safety of all connected systems
- Integrate a configuration management system that to ensure that any adjustment made to existing systems do not adversely affect the security of the system or equipment it supports.
- Conduct the appropriate levels of information awareness training across organizations
- Create an incident response team to handle cybersecurity incidents
- Follow the appropriate system and service acquisition guidelines for all new and existing projects, upgrades or retrofits, and system operations and maintenance

The $1.2 trillion infrastructure spending bill that was passed in November 2021 included $1 billion to help establish a four-year grant program within the Department of Homeland Security. This grant program will be administered by FEMA while CISA provides and advisory role. The bill will fund $200 million if FY 2022, $400 million in FY2023, $300 million in FY 2024 and $100 million in FY 2025. This grant program is expected to open in the third quarter of 2022.

An eligible entity that receives a grant under this program and a local government that receives funds from a grant under this program must use the grant to:

- implement the Cybersecurity Plan of the eligible entity
- develop or revise the Cybersecurity Plan of the eligible entity
- pay expenses directly relating to the administration of the grant, which shall not exceed 5 percent of the amount of the grant
- assist with activities that address imminent cybersecurity threats, as confirmed by the Secretary of Homeland Security, acting through the National Cyber Director, to the information systems owned or operated by, or on behalf of, the eligible entity or a local government within the jurisdiction of the eligible entity
- fund any other appropriate activity determined by the Secretary of Homeland Security, acting through the National Cyber Director.

Since this cybersecurity grant program is brand new following recent legislation, it is important to stay up to date on all new grant opportunities released in this sector.

## Transportation Study

As discussed in the transportation section earlier in the report, there have been numerous studies looking at the viability of the US-24 corridor as it relates to traffic congestion, alternate emergency routes and future growth of the area. There are many factors that go into transportation planning, especially when looking to construct new highways and bridges in rapidly expanding communities. Going forward, it is recommended that additional studies be developed and completed in order to help with future transportation planning. It is important to look at not only traffic counts but to also ensure economic development capacity, emergency routes, and traffic safety are addressed.

The Green valley Area Future Plan completed in 2019 highlights keys goals for transportation projects along the US-24 corridor that will be useful in any future studies:

- Ensure the area's road and bridge system is in good repair and is safe for all users, with projects advanced in a transparent manner.
- Provide increased access to recreation opportunities for residents and visitors and increase opportunities for active transportation.
- Support an efficient and safety-focused US-24 Corridor and supporting road network.
- Ensure roadway types are appropriate to support the growth and development pattern utilizing the roadway, now and in the future.
- Finance costs for constructing and maintaining roadways and other transportation projects in a manner that maintains fiscal soundness.

On January 14th, 2022, the Federal Highway Administration announced an historic bridge investment under bipartisan infrastructure law. The law will provide $26.5 billion to states to assist with fixes bridges across the country. Details on the Bridge Formula Program are available at https://www.fhwa.dot.gov/bridge/bfp/20220114.cfm. Although additional study of the area is required to come to a final solution for the US-24 corridor area, it is promising to see this type of funding being allocated at the Federal level for future transportation needs.

# Courses of Action and Funding Sources

This section of the report details the recommendations and action items following completion of the Flint Hills MIR. The recommendation table displays the Action Item ID, Action Item, Timeframe and which community or organization each item applies to. The table below shows the definitions of Action Item ID, Timeframe, and Potential Funding Sources.

### Table 17. Actions and Funding Key

| Action Item ID |
|---|
| EM – Emergency Management |
| EI – Electrical Infrastructure |
| WI – Water Infrastructure |
| WWI – Wastewater Infrastructure |
| S - SCADA |
| T - Transportation |
| C - Cybersecurity |
| **Timeframe** |
| Short–Term: Within one year (2022/2023) |
| Mid–Term: Within 2-5 years (2024-2026) |
| Long–Term: 6 or more years from MIR completion (2027 and beyond) |
| **Potential Funding Sources** |
| CNCS – Corporation for National and Community Service |
| DHS – Department of Homeland Security |
| DOD – Department of Defense |
| DOE – Department of Energy |
| DOT – Department of Transportation |
| DOTrs – Department of Treasury |
| EDA – Economic Development Administration |
| EPA – Environmental Protection Agency |
| KS – State of Kansas |
| USDA – Department of Agriculture |
| USGS – US Geological Survey |

**Action Item ID** – Each recommended action item has been grouped into the categories in the adjacent table and assigned a unique alpha-numeric identifier to provide a reference for each item. The Action Item ID is composed of the category and action number (e.g., EM 1, EM 2, etc.).

**Timeframe** – The timeframe column indicates the projected timeframe to begin implementation of each action. The timeframe describes the year in which an action will be initiated or if it is an on-going action.

**Potential Funding Sources** – The potential funding sources column been paired with the attached Compendium of Infrastructure Resilience Funding Sources (Appendix E). Each action item has relevant potential funding sources identified through a unique alpha-numeric identifier linking it back to the funding source compendium. The potential funding source is composed on the source organization and funding opportunity number (e.g., DHS 1.0, EPA 1.0, etc.). This list is not an exhaustive list as grants are continually updated and released based on the funding organization and any legislation that may be ongoing.

## Table 18. Flint Hills MIR Actions and Potential Funding Sources

| Action Item ID | Action Item | Timeframe | Potential Funding Sources | Clay County | City of Clay Center | City of Wakefield | Geary County | City of Grandview Plaza | Junction City | City of Milford | Pottawatomie County | City of St George | City of Wamego | Riley County | City of Riley | City of Leonardville | City of Manhattan | City of Ogden | Bluestem Electric Cooperative | Evergy | Flint Hills Electric Cooperative | Fort Riley | Kansas Gas Service |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Emergency Management/Planning** | | | | | | | | | | | | | | | | | | | | | | | |
| **EM 1** | **Develop and Adopt Comprehensive Plan** | Short | DHS 1.1<br>DHS 1.8 | | | | | x | | | | x | | | | x | | | | | | | |
| **EM 2** | **Develop and Adopt Critical Facilities Plan** | Short | DHS 1.1<br>DHS 1.8 | | x | x | | x | x | x | | x | x | | | x | | x | | | | | |
| **EM 3** | **Develop and Adopt Emergency Operations Plan** | Short | DHS 1.1<br>DHS 1.8<br>KS 1.0 | | x | | | | | | | x | | | x | | | | | | | | |
| **EM 4** | **Upgrade Emergency Operations Center** | Mid | DHS 1.0<br>DHS 1.6<br>KS 1.0<br>DHS 1.8 | | | | | | | | | | | x | | | | | | | | | |
| **EM 5** | **Conduct Study to assess regional 911 call centers**<br>Study and assessment of effectiveness of command and control between county emergency operations centers/911 call centers. | Mid | DHS 1.1<br>DHS 1.9<br>KS 1.0<br>USDC 1.5<br>DOT 1.8<br>DHS 1.14 | | | | | | | | | | | x | | | | | | | | | |
| **EM 6** | **Communications Equipment Upgrade/Interoperability**<br>Ensure all emergency communications equipment is up to date and able to function across different response agencies and locations | Mid | DHS 1.1<br>DHS 1.9<br>DHS 1.12<br>DHS 1.14<br>USDC 1.5 | | | | | | | | | | | x | | | | | | | | | |

| Action Item ID | Action Item | Timeframe | Potential Funding Sources | Clay County | City of Clay Center | City of Wakefield | Geary County | City of Grandview Plaza | Junction City | City of Milford | Pottawatomie County | City of St George | City of Wamego | Riley County | City of Riley | City of Leonardville | City of Manhattan | City of Ogden | Bluestem Electric Cooperative | Evergy | Flint Hills Electric Cooperative | Fort Riley | Kansas Gas Service |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **EM 7** | **Community Outreach*** Fund recurring outreach program to educate citizens about emergency preparedness and mitigation | Short | DHS 1.1 DHS 1.8 DHS 1.6 KS 1.0 CNCS 1.0 | | | | | | | | | | | x | | | | | | | | | |
| **EM 8** | **Storm Response Survey*** Conduct a survey to evaluate the city's response and recovery to Winter Storm and develop plan for clearing of transportation routes. | Short | DHS 1.1 DHS 1.8 DHS 1.6 KS 1.0 CNCS 1.0 | | x | | | | | | | | | | | | | | | | | | |
| **EM 9** | **Construct New City Hall/Community Storm Shelter** | Long | DHS 1.0 DOTrs 1.0 CNCS 1.0 | | | | | | | | | | | | | | | x | | | | | |
| **EM 10** | **Construct hardened facilities for emergency response/public shelter** I.e., fire stations, EMS stations, public works, community shelter | Long | DHS 1.0 DOTrs 1.0 | | | | | | | | x | | | | | | | | | | | | |
| **EM 11** | **Conduct Infrastructure Capacity Study** Study capacity of water/wastewater/electrical infrastructure to assist with future planning | Mid | KS 1.2 USDC 1.0 EDA 1.1 | | | | | | | | | | x | | | | | | | | | | |
| **Electrical Infrastructure** | | | | | | | | | | | | | | | | | | | | | | | |
| **EI 1** | **Purchase and Install Backup Generation for Critical Facilities*** Identify all critical facilities and size appropriate backup generation solutions to include all necessary installation requirements. (i.e., transfer switching, fuel storage, civil work for generator install) | Mid | DOD 1.1 DHS 1.0 DHS 1.8 | x | x | x | | | x | | | | x | x | x | x | | x | | | | | |

| Action Item ID | Action Item | Timeframe | Potential Funding Sources | Clay County | City of Clay Center | City of Wakefield | Geary County | City of Grandview Plaza | Junction City | City of Milford | Pottawatomie County | City of St George | City of Wamego | Riley County | City of Riley | City of Leonardville | City of Manhattan | City of Ogden | Bluestem Electric Cooperative | Evergy | Flint Hills Electric Cooperative | Fort Riley | Kansas Gas Service |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **EI 2** | **Critical Facility Transfer Switches*** Seek funding for the purchase of transfer switches for facilities designated as community shelters and critical facilities to be compatible with generator use | Mid | DOD 1.1<br>DHS 1.0<br>DHS 1.8 | | x | | | | | | | | | | x | | | | | | | | |
| **EI 3** | **Power Line Upgrade/Modernization*** Enhance and upgrade all power lines, utility poles and distribution line equipment to better withstand all hazard events. | Long | DOD 1.1<br>DHS 1.0<br>DHS 1.8 | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | |
| **EI 4** | **Develop Regional Emergency Restoration Plan** | Short | DOD 1.1<br>DHS 1.0<br>DHS 1.8 | | x | | | | | | | | x | | x | | | | x | x | | | |
| **EI 5** | **Substation Upgrade** Enhance and upgrade all substations better withstand all hazard events. | Long | DOD 1.1<br>DHS 1.0 | | x | | | | | | | | x | | | | | | x | x | x | | |
| **EI 6** | **GIS Mapping** Map electrical utility network into GIS database | Short | DOE 1.1 | | x | | | | | | | | | | | | | | x | | | | |
| **EI 7** | **Purchase of Backup Transformers/substation repair equipment** Mitigation of substation vulnerabilities | Mid | DHS 1.1 | | | x | | x | | | | | | | | | | x | x | | x | | |
| **EI 8** | **Provide/Increase Fuel Storage for Backup Generation** Increase fuel storage capacity to at least 14 days | Mid | DHS 1.1 | | x | x | | x | x | | | x | | x | x | x | x | x | | | | | |
| **EI 9** | **Addition of backup generation** Supplement existing distribution system generator backup to increase redundancy and distribution capability | Mid | DOD 1.1<br>DHS 1.0 | | x | | | | | x | | | | | | | | | x | | | | |
| **EI 10** | **Construct New Substation** Provides redundant power source and allows for expansion of distribution | Long | DOD 1.1<br>DHS 1.0 | | x | | | | | x | | | | | | | | x | | | x | | |

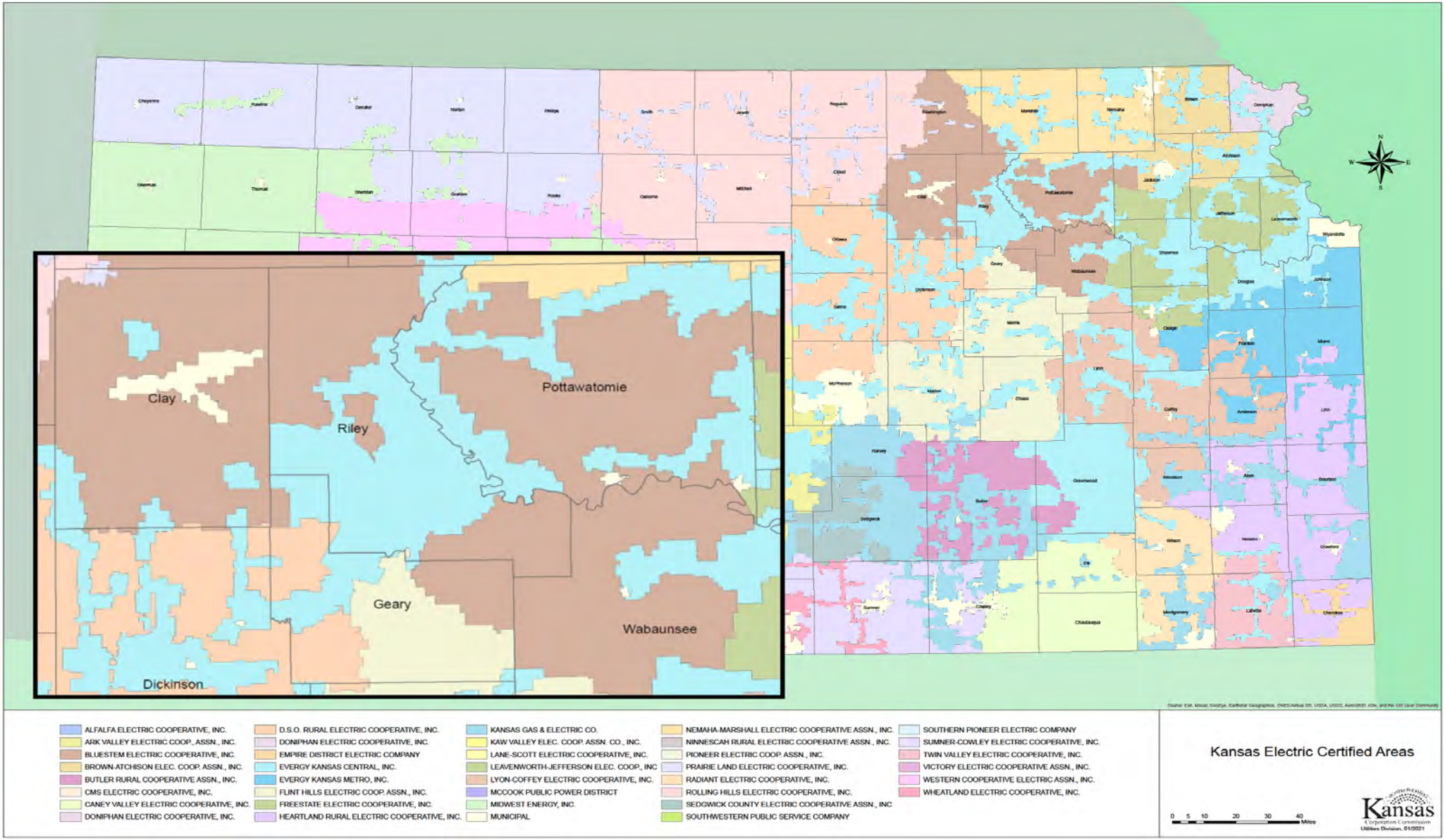
| Action Item ID | Action Item | Timeframe | Potential Funding Sources | Clay County | City of Clay Center | City of Wakefield | Geary County | City of Grandview Plaza | Junction City | City of Milford | Pottawatomie County | City of St George | City of Wamego | Riley County | City of Riley | City of Leonardville | City of Manhattan | City of Ogden | Bluestem Electric Cooperative | Evergy | Flint Hills Electric Cooperative | Fort Riley | Kansas Gas Service |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **EI 11** | **Implement Overhead Reclosers** increase automation and sectionalizing capabilities as well as equipment protection | Mid | DOE 1.1 | | x | x | | x | | x | | x | x | | x | | | x | x | x | x | | |
| **EI 12** | **Update Clay Center Warehouse** Current facility is outdated. Looking to construct similar facility to the new warehouse in Wamego. This would include construction of Storm Command Center. | Mid | USDA 1.6 | | | | | | | | | | | | | | | | x | | | | |
| **EI 13** | **Construct Backup Transmission Line/additional interconnection** Increase system redundancy | Long | DOD 1.1<br>DHS 1.0 | | x | | | | | | | | | | | | | | | | | | |
| **EI 14** | **Complete Vehicle Study** Complete a vehicle study to determine the appropriate type and number of service vehicle required | Short | DHS 1.1 | | | | | | | | | | | | | | | | x | | x | | |
| **Water Infrastructure** | | | | | | | | | | | | | | | | | | | | | | | |
| **WI 1** | **Construct additional/backup well and pumps** Provides alternate water source and increases redundancy | Mid | DOTrs 1.1<br>DOD 1.1<br>EPA 1.0<br>EPA 1.1<br>EPA 1.2<br>EPA 1.8<br>DHS 1.0 | | | | | x | | | | x | x | | x | | | | | | | | |
| **WI 2** | **Develop and Implement Water Coordination Plan** | Short | DOTrs 1.1<br>EPA 1.0 | | | | | x | x | | | x | | | | | | | | | | | |
| **WI 3** | **Ensure redundant heating at all pumping stations** | Short | DOTrs 1.1<br>EPA 1.1<br>EPA 1.8 | | | | | | | | | | x | | | | | | | | | | |
| **WI 4** | **Construct Additional Water Storage** | Mid | DOTrs 1.1<br>DOD 1.1<br>EPA 1.1<br>EPA 1.2<br>EPA 1.8<br>DHS 1.0 | | | | | | | | | x | x | | x | | | | | | | | |

