

# 2017 MULTI-JURISDICTIONAL RISK ASSESSMENT AND HAZARD VULNERABILITY ANALYSIS FOR SEDGWICK COUNTY, KANSAS



PREPARED BY:

**SEDGWICK COUNTY EMERGENCY MANAGEMENT  
714 N. MAIN STREET  
WICHITA, KANSAS 67203**

## Special Acknowledgements

Sedgwick County Public Works, Sedgwick County Metropolitan Area Building and Construction Department, Sedgwick County Geographic Information Services, Sedgwick County Environmental Resources, Wichita Fire and Police Departments, Sedgwick County Sheriff Office, Sedgwick County Fire District #1, and the Wichita Area Metropolitan Planning Organization (WAMPO).



# 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

## TABLE OF CONTENTS

|                                                                       |                                     |
|-----------------------------------------------------------------------|-------------------------------------|
| SPECIAL ACKNOWLEDGEMENTS                                              | i                                   |
| TABLE OF CONTENTS                                                     | ii                                  |
| INTRODUCTION                                                          | i                                   |
| 1 PURPOSE                                                             | 1                                   |
| 2 FEDERAL GUIDANCE                                                    | 1                                   |
| 2.1 NATIONAL RESPONSE FRAMEWORK (NRF)                                 | 1                                   |
| 2.2 EMERGENCY SUPPORT FUNCTIONS                                       | 2                                   |
| 2.3 NATIONAL INCIDENT MANAGEMENT SYSTEM (NIMS)                        | 3                                   |
| 2.4 NATIONAL INFRASTRUCTURE PROTECTION PLAN (NIPP)                    | 3                                   |
| 3 EMERGENCY MANAGEMENT                                                | 5                                   |
| 4 HISTORY                                                             | 6                                   |
| 4.1 KANSAS                                                            | 6                                   |
| 4.2 EARLY SEDGWICK COUNTY                                             | 6                                   |
| 4.3 EARLY TERRITORIES                                                 | 9                                   |
| 4.4 EARLY TOWNS AND CITIES                                            | 10                                  |
| 5 DEMOGRAPHICS                                                        | 21                                  |
| 5.1 POPULATION                                                        | 21                                  |
| 5.2 MIGRATION                                                         | 23                                  |
| 5.3 LAND USE                                                          | 23                                  |
| 5.4 PROJECTED GROWTH                                                  | 26                                  |
| 5.5 METROPOLITAN STATISTICAL AREA                                     | 27                                  |
| 5.6 WICHITA AREA METROPOLITAN PLANNING ORGANIZATION (WAMPO) REGION    | 27                                  |
| 5.7 SUSCEPTIBLE POPULATIONS                                           | 30                                  |
| 5.7.1 ELDERLY                                                         | 30                                  |
| 5.7.2 FUNCTIONAL NEEDS/DISABILITY                                     | 30                                  |
| 5.7.3 SPECIAL NEEDS CONSIDERATIONS                                    | 6                                   |
| 5.7.4 HOMELESS                                                        | 6                                   |
| 5.8 SOCIAL VULNERABILITY INDEX (SOVI)                                 | 6                                   |
| 5.9 EXPOSURE OF BUILT ENVIRONMENT                                     | 8                                   |
| 5.10 SPATIAL HAZARD EVENTS AND LOSSES DATABASE FOR THE U.S. (SHELDUS) | 9                                   |
| 5.11 INDUSTRY OVERVIEW                                                | 10                                  |
| 5.12 TRADE                                                            | <b>Error! Bookmark not defined.</b> |
| 6 GEOLOGY/HYDROGEOLOGY                                                | 42                                  |
| 6.1 GEOHYDROLOGY                                                      | 43                                  |
| 6.2 OIL AND GAS                                                       | 45                                  |
| 6.3 SOILS – GENERAL                                                   | 48                                  |
| 6.4 SOILS – ANIMAL DISPOSAL AND DEBRIS                                | 50                                  |
| 6.5 SEDGWICK BASIN PROVIDENCE/ANTICLINES                              | 52                                  |
| 6.6 SINKHOLES (SEE ALSO KARST)                                        | 53                                  |
| 6.7 FAULTS                                                            | 53                                  |
| 6.8 SALT CONTAMINATION OF GROUND WATER IN SOUTH CENTRAL KANSAS        | 54                                  |
| 6.9 HUTCHINSON SALT MEMBER                                            | 55                                  |
| 6.10 KARST                                                            | 57                                  |