| Action Item ID | Action Item | Timeframe | Potential Funding Sources | Clay County | City of Clay Center | City of Wakefield | Geary County | City of Grandview Plaza | Junction City | City of Milford | Pottawatomie County | City of St George | City of Wamego | Riley County | City of Riley | City of Leonardville | City of Manhattan | City of Ogden | Bluestem Electric Cooperative | Evergy | Flint Hills Electric Cooperative | Fort Riley | Kansas Gas Service |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WI 5** | **Raise Well heads above flood plain** | Mid | DOTrs 1.1<br>EPA 1.0<br>EPA 1.1<br>EPA 1.2<br>EPA 1.8<br>DHS 1.0<br>DHS 1.5 | | | | | | | | | | | | | | x | | | | | | |
| **WI 6** | **Conduct Water Main Assessment**<br>Determine at risk or aging water lines to replace/update | Short | DOTrs 1.1<br>EDA 1.1<br>EPA 1.0 | | | | | | | | | | | | | | x | | | | | | |
| **WI 7** | **Install Physical Security at Water Tower** | Mid | EPA 1.0<br>EPA 1.1<br>DHS 1.1 | | | | | | | | | | | | | | | x | | | | | |
| **WI 8** | **Construct Water Treatment Plant** | Long | DOTrs 1.1<br>EPA 1.0<br>EPA 1.1<br>EPA 1.2 | | | x | | | | | | | | | | | | x | | | | | |
| **WI 9** | **Upgrade Riley Blvd Water Main** | Mid | DOTrs 1.1<br>EPA 1.1<br>EPA 1.2<br>EPA 1.8 | | | | | | | | | | | | | | | x | | | | | |
| **WI 10** | **Conduct Stormwater Survey** | Short | DOTrs 1.1<br>EDA 1.1<br>EPA 1.1 | | | | | | | | | | | | | | | x | | | | | |
| | **Wastewater Infrastructure** | | | | | | | | | | | | | | | | | | | | | | |
| **WWI 1** | **Establish connectivity between WWTPs** | Mid | EPA 1.0<br>EPA 1.1<br>EPA 1.2 | | | | | | x | | | | | | | | | | | | | | |
| **WWI 2** | **Upgrade/Replace existing wastewater lines** | Long | EPA 1.1<br>EPA 1.2 | | | | | | | | | | x | | | | | | | | | | |
| **WWI 3** | **Expand Levees and pumping capability around WWTP**<br>**Reduce risk to WWTP flooding** | Long | DOD 1.1<br>EPA 1.0<br>DHS 1.0<br>DHS 1.5 | | | | | | | | | | | | | | x | | | | | | |

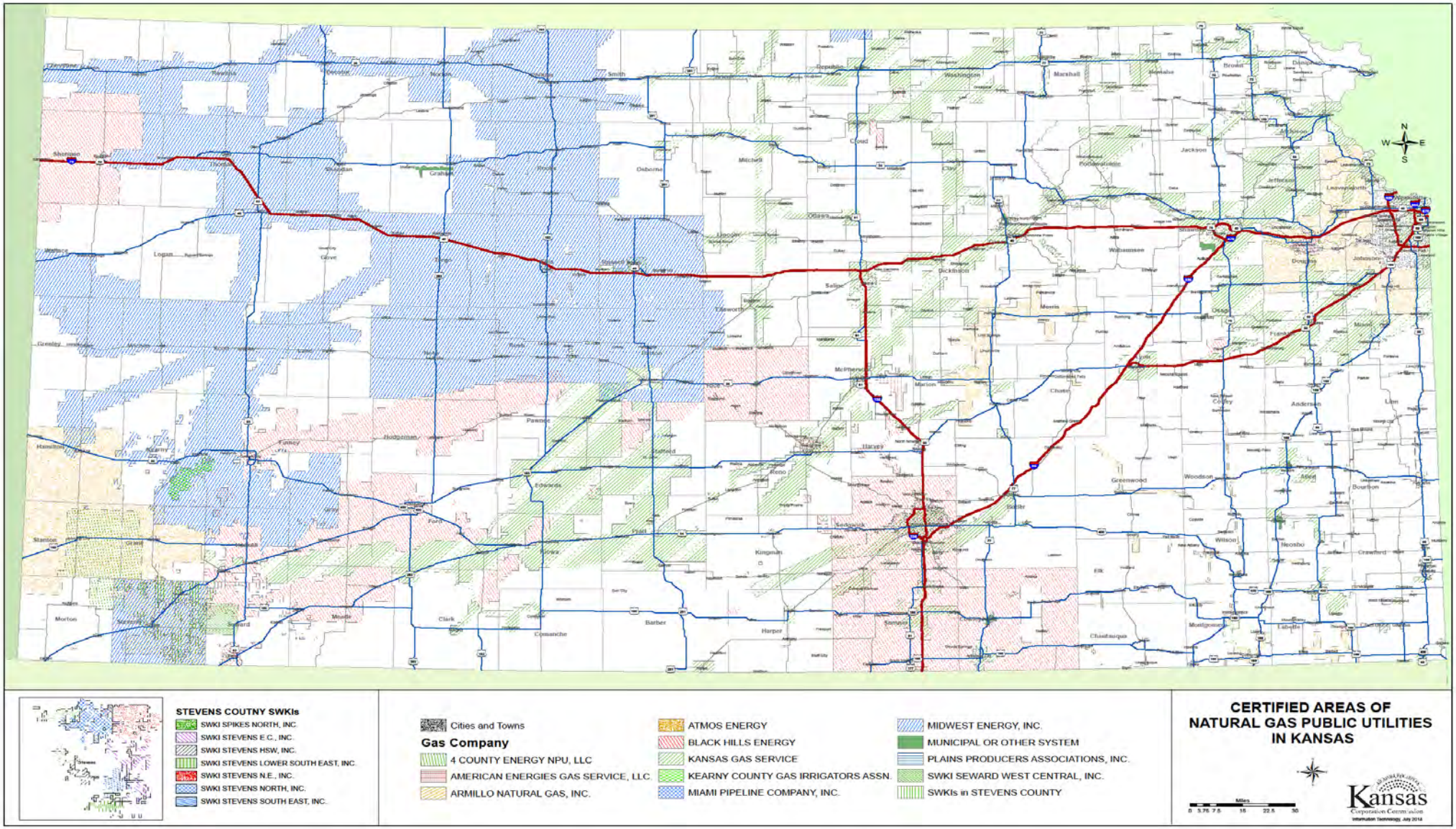
| Action Item ID | Action Item | Timeframe | Potential Funding Sources | Clay County | City of Clay Center | City of Wakefield | Geary County | City of Grandview Plaza | Junction City | City of Milford | Pottawatomie County | City of St George | City of Wamego | Riley County | City of Riley | City of Leonardville | City of Manhattan | City of Ogden | Bluestem Electric Cooperative | Evergy | Flint Hills Electric Cooperative | Fort Riley | Kansas Gas Service |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WWI 4** | **Wastewater System Survey/Study** Determine what parts of WWT system need replacement/upgrades | Short | EDA 1.0<br>EDA 1.1<br>EPA 1.0 | | | | | | | | | | | | | | | x | | | | | |
| **WWI 5** | **Construct Waste Water Treatment Plant/Facility** Determine what parts of WWT system need replacement/upgrades | Mid | EPA 1.0<br>USDA 1.0<br>EPA 1.1<br>EPA 1.2 | | | x | | | | | | | | | x | | | x | | | | | |
| **WWI 6** | **Construct concrete floodwall for main lift station/Water/Wastewater treatment facilities** | Mid | EPA 1.0<br>EPA 1.1<br>EPA 1.2<br>DHS 1.0<br>DHS 1.5 | | | | | | | | x | | | | | | | | | | | | |
| **SCADA** | | | | | | | | | | | | | | | | | | | | | | | |
| **S 1** | **Implement SCADA system for utility operation and monitoring** | Short | DOD 1.1<br>EPA 1.3<br>DHS 1.6 | | | | | x | | | | | | | x | | | x | | | | | |
| **S 2** | **Upgrade or expand existing SCADA systems** | Short | DOD 1.1<br>EPA 1.3<br>DHS 1.6 | | x | | | | x | | x | x | x | | | | | | | | | | |
| **Transportation** | | | | | | | | | | | | | | | | | | | | | | | |
| **T 1** | **Riley Blvd (Ogden City Limits) maintenance/rebuild for Fort Riley Access** | Mid | DOD 1.0<br>DOT 1.6 | | | | | | | | | | | | | | | x | | | | | |
| **T 2** | **Construct Highway 24 River Crossing Alternate Location** | Long | DOT 1.6<br>DOT 1.5<br>DOT 1.0<br>DOT 1.2 | | | | | | | | x | x | x | | | | | | | | | | |
| **T 3** | **Modernization of Current Highway 24 River Crossing** | Mid | DOT 1.6<br>DOT 1.5<br>DOT 1.0<br>DOT 1.2 | | | | | | | | x | x | x | | | | | | | | | | |
| **T 4** | **Paving of Blue River Road from Junietta to Dyer** | Short | DOT 1.5<br>DOT 1.6 | | | | | | | | x | x | x | | | | | | | | | | |

| Action Item ID | Action Item | Timeframe | Potential Funding Sources | Clay County | City of Clay Center | City of Wakefield | Geary County | City of Grandview Plaza | Junction City | City of Milford | Pottawatomie County | City of St George | City of Wamego | Riley County | City of Riley | City of Leonardville | City of Manhattan | City of Ogden | Bluestem Electric Cooperative | Evergy | Flint Hills Electric Cooperative | Fort Riley | Kansas Gas Service |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T 5 | Complete US-24 Corridor Transportation Study | Short | DOT 1.1 | | | | x | | | | x | | | x | | | | | | | | | |
| **Cybersecurity** | | | | | | | | | | | | | | | | | | | | | | | |
| C 1 | Develop and execute cybersecurity Program | Mid | DHS 1.6 | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | | x | | |
| C 2 | Conduct cybersecurity risk assessment | Mid | DHS 1.6 | x | | | x | | | | x | | | x | | | | | x | | x | | |
| C 3 | Implement use of cyber tools | Mid | DHS 1.6 | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | | x | | |
| C 4 | Implement continuous monitoring system | Mid | DHS 1.6 | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | | x | | |
| C 5 | Implement a configuration management system | Mid | DHS 1.6 | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | | x | | |
| C 6 | Conduct information awareness training | Mid | DHS 1.6 | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| C 7 | Create incident response team | Mid | DHS 1.6 | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | | x | | |

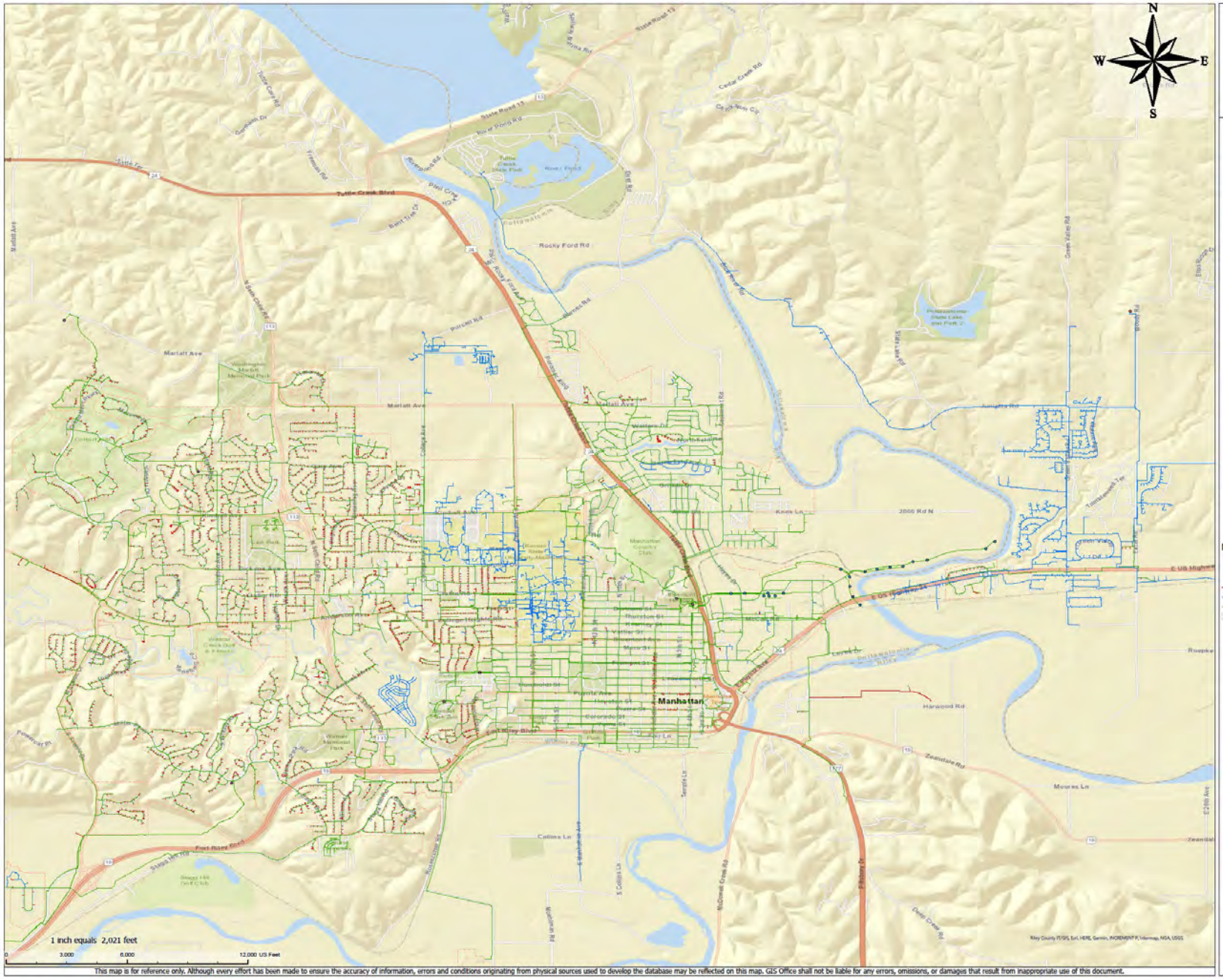
# Appendix A - Regional Electric Provider Map


Clay
Riley
Pottawatomie
Geary
Wabaunsee
Dickinson
ALFALFA ELECTRIC COOPERATIVE, INC.
ARK VALLEY ELECTRIC COOP., ASSN., INC.
BLUESTEM ELECTRIC COOPERATIVE, INC.
BROWN-ATCHISON ELEC. COOP. ASSN., INC.
BUTLER RURAL COOPERATIVE ASSN., INC.
CMS ELECTRIC COOPERATIVE, INC.
CANEY VALLEY ELECTRIC COOPERATIVE, INC.
DONIPHAN ELECTRIC COOPERATIVE, INC.
D.S.O. RURAL ELECTRIC COOPERATIVE, INC.
DONIPHAN ELECTRIC COOPERATIVE, INC.
EMPIRE DISTRICT ELECTRIC COMPANY
EVERGY KANSAS CENTRAL, INC.
EVERGY KANSAS METRO, INC.
FLINT HILLS ELECTRIC COOP. ASSN., INC.
FREESTATE ELECTRIC COOPERATIVE, INC.
HEARTLAND RURAL ELECTRIC COOPERATIVE, INC.
KANSAS GAS & ELECTRIC CO.
KAW VALLEY ELEC. COOP. ASSN. CO., INC.
LANE-SCOTT ELECTRIC COOPERATIVE, INC.
LEAVENWORTH-JEFFERSON ELEC. COOP., INC
LYON-COFFEY ELECTRIC COOPERATIVE, INC.
MCCOOK PUBLIC POWER DISTRICT
MIDWEST ENERGY, INC.
MUNICIPAL
NEMAHA-MARSHALL ELECTRIC COOPERATIVE ASSN., INC.
NINNESCAH RURAL ELECTRIC COOPERATIVE ASSN., INC.
PIONEER ELECTRIC COOP. ASSN., INC.
PRAIRIE LAND ELECTRIC COOPERATIVE, INC.
RADIANT ELECTRIC COOPERATIVE, INC.
ROLLING HILLS ELECTRIC COOPERATIVE, INC.
SEDGWICK COUNTY ELECTRIC COOPERATIVE ASSN., INC
SOUTHWESTERN PUBLIC SERVICE COMPANY
SOUTHERN PIONEER ELECTRIC COMPANY
SUMNER-COWLEY ELECTRIC COOPERATIVE, INC.
TWIN VALLEY ELECTRIC COOPERATIVE, INC.
VICTORY ELECTRIC COOPERATIVE ASSN., INC.
WESTERN COOPERATIVE ELECTRIC ASSN., INC.
WHEATLAND ELECTRIC COOPERATIVE, INC.
Kansas Electric Certified Areas
0 5 10 20 30 40 Miles
Kansas
Corporation Commission
Utilities Division, 01/2021