# 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

|        |                                                                   |     |
|--------|-------------------------------------------------------------------|-----|
| 7      | THREATENED AND ENDANGERED SPECIES                                 | 61  |
| 8      | WETLANDS                                                          | 65  |
| 9      | SECTOR SPECIFIC AREAS                                             | 66  |
| 9.1    | AGRICULTURE AND FOOD SECTOR                                       | 66  |
| 9.2    | BANKING AND FINANCE SECTOR                                        | 70  |
| 9.3    | CHEMICALS AND HAZARDOUS MATERIALS SECTOR                          | 72  |
| 9.4    | COMMERCIAL FACILITIES SECTOR                                      | 73  |
| 9.5    | COMMUNICATIONS SECTOR                                             | 77  |
| 9.6    | CRITICAL MANUFACTURING SECTOR                                     | 81  |
| 9.7    | DAMS SECTOR                                                       | 83  |
| 9.7.1  | CHENEY DAM AND RESERVOIR                                          | 86  |
| 9.7.2  | LAKE AFTON PARK/KING DAM                                          | 87  |
| 9.7.3  | ANDALE WSD FRD No. A-2 DAM                                        | 88  |
| 9.7.4  | FAWN LAKE DAM (KANSAS #3774)                                      | 89  |
| 9.7.5  | WICHITA-VALLEY CENTER LOCAL PROTECTION PROJECT                    | 89  |
| 9.7.6  | COWSKIN CREEK LOCAL FLOOD PROTECTION PROJECT                      | 91  |
| 9.7.7  | COWSKIN CREEK STORMWATER MASTER DRAINAGE PLAN                     | 91  |
| 9.8    | DEFENSE INDUSTRIAL BASE SECTOR                                    | 92  |
| 9.9    | EMERGENCY SERVICES SECTOR                                         | 95  |
| 9.9.1  | LAW ENFORCEMENT                                                   | 95  |
| 9.9.2  | FIRE DEPARTMENTS                                                  | 102 |
| 9.9.3  | SEDGWICK COUNTY EMERGENCY MANAGEMENT (SCEM)                       | 105 |
| 9.9.4  | SEDGWICK COUNTY EMERGENCY MEDICAL SERVICE (SCEMS)                 | 106 |
| 9.10   | ENERGY SECTOR                                                     | 108 |
| 9.10.1 | ELECTRICAL DISTRIBUTION SYSTEM                                    | 108 |
| 9.10.2 | PETROLEUM DISTRIBUTION SYSTEM                                     | 119 |
| 9.10.3 | NATURAL GAS DISTRIBUTION SYSTEM                                   | 121 |
| 9.11   | GOVERNMENT FACILITIES SECTOR                                      | 124 |
| 9.12   | HEALTHCARE AND PUBLIC HEALTH SECTOR                               | 128 |
| 9.13   | INFORMATION TECHNOLOGY (IT) SECTOR                                | 145 |
| 9.14   | MONUMENTS AND ICONS SECTOR                                        | 146 |
| 9.15   | NUCLEAR REACTORS, MATERIALS, AND WASTE SECTOR (OR NUCLEAR SECTOR) | 154 |
| 9.16   | POSTAL AND SHIPPING SECTOR                                        | 156 |
| 9.17   | TRANSPORTATION SYSTEMS SECTOR                                     | 159 |
| 9.17.1 | SAFETY                                                            | 159 |
| 9.17.2 | SECURITY                                                          | 160 |
| 9.17.3 | OPERATIONS AND MAINTENANCE                                        | 160 |
| 9.17.4 | HIGHWAYS                                                          | 161 |
| 9.17.5 | BICYCLE AND PEDESTRIAN                                            | 173 |
| 9.17.6 | MOTOR CARRIERS                                                    | 173 |
| 9.17.7 | AVIATION                                                          | 175 |
| 9.17.8 | RAILROAD                                                          | 180 |
| 9.18   | WATER SECTOR                                                      | 204 |
| 9.18.1 | WATER DISTRIBUTION SYSTEM (URBAN)                                 | 205 |
| 9.18.2 | EQUUS BEDS AQUIFER STORAGE AND RECOVERY (ASR) PROJECT             | 206 |
| 9.18.3 | WATER DISTRIBUTION SYSTEM (RURAL)                                 | 208 |
| 9.18.4 | WATERSHEDS AND DISTRICTS                                          | 188 |
|        | SEDGWICK COUNTY STATISTICAL DATA CHART                            | 207 |
|        | RISK ASSESSMENT                                                   |     |
| 10     | HAZARD EVENT DETERMINATIONS                                       | 208 |