# Appendix B - Natural Gas Service Map (Kansas)


STEVENS COUTNY SWKIs
SWKI SPIKES NORTH, INC.
SWKI STEVENS E.C., INC.
SWKI STEVENS HSW, INC.
SWKI STEVENS LOWER SOUTH EAST, INC.
SWKI STEVENS N.E., INC.
SWKI STEVENS NORTH, INC.
SWKI STEVENS SOUTH EAST, INC.
Cities and Towns
Gas Company
4 COUNTY ENERGY NPU, LLC
AMERICAN ENERGIES GAS SERVICE, LLC.
ARMILLO NATURAL GAS, INC.
ATMOS ENERGY
BLACK HILLS ENERGY
KANSAS GAS SERVICE
KEARNY COUNTY GAS IRRIGATORS ASSN.
MIAMI PIPELINE COMPANY, INC.
MIDWEST ENERGY, INC.
MUNICIPAL OR OTHER SYSTEM
PLAINS PRODUCERS ASSOCIATIONS, INC.
SWKI SEWARD WEST CENTRAL, INC.
SWKIs in STEVENS COUNTY
CERTIFIED AREAS OF NATURAL GAS PUBLIC UTILITIES IN KANSAS
Kansas Corporation Commission

# Appendix C - Manhattan Water System

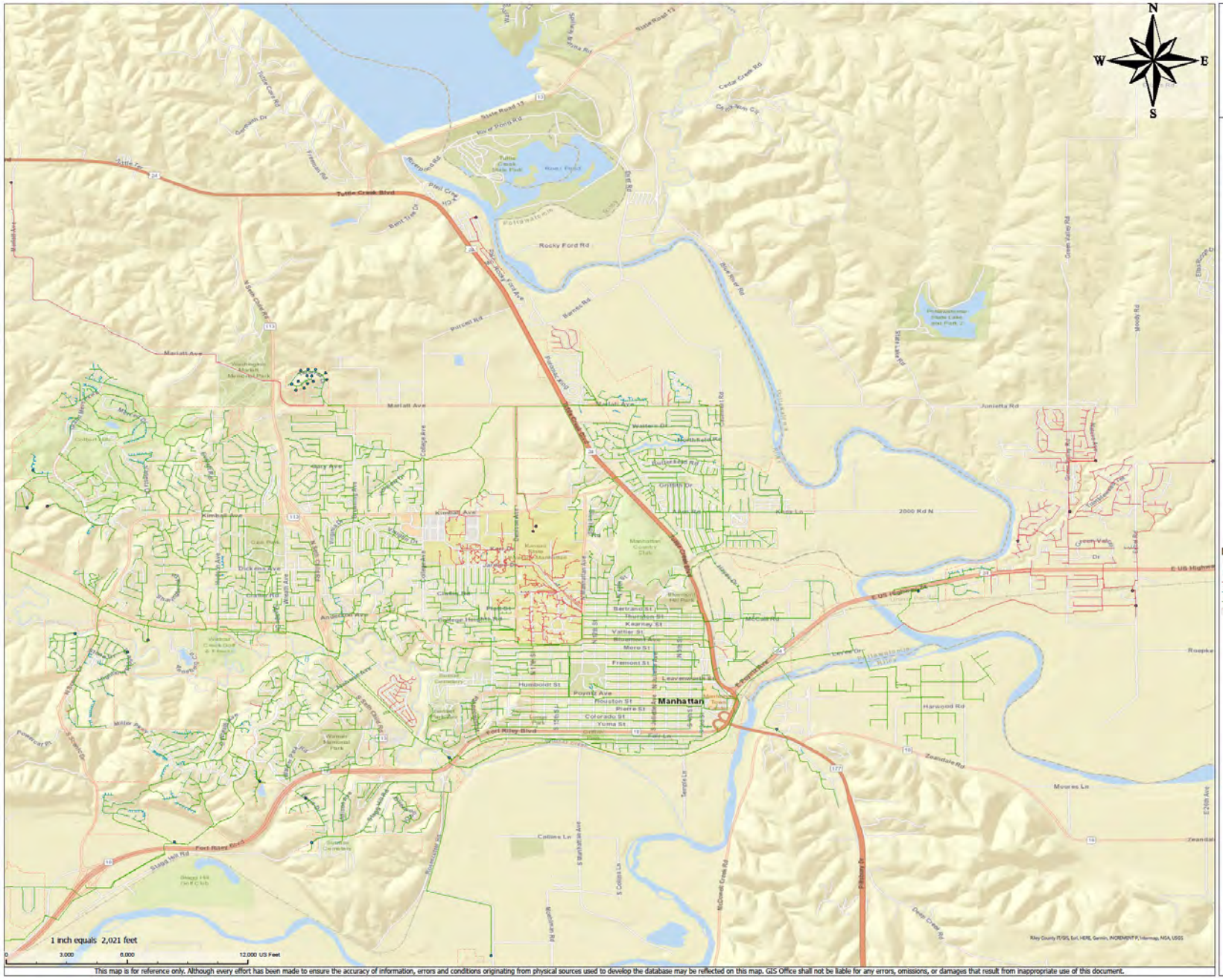



**Flint Hills MIR**
**Manhattan Water System**
October 28, 2021

Manhattan_Water
- Private_waterStorageFacilities
- MHK_waterSupplySources
- MHK_waterStorageFacilities
- services_waterPipes
- Private_waterPipes
- MHK_waterPipes
- Incorporated Areas

Proprietary & Confidential For Official Use Only (FOUO)
Controlled Unclassified Information (CUI)

# Appendix D - Manhattan Wastewater System




**Flint Hills MIR**
**Manhattan Sewer System**
October 28, 2021

Proprietary & Confidential For Official Use Only (FOUO)
Controlled Unclassified Information (CUI)

FLINT HILLS

# APPENDIX E: COMPENDIUM OF PROGRAMS AND MECHANISMS FOR FUNDING INFRASTRUCTURE RESILIENCE

## Summary

***This compendium catalogues federal, state, and non-governmental programs andfunding mechanisms with potential to finance and support efforts to enhance infrastructure resilience and security.***

The purpose of this compendium is to support state, local, tribal, and territorial communities, as well private sector owners and operators of infrastructure assets with their efforts to improve thesecurity and resilience of their communities and infrastructure systems. Note that some funding opportunities are temporary or are not available annually. Due to the evolving nature of funding opportunities, this list is not exhaustive.

# Table of Contents

# I. Federal Programs

## U.S. Department of Agriculture

### *Water & Environmental Grant and Loan Funding (UDSA 1.0)*

Website

https://www.rd.usda.gov/programs-services/water-environmental-programs

Type of Financing

Grants and Loans

Critical Infrastructure Sector

Water and Wastewater

Overview

Through Rural Utilities Service Water and Environmental Programs (WEP), rural communities obtain the technical assistance and financing necessary to develop drinking water and waste disposal systems. Safe drinking water and sanitary waste disposal systems are vital not only to public health, but also to the economic vitality of rural America. Rural Development is a leader in helping rural America improve the quality of life and increase the economic opportunities for rural people.

WEP provides funding for the construction of water and waste facilities in rural communities and is proud to be the only Federal program exclusively focused on rural water and waste infrastructure needs of rural communities with populations of 10,000 or less. WEP also provides funding to organizations that provide technical assistance and training to rural communities in relation to their water and waste activities. WEP is administered through National Office staff in Washington, DC, and a network of field staff in each State.

## Centers for Disease Control

### *Public Health Emergency Preparedness Cooperative Agreements (CDC 1.0)*

Website

http://www.cdc.gov/phpr/archive.htm

Type of Financing

Cooperative Agreement Funding

Critical Infrastructure Sector

Healthcare and Public Health

Overview

The Public Health Emergency Preparedness (PHEP) provides funding for public health departments across the nation to upgrade their ability to effectively respond to a range of public health threats, including infectious diseases, natural disasters, and biological, chemical, nuclear,and radiological events.

## U.S. Department of Commerce

### *Economic Development Agency (EDA) Economic Development Grants (USDC 1.0)*

Website

https://www.eda.gov/funding-opportunities/

Type of Financing

Grant

Critical Infrastructure Sector

N/A

Overview

Assists eligible recipients in developing economic development plans and studies designed tobuild capacity and guide the economic prosperity and resiliency of an area or region.

Eligibility

State governments, Private institutions of higher education, Nonprofits having a 501(c)(3) statuswith the IRS, other than institutions of higher education, County governments, Nonprofits that donot have a 501(c)(3) status with the IRS, other than institutions of higher education, Public and State controlled institutions of higher education, Special district governments, Others (see text field entitled "Additional Information on Eligibility" for clarification), Native American tribal organizations (other than Federally recognized tribal governments), City or township governments, Native American tribal governments (Federally recognized).

### *Economic Development Agency (EDA) Planning Program and Local TechnicalAssistance Program (USDC 1.1)*

Website

https://www.eda.gov/funding-opportunities/

Type of Financing

Cooperative Agreement Grant

Critical Infrastructure Sector

N/A

Overview

To provide investments supporting construction, non-construction, technical assistance, and revolving loan fund projects under EDA's Planning and Local Technical Assistance programs. Under the Planning program EDA assists eligible recipients in creating regional economic development plans designed to build capacity and guide the economic prosperity and resiliencyof an area or region.

Eligibility

Special district governments, Native American tribal governments (Federally recognized), Publicand State controlled institutions of higher education, City or township governments, Others (seetext field entitled "Additional Information on Eligibility" for clarification), Nonprofits having a 501(c)(3) status with the IRS, other than institutions of higher education, Private institutions of higher education, County governments, Nonprofits that do not have a 501(c)(3) status with the IRS, other than institutions of higher education, State governments.

### *NOAA Regional Coastal Resilience Grants (USDC 1.2)*

Website

https://www.coast.noaa.gov/resilience-grant/

Type of Financing

Grant

Critical Infrastructure Sector

N/A

Overview

To aid coastal communities address increasing risks from extreme weather through competitivegrant awards. Awards are made for project proposals that advance resilience strategies, oftenthrough land and ocean use planning, disaster preparedness projects, environmental restoration, hazard mitigation planning, or other regional, state, or community planning efforts.

Eligibility

Eligible applicants include nonprofit organizations, institutions of higher education, regional organizations, private entities, and local, state, and tribal governments. Typical award amounts will range from $250,000 to $1 million for projects lasting up to three years. Cost-sharing through cash or in-kind contributions is expected. Projects must be located in one or more of the35 U.S. coastal states or territories.

### *NOAA Coastal and Estuarine Land Conservation Program (USDC 1.3)*

Website

https://coast.noaa.gov/czm/landconservation/

Type of Financing

Matching Funds

Critical Infrastructure Sector

N/A

Overview

Provides matching funds to state and local governments to purchase threatened coastal andestuarine lands or obtain conservation easements.

Eligibility

State and local governments. To be considered, the land must be important ecologically orpossess other coastal conservation values, such as historic features, scenic views, E5 or recreational opportunities.

### *NOAA Coastal Ecosystem Resiliency Grants Program (USDC 1.4)*

Website

http://www.habitat.noaa.gov/funding/coastalresiliencyprojects.html

Type of Financing

Grant

Critical Infrastructure Sector

N/A

Overview

Investing in habitat restoration and ecosystem resiliency projects provides sustainable and lasting benefits that reduce risks posed to coastal communities from extreme weather events,changing environmental conditions, and known or potential climate change impacts.

### *Public Safety Communications Research Division Grants (USDC 1.5)*

Website

https://www.nist.gov/ctl/pscr/funding-opportunities/grants-and-cooperative-agreements

Type of Financing

Grants, Cooperative Agreements

Critical Infrastructure Sector

Emergency Communications

Overview

SCR works with public safety agencies, academic researchers, and industry partners in both technology and human/social areas, and system developers to support our mission and accelerate the advancement of public safety communications technologies. PSCR leverages Financial Assistance Awards in the form of grants and cooperative agreements to stimulate critical R&D, advanced engineering, and product development in key technology focus areas. Official announcements for all open opportunities are made available on grants.gov. Application evaluation procedures are described on each individual notice of funding opportunity (NOFO).

Eligibility

Varies by funding opportunity

## Corporation for National and Community Service

### *AmeriCorps State and National Grants (CNCS 1.0)*

Website

https://www.nationalservice.gov/build-your-capacity/grants/ASNgrants

Type of Financing

Grant

Critical Infrastructure Sector

N/A

Overview

Grant funding for disaster services - improving community resiliency through disasterpreparation, response, recovery, and mitigation.

Eligibility

The following Non-Federal entities who have DUNS numbers and are registered in System forAward Management (SAM) are eligible to apply: Indian Tribes, Institutions of higher education,Local governments, Nonprofit organizations, States.

## U.S. Department of Defense

### *Defense Access Roads (DOD 1.0)*

Website

https://highways.dot.gov/federal-lands/programs/defense#

Type of Financing

There is no regular appropriation of money available for the DAR program. Military Construction (MILCON) funds are specifically budgeted, authorized and appropriated for eligible DAR projects. Since 1957 the DAR program has averaged $20 million per year.

Critical Infrastructure Sector

Transportation/National Defense

Overview

The Defense Access Road (DAR) Program provides a means for the military to pay their share of the cost of public highway improvements necessary to mitigate an unusual impact of a defense activity. An unusual impact could be a significant increase in personnel at a military installation, relocation of an access gate, or the deployment of an oversized or overweight military vehicle or transporter unit. The DAR program is jointly administered by the FHWA and SDDC. The Federal Lands Highway Office administers the program for FHWA and the

Transportation Engineering Agency administers the program for SDDC. The roles and responsibilities of each agency are defined in regulations located in 23 CFR 660E.

### Eligibility

To initiate a DAR project, the local military installation identifies the access or mobility needs and brings these deficiencies to the attention of the Military Surface Deployment and Distribution Command (SDDC). The SDDC reviews the requirement and makes a preliminary eligibility determination. If it appears eligible, the SDDC requests the FHWA to prepare an engineering evaluation to identify the cost and scope of the needs. The FHWA forwards the evaluation and recommendations to the SDDC. The SDDC then submits its determination of eligibility and its recommended DOD share of the improvements to the Commander, SDDC, with the recommendation that the roadway be certified as important for the national defense. Once certified by the Commander, SDDC, the roads become eligible for DOD funding. The DAR Program does not provide for maintenance of roadways funded by the program, except for maintaining the structural capacity of designated gravel roads that support the Minuteman Program. Air Force operations and maintenance funds are used for this maintenance program.

## *Defense Community Infrastructure Program (DCIP) (DOD 1.1)*

### Website

https://oldcc.gov/defense-community-infrastructure-program-dcip

### Type of Financing

Grant

### Critical Infrastructure Sector

Multi

### Overview

The Defense Community Infrastructure Program (DCIP) is designed to address deficiencies in community infrastructure, supportive of a military installation, in order to enhance military value, installation resilience, and military family quality of life. DCIP is authorized under Public Law 115-232 Section 2861. The program authorizes the Secretary of Defense to make grants, conclude cooperative agreements, and supplement funds available under other Federal programs in support of the program.

### Eligibility

For information on SAM and Grants.gov registration, please see ***OLDCC Competitive Proposal Instructions.***

### *Defense Manufacturing Community Support Program (DMCSP) (DOD 1.2)*

Website

https://oldcc.gov/defense-manufacturing-community-support-program

Type of Financing

Grant

Critical Infrastructure Sector

Multi

Overview

The DMCSP is designed to support long-term community investments that strengthen national security innovation and expand the capabilities of the defense manufacturing industrial ecosystem. This includes long-term investment in critical skills, facilities, workforce development, research and development, and small business support in order to strengthen the national security innovation base.

Eligibility

During open competition periods, the general application process is as follows:

1. Consortium must apply for and receive designation as a Defense Manufacturing Community.
2. Upon receiving the above designation, you will be invited to submit a grant application for funding.

### *Intergovernmental Affairs (IGA) Program (DOD1.3)*

Website

https://oldcc.gov/our-programs/intergovernmental-affairs-program

Type of Financing

Multi

Critical Infrastructure Sector

Multi

Overview

OLDCC's Intergovernmental Affairs (IGA) program is the foundation for the success of all our activities. The IGA program leverages, integrates, and amplifies the goals and activities of each OLDCC's programs to ensure defense priorities benefit from the synergy created by a diverse and crosscutting set of stakeholders. For instance, the Economic Adjustment Committee coordinates all our Federal partners on economic, workforce, manufacturing, environmental, and infrastructure challenges and opportunities to better the National Defense Strategy.

### Eligibility

The IGA program also works with governors, mayors, state legislators, county officials, and governmental associations to identify challenges on the ground and implement strategies that best meet the specific needs in their state and region. There is rarely a "one size fits all" approach of how to support military bases, missions, and the defense industrial base. IGA works with our elected, public, and private sector partners across the nation to identify what they can do to support evolving national security imperatives.

## *Office of Local Defense Community Cooperation (OLDCC) Construction Program (DOD 1.4)*

### Website

https://oldcc.gov/our-programs/construction

### Type of Financing

Multi

### Critical Infrastructure Sector

Multi

### Overview

The Construction program enables states and communities to undertake necessary investments in public services and infrastructure to support the readiness and lethality of installations, as well as to provide safe places for services members and their families to live, work, and play. Current efforts support the management of civilian activities to absorb announced mission growth and investments in infrastructure such as the renovation of public schools on military installations, improvement of roads to medical facilities, and outside-the-fence investments in infrastructure.

Program lines include mission growth assistance, Public Schools on Military Installations (PSMI), transportation infrastructure improvements associated with medical facilities, and civilian infrastructure on the Territory of Guam.

### Eligibility

Each of the programs in the Construction portfolio has its own eligibility criteria listed below.

#### *Mission Growth*

Projects are need-based connected to documented mission growth that meets or exceeds certain criteria outlined in 10 USC Section 2391(b)(2) and CFDA 12.618.

#### *Public Schools on Military Installations (PSMI)*

Local education authorities are invited to apply based upon their placement on a prioritized listing and availability of funds.

#### *Transportation Infrastructure Improvements Associated with Medical Facilities*

Projects were competitively selected from proposals supporting eligible military medical facilities. No new projects are anticipated at this time.

*Civilian Infrastructure on the Territory of Guam*

Projects were evaluated and recommended through a multi-agency Economic Adjustment Committee report, following the Navy's review of the basing actions under the National Environmental Policy Act, as amended.

### *Readiness and Environmental Protection Integration (REPI) Program (DOD 1.5)*

Website

https://www.repi.mil/Resilience/

Type of Financing

Grant

Critical Infrastructure Sector

Natural Infrastructure

Overview

The REPI Program preserves military missions by limiting or alleviating encroachment threats that could adversely affect Department of Defense (DoD) installations including incompatible development, endangered species restrictions, and habitat loss. However, climate change and extreme weather events, ranging from severe flooding to catastrophic wildfire, are an increasingly concerning encroachment impact and threaten DoD training lands, infrastructure, and public safety. To protect installation and range operations from predicted or unanticipated changes in environmental conditions, the REPI program is now able to fund off-base natural infrastructure projects, also known as REPI Resilience Projects, in addition to more traditional REPI projects.

Eligibility

REPI Program funds can satisfy the match or cost-sharing requirement for any resilience or conservation program of any federal agency. Granted under 10 U.S.C. § 2684a(h), REPI installations and partners can leverage this authority to improve installation resilience and ensure military readiness through interagency coordination.

## U.S. Department of Energy

### *Smart Grid Investment Grants (DOE 1.0)*

Website

https://www.smartgrid.gov/recovery_act/overview/smart_grid_investment_grant_program.html

Type of Financing

Grant/Matching Funds

Critical Infrastructure Sector

Energy

Overview

To accelerate the modernization of the nation's electric transmission and distribution systems. The program targets electric providers across the nation with plans to upgrade their systems—through a merit-based, competitive solicitation.

Eligibility

Applications are being sought that apply "smart" technology to: appliances and electrical equipment, electricity distribution and transmission systems, and homes, offices and industrialfacilities.

### *State Energy Program (DOE 1.1)*

Website

https://www.energy.gov/eere/wipo/state-energy-program-guidance

Type of Financing

Grant

Critical Infrastructure Sector

Energy

Overview

For more than 30 years, the U.S. Department of Energy's (DOE) State Energy Program (SEP) has provided funding and technical assistance to states, U.S. territories, and the District of Columbia. State Energy Offices use SEP funds to develop state plans that advance energy solutions through regional networks, strategic energy planning, executive orders, legislation and local ordinances, management of local retrofits, and land-use plans.

https://www.energy.gov/sites/prod/files/2021/01/f82/SEP-Program-Notice-21-01_PY21-Application-Instructions.pdf

## U.S. Department of Transportation

### *Congestion Mitigation and Air Quality Improvement Program (DOT 1.0)*

Website

www.fhwa.dot.gov/federalaid/guide/guide_current.cfm#c08

Type of Financing

Federal Fund Apportionment

Critical Infrastructure Sector

Transportation Systems

Overview

Flexible funding source to State and local governments for transportation projects and programsto help meet the requirements of the Clean Air Act. Funding is available to reduce congestion and improve air quality for areas that do not meet the National

Ambient Air Quality Standards forozone, carbon monoxide, or particulate matter (nonattainment areas) and for former nonattainment areas that are now in compliance (maintenance areas).

Eligibility

Funds may be used for a transportation project or program that is likely to contribute to the attainment or maintenance of a national ambient air quality standard, with a high level of effectiveness in reducing air pollution, and that is included in the metropolitan planning organization's (MPO's) current transportation plan and transportation improvement program (TIP) or the current state transportation improvement program (STIP) in areas without an MPO.

### *FHA Surface Transportation Block Grant Program (DOT 1.1)*

Website

https://www.fhwa.dot.gov/fastact/factsheets/stbgfs.cfm

Type of Financing

Grant

Critical Infrastructure Sector

Transportation Systems

Overview

Funding for highway and transit infrastructure construction and rehabilitation, highway operational improvements such as hazard elimination, bicycle and pedestrian transportation infrastructure, transportation planning, highway and transit research and development and technology transfer programs, and capital and operating costs for traffic monitoring, management, and control facilities and programs, including advanced truck stop electrificationsystems.

### *Infrastructure for Rebuilding America (INFRA) Grant (DOT 1.2)*

Website

https://www.transportation.gov/buildamerica/financing/infra-grants/infrastructure-rebuilding-america

Type of Financing

Discretionary Grant Program

Critical Infrastructure Sector

Transportation Systems

Overview

These grants advance the Administration's priorities of rebuilding America's infrastructure and creating jobs by funding highway and rail projects of regional and national economic significance that position America to win the 21st century.

Eligibility

INFRA grants were selected based on several criteria. In addition to prioritizing projects that would improve local economies, create jobs, and meet all statutory requirements, for the first time in USDOT's history, grants were considered by how they would address climate change, environmental justice, and racial equity.

Eligible applicants for INFRA grants are:

- a State or group of States;
- a metropolitan planning organization that serves an urbanized area (as defined by the Bureau of the Census) with a population of more than 200,000 individuals;
- a unit of local government or group of local governments;
- a political subdivision of a State or local government;
- a special purpose district or public authority with a transportation function, including a port authority;
- a Federal land management agency that applies jointly with a State or group of States;
- a tribal government or a consortium of tribal governments; or
- a multi-State or multijurisdictional group of public entities.

### *Interstate Maintenance (IM) Program (DOT 1.3)*

Website

https://www.fhwa.dot.gov/safetealu/factsheets/im.htm

Type of Financing

Formula Funding

Critical Infrastructure Sector

Transportation Systems

Overview

Provides formula funding for Interstate resurfacing, restoration, rehabilitation, and reconstruction; the reconstruction or new construction of bridges, interchanges, and crossings; capital costs related to operational, safety, traffic management, or intelligent transportation systems improvements; and preventive maintenance.

Eligibility

Projects on routes on the Interstate System, except those added under 23 USC 103(c)(4)(A) that were not previously designated future Interstate under former 23 UCS 139(b), as well as any segments that become part of the Interstate System under Section 1105(e)(5) of ISTEA are eligible for funding.

### *The Highway Bridge Program (DOT 1.4)*

Website

https://www.fhwa.dot.gov/safetealu/factsheets/bridge.htm

Type of Financing

Formula Funding

Critical Infrastructure Sector

Transportation Systems

Overview

Provides formula funding to states to improve structurally deficient and functionally obsolete highway bridges on public roads.

Eligibility

Eligible activities are expanded to include systematic preventative maintenance on Federal-aid and non-Federal-aid highway systems. States may carry out projects for the installation of scour countermeasures or systematic preventative maintenance without regard to whether the bridge is eligible for rehabilitation or replacement.

### *The Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Grant (DOT 1.5)*

Website

https://www.transportation.gov/RAISEgrants/about

Type of Financing

Grant

Critical Infrastructure Sector

Transportation Systems

Overview

The Rebuilding American Infrastructure with Sustainability and Equity, or RAISE Discretionary Grant program, provides a unique opportunity for the DOT to invest in road, rail, transit and port projects that promise to achieve national objectives. Previously known as the Better Utilizing Investments to Leverage Development (BUILD) and Transportation Investment Generating Economic Recovery (TIGER) Discretionary Grants, Congress has dedicated nearly $9.9 billion for thirteen rounds of National Infrastructure Investments to fund projects that have a significant local or regional impact.

Eligibility

Eligible Applicants for RAISE grants are State, local and tribal governments, including U.S. territories, transit agencies, port authorities, metropolitan planning organizations (MPOs), and other political subdivisions of State or local governments.

Multiple States or jurisdictions may submit a joint application and must identify a lead applicant as the primary point of contact, and identify the primary recipient of the award. Joint applications must include a description of the roles and responsibilities of each applicant.

### *Transportation Investment Generating Economic Recovery (TIGER) Discretionary Grants (DOT 1.6)*

Website

https://www.transportation.gov/tiger

Type of Financing

Grant

Critical Infrastructure Sector

Transportation Systems

Overview

Competitive grant program that supports innovative transportation projects, including multi-modal and multi-jurisdictional projects, which are difficult to fund through traditional federal programs.

Eligibility

Applicants must detail the benefits their project would deliver for five long-term outcomes: safety, economic competitiveness, state of good repair, quality of life and environmental sustainability. DOT also evaluates projects on innovation, partnerships, project readiness, benefit cost analysis, and cost share.

### *FHWA Emergency Relief Program (DOT 1.7)*

Website

http://www.fhwa.dot.gov/programadmin/erelief.cfm

Critical Infrastructure Sector

Transportation Systems

Overview

A special program from the Highway Trust Fund for the repair or reconstruction of Federal-aid highways and roads on Federal lands which have suffered serious damage as a result of (1) natural disasters or (2) catastrophic failures from an external cause.

Eligibility

It is the responsibility of individual States to request ER funds for assistance in the cost of necessary repair of Federal-aid highways damaged by natural disasters or catastrophic failures.

### *FTA Public Transportation Emergency Relief Program (DOT 1.8)*

Website

https://www.transit.dot.gov/funding/grant-programs/emergency-relief-program/emergency-relief-program

Critical Infrastructure Sector

Transportation Systems

Overview

Helps states and public transportation systems pay for protecting, repairing, and/or replacing equipment and facilities that may suffer or have suffered serious damage as a result of an emergency, including natural disasters such as floods, hurricanes, and tornadoes.

Eligibility

States and transit agencies that are affected by a declared emergency or disaster.

### *Rail Line Relocation & Improvement Capital Grant Program (RLR) (DOT 1.9)*

Website

https://www.fra.dot.gov/Page/P0090

Type of Financing

Loan/Loan Guarantee

Critical Infrastructure Sector

Transportation Systems

Overview

Provides loans and loan guarantees to develop or rehabilitate railroad infrastructure. Eligible borrowers include state and local governments, government sponsored corporations, and joint ventures that include a railroad, and limited option freight shippers who intend to construct a railroad.

Eligibility

Only States, political subdivisions of States (such as a city or county), and the District of Columbia are eligible for grants under the program. Grants may only be awarded for construction projects that improve the route or structure of a rail line and: 1) are carried out for the purpose of mitigating the adverse effects of rail traffic on safety, motor vehicle traffic flow, community quality of life, or economic development; or 2) involve a lateral or vertical relocationof any portion of the rail line.

## U.S. Economic Development Administration

### *Coronavirus Aid, Relief and Economic Security (CARES) Act (EDA 1.0)*

Website

https://eda.gov/cares/

Type of Financing

Grant/Revolving Loan Fund

Critical Infrastructure Sector

Multi

Overview

The Coronavirus Aid, Relief, and Economic Security (CARES) Act provides the Economic Development Administration (EDA) with $1.5 billion for economic development assistance programs to help communities prevent, prepare for, and respond to coronavirus.

Eligibility

EDA CARES Act funding is available to state and local governmental entities, institutions of higher education, not for-profit entities, and federally recognized tribes.

### *Public Works and Economic Adjustment Assistance Programs (PWEAA) (EDA 1.1)*

Website

https://www.eda.gov/pdf/about/Public-Works-Program-1-Pager.pdf

Type of Financing

Grant

Critical Infrastructure Sector

Multi

Overview

EDA's Public Works program helps distressed communities revitalize, expand, and upgrade their physical infrastructure. This program enables communities to attract new industry; encourage business expansion; diversify local economies; and generate or retain long-term, private-sector jobs and investment through the acquisition or development of land and infrastructure improvements needed for the successful establishment or expansion of industrial or commercial enterprises.

### *American Rescue Plan Act Economic Adjustment Assistance (ARPA EAA) (EDA 1.2)*

Website

https://www.grants.gov/web/grants/view-opportunity.html?oppId=334743

Type of Financing

Cooperative Agreement Grant

Critical Infrastructure Sector

Multi

Overview

EDA's ARPA EAA NOFO is designed to provide a wide-range of financial assistance to communities and regions as they respond to, and recover from, the economic impacts of the coronavirus pandemic, including long-term recovery and resilience to future economic disasters. Under this announcement, EDA solicits applications under the authority of the Economic Adjustment Assistance (EAA) program, which is flexible and responsive to the economic development needs and priorities of local and regional stakeholders. This is the broadest NOFO EDA is publishing under ARPA and any eligible applicant from any EDA Region may apply. EDA expects to fund a number of projects under this NOFO that support communities negatively impacted by the downturn in the coal economy, supporting transitioning away from coal.

EDA anticipates funding approximately 300 non-construction and construction projects that cost between approximately $500,000 and $5,000,000 with this appropriation, though EDA will consider applications above and below these amounts.

Eligibility

Private institutions of higher education, special district governments, public and state-controlled institutions of higher education, state governments, Native American tribal governments, County governments, city or township governments, 501(c((3) nonprofits other than institutions of higher education.

## U.S. Environmental Protection Agency

### *The Clean Water State Revolving Fund (CWSRF) (EPA 1.0)*

Website

https://www.epa.gov/cwsrf

Type of Financing

Multiple

Critical Infrastructure Sector

Water and Wastewater Systems

Overview

The CWSRF was created by the 1987 amendments to the Clean Water Act (CWA) as a financial assistance program for a wide range of water infrastructure projects, under 33 U.S. Code §1383. The program is a powerful partnership between EPA and the states that replaced EPA's Construction Grants program. States have the flexibility to fund a range of projects that address their highest priority water quality needs. The program was amended in 2014 by the Water Resources Reform and Development Act.

Using a combination of federal and state funds, state CWSRF programs provide loans to eligible recipients to:

- construct municipal wastewater facilities,
- control nonpoint sources of pollution,
- build decentralized wastewater treatment systems,
- create green infrastructure projects,
- protect estuaries, and
- fund other water quality projects.

Eligibility

Eligible Projects include: Construction of publicly owned treatment works, Nonpoint source, National estuary program projects, Decentralized wastewater treatment systems, Stormwater,Water conservation, efficiency, and reuse, Watershed pilot projects, Energy efficiency, Water reuse, Security measures at publicly owned treatment works, technical assistance.

### *Water Infrastructure Finance and Innovation Act (WIFIA) Loans (EPA 1.1)*

Website

https://www.epa.gov/wifia/learn-about-wifia-program#overview

Type of Financing

Credit Financing

Critical Infrastructure Sector

Water and Wastewater Systems

Overview

A federal credit program administered by EPA for eligible water and wastewater infrastructureprojects.

### *The Drinking Water State Revolving Fund (DWSRF) (EPA 1.2)*

Website

https://www.epa.gov/dwsrf

Type of Financing

Credit Financing

Critical Infrastructure Sector

Water and Wastewater Systems

Overview

A federal credit program administered by EPA for eligible drinking water treatment anddistribution projects.

Eligibility

Eligible Projects include: Treatment; Transmission and distribution; Source; Storage;Consolidation; Creation of new systems.

### *EPA Smart Growth Grants (EPA 1.3)*

Website

https://www.epa.gov/smartgrowth/epa-smart-growth-grants-and-other-funding

Type of Financing

Grant

Critical Infrastructure Sector

N/A

Overview

Funding to support activities that improve the quality of development and protect human healthand the environment.