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

|         |                                                |     |
|---------|------------------------------------------------|-----|
| 10.1    | HAZARD SEVERITY RATING                         | 208 |
| 10.2    | MITIGATION PLAN METHODOLOGY                    | 209 |
| 11      | HAZARD VULNERABILITY VS RISK ASSESSMENT        | 211 |
| 11.1    | FLOODS                                         | 212 |
| 11.2    | TORNADOES                                      | 227 |
| 11.3    | STORMS (WINTER-SUMMER)                         | 234 |
| 11.3.1  | STORM CLASSIFICATIONS                          | 234 |
| 11.3.2  | STORM DAMAGE EVENTS                            | 235 |
| 11.3.3  | THUNDERSTORMS                                  | 236 |
| 11.3.4  | HAIL                                           | 238 |
| 11.3.5  | SNOW AND ICE STORMS                            | 239 |
| 11.4    | DROUGHT                                        | 243 |
| 11.5    | EARTHQUAKES                                    | 249 |
| 11.6    | FOG                                            | 256 |
| 11.7    | HAZARDOUS MATERIAL                             | 258 |
| 11.7.1  | U.S. CENSUS BUREAU GENERAL DEFINITIONS         | 259 |
| 11.7.2  | HAZARDOUS MATERIAL DEFINITIONS                 | 259 |
| 11.7.3  | HAZARDOUS SUBSTANCE DEFINITIONS                | 260 |
| 11.7.4  | HAZARDOUS MATERIAL CLASSIFICATIONS (USDOT)     | 260 |
| 11.7.5  | HAZARDOUS MATERIAL CATEGORIES                  | 260 |
| 11.7.6  | COMMODITY CODE CLASSIFICATIONS                 | 261 |
| 11.7.7  | 2007 U.S. COMMODITY FLOW SURVEY                | 262 |
| 11.7.8  | HAZARDOUS MATERIALS SHIPMENTS                  | 265 |
| 11.7.9  | COMMODITY TYPES                                | 266 |
| 11.7.10 | U.S. EPA TOXIC RELEASE INVENTORY (TRI)         | 267 |
| 11.7.11 | NATIONAL RESPONSE CENTER                       | 268 |
| 11.7.12 | HAZMAT INCIDENT SUMMARY                        | 269 |
| 11.7.13 | RADIOLOGICAL CONCERNS/INCIDENTS                | 269 |
| 11.7.14 | NUCLEAR WEAPONS TRANSPORTATION                 | 269 |
| 11.7.15 | METHAMPHETAMINE/CLANDESTINE LAB INCIDENTS      | 270 |
| 11.7.16 | WASTE TRANSFERS                                | 271 |
| 11.7.17 | SUSCEPTIBLE POPULATION PROXIMITY               | 272 |
| 11.8    | RADIOLOGICAL                                   | 274 |
| 11.8.1  | NUCLEAR WEAPON (IONIZING RADIATION)            | 274 |
| 11.8.2  | RADIOLOGICAL DISPERSAL DEVICE (RDD)            | 275 |
| 11.8.3  | ELECTROMAGNETIC RADIATION/PULSE (EMR/EMP)      | 275 |
| 11.8.4  | GEOMAGNETIC STORMS                             | 277 |
| 11.8.5  | NATURAL EMP VS EMP ATTACK                      | 277 |
| 11.8.6  | SOLAR CYCLES/FLARES AND CORONAL MASS EJECTIONS | 277 |
| 11.8.7  | NOAA SPACE WEATHER SCALES                      | 279 |
| 11.9    | FIRE/WILDFIRE                                  | 282 |
| 11.10   | WEAPON OF MASS DESTRUCTION                     | 284 |
| 11.10.1 | LOW EXPLOSIVES                                 | 284 |
| 11.10.2 | HIGH EXPLOSIVES                                | 284 |
| 11.10.3 | TERTIARY EXPLOSIVES                            | 284 |
| 11.10.4 | EMERGENCY RESPONSE CALLS                       | 284 |
| 11.11   | POLLUTION                                      | 286 |
| 11.11.1 | AIR QUALITY                                    | 286 |
| 11.11.2 | WASTE CHEMICAL RELEASES                        | 286 |
| 11.11.3 | HAZARDOUS WASTE SITES                          | 286 |
| 11.11.4 | DISPOSAL/SOLID WASTE SITES                     | 286 |
| 11.12   | DAMS AND LEVEES                                | 291 |
| 11.12.1 | TUTTLE CREEK DAM STUDY                         | 291 |
| 11.13   | EMERGING PUBLIC HEALTH THREATS                 | 293 |
| 11.13.1 | HISTORY                                        | 293 |
| 11.13.2 | COMMUNICABLE DISEASE                           | 293 |

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

|                          |                                             |     |
|--------------------------|---------------------------------------------|-----|
| 11.13.3                  | REPORTABLE DISEASE OUTBREAKS                | 294 |
| 11.13.4                  | EPIDEMIC AND PANDEMIC DISEASES              | 295 |
| 11.13.5                  | NATURALLY OCCURRING OUTBREAKS               | 296 |
| 11.13.6                  | BIOLOGICAL WEAPON POTENTIAL                 | 296 |
| 11.14                    | UTILITIES                                   | 299 |
| 11.14.1                  | ELECTRIC                                    | 299 |
| 11.14.2                  | PIPELINES                                   | 299 |
| 11.15                    | TRANSPORTATION ACCIDENTS                    | 301 |
| 11.16                    | CIVIL DISTURBANCES                          | 302 |
| 11.16.1                  | HATE GROUPS                                 | 302 |
| 11.16.2                  | GANGS                                       | 303 |
| 11.16.3                  | ACTIVIST GROUPS                             | 304 |
| 11.16.4                  | TERRORISM                                   | 305 |
| 11.17                    | SINKHOLES/SUBSIDENCE                        | 313 |
| 11.18                    | ASTEROIDS AND METEORITES                    | 315 |
| 11.19                    | CYBERSPACE THREATS                          | 318 |
| 11.19.1                  | THREAT AND VULNERABILITY: A 5-LEVEL PROBLEM | 319 |
| 11.19.2                  | EXAMPLE ATTACKS                             | 320 |
| 11.19.3                  | RESOURCES                                   | 320 |
| SUMMARY                  |                                             | 323 |
| DEFINITIONS              |                                             | 329 |
| BIBLIOGRAPHY             |                                             |     |
| BIBLIOGRAPHY – WEB SITES |                                             |     |
| APPENDIX A               |                                             |     |
| APPENDIX B               |                                             |     |

## FOREWORD

The Sedgwick County Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis is an all-hazards multi-jurisdictional analysis that was created to provide the public an overview of the hazards that can impact or have impacted Sedgwick County and the surrounding area. The information was compiled from existing community plans, internet resources, departmental input, and specialized committees/organizations to ensure the accuracy and completeness of this analysis.

Historically, the 1984 analysis contained general information on risk and hazards and was superseded by a more comprehensive 2006 hazards analysis plan. With the advent of the U.S. Department of Homeland Security's national plans (National Response Framework and National Infrastructure Protection Plan), this analysis incorporates the essence of those documents to meet the needs of the local jurisdictions and allows for interface with the national plans in meaning and content. An explanation of this process is contained in the introduction portion of this analysis and the format mirrors the national plans for consistency.

This analysis addresses a historical review of what existed and the hazards the early pioneers faced and leading up to the present risks and hazards our communities currently face. In order to better prepare for future risks and hazards our communities face, including regionally, this analysis incorporates future projections based on available data and trends from multiple sources.

In addition, preparation of this plan incorporates planning guidance outlined in the National Response Team's (NRT) 2001 Hazardous Materials Emergency Planning Guide (NRT-1), and the U.S. Environmental Protection Agency's Chemical Emergency Preparedness Program "Green Book" supplemental guidance entitled "Technical Guidance for Hazardous Analysis."