### *Urban Waters Small Grants (EPA 1.4)*

Website

https://www.epa.gov/urbanwaters/urban-waters-small-grants

Type of Financing

Grant

Critical Infrastructure Sector

Water and Wastewater Systems

Overview

Helps protect and restore urban waters, improve water quality, and support communityrevitalization and other local priorities.

Eligibility

In general, projects should meet the following four program objectives: 1) Address local waterquality issues related to urban runoff pollution; 2) Provide additional community benefits; 3) Actively engage underserved communities; and 4) Foster partnership.

### *319 Grant Program for States and Territories (EPA 1.5)*

Website

https://www.epa.gov/nps/319-grant-program-states-and-territories

Type of Financing

Grant

Critical Infrastructure Sector

N/A

Overview

States, territories and tribes receive grant money that supports a wide variety of activities including technical assistance, financial assistance, education, training, technology transfer, demonstration projects and monitoring to assess the success of specific nonpoint source implementation projects.

Eligibility

If a state's funding plan is consistent with grant eligibility requirements and procedures, EPA then awards the funds to the state.

### *Wetland Program Development Grants (EPA 1.6)*

Website

https://www.epa.gov/wetlands/wetland-program-development-grants

Type of Financing

Grant

Critical Infrastructure Sector

Water and Wastewater Systems

Overview

Provides funding to projects that promote the coordination and acceleration of research, investigations, experiments, training, demonstrations, surveys, and studies relating to the causes, effects, extent, prevention, reduction, and elimination of water pollution.

Eligibility

States, tribes, local governments, interstate associations, and intertribal consortia are eligible toapply for the Regional WPDG Request for Proposals (RFPs). Nonprofits, interstate associationsand intertribal consortia are eligible to apply for the National WPDG RFPs.

### *Brownfields Grant Funding (EPA 1.7)*

Website

https://www.epa.gov/brownfields/types-brownfields-grant-funding

Type of Financing

Grants

Critical Infrastructure Sector

N/A

Overview

- **Assessment Grants**: Assessment grants provide funding for a grant recipient to inventory, characterize, assess, and conduct planning and community involvement related to brownfield sites.
- **Revolving Loan Fund Grants**: The purpose of revolving loan fund grants is to enable states, political subdivisions, and Indian tribes to make low interest loans to carryout cleanup activities at brownfields properties.
- **Cleanup Grants**: Cleanup grants provide funding for a grant recipient to carry out cleanup activities at brownfield sites.
- **Area-Wide Planning Grants (AWP):** Grant funding to communities to research, plan and develop implementation strategies for an area affected by one or more brownfields. Developing an area-wide plan will inform the assessment, cleanup and reuse of brownfields properties and promote area-wide revitalization.
- **Environmental Workforce Development and Job Training Grants (EWDJT):** Environmental workforce development and job training grants are designed to provide funding to eligible entities, including nonprofit organizations, to recruit, train, and place predominantly low-income and minority, unemployed and under-employed residents of solid and hazardous waste-impacted communities with the skills needed to secure full-time, sustainable employment in the environmental field and in the assessment and cleanup work taking place in their communities.
- **Multi-Purpose Pilot Grants**: In FY2010, EPA piloted a new grant program that will provide a single grant to an eligible entity for both assessment and cleanup work at a specific brownfield site owned by the applicant.
- **Training, Research, and Technical Assistance Grants**: Training, research, and technical assistance grants provide funding to eligible organizations to provide training, research, and technical assistance to facilitate brownfields revitalization.

### *Water Infrastructure Improvements for the Nation Act (WIIN ACT) Grants (EPA 1.8)*

Website

https://www.epa.gov/dwcapacity/water-infrastructure-improvements-nation-act-wiin-act-grant-programs

Type of Financing

Grant

Critical Infrastructure Sector

Water Systems

Overview

The 2016 Water Infrastructure Improvements for the Nation Act (WIIN Act) addresses, supports, and improves America's drinking water infrastructure. Included in the WIIN Act are three new drinking water grants that promote public health and the protection of the environment.

## U.S. Department of Homeland Security

### *Building Resilient Infrastructure and Communities (BRIC) Grants (DHS 1.0)*

Website

https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities

Type of Financing

Grant

Critical Infrastructure Sector

N/A

Overview

The Federal Emergency Management Agency (FEMA) makes federal funds available through the new Building Resilient Infrastructures and Communities (BRIC) grant program to states, local communities, tribes and territories (SLTTs) for pre-disaster mitigation activities. BRIC is a new FEMA pre-disaster hazard mitigation program that replaces the existing Pre-Disaster Mitigation (PDM) program. The Disaster Recovery Reform Act, Section 1234; amended Section203 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) and authorizes BRIC.
The BRIC priorities are to:

- incentivize public infrastructure projects;
- incentivize projects that mitigate risk to one or more lifelines;
- incentivize projects that incorporate nature-based solutions;
- and, incentivize adoption and enforcement of modern building codes.

Eligibility

State, local, tribal, and territorial government.

### *FEMA Homeland Security Grant Program (HSGP) (DHS 1.1)*

Website

https://www.fema.gov/homeland-security-grant-program

Type of Financing

Grant

Overview

Provide a primary funding mechanism for building and sustaining national preparedness capabilities. HSGP is comprised of three interconnected grant programs: 1) State HomelandSecurity Program (SHSP) 2) Urban Area Security Initiative (UASI) 3) Operation Stonegarden(OPSG). Together, these grant programs fund a range of preparedness activities, including planning, organization, equipment purchase, training, exercises, and management and administration.

### *FEMA Public Assistance Grant Program: Local, State, Tribal and Private Non-Profit (DHS 1.2)*

Website

https://www.fema.gov/public-assistance-local-state-tribal-and-non-profit

Type of Financing

Grant

Overview

Provides federal assistance in the form of grants to state, tribal, and local governments and certain private nonprofit organizations following a Presidential disaster declaration so that communities can quickly respond to and recover from major disasters or emergencies. Throughthe program, FEMA provides supplemental federal disaster grant assistance for debris removal,life-saving emergency protective measures, and the repair, replacement, or restoration of disaster-damaged publicly owned facilities, and the facilities of certain private non-profit organizations.

Eligibility

The federal share of assistance is not less than 75 percent of the eligible cost. The Recipient(usually the state) determines how the non-federal share (up to 25 percent) is split with the subrecipients (eligible applicants).

### *FEMA Tribal Homeland Security Grant (DHS 1.3)*

Website

https://www.fema.gov/tribal-homeland-security-grant-program

Type of Financing

Grant

Overview

This program provides funding to eligible Federally- recognized tribes to strengthen their capacity to prevent, protect against, mitigate, respond to, and recover from potential terrorist attacks and other hazards. Grants are awarded based on eligibility and effectiveness, the latterof which is determined by a peer review process.

Eligibility

"Directly eligible tribes" as defined in 6 U.S.C. § 601(4)

### *FEMA Hazard Mitigation Grant Program (DHS 1.4)*

Website

https://www.fema.gov/hazard-mitigation-grant-program

Type of Financing

Grant

Critical Infrastructure Sector

Emergency Services

Overview

The purpose of the HMGP program is to help communities implement hazard mitigation measures following a Presidential major disaster declaration. HMGP funds can be used for avariety of infrastructure projects as well planning activities.

Eligibility

Consistent with requirements in 44 CFR Parts 201 and 206, a mitigation planning subaward must result in a mitigation plan adopted by the jurisdiction(s) and approved by FEMA, or it mustresult in a mitigation planning-related activity (eligible under HMGP only) approved by FEMA.

### *FEMA Flood Mitigation Assistance Grant Program (DHS 1.5)*

Website

https://www.fema.gov/flood-mitigation-assistance-grant-program

Type of Financing

Grant

Critical Infrastructure Sector

Emergency Services

Overview

FMA provides funding to States, Territories, federally-recognized tribes and local communities for projects and planning that reduces or eliminates long-term risk of flood damage to structuresinsured under the NFIP.

Eligibility

States, Territories, Federally-recognized tribes, Local governments

### *FEMA Preparedness (Non-Disaster) Grants (DHS 1.6)*

Website

https://www.fema.gov/non-disaster-grants-management-system

Type of Financing

Grant

Critical Infrastructure Sector

Emergency Services

Overview

Provides state and local governments with preparedness program funding to enhance the capacity of responders to prevent, respond to, and recover from a weapons of mass destruction terrorism incident involving chemical, biological, radiological, nuclear, and explosive devices andcyber-attacks.

### *FEMA Transit Security Grant Program (DHS 1.7)*

Website

https://www.fema.gov/transit-security-grant-program

Type of Financing

Grant

Critical Infrastructure Sector

Transportation Systems

Overview

Provides funds to owners and operators of transit systems to protect and increase the resilienceof critical surface transportation infrastructure and the traveling public from acts of terrorism.

Eligibility

Eligible transit agencies are determined based on daily unlinked passenger trips (ridership) andtransit systems that serve historically eligible Urban Area Security Initiative (UASI) jurisdictions.

### *FEMA Emergency Management Performance Grant (EMPG) Program (DHS 1.8)*

Website

https://www.fema.gov/emergency-management-performance-grant-program

Type of Financing

Grant

Critical Infrastructure Sector

Emergency Services

Overview

Provides grant funding to states to assist state, local, territorial, and tribal governments inpreparing for all hazards, as authorized by the Stafford Act.

Eligibility

All 56 States and territories, as well as the Republic of the Marshall Islands and the FederatedStates of Micronesia, are eligible for FY 2016 EMPG Program funds.

### *FEMA Assistance to Firefighters Grant (DHS 1.9)*

Website

https://www.fema.gov/welcome-assistance-firefighters-grant-program

Type of Financing

Grant

Critical Infrastructure Sector

Emergency Services

Overview

To enhance the safety of the public and firefighters with respect to fire-related hazards by providing direct financial assistance for critically needed resources to equip and train emergencypersonnel to recognized standards, enhance operations efficiencies, foster interoperability, and support community resilience.

### *FEMA Community Disaster Loan Program (DHS 1.10*

Website

https://www.fema.gov/community-disaster-loan-program

Type of Financing

Direct Loans

Critical Infrastructure Sector

Emergency Services

Overview

To provide funds to any eligible jurisdiction in a designated disaster area that has suffered asubstantial loss of tax and other revenue.

Eligibility

local governments who have suffered a substantial loss (greater than 5%) of tax and other revenues as a result of a major disaster, and which can demonstrate a need for federal financialassistance in order to perform its governmental functions.

### *FEMA Port Security Grant Program (DHS 1.11)*

Website

https://www.fema.gov/port-security-grant-program

Type of Financing

Grant

Critical Infrastructure Sector

Transportation Systems

Overview

Supports the building, sustainment, and delivery of core capabilities essential to achieving theNational Preparedness Goal (the Goal) of a secure and resilient Nation.

### *CISA Emergency Communications Grant Guidance (DHS 1.12)*

Website

https://www.cisa.gov/publication/emergency-communications-grant-guidance-documents

Type of Financing

Grant Guidance

Critical Infrastructure Sector

Communications, Emergency Services

Overview

CISA provides a series of guidance documents providing recommendations for developing andmaintaining interoperable emergency communications systems. This guidance can be used to inform grant applications for any grant program which provides funding for emergency communications systems.

### *High Hazard Potential Dam Grant Program (DHS 1.13)*

Website

https://www.fema.gov/emergency-managers/risk-management/dam-safety/rehabilitation-high-hazard-potential-dams

Type of Financing

Grants

Critical Infrastructure Sector

Dams

Overview

The High Hazard Potential Dam Grant (HHPD) awards provide technical, planning, design and construction assistance in the form of grants for rehabilitation of eligible high hazard potential dams.

Eligibility

A state or territory with an enacted dam safety program, the State Administrative Agency, or an equivalent state agency, is eligible for the grant.

### *SAFECOM Emergency Communication Grants (DHS 1.14)*

Website

https://www.cisa.gov/sites/default/files/publications/FY%202021%20SAFECOM%20Guidance_Final_508.pdf

Type of Financing

Grants and loans

Critical Infrastructure Sector

Emergency Communications

Overview

The SAFECOM Guidance is designed to promote and align with the national vision established in the NECP. CISA published a second update to the NECP in September 2019 that builds upon revisions made in 2014, while also positioning the NECP to maintain relevance into the future. Updates to the NECP goals and objectives aim to enhance emergency communications capabilities at all levels of government in coordination with the private sector, nongovernmental organizations, and communities across the Nation. The plan’s success relies on the whole community embracing the NECP goals and objectives,

and most importantly implementing them. Critical components for advancing emergency communications fall under three national priorities:

- Enhance effective governance across partners with a stake in emergency communications, embracing a shared responsibility of the whole community from traditional emergency responders and supporting entities to the citizens served
- Address interoperability challenges posed by rapid technology advancements and increased information sharing, ensuring the most critical information gets to the right people at the right time
- Build resilient and se cure emergency communications systems to reduce cybersecurity threats and vulnerabilities

Eligibility

Varies by funding opportunity

## U.S. Department of Health and Human Services

### *Disaster Assistance for State Units on Aging (SUAs) (DHHS 1.0)*

Website

https://acl.gov/grants/disaster-assistance-state-units-aging-suas-and-tribal-organizations- national-disasters-1

Critical Infrastructure Sector

Healthcare and Public Health

Overview

Provide disaster relief funds to those SUAs and tribal organizations that are currently receiving agrant under Title VI of the Older Americans Act.

### *Hospital Preparedness Program (DHHS 1.1)*

Website

http://www.phe.gov/Preparedness/planning/hpp/Pages/funding.aspx

Type of Financing

Grants and Cooperative Agreements

Critical Infrastructure Sector

Healthcare and Public Health

Overview

The Hospital Preparedness Program (HPP) provides leadership and funding through grants andcooperative agreements to States, territories, and eligible municipalities. The grants are provided to improve surge capacity and enhance community and hospital preparedness for public health emergencies.

## U.S. Department of Housing and Urban Development

### *Community Development Block Grant Program (CDBG) (HUD 1.0)*

Website

https://www.hud.gov/program_offices/comm_planning/communitydevelopment

Type of Financing

Grant

Critical Infrastructure Sector

N/A

Overview

Provides communities with resources to address a wide range of unique community development needs including neighborhood stabilization and disaster recovery assistance.

Eligibility

Over a 1, 2, or 3-year period, as selected by the grantee, not less than 70 percent of CDBG funds must be used for activities that benefit low- and moderate-income persons. In addition, each activity must meet one of the following national objectives for the program: benefit low- and moderate-income persons, prevention or elimination of slums or blight, or address community development needs having a particular urgency because existing conditions pose aserious and immediate threat to the health or welfare of the community for which other funding is not available.

### *Rural Housing & Economic Development (RHED) (HUD 1.1)*

Website

https://www.hudexchange.info/programs/rhed/

Type of Financing

Grant

Critical Infrastructure Sector

N/A

Overview

This grant program funds activities to build capacity at the state and local level and economicdevelopment in rural areas.

Eligibility

Rural nonprofits, community development corporations (CDCs), state housing finance agencies(HFAs), state community and/or economic development agencies, and federally recognized Indian tribes.

## U.S. Department of Treasury

### *Capital Projects Fund (DOTrs 1.0)*

Website

https://home.treasury.gov/policy-issues/coronavirus/assistance-for-state-local-and-tribal-governments/capital-projects-fund

Type of Financing

Grant

Critical Infrastructure Sector

Broadband/Digital Connectivity/Multi-purpose Community Facility

Overview

The COVID-19 public health emergency revealed and continues to reinforce our understanding that communities without access to high-quality modern infrastructure, including broadband, face impediments to fully participating in aspects of daily life, such as remote work, telehealth, and distance learning. Treasury is launching the Capital Projects Fund to allow recipients to invest in capital assets that meet communities' critical needs in the short- and long-term, with a key emphasis on making funding available for broadband infrastructure. The Capital Projects Fund aims to:

- Directly support recovery from the COVID-19 public health emergency by strengthening and improving the infrastructure necessary for participation in work, education, and health monitoring that will last beyond the pandemic.
- Enable investments in capital assets designed to address inequities in access to critical services.
- Contribute to the Administration's goal of providing every American with the modern infrastructure necessary to access critical services, including a high-quality and affordable broadband internet connection.

Eligibility

For a capital project to be an eligible use of Capital Projects Fund grant funds, it must meet all of the following criteria:

3. The capital project invests in capital assets designed to directly enable work, education, and health monitoring.
4. The capital project is designed to address a critical need that resulted from or was made apparent or exacerbated by the COVID-19 public health emergency.
5. The capital project is designed to address a critical need of the community to be served by it.

The following capital projects are identified in the Capital Projects Fund Guidance as being eligible uses of Capital Projects Fund grant funding:

- Broadband Infrastructure Projects: the construction and deployment of broadband infrastructure designed to deliver service that reliably meets or exceeds symmetrical speeds of 100Mbps so that communities have future-proof infrastructure to serve their long-term needs.
- Digital Connectivity Technology Projects: the purchase or installation of devices and equipment, such as laptops, tablets, desktop personal computers, and public Wi-Fi equipment, to facilitate broadband internet access for communities where affordability is a barrier to broadband adoption and use.
- Multi-Purpose Community Facility Projects: the construction or improvement of buildings designed to jointly and directly enable work, education, and health monitoring located in communities with critical need for the project.