Until further notice, requests for information related to industry storage reporting, layouts and emergency operating plans covered under the Superfund Amendments and Reauthorization Act (SARA) Title III will be reviewed by the Local Emergency Planning Committee (LEPC) on a case by case basis for determining applicability of K.S.A § 45-221(12) of the Kansas Open Records Act which states "Records of emergency or security information or procedures of a public agency, or plans, drawings, specifications or related information for any building or facility which is used for purposes requiring security measures in or around the building or facility or which is used for the generation or transmission of power, water, fuels or communications, if disclosure would jeopardize security of the public agency, building or facility." This includes specific information regarding critical infrastructure contained within or serving Sedgwick County.



## **SECTION 1**

### **INTRODUCTION**

# 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

## 1 PURPOSE

The purpose of a hazards analysis is to identify the potential hazards facing a community - whether they are natural, technological or socially related. The analysis follows a three-step decision making process and is designed to consider all potential hazards within the planning district and to identify hazards and threats that should be addressed in the emergency planning process. The three components or processes of the analysis include:

Hazards Identification – Typically provides specific information on situations that have the potential for causing injury to life or damage to property and the environment. It is an approach for prevention, mitigation, preparedness, response, continuity, and recovery that addresses a full range of threats and hazards, including natural, technological, and socially caused.

Vulnerability Analysis – Vulnerabilities include potential human impact, property impact, business impact, and impact on resources both internal and external. It also looks at the magnitude of the disaster/emergency, frequency of occurrence, speed of onset, and severity.

*Potential Human Impact* – Identifies the possibility of death or injury to people

*Potential Business Impact* - Considers the potential loss of market share and business interruption to include:

- Employees unable to report to work
- Customers unable to reach facility
- Company in violation of contractual agreements
- Imposition of fines and penalties or legal costs
- Interruption of critical supplies
- Interruption of product distribution

*Potential Property Impact* – Identifies the potential for losses and damages to include vital records, equipment, products and services, lifeline services, and operations.

*Internal and External Resources* – Identifies the need to respond and recover to include lifeline services, agreements, training, and backup systems

Risk Assessment – is the predicted or probable impact that a hazard would have on the people, services, and specific facilities in the community. (*FEMA IS-235*) This includes life safety (hazard areas, high-risk populations, etc.), essential facilities, and critical infrastructure. Risks can range from negligible to catastrophic.

## PLANS

The [Sedgwick County Local Emergency Operations Plan \(LEOP\)](#) utilizes the information contained in this analysis to address response procedures by public and private agencies in the event of an emergency or disaster. The [South-Central Kansas \(Homeland Security G\) Multi-Hazard, Multi-Jurisdictional Mitigation Plan](#) identifies the effects of the hazards presented in this analysis to minimize or eliminate those hazards facing our communities. This analysis also assists and aids in the development of individualized emergency and crisis plans prepared by public and private agencies and individuals.

## 2 FEDERAL GUIDANCE

### 2.1 NATIONAL RESPONSE FRAMEWORK (NRF)

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

The NRF presents the guiding principles that enable all response partners to prepare for and provide a unified national response to disasters and emergencies. It establishes a comprehensive, national, all-hazards approach to domestic incident response. It is built upon *scalable, flexible, and adaptable coordinating structures* to align key roles and responsibilities *across the Nation*. It describes specific authorities and best practices for managing incidents that range from the serious but purely local, to large-scale terrorist attacks or catastrophic natural disasters. The National Response Framework defines the principles, roles, and structures that organize how we respond as a nation. The NRF:

- Describes how communities, tribes, states, the federal government, private-sectors, and nongovernmental partners work together to coordinate national response;
- Describes specific authorities and best practices for managing incidents; and builds upon the National Incident Management System (NIMS), which provides a consistent template for managing incidents.

The term “response” as used in NRF includes immediate actions to save lives, protect property and the environment, and meet basic human needs. Response also includes the execution of emergency plans and actions to support short-term recovery. In Sedgwick County, the LEOP applies the NRF principles that guide the response, roles and responsibilities, response actions, response organizations, and planning requirements to achieve an effective local and regional response to any incident that occurs.

### 2.2 EMERGENCY SUPPORT FUNCTIONS

Emergency Support Functions (ESFs) are used by the Federal Government and many State and local governments as the primary mechanism to organize and provide resources needed for efficient incident management. ESFs align categories of resources and provide strategic objectives for their use.

ESFs utilize standardized resource management concepts such as typing, inventorying, and tracking to facilitate the dispatch, deployment, and recovery of resources before, during, and after an incident.

#### CRITICAL INFRASTRUCTURE/KEY RESOURCE AS IT RELATES TO INCIDENT MANAGEMENT

| Critical Infrastructure/Key Resource | ESF #1 | ESF #2 | ESF #3 | ESF #4 | ESF #5 | ESF #6 | ESF #7 | ESF #8 | ESF #9 | ESF #10 | ESF #11 | ESF #12 | ESF #13 | ESF #14 | ESF #15 |
|--------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|---------|---------|---------|---------|
| Agriculture & Food                   |        |        |        |        |        |        | X      | X      |        |         | X       |         |         |         |         |
| Banking & Finance                    |        |        |        |        |        |        |        |        |        |         |         |         |         | X       | X       |
| Chemical                             |        |        |        |        |        |        |        |        |        | X       |         |         | X       |         |         |
| Commercial Facilities                |        |        |        |        |        | X      | X      |        |        |         |         |         | X       | X       | X       |
| Communications                       |        | X      |        |        |        |        | X      |        |        |         |         |         |         |         |         |
| Critical Manufacturing               | X      | X      |        |        | X      |        | X      |        |        | X       |         | X       | X       |         |         |
| Dams                                 |        |        | X      |        |        |        |        |        |        |         |         | X       |         |         |         |
| Defense Industrial Base              |        |        |        |        |        |        | X      |        |        |         |         |         |         |         | X       |
| Emergency Services                   | X      | X      | X      | X      | X      | X      | X      | X      | X      | X       |         | X       | X       | X       | X       |
| Energy                               |        |        |        |        |        |        |        |        |        |         |         |         |         |         |         |
| Government Facilities                |        |        | X      | X      | X      |        | X      |        |        |         |         |         |         |         | X       |
| Healthcare & Public Health           |        |        |        |        |        | X      | X      | X      |        |         |         |         |         |         | X       |
| Information Technology               |        | X      |        |        |        |        | X      |        |        |         |         |         |         |         | X       |
| Monuments & Icons                    |        |        | X      |        |        |        | X      |        |        |         | X       |         | X       |         | X       |
| Nuclear Reactors, Materials & Waste  |        |        |        |        |        |        | X      |        |        | X       |         | X       |         |         |         |
| Postal & Shipping                    | X      |        |        |        |        |        | X      |        |        |         |         |         | X       |         | X       |
| Transportation Systems               | X      |        |        |        |        |        | X      |        |        |         |         |         |         |         | X       |
| Water                                |        |        | X      |        |        |        |        |        |        |         |         |         |         | X       | X       |

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 2.3 NATIONAL INCIDENT MANAGEMENT SYSTEM (NIMS)

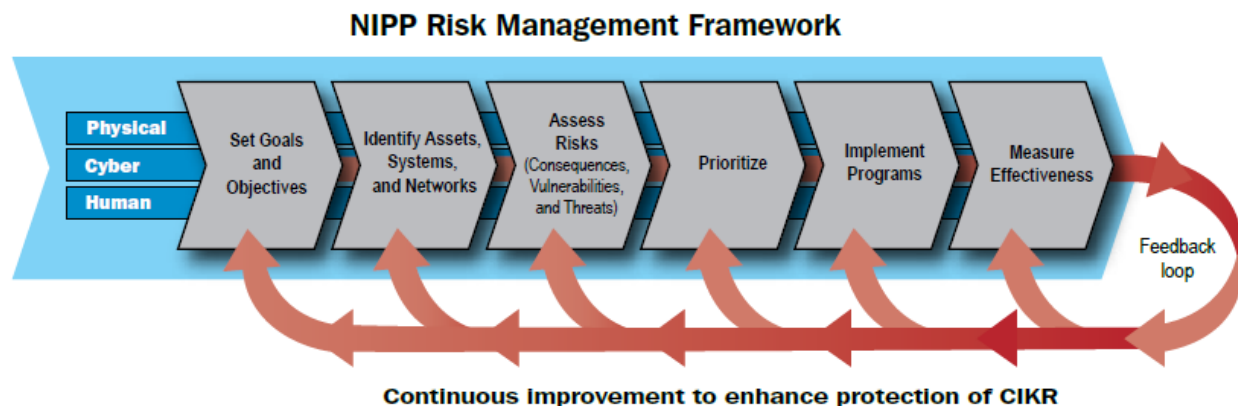
In Homeland Security Presidential Directive 5 (HSPD-5), *Management of Domestic Incidents*, the President directed the Secretary of Homeland Security to develop, submit for review to the Homeland Security Council, and administer a NIMS. This system will provide a consistent nationwide approach for Federal, State, local, and tribal governments to work effectively and efficiently together to prepare for, prevent, respond to, and recover from domestic incidents, regardless of cause, size, or complexity. The NIMS enhances the management of domestic incidents by establishing a single, comprehensive system for incident management and will help achieve greater cooperation among Departments and agencies at all levels of government.

### 2.4 NATIONAL INFRASTRUCTURE PROTECTION PLAN (NIPP)

The NIPP provides the unifying structure for the integration of a wide range of efforts for the enhanced protection and resiliency of the critical infrastructure and key resources (CIKR) into a single program. The overarching goal of the NIPP is to build a safer, more secure, and more resilient America by preventing, deterring, neutralizing, or mitigating the effects of deliberate efforts by terrorists to destroy, incapacitate, or exploit elements of the CIKR and to strengthen national preparedness, timely response, and rapid recovery of CIKR in the event of an attack, natural disaster, or other emergency. It establishes the overarching concepts relevant to all CIKR sectors identified under the authority of Homeland Security Presidential Directive 7 (HSPD-7), and addresses the physical, cyber, and human considerations required for effective implementation of protective programs and resiliency strategies.

#### *Risk Management*

The NIPP specifies the key initiatives, milestones, and metrics required to achieve the CIKR protection mission. It sets forth a comprehensive risk management framework and clearly defined roles and responsibilities for the Department of Homeland Security (DHS), Federal Sector-Specific Agencies (SSAs), and other Federal, State, local, tribal, territorial, and private sector partners. The cornerstone of the NIPP is its risk management framework, which establishes the processes for combining consequence, vulnerability, and threat information to produce a comprehensive, systematic, and rational assessment of national or sector risk.



The NIPP, the National Preparedness Guidelines (NPG), and the NRF together provide a comprehensive, integrated approach to the homeland security mission. The NIPP establishes the overall risk-informed approach that defines the Nation's CIKR protection posture, while the NRF provides the approach for domestic incident management. The NPG sets forth national priorities, doctrine, and roles and responsibilities for building capabilities across the prevention, protection, response, and recovery mission areas. Increases in CIKR protective measures in the context of specific threats or that correspond to threat

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

conditions provide an important bridge between NIPP steady-state protection and the incident management activities under the NRF.