### *Coronavirus State and Local Fiscal Recovery Funds (DOTrs 1.1)*

#### Website

https://home.treasury.gov/policy-issues/coronavirus/assistance-for-state-local-and-tribal-governments/state-and-local-fiscal-recovery-funds

#### Type of Financing

Federal Funding

#### Critical Infrastructure Sector

Water/Sewer/Broadband

#### Overview

The Coronavirus State and Local Fiscal Recovery Funds provide substantial flexibility for each government to meet local needs—including support for households, small businesses, impacted industries, essential workers, and the communities hardest hit by the crisis. These funds can also be used to make necessary investments in water, sewer, and broadband infrastructure.

- **Invest in water, sewer, and broadband infrastructure**, making necessary investments to improve access to clean drinking water, support vital wastewater and stormwater infrastructure, and to expand access to broadband internet.

#### Eligibility

Treasury will distribute funds to eligible state, territorial, metropolitan city, county, and Tribal governments.

Eligible local governments that are classified as non-entitlement units of local government should expect to receive this funding through their applicable state government. Jurisdictions classified as non-entitlement units of local government are not eligible to receive this funding directly from Treasury and should not request funding through the Treasury Submission Portal.

## National Science Foundation

### *Decision, Risk, and Management Sciences Program (DRMS) (NSF 1.0)*

Website

http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5423&org=SES

Overview

Provides funding to support scientific research directed at increasing the understanding andeffectiveness of decision making by individuals, groups, organizations, and society.

### *Engineering for Natural Hazards (ENH) Program (NSF 1.1)*

Website

https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=505177

Overview

The Engineering for Natural Hazards (ENH) program supports fundamental research thatadvances knowledge for understanding and mitigating the impact of natural hazards on constructed civil infrastructure.

## U.S. Small Business Administration

### *Disaster Loans (SBA 1.0)*

Website

https://www.sba.gov/page/disaster-loan-applications

Type of Financing

Direct Loans

Critical Infrastructure Sector

Emergency Services

Overview

Loans for home and personal, physical small businesses, and economic injury in Presidentialdeclared disaster areas.

Eligibility

Located in a declared disaster area.

## U.S. Department of the Interior

### *The Hurricane Sandy Coastal Resiliency Competitive Grant Program (DOI 1.0)*

Website

http://www.nfwf.org/hurricanesandy/Pages/home.aspx

Type of Financing

Competitive Grant

Critical Infrastructure Sector

Multi

Overview

Administered by the NFWF, the program supports projects that reduce communities' vulnerability to the growing risks from coastal storms, sea level rise, flooding, erosion and associated threats through strengthening natural ecosystems that also benefit fish and wildlife.

### *Bureau of Reclamation's WaterSMART Drought Response Program (DOI 1.1)*

Website

http://www.usbr.gov/drought/

Type of Financing

Competitive Funding

Critical Infrastructure Sector

N/A

Overview

Funding to develop a new drought contingency plan or to update an existing plan. Funding for drought resiliency projects that will build long-term resiliency into drought planning and mitigateimpacts caused by drought.

Eligibility

Reclamation will fund drought resiliency projects that will helpcommunities prepare for and respond to drought.

### *U.S. Fish and Wildlife Service Coastal Impact Assistance Program (DOI 1.2)*

Website

https://wsfrprograms.fws.gov/subpages/grantprograms/ciap/ciap.htm

Type of Financing

Grant

Critical Infrastructure Sector

N/A

Overview

Grant funding to conserve, restore or protect coastal areas including wetlands; mitigation of damage to fish, wildlife, or natural resources; planning assistance and the administrative costs of complying with these objectives; implementation of a federally-approved marine, coastal, or comprehensive conservation management plan; and mitigation of the impact of outer Continental Shelf activities through funding of onshore infrastructure projects and public serviceneeds.

Eligibility

States eligible for CIAP funding are: Alabama, Alaska, California, Louisiana, Mississippi, and Texas. Also eligible to apply for and receive CIAP funds are 67 coastal political subdivisions inthe six states.

### *U.S. Fish and Wildlife Service Coastal Wetlands Conservation Grant Program (DOI 1.3)*

Website

https://www.fws.gov/coastal/coastalgrants/

Type of Financing

Matching Grant

Critical Infrastructure Sector

N/A

Overview

Provides matching grants to states for acquisition, restoration, management or enhancement ofcoastal wetlands.

Eligibility

States receiving funds are California, Georgia, Massachusetts, New Hampshire, New Jersey,Maine, North Carolina, Texas, Washington and Wisconsin.

## U.S. Geological Survey

### *Earthquake Hazards Program (USGS 1.0)*

Website

http://earthquake.usgs.gov/research/external/

Type of Financing

Competitive Grant

Critical Infrastructure Sector

N/A

Overview

Provides grants and cooperative agreements to support research in earthquake hazards, thephysics of earthquakes, earthquake occurrence, and earthquake safety policy.

## U.S. Department of Agriculture

### *NRCS Agricultural Management Assistance Program (USDA 1.0)*

Website

https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/ama/

Type of Financing

Technical and Financial Assistance

Critical Infrastructure Sector

Food and Agriculture

Overview

Producers receive conservation technical and financial assistance to construct or improve watermanagement or irrigation structures, plant trees for windbreaks or, in order to improve water quality and mitigate risk, diversify their operation and conservation practices including soil erosion control, integrated pest management or transition to organic farming.

Eligibility

AMA is available in 16 states where participation in the Federal Crop Insurance Program is historically low: Connecticut, Delaware, Hawaii, Maine, Maryland, Massachusetts, Nevada, NewHampshire, New Jersey, New York, Pennsylvania, Rhode Island, Utah, Vermont, West Virginia,and Wyoming.

### *Strategic Economic and Community Development (USDA 1.1)*

Website

https://www.rd.usda.gov/programs-services/strategic-economic-and-community-development

Critical Infrastructure Sector

N/A

Overview

Provides priority to projects that support strategic economic and community development plansthrough the alignment of resources with long-range and multi-jurisdictional challenges and needs by leveraging federal, state, local, or private funding.

Eligibility

To be eligible for SECD, a project must: Be eligible for the underlying program, be carried outsolely in a rural area, and support a multi-jurisdictional strategic economic community development plan.

### *Rural Energy for America Program Renewable Energy Systems & Energy Efficiency Improvement Loans & Grants (USDA 1.2)*

Website

https://www.rd.usda.gov/programs-services/rural-energy-america-program-renewable-energy- systems-energy-efficiency

Type of Financing

Guaranteed Loans/Grant Funding

Critical Infrastructure Sector

Food and Agriculture

Overview

Provides guaranteed loan financing and grant funding to agricultural producers and rural smallbusinesses for renewable energy systems or to make energy efficiency improvements.

Eligibility

Agricultural producers with at least 50% of gross income coming from agricultural operations,and small businesses in eligible rural areas.

### *Emergency Community Water Assistance Grants (ECWAG) (USDA 1.3)*

Website

https://www.rd.usda.gov/files/rdECWAG_Feb2014.pdf

Type of Financing

Grant

Critical Infrastructure Sector

Water and Wastewater Systems

Overview

Helps eligible rural communities recover from or prepare for emergencies that result in a declinein capacity to provide safe, reliable drinking water for households and businesses.

Eligibility

Eligible applicants include most State and local governmental entities, nonprofit organizations and federally recognized Tribes. Privately owned wells are not eligible. Projects must be locatedin rural areas and towns up with 10,000 or fewer people and with a median household income less than $62,883.

### *Emergency Watershed Protection Program (USDA 1.4)*

Website

https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1045263.pdf

Type of Financing

Financial and Technical Assistance

Critical Infrastructure Sector

Water and Wastewater Systems/Emergency Management

Overview

Can help communities address watershed impairments that pose imminent threats to lives andproperty.

Eligibility

Public and private landowners are eligible for assistance but must be represented by a project sponsor. Sponsors include legal subdivisions of the State, such as a city, county, general improvement district, conservation district, or any Native American tribe or tribal organization asdefined in section 4 of the Self-Determination and Education Assistance Act.

### *The Emergency Watershed Protection - Floodplain Easement Program (EWP-FPE) (USDA 1.5)*

Website

https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/landscape/ewpp/?cid=nrcs1_43_008216

Critical Infrastructure Sector

Water and Wastewater Systems

Overview

Provides an alternative measure to traditional EWP recovery, where it is determined thatacquiring an easement in lieu of recovery measures is the more economical and prudentapproach to reducing a threat to life or property.

### *Community Facilities Direct Loan & Grant Program (USDA 1.6)*

Website

https://www.rd.usda.gov/programs-services/community-facilities-direct-loan-grant-program

Type of Financing

Loan and Grant Funding

Critical Infrastructure Sector

N/A

Overview

Provides affordable funding to develop essential community facilities in rural areas.

Eligibility

Rural areas including cities, villages, townships and towns including Federally Recognized Tribal Lands with no more than 20,000 residents according to the latest U.S. Census Data areeligible for this program.

# II. State Programs

## Kansas

### *PROGRAMS/FUNDING OPPORTUNITIES*

- **The Emergency Management Performance Grant (EMPG) (KS 1.0):** The EMPG is offered togive assistance to counties in developing disaster and assistance programs, priorities,and organizations. The purpose of the program is to ensure that a comprehensive emergency management system exists for disasters or emergencies resulting from natural disasters, technological, or man-caused events. http://www.kansastag.gov/KDEM.asp?PageID=411
- **Community Development Block Grants (KS 1.1):** Business finance grants to cities or counties can be loaned to private businesses to provide gap financing that creates or retains permanent jobs. Funding is also available for infrastructure improvements that directly create or retain permanent jobs. Eligible activities include infrastructure, land acquisition, fixed assets and working capital. Some repayment is required for all Economic Development categories. Grants are made to cities and counties, who then loan funds to developing businesses. Repaid funds are returned to the state revolving loan fund. Funds may also be used for infrastructure on a loan / grant basis. The funding ceiling is $35,000 per job created or retained with a maximum of $750,000. https://www.kansascommerce.gov/program/community-programs/cdbg/cdbg-eco-devo/
- **Kansas State Revolving Fund (KS 1.2)**: The Public Water Supply Section manages programs that can provide funding assistance for municipalities that desire to make drinking water and wastewater infrastructure improvements. Grant funding is available for planning assistance related to drinking water infrastructure and loan funding is available for planning, design, and construction of both drinking water and wastewater system infrastructure. There are 3 planning grant programs, Regional Public Water Supply Planning Grants, and Small Public Water Supply Systems Grants, and Corrosion Control Study Grants. Regional Public Water Supply Planning Grants can provide for 50% of the cost (up to $12,500) for developing engineering studies that evaluate regional solutions to public water supply needs. Small Public Water Supply System Grants can provide for 50% of the cost (up to $5,000) for developing engineering studies for public water supply systems serving a population of 1,000 or less that are out of compliance with drinking water regulations. Corrosion Control Study Grants can provide for 50% of the cost (up to $3,000) for developing a corrosion control study for public water supply systems serving a population of 10,000 or less that have had an action level exceedance for lead or copper. The Kansas SRF can provide subsidized interest rate loans for almost any public water supply system or wastewater system infrastructure need. The interest rate for loans made in July 2021 is 1.33%. https://www.kdheks.gov/pws/loansgrants/loansgrants.html

# III. Non-Governmental Programs

## The Kresge Foundation

### *Place-based, local systems, neighborhood, and environments funding (NGO 1.0)*

Website

http://kresge.org/opportunities

Type of Financing

Grant

Critical Infrastructure Sector

N/A

Overview

Funding and grants offered for communities seeking resilience from natural disasters.

## The Rockefeller Foundation

### *CityNext (NGO 1.1)*

Website

https://www.rockefellerfoundation.org/our-work/grants/

Type of Financing

Grants

Critical Infrastructure Sector

N/A

Overview

Helping cities, organizations, and communities better prepare for, respond to, and transformfrom disruption, through technical assistance, grant and funding.

## OpenSpace Institute

### *Environmental Focused Grants (NGO 1.2)*

Website

http://www.osiny.org/site/PageServer?pagename=Program_CFP_GeographicRegions

Type of Financing

Grant

Critical Infrastructure Sector

N/A

Overview

Grants and loans w/ focus on the east coast for communities looking to improve resiliency toenvironmentally delicate areas.

## The Threshold Foundation

### *Thriving Resilient Communities Funds (NGO 1.3)*

Website

https://www.thresholdfoundation.org/thriving-resilient-communities

Type of Financing

Grant

Overview

Funds collaborative tools and approaches that build leadership and capacity for communities toaddress their own strategic needs in the face of energy, climate, economic, and social challenges.

## The Wildlife Conservation Society

### *Climate Adaptation Fund (NGO 1.4)*

Website

http://wcsclimateadaptationfund.org/program-information

Type of Financing

Award Funding

Critical Infrastructure Sector

N/A

Overview

Awards will be made to non-profit conservation organizations for applied, on-the-ground projectsfocused on implementing priority conservation actions for climate adaptation at a landscape scale.

Eligibility

This program provides grants to U.S.-based non-profit conservation organizations with approved IRS 501(c)(3) status. Grants can be awarded for projects only within the 50 U.S. states and six U.S. territories. The WCS Climate Adaptation Fund is unable to make grants to for-profit corporations, individuals, universities, public agencies, municipalities or other types ofgovernment entities.

## Appendix F: Additional Information Sources – Funding Resources

| Resource | Information Available | Link |
|---|---|---|
| Grants.gov | A searchable database of USG grantsavailable including sponsoring agency, posted and closing dates. Grantor agencies include the CDC, NSF, NIH, etc. Funding Opportunity Number is an active hyperlink category that allows the user to view the grant opportunity summary sheet. | http://www.grants.gov/web/grants/search-grants.html |
| FedCenter.gov | Contains information on variousFederal, State and non-profit organization grant opportunities. | https://www.fedcenter.gov/opportunities/grants/ |
| Catalog of Federal Domestic Assistance | Contains detailed program descriptions for 2,299 Federal assistance programs. | https://www.cfda.gov/index?s=main&mode=list&tab=list&tabmode=list |
| DisasterAssistance.gov | Provides access to disaster help andresources for the U.S. and territoriesand lists currently declared disaster states (and affected counties) that may allow for individual assistance. | www.disasterassistance.gov |
| U.S. Climate Resilience Toolkit | A listing of a number of federal government and NGO sources for technical assistance funding to promote increased climate resilience with hyperlinks to other organizations.It is a coordinated effort by NOAA, USDA, and the Department of the Interior. | https://toolkit.climate.gov/content/funding-opportunities |
| Federal Funding Compendium for Urban heat Adaptation (2013) | Provides a list of federal fundingsources for climate-related work. | https://www.georgetownclimate.org/files/report/Federal%20Funding%20Compendium%20for%20Urban%20Heat%20Adaptation.pdf |
| EPA Catalogue of Federal Funding Sources for Watershed Protection | A searchable database of financialassistance sources (grants, loans,cost-sharing) available to fund a variety of watershed protection projects. | https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=20004O44.TXT |
| National Integrated Drought Information System | Provides information and services tomitigate drought including links to USG Agencies that provide financial assistance. | https://www.drought.gov/drought/resources/recovery |
| Tribal Climate Change Guide for Funding, Science, Programs, and Adaptation Plans | A sortable spreadsheet that can helptribes find potential funding sources and other resources, maintained by University of Oregon. | http://tribalclimateguide.uoregon.edu/ |
| Great Lakes Costal Resilience | Coordinating organization with information on financing and technicalresources on zoning and land use, infrastructure, habitat and environment, and public health and safety. Provides links to a number of resources and other organizations. | http://www.greatlakesresilience.org/ |
| Federation of Canada: Green Municipal Fund | A unique program that provides funding and knowledge services to support sustainable community development. GMF-supported initiatives aim to improve air, water, and soil, and mitigate the impacts of climate change (for potential for cross-border initiatives). | http://www.fcm.ca/home/programs/green-municipal-fund.htm |
| U.S. Committee on the Marine Transportation Systems (CMTS) Federal Funding Handbook: Marine Transportation SystemInfrastructure | Reference to funding programs withwhich stakeholders might not be familiar, including coastal wetland &wildlife, disaster recovery, and economic development. | https://www.cmts.gov/downloads/2017_CMTS_Federal_Funding_Handbook_for_MTS_Infrastructure.pdf |
| Statelocalgov.net | List of state and local grant fundingopportunities. | http://www.statelocalgov.net/50states-state-grants.cfm |