### *Sector-Specific Agency (SSA)*

HSPD-7 designates a Federal SSA to lead CIKR protection efforts in each sector. The directive allows for the Department of Homeland Security to identify gaps in existing CIKR sectors and establish new sectors to fill these gaps. Each SSA developed a Sector-Specific Plan that details the application of the NIPP framework to the unique characteristics of their sector.

A sector is a logical collection of assets, systems, or networks that provide a common function to the economy, government, or society. There are a total of 18 CIKR sectors, identified by the criteria set forth in HSPD-7. This document established U.S. policy for enhancing CIKR protection by establishing a framework for NIPP partners to identify, prioritize, and protect the Nation's CIKR from terrorist attacks.

**Sector-Specific Agencies and Assigned CIKR Sectors**

| <b>Sector Specific Agency</b>                                                                  | <b>Critical Infrastructure and Key Resources Sector</b>                                                                             |
|------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Department of Agriculture <sup>a</sup><br>Department of Health and Human Services <sup>b</sup> | Agriculture and Food                                                                                                                |
| Department of Defense <sup>c</sup>                                                             | Defense Industrial Base                                                                                                             |
| Department of Energy                                                                           | Energy <sup>d</sup>                                                                                                                 |
| Department of Health and Human Services                                                        | Healthcare and Public Health                                                                                                        |
| Department of the Interior                                                                     | National Monuments and Icons                                                                                                        |
| Department of the Treasury                                                                     | Banking and Finance                                                                                                                 |
| Environmental Protection Agency                                                                | Water <sup>e</sup>                                                                                                                  |
| Department of Homeland Security<br><i>Office of Infrastructure Protection</i>                  | Chemical<br>Commercial Facilities<br>Critical Manufacturing<br>Dams<br>Emergency Services<br>Nuclear Reactors, Materials, and Waste |
| <i>Office of Cybersecurity and Communications</i>                                              | Information Technology<br>Communications                                                                                            |
| <i>Transportation Security Administration</i>                                                  | Postal and Shipping                                                                                                                 |
| <i>Transportation Security Administration<br/>United States Coast Guard<sup>f</sup></i>        | Transportation Systems <sup>g</sup>                                                                                                 |
| <i>Immigration and Customs Enforcement,<br/>Federal Protective Service</i>                     | Government Facilities <sup>h</sup>                                                                                                  |

**a** The Department of Agriculture is responsible for agriculture and food (meat, poultry, and egg products).

**b** The Department of Health and Human Services is responsible for food other than meat, poultry, and egg products.

**c** Nothing in this plan impairs or otherwise affects the authority of the Secretary of Defense over the Department of Defense (DoD), including the chain of command for military forces from the President as Commander in Chief, to the Secretary of Defense, to the commander of military forces, or military command and control procedures.

**d** The Energy Sector includes the production, refining, storage, and distribution of oil, gas, and electric power, except for commercial nuclear power facilities.

**e** The Water Sector includes drinking water and wastewater systems.

**f** The U.S. Coast Guard is the SSA for the maritime transportation mode.

**g** As stated in HSPD-7, the Department of Transportation and the Department of Homeland Security will collaborate on all matters relating to transportation security and transportation infrastructure protection.

**h** The Department of Education is the SSA for the Education Facilities Subsector of the Government Facilities Sector.

# 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

## CRITICAL INFRASTRUCTURE / KEY RESOURCE (CI/KR) SECTORS

Critical Infrastructure: Those elements of a system so vital that disabling any of them could incapacitate the entire system.

Current CIP policy, described in HSPD-7, defines responsibilities for DHS, sector-specific agencies, and other departments and agencies. It instructs federal departments and agencies to identify, prioritize, and coordinate the protection of critical infrastructure to prevent, deter, and mitigate the effects of attacks. The Secretary of Homeland Security is assigned several responsibilities, including establishing uniform policies, approaches, guidelines, and methodologies for integrating federal infrastructure protection and risk management activities within and across sectors. To ensure the coverage of critical sectors, HSPD-7 designated sector specific agencies for the critical infrastructure sectors identified. These agencies are responsible for infrastructure protection activities in their assigned sectors, which include coordinating and collaborating with relevant federal agencies, state and local governments, and the private sector to carry out their responsibilities and facilitating the sharing of information about physical and cyber threats, vulnerabilities, incidents, potential protective measures, and best practices. Further, the sector-specific agencies are to continue to encourage the development of information-sharing and analysis mechanisms and to support sector-coordinating mechanisms. Table 1 identifies the infrastructure sectors specified in federal policy and the related sector-specific agencies.

## 3 EMERGENCY MANAGEMENT

KSA 48-904(a) defines emergency management as the "...preparation for and the carrying out of all emergency functions, other than functions for which military forces or other federal agencies are primarily responsible, to prevent, minimize and repair injury and damage resulting from disaster."

Emergency management provides a systematic, proactive approach guiding departments and agencies at all levels of government, the private sector, and nongovernmental organizations to work seamlessly regardless of cause, size, location, or complexity, in order to reduce the loss of life, property, and harm to the environment. While DHS identifies five elements (prepare for, respond to, recover from, and mitigate) traditional emergency management identifies four elements (mitigation, preparation, response, and recovery). This is an all-hazards approach which includes natural disasters, acts of terrorism, and other man-made disasters. Each of the management phases described above are not linear and can be intertwined with the Department of Homeland Security's mission areas of prevent, protect, respond, and recover.

### *Comprehensive Emergency Management System*

- Mitigation – Taking sustained actions to reduce or eliminate long-term risks to people and property from hazards and their effects;
- Preparedness – Planning, training, and building the emergency management profession to prepare effectively for, mitigate against, respond to, and recover from any hazard;
- Response – Conducting emergency operations to save lives and property through positioning emergency equipment, personnel, and supplies, through evacuating potential victims, through providing food, water, shelter, and medical care to those in need, and through restoring critical public services; and
- Recovery – Rebuilding communities so individuals, businesses, and governments can function on their own, return to normal life, and protect against future hazards..."

### *Disaster*

KSA 48-904(d) defines disaster as "...the occurrence or imminent threat of widespread or severe damage, injury or loss of life or property resulting from any natural or manmade cause, including, but not limited to, fire, flood, earthquake, wind, storm, epidemics, contagious or infectious disease, air contamination, blight, drought, infestation, explosion, riot, terrorism or hostile military or paramilitary action."

## **SECTION 2**

# **DEMOGRAPHICS**



# 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

## 4 HISTORY

### 4.1 KANSAS

Kansas became United States territory in 1803 as part of the Louisiana Purchase. The Kansas Territory consisted of a wide range of buffalo and Native American Indians living among the grasslands of the prairie with gypsum hills and limestone formations surrounded by rivers and streams. As the pioneers proceeded into this frontier, they were met with droughts, grasshopper plagues, blizzards, and other natural phenomenon testing their will of endurance. Trails and dirt roads meant for commerce and trade along with military security helped the struggling pioneer spirit in securing their right to join the 33 states of the Union and become the 34th star on the flag on January 29, 1861 under the motto "Ad Astra per Aspera," meaning "To the Stars with Difficulty."

### 4.2 EARLY SEDGWICK COUNTY<sup>1</sup>

The county was organized in 1870 and was named for Union General John Sedgwick who was killed at the Battle of Spotsylvania in 1864. On March 1870, the Wichita town site plot was filed in El Dorado, the first county seat. It is unknown whether or not Francisco Vasquez de Coronado visited the Wichita location in 1541 while searching for the fabled cities of gold, but by 1757 a French map drawn by Du Pratz shows the junction of the Arkansas Rivers as "A Gold Mine." In 1836, Jesse Chisholm led an expedition from St. Louis to the convergence of the Arkansas and Little Arkansas rivers possibly in search of this "gold."



Before European settlement of Sedgwick County, the Osage Indians occupied the land along with Pawnees and the Kansas or "Kaws" as they were nicknamed by the French. The "Paducas" as the Osage Indians called them, ranged the western plains and are believed to have been the Cheyenne Indians as first encountered by M. Du Fissinet in 1719 and M. De Bourgmont in 1724, on the head of the Smoky Hill River. Commencing about 1832, the Indian population of Kansas was increased by seventeen tribes, who were located on reservations in the eastern fourth of the state, occupying about that entire region. When the Santa Fe Trail was established, it became the objective point of Indians from the Dakotas to the Rio Grande. To protect this route of traffic, and later the settlements, the government at various times constructed and maintained in Kansas twelve forts and numbers of military posts.

The Arkansas River is the Indian word "Kansas" with the French prefix of "Ark," a bow. The Wichita Indians were transients, fugitives from their distant homes, driven out by the exigencies of cruel war. They built their town of grass houses at the junction of the two rivers St. Peter and St. Paul of Coronado, or "Neshutsa" and "Neshutsa Shinka" of the Osages, in whose territory it was located, which became known all over the plains as "The Wichita Town," and on their village site has arisen the largest city in the state.

The word "Wichita" is not a Wichita word at all, but an Osage word, and it was from the Osages themselves, many years ago, it was learned that the word meant "Scattered Lodges" or "Scattered Villages."

The Native Americans known collectively as "Wichitas" were remnants of tribes affiliated together when first known to settlers more than a century ago. They were composed of elements of the Wichitas, Wacoes, Towacanies and Kechies, who spoke the Wichita language, and the Caddoes, Ionies and Nadarkoes, who spoke the Caddo language. In 1863, came the Wichitas, who located near the mouth of the Little River, and with whom the writer and others engaged in mercantile traffic, as also with the Osages, who made this valley their hunting ground. Their camps or villages were four or five miles up the Little River. At about the

<sup>1</sup> HISTORY OF WICHITA AND SEDGWICK COUNTY, KANSAS – Past and Present – Including and Account of the Cities, Towns and Villages of the County, Hon. O.H. Bentley, Vol 1, C.F. Cooper & Company, Chicago, 1910



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

same time bands of Shawnees, Delawares, Kickapoos and others came and settled on neighboring streams.

The river was the western hunting ground of the Osage Indians when the first explorers visited them on the Osage River. At that time they had a name which signified it was the young or offspring of the big river. The Arkansas was "Ne Shutsa" (red water); the Little Arkansas river, "Ne Shutsa Shinka" (the young or little red water), associating the two rivers as parent and child.<sup>2</sup>

This was the favorite hunting ground of the Little Osages, who usually came out in June and again in September, under their chief, Mint-sho-shin-ka (Little Bear), and No-po-wal-la, second chief. They camped along the Little Arkansas in the timber and made their lodges of rows of green poles set in the ground about eight feet apart, bent over and tied together, forming an arch about six feet high; other poles would be lashed to the sides with willow withes, and all covered with dry buffalo skins, forming very comfortable houses, ten, twenty or more feet in length. Buffaloes were here in endless numbers, except in the winter months. The Osage (Wa Sashes), Wichita and plains Indians used the bow and arrow in killing buffalo.