# Appendix G: FEMA National Risk Index Flint Hills Region Comparison Report

National Risk Index

August 23, 2022

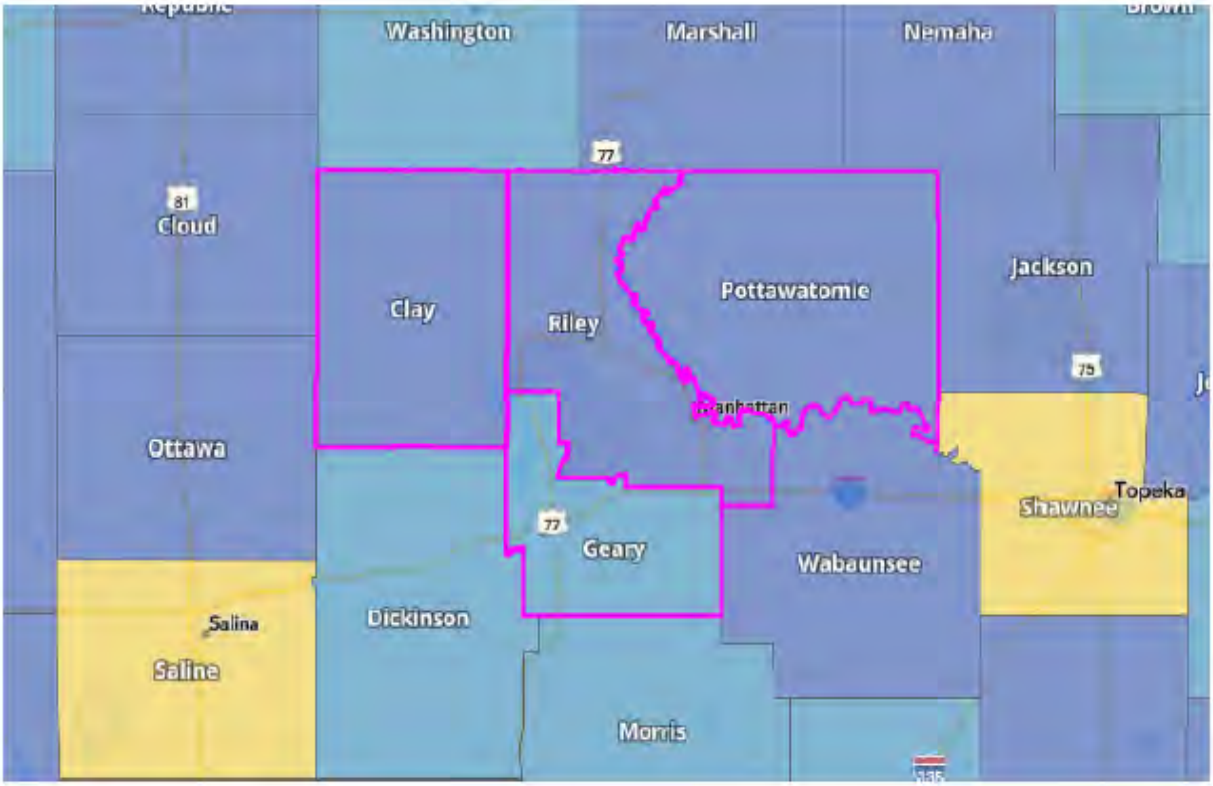
## Risk Comparison Report

Use this report to determine how risk factors in selected communities compare to each other. Click a community name in any table below to open an individual risk profile report for that community and review its risk factors in more detail.

While reviewing this report, keep in mind that low risk is driven by lower loss due to natural hazards, lower social vulnerability, and higher community resilience.

For more information about the National Risk Index, its data, and how to interpret the information it provides, please review the About the National Risk Index and How to Take Action sections at the end of this report. Or, visit the National Risk Index website at hazards.fema.gov/nri/learn-more to access supporting documentation and links.

# Risk Index




Risk Index Legend

Very High | Relatively High | Relatively Moderate | Relatively Low | Very Low

No Rating | Not Applicable | Insufficient Data

| Rank | Community | State | Rating | Score | | |
|---|---|---|---|---|---|---|
| 1 | Geary County | KS | Relatively Low | 8.25 | 0 | 100 |
| 2 | Riley County | KS | Very Low | 7.20 | 0 | 100 |
| 3 | Clay County | KS | Very Low | 6.82 | 0 | 100 |
| 4 | Pottawatomie County | KS | Very Low | 4.27 | 0 | 100 |

## Hazard Type Risk Index

Hazard type Risk Index scores are calculated using data for only a single hazard type, and reflect a community's relative risk for only that hazard type.

### Avalanche

| Rank | Community | State | Rating | Score |
|---|---|---|---|---|
| | Clay County | KS | Not Applicable | -- |
| | Geary County | KS | Not Applicable | -- |
| | Pottawatomie County | KS | Not Applicable | -- |
| | Riley County | KS | Not Applicable | -- |

### Coastal Flooding

| Rank | Community | State | Rating | Score |
|---|---|---|---|---|
| | Clay County | KS | Not Applicable | -- |
| | Geary County | KS | Not Applicable | -- |
| | Pottawatomie County | KS | Not Applicable | -- |
| | Riley County | KS | Not Applicable | -- |

## Cold Wave

| Rank | Community | State | Rating | Score | | |
|---|---|---|---|---|---|---|
| 1 | Geary County | KS | Very Low | 5.91 | 0 | 100 |
| 2 | Clay County | KS | Very Low | 5.49 | 0 | 100 |
| 3 | Riley County | KS | Very Low | 4.11 | 0 | 100 |
| 4 | Pottawatomie County | KS | Very Low | 3.50 | 0 | 100 |

## Drought

| Rank | Community | State | Rating | Score | | |
|---|---|---|---|---|---|---|
| 1 | Geary County | KS | Relatively Low | 4.74 | 0 | 100 |
| 2 | Pottawatomie County | KS | Very Low | 3.89 | 0 | 100 |
| 3 | Riley County | KS | Very Low | 3.12 | 0 | 100 |
| 4 | Clay County | KS | Very Low | 0.53 | 0 | 100 |

## Earthquake

| Rank | Community | State | Rating | Score | | |
|---|---|---|---|---|---|---|
| 1 | Riley County | KS | Very Low | 1.03 | 0 | 100 |
| 2 | Geary County | KS | Very Low | 0.90 | 0 | 100 |
| 3 | Clay County | KS | Very Low | 0.71 | 0 | 100 |
| 4 | Pottawatomie County | KS | Very Low | 0.67 | 0 | 100 |

## Hail

| Rank | Community | State | Rating | Score | | |
|---|---|---|---|---|---|---|
| 1 | Clay County | KS | Relatively Moderate | 17.94 | 0 | 100 |
| 2 | Riley County | KS | Relatively Low | 12.50 | 0 | 100 |
| 3 | Geary County | KS | Very Low | 6.24 | 0 | 100 |
| 4 | Pottawatomie County | KS | Very Low | 4.03 | 0 | 100 |

## Heat Wave

| Rank | Community | State | Rating | Score | | |
|---|---|---|---|---|---|---|
| 1 | Geary County | KS | Relatively Moderate | 13.46 | 0 | 100 |
| 2 | Riley County | KS | Relatively Low | 6.17 | 0 | 100 |
| 3 | Clay County | KS | Relatively Low | 4.85 | 0 | 100 |
| 4 | Pottawatomie County | KS | Relatively Low | 4.58 | 0 | 100 |

## Hurricane

| Rank | Community | State | Rating | Score |
|---|---|---|---|---|
| | Clay County | KS | Not Applicable | -- |
| | Geary County | KS | Not Applicable | -- |
| | Pottawatomie County | KS | Not Applicable | -- |
| | Riley County | KS | Not Applicable | -- |

## Ice Storm

| Rank | Community | State | Rating | Score | | |
|---|---|---|---|---|---|---|
| 1 | Clay County | KS | Very Low | 8.08 | 0 | 100 |
| 2 | Pottawatomie County | KS | Very Low | 7.55 | 0 | 100 |
| 3 | Geary County | KS | Very Low | 6.76 | 0 | 100 |
| 4 | Riley County | KS | Very Low | 4.66 | 0 | 100 |

## Landslide

| Rank | Community | State | Rating | Score | | |
|---|---|---|---|---|---|---|
| 1 | Pottawatomie County | KS | Relatively Low | 8.83 | 0 | 100 |
| 2 | Geary County | KS | Very Low | 6.98 | 0 | 100 |
| 3 | Clay County | KS | Very Low | 6.85 | 0 | 100 |
| 4 | Riley County | KS | Very Low | 6.62 | 0 | 100 |

## Lightning

| Rank | Community | State | Rating | Score | | |
|---|---|---|---|---|---|---|
| 1 | Riley County | KS | Relatively Low | 12.04 | 0 | 100 |
| 2 | Geary County | KS | Relatively Low | 9.49 | 0 | 100 |
| 3 | Clay County | KS | Very Low | 6.65 | 0 | 100 |
| 4 | Pottawatomie County | KS | Very Low | 4.84 | 0 | 100 |

## Riverine Flooding

| Rank | Community | State | Rating | Score | | |
|---|---|---|---|---|---|---|
| 1 | Geary County | KS | Relatively Low | 7.08 | 0 | 100 |
| 2 | Riley County | KS | Relatively Low | 6.30 | 0 | 100 |
| 3 | Clay County | KS | Relatively Low | 6.16 | 0 | 100 |
| 4 | Pottawatomie County | KS | Very Low | 4.28 | 0 | 100 |

## Strong Wind

| Rank | Community | State | Rating | Score | | |
|---|---|---|---|---|---|---|
| 1 | Geary County | KS | Relatively Low | 12.48 | 0 | 100 |
| 2 | Riley County | KS | Relatively Low | 11.95 | 0 | 100 |
| 3 | Clay County | KS | Relatively Low | 11.60 | 0 | 100 |
| 4 | Pottawatomie County | KS | Very Low | 6.37 | 0 | 100 |

## Tornado

| Rank | Community | State | Rating | Score | | |
|---|---|---|---|---|---|---|
| 1 | Geary County | KS | Relatively Moderate | 18.44 | 0 | 100 |
| 2 | Riley County | KS | Relatively Low | 15.30 | 0 | 100 |
| 3 | Clay County | KS | Relatively Low | 13.25 | 0 | 100 |
| 4 | Pottawatomie County | KS | Relatively Low | 9.62 | 0 | 100 |

## Tsunami

| Rank | Community | State | Rating | Score |
|---|---|---|---|---|
| | Clay County | KS | Not Applicable | -- |
| | Geary County | KS | Not Applicable | -- |
| | Pottawatomie County | KS | Not Applicable | -- |
| | Riley County | KS | Not Applicable | -- |

## Volcanic Activity

| Rank | Community | State | Rating | Score |
|---|---|---|---|---|
| | Clay County | KS | Not Applicable | -- |
| | Geary County | KS | Not Applicable | -- |
| | Pottawatomie County | KS | Not Applicable | -- |
| | Riley County | KS | Not Applicable | -- |

## Wildfire

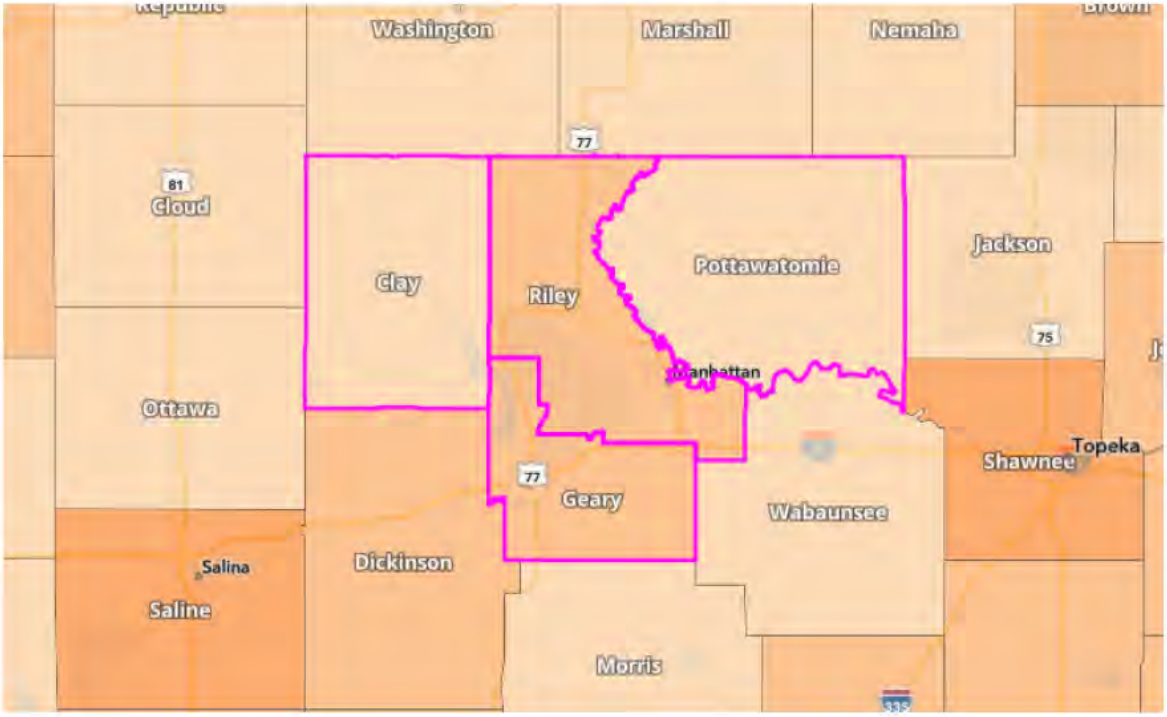
| Rank | Community | State | Rating | Score | |
|---|---|---|---|---|---|
| 1 | Geary County | KS | Relatively Low | 7.88 | 0 100 |
| 2 | Riley County | KS | Relatively Low | 6.69 | 0 100 |
| 3 | Pottawatomie County | KS | Relatively Low | 6.33 | 0 100 |
| 4 | Clay County | KS | Very Low | 4.83 | 0 100 |

Winter Weather

| Rank | Community | State | Rating | Score | | |
|---|---|---|---|---|---|---|
| 1 | Geary County | KS | Relatively Moderate | 18.95 | 0 | 100 |
| 2 | Clay County | KS | Relatively Low | 9.24 | 0 | 100 |
| 3 | Pottawatomie County | KS | Very Low | 5.81 | 0 | 100 |
| 4 | Riley County | KS | Very Low | 5.48 | 0 | 100 |

## Expected Annual Loss

Expected Annual Loss measures the expected loss each year due to natural hazards.




Expected Annual Loss Legend

Very High | Relatively High | Relatively Moderate | Relatively Low | Very Low

No Expected Annual Losses | Not Applicable | Insufficient Data

| Rank | Community | State | Rating | Score | | |
|---|---|---|---|---|---|---|
| 1 | Riley County | KS | Relatively Low | 16.15 | 0 | 100 |
| 2 | Geary County | KS | Relatively Low | 13.97 | 0 | 100 |
| 3 | Clay County | KS | Very Low | 9.18 | 0 | 100 |
| 4 | Pottawatomie County | KS | Very Low | 9.10 | 0 | 100 |

## Expected Annual Loss for Hazard Types

Expected Annual Loss scores for hazard types are calculated using data for only a single hazard type, and reflect a community's relative expected annual loss for only that hazard type.

### Avalanche

| Rank | Community | State | Rating | Score |
|---|---|---|---|---|
| | Clay County | KS | Not Applicable | -- |
| | Geary County | KS | Not Applicable | -- |
| | Pottawatomie County | KS | Not Applicable | -- |
| | Riley County | KS | Not Applicable | -- |

### Coastal Flooding

| Rank | Community | State | Rating | Score |
|---|---|---|---|---|
| | Clay County | KS | Not Applicable | -- |
| | Geary County | KS | Not Applicable | -- |
| | Pottawatomie County | KS | Not Applicable | -- |
| | Riley County | KS | Not Applicable | -- |

## Cold Wave

| Rank | Community | State | Rating | Score | | |
|---|---|---|---|---|---|---|
| 1 | Geary County | KS | Relatively Low | 8.99 | 0 | 100 |
| 2 | Riley County | KS | Relatively Low | 8.28 | 0 | 100 |
| 3 | Pottawatomie County | KS | Very Low | 6.69 | 0 | 100 |
| 4 | Clay County | KS | Very Low | 6.64 | 0 | 100 |

## Drought

| Rank | Community | State | Rating | Score | | |
|---|---|---|---|---|---|---|
| 1 | Pottawatomie County | KS | Relatively Low | 6.81 | 0 | 100 |
| 2 | Geary County | KS | Relatively Low | 6.61 | 0 | 100 |
| 3 | Riley County | KS | Relatively Low | 5.75 | 0 | 100 |
| 4 | Clay County | KS | Very Low | 0.58 | 0 | 100 |

## Earthquake

| Rank | Community | State | Rating | Score | | |
|---|---|---|---|---|---|---|
| 1 | Riley County | KS | Very Low | 2.32 | 0 | 100 |
| 2 | Geary County | KS | Very Low | 1.53 | 0 | 100 |
| 3 | Pottawatomie County | KS | Very Low | 1.43 | 0 | 100 |
| 4 | Clay County | KS | Very Low | 0.95 | 0 | 100 |

## Hail

| Rank | Community | State | Rating | Score | | |
|---|---|---|---|---|---|---|
| 1 | Riley County | KS | Relatively Moderate | 26.26 | 0 | 100 |
| 2 | Clay County | KS | Relatively Moderate | 22.61 | 0 | 100 |
| 3 | Geary County | KS | Relatively Low | 9.90 | 0 | 100 |
| 4 | Pottawatomie County | KS | Very Low | 8.05 | 0 | 100 |

## Heat Wave

| Rank | Community | State | Rating | Score | | |
|---|---|---|---|---|---|---|
| 1 | Geary County | KS | Relatively Moderate | 21.77 | 0 | 100 |
| 2 | Riley County | KS | Relatively Moderate | 13.21 | 0 | 100 |
| 3 | Pottawatomie County | KS | Relatively Low | 9.32 | 0 | 100 |
| 4 | Clay County | KS | Relatively Low | 6.23 | 0 | 100 |

## Hurricane

| Rank | Community | State | Rating | Score |
|---|---|---|---|---|
| | Clay County | KS | Not Applicable | -- |
| | Geary County | KS | Not Applicable | -- |
| | Pottawatomie County | KS | Not Applicable | -- |
| | Riley County | KS | Not Applicable | -- |

## Ice Storm

| Rank | Community | State | Rating | Score | | |
|---|---|---|---|---|---|---|
| 1 | Pottawatomie County | KS | Relatively Low | 17.91 | 0 | 100 |
| 2 | Geary County | KS | Relatively Low | 12.76 | 0 | 100 |
| 3 | Clay County | KS | Relatively Low | 12.13 | 0 | 100 |
| 4 | Riley County | KS | Very Low | 11.64 | 0 | 100 |

## Landslide

| Rank | Community | State | Rating | Score | | |
|---|---|---|---|---|---|---|
| 1 | Pottawatomie County | KS | Relatively Moderate | 20.60 | 0 | 100 |
| 2 | Riley County | KS | Relatively Low | 16.28 | 0 | 100 |
| 3 | Geary County | KS | Relatively Low | 12.96 | 0 | 100 |
| 4 | Clay County | KS | Relatively Low | 10.10 | 0 | 100 |

## Lightning

| Rank | Community | State | Rating | Score | | |
|---|---|---|---|---|---|---|
| 1 | Riley County | KS | Relatively High | 34.79 | 0 | 100 |
| 2 | Geary County | KS | Relatively Low | 20.70 | 0 | 100 |
| 3 | Pottawatomie County | KS | Relatively Low | 13.28 | 0 | 100 |
| 4 | Clay County | KS | Very Low | 11.53 | 0 | 100 |

## Riverine Flooding

| Rank | Community | State | Rating | Score | | |
|---|---|---|---|---|---|---|
| 1 | Riley County | KS | Relatively Low | 12.16 | 0 | 100 |
| 2 | Geary County | KS | Relatively Low | 10.33 | 0 | 100 |
| 3 | Pottawatomie County | KS | Relatively Low | 7.85 | 0 | 100 |
| 4 | Clay County | KS | Relatively Low | 7.14 | 0 | 100 |

## Strong Wind

| Rank | Community | State | Rating | Score | | |
|---|---|---|---|---|---|---|
| 1 | Riley County | KS | Relatively High | 39.82 | 0 | 100 |
| 2 | Geary County | KS | Relatively Moderate | 31.38 | 0 | 100 |
| 3 | Clay County | KS | Relatively Low | 23.18 | 0 | 100 |
| 4 | Pottawatomie County | KS | Relatively Low | 20.14 | 0 | 100 |

## Tornado

| Rank | Community | State | Rating | Score | | |
|---|---|---|---|---|---|---|
| 1 | Riley County | KS | Relatively High | 29.55 | 0 | 100 |
| 2 | Geary County | KS | Relatively High | 26.89 | 0 | 100 |
| 3 | Pottawatomie County | KS | Relatively Moderate | 17.63 | 0 | 100 |
| 4 | Clay County | KS | Relatively Low | 15.36 | 0 | 100 |

## Tsunami

| Rank | Community | State | Rating | Score |
|---|---|---|---|---|
| | Clay County | KS | Not Applicable | -- |
| | Geary County | KS | Not Applicable | -- |
| | Pottawatomie County | KS | Not Applicable | -- |
| | Riley County | KS | Not Applicable | -- |

## Volcanic Activity

| Rank | Community | State | Rating | Score |
|---|---|---|---|---|
| | Clay County | KS | Not Applicable | -- |
| | Geary County | KS | Not Applicable | -- |
| | Pottawatomie County | KS | Not Applicable | -- |
| | Riley County | KS | Not Applicable | -- |

## Wildfire

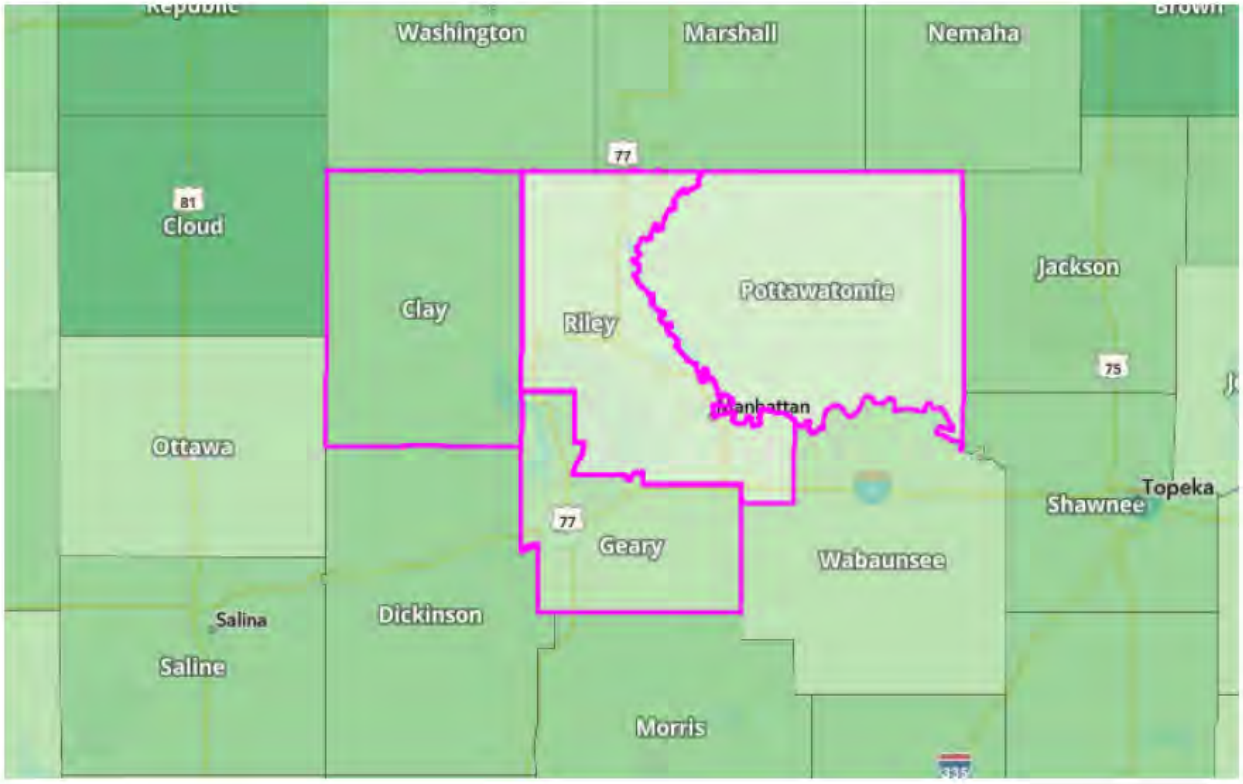
| Rank | Community | State | Rating | Score | | |
|---|---|---|---|---|---|---|
| 1 | Riley County | KS | Relatively Low | 12.91 | 0 | 100 |
| 2 | Pottawatomie County | KS | Relatively Low | 11.59 | 0 | 100 |
| 3 | Geary County | KS | Relatively Low | 11.49 | 0 | 100 |
| 4 | Clay County | KS | Very Low | 5.60 | 0 | 100 |

Winter Weather

| Rank | Community | State | Rating | Score | | |
|---|---|---|---|---|---|---|
| 1 | Geary County | KS | Relatively High | 34.39 | 0 | 100 |
| 2 | Clay County | KS | Relatively Low | 13.33 | 0 | 100 |
| 3 | Pottawatomie County | KS | Relatively Low | 13.25 | 0 | 100 |
| 4 | Riley County | KS | Relatively Low | 13.18 | 0 | 100 |

# Social Vulnerability

Social Vulnerability measures the susceptibility of social groups to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood.



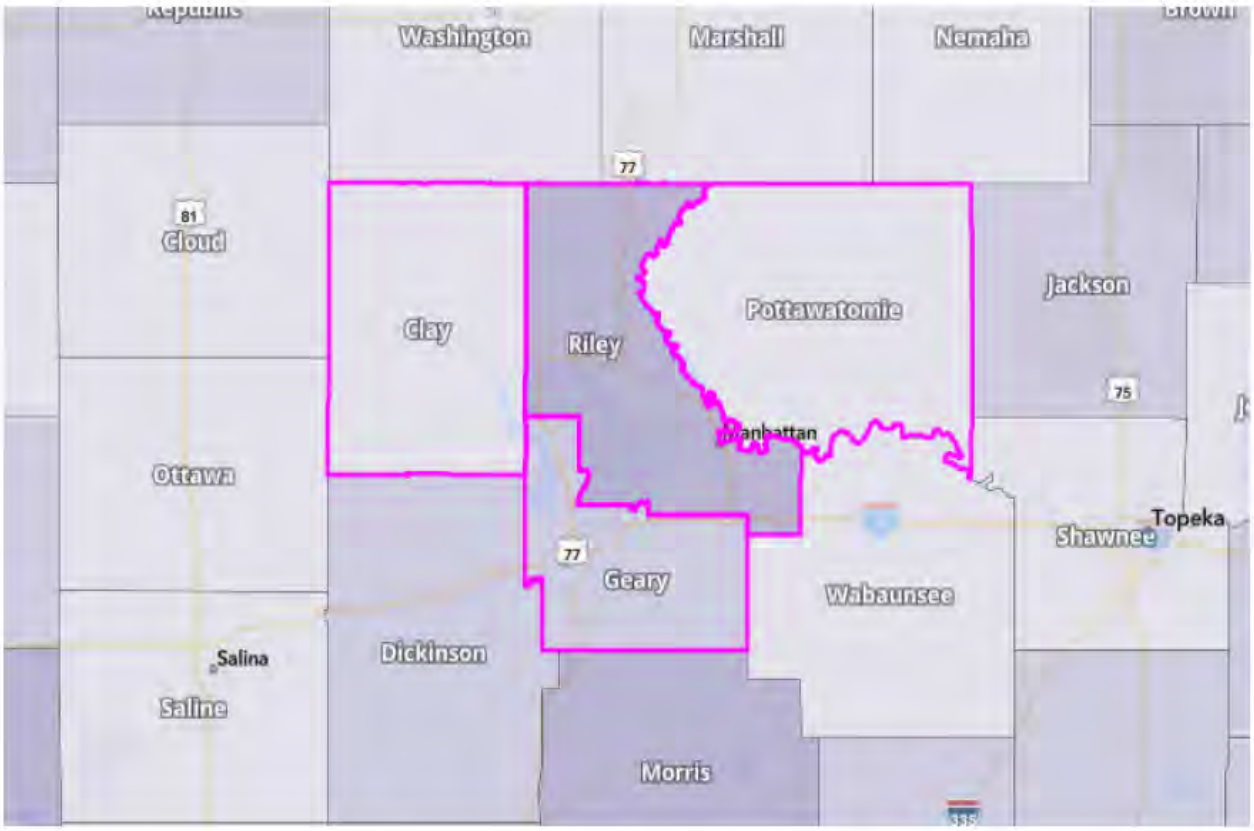

Social Vulnerability Legend

Very High | Relatively High | Relatively Moderate | Relatively Low | Very Low | Data Unavailable

| Rank | Community | State | Rating | Score | | |
|---|---|---|---|---|---|---|
| 1 | Clay County | KS | Relatively Moderate | 37.92 | 0 | 100 |
| 2 | Geary County | KS | Relatively Low | 29.09 | 0 | 100 |
| 3 | Pottawatomie County | KS | Very Low | 23.97 | 0 | 100 |
| 4 | Riley County | KS | Very Low | 20.93 | 0 | 100 |

# Community Resilience

Community Resilience measures a community's ability to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions.




Community Resilience Legend

Very High | Relatively High | Relatively Moderate | Relatively Low | Very Low | Data Unavailable

| Rank | Community | State | Rating | Score | | |
|---|---|---|---|---|---|---|
| 1 | Clay County | KS | Very High | 58.98 | 0 | 100 |
| 2 | Pottawatomie County | KS | Very High | 58.95 | 0 | 100 |
| 3 | Geary County | KS | Relatively High | 56.94 | 0 | 100 |
| 4 | Riley County | KS | Relatively Moderate | 54.26 | 0 | 100 |

## About the National Risk Index

The National Risk Index is a dataset and online tool to help illustrate the United States communities most at risk for 18 natural hazards: Avalanche, Coastal Flooding, Cold Wave, Drought, Earthquake, Hail, Heat Wave, Hurricane, Ice Storm, Landslide, Lightning, Riverine Flooding, Strong Wind, Tornado, Tsunami, Volcanic Activity, Wildfire, and Winter Weather.

The National Risk Index leverages available source data for Expected Annual Loss due to these 18 hazard types, Social Vulnerability, and Community Resilience to develop a baseline relative risk measurement for each United States county and Census tract. These measurements are calculated using average past conditions, but they cannot be used to predict future outcomes for a community. The National Risk Index is intended to fill gaps in available data and analyses to better inform federal, state, local, tribal, and territorial decision makers as they develop risk reduction strategies.

Explore the National Risk Index Map at **hazards.fema.gov/nri/map**.

Visit the National Risk Index website at **hazards.fema.gov/nri/learn-more** to access supporting documentation and links.

## Calculating the Risk Index

Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability and Community Resilience:

$$\text{Risk Index} = \text{Expected Annual Loss} \times \text{Social Vulnerability} \div \text{Community Resilience}$$

Risk Index scores are presented as a composite score for all 18 hazard types, as well as individual scores for each hazard type.

For more information, visit **hazards.fema.gov/nri/determining-risk**.

## Calculating Expected Annual Loss

Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios for 18 hazard types:

$$\text{Expected Annual Loss} = \text{Exposure} \times \text{Annualized Frequency} \times \text{Historic Loss Ratio}$$

Expected Annual Loss scores are presented as a composite score for all 18 hazard types, as well as individual scores for each hazard type.

For more information, visit **hazards.fema.gov/nri/expected-annual-loss**.

## Calculating Social Vulnerability

Social Vulnerability is measured using the Social Vulnerability Index (SoVI) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI).

For more information, visit **hazards.fema.gov/nri/social-vulnerability**.

## Calculating Community Resilience

Community Resilience is measured using the Baseline Resilience Indicators for Communities (HVRI BRIC) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI).

For more information, visit **hazards.fema.gov/nri/community-resilience**.

## How to Take Action

There are many ways to reduce natural hazard risk through mitigation. Communities with high National Risk Index scores can take action to reduce risk by decreasing Expected Annual Loss due to natural hazards, decreasing Social Vulnerability, and increasing Community Resilience.

For information about how to take action and reduce your risk, visit **hazards.fema.gov/nri/take-action**.

## Disclaimer

The National Risk Index (the Risk Index or the Index) and its associated data are meant for planning purposes only. This tool was created for broad nationwide comparisons and is not a substitute for localized risk assessment analysis. Nationwide datasets used as inputs for the National Risk Index are, in many cases, not as accurate as available local data. Users with access to local data for each National Risk Index risk factor should consider substituting the Risk Index data with local data to recalculate a more accurate risk index. If you decide to download the National Risk Index data and substitute it with local data, you assume responsibility for the accuracy of the data and any resulting data index. Please visit the **Contact Us** page if you would like to discuss this process further.

The methodology used by the National Risk Index has been reviewed by subject matter experts in the fields of natural hazard risk research, risk analysis, mitigation planning, and emergency management. The processing methods used to create the National Risk Index have produced results similar to those from other natural hazard risk analyses conducted on a smaller scale. The breadth and combination of geographic information systems (GIS) and data processing techniques leveraged by the National Risk Index enable it to incorporate multiple hazard types and risk factors, manage its nationwide scope, and capture what might have been missed using other methods.

The National Risk Index does not consider the intricate economic and physical interdependencies that exist across geographic regions. Keep in mind that hazard impacts in surrounding counties or Census tracts can cause indirect losses in your community regardless of your community's risk profile.

Nationwide data available for some risk factors are rudimentary at this time. The National Risk Index will be continuously updated as new data become available and improved methodologies are identified.

The National Risk Index Contact Us page is available at **hazards.fema.gov/nri/contact-us**.

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