In the fall of 1863 some 1,500 Wichita Indians came and made their village on the little river near its junction. The name of their camp was Wichita, from which the present city of Wichita derives its name. They flourished on buffalo meat and the fine gardens of corn, beans, squash and melons they raised the next summer. They built cone-shaped houses of poles, thatched with grass, ten to twenty-five feet in diameter, fifteen to twenty feet high, very comfortable and durable.

They were a kind, gentle, honest people. At the same time there came from the South camps of Kickapoos, Shawnees, Delawares and others, who settled on the Walnut and White Water. These Indians were the friends of all the wild Indians of the plains, and so long as they remained the Southwestern frontier was safe from hostile attack. With these Indians as guides, we traveled all the plains in safety, and visited the wild tribes and thoroughly explored the country of the Cimarron, Canadian and Washita, the winter home of the wild tribes. These rivers some years later were stated by military men to be an unknown country, when the fact was that some of us knew that country well as early as 1864, and visited the wild tribes in their winter camps with teams and wagons for the purpose of trade, and came and went at all times, winter or summer, without difficulty, loss or hardship.

There were pretty lively times along the Little Arkansas after the Wichitas came. The Osages were here part of the time. Parties of Kaw Indians occasionally came. The plains Indians came here visiting their friends, the Wichitas. Col. J. H. Leavenworth was sent to this point by the government to arrange with the wild Indians for a treaty of peace, as we could communicate with them at all times, and to him in a large measure should be given the credit for the success of the treaty of 1865.

The most influential man among these Indians was Jesse Chisholm, a Cherokee, who was beloved of all the Indians. Jesse Chisholm laid out the trail bearing his name, from the Little Arkansas south to the north fork of the Canadian, and the stream running through Wichita was named for him, as he was the first person to build a house on it. The Treaty of the Little Arkansas was held on the east bank of the Little Arkansas, about six miles above its mouth, in the middle of October, 1865. The commissioners on the part of the United States were William S. Harney, Kit Carson, John B. Sanborn, William W. Bent, Jesse H. Leavenworth, Thomas Murphy, and James Steel. The Indians were represented by Moke-ta-ve-to (Black Kettle), Oh-to-ah-ne-so-to-wheo (Seven Bulls), Oh-has-tee (Little Raven), Oh-hah-mah-hah (Storm), and other chiefs and head men on the part of the Indians.

The Indians, several hundred in number, camped along the river, on either side, as did the one or two companies of soldiers who were present. The Wichita, Waco, Caddo, Ioneye, Towakony, Kechi, and other Indians, some 1,500 in number, were living here at the time, and were scattered along down the river to the

---

<sup>2</sup> HISTORY OF WICHITA AND SEDGWICK COUNTY, KANSAS – Past and Present – Including and Account of the Cities, Towns and Villages of the County, Hon. O.H. Bentley, Vol 1, C.F. Cooper & Company, Chicago, 1910

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

junction. They had cultivated extensive gardens, and had scaffolds covered with sliced pumpkins, beans and corn, drying for winter use, with plenty of melons in their gardens, which were a feast to visiting brethren.

About six miles above the junction was the western terminus of the great Osage trail from the Neosho and Verdigris to the Little Arkansas, evidently long in use, from the deep gullies washed in the trails on the slopes of the hills.

In 1867 a detachment of the Fifth United States Infantry, under command of Col. Thomas F. Barr, was stationed near the mouth of the river, by the Indian village, where Wichita now stands. These troops brought the cholera epidemic with them, killing many Indians and about a dozen settlers from Butler County. About 1867 began the exodus of the Indians to the Indian Territory (Oklahoma).

There were a number of Indian scares in Sedgwick County, and although no fighting took place here, a detachment of the Fifth United States infantry, under command of Col. Barr, was stationed on the site of Wichita in 1867. A number of the men, at the expiration of their term of enlistment, became settlers in the vicinity. During the last Indian scare, which occurred in 1874, more than 1,000 people from Sedgwick, Kingman, Sumner and Harvey counties came to Wichita in a single day. In a few days they all returned to their homes.

During the year 1870 immigration poured into the county rapidly. The Osage Trust Lands embraced the territory of the county as far north as the north line of the second of the southern tiers of sections, in Township 26, a little over four miles north of the northern limits of the present site of Wichita, and, for contiguity to the embryo city, the principal settlements were made on these lands.

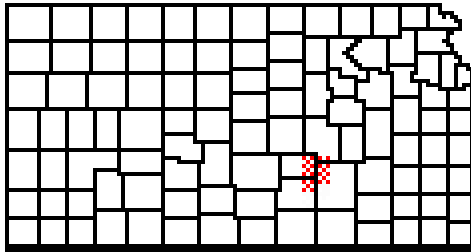
Sedgwick County was the northern terminus of the Chisholm Trail for a short time (1872-1876), and subsequently developed into an important cattle center. The Wichita and Southwestern Railroad Company (a branch of the Santa Fe) arrived in 1872, playing a crucial role in the development of the county's economic role in the state.

In 1867, a blizzard with severe cold and deep snow came along about that time. It was so cold a loaded team could be driven across the stream on the ice. In 1874 and 1876, grasshopper infestation destroyed numerous crops coupled with drought conditions. On January 1, 1886, blizzard conditions existed throughout Kansas. On February 11, 1888, a smallpox epidemic occurred including Wichita which totaled 47 cases and two deaths.

The early development of the aircraft industry, beginning just prior to and during the 1920 saw the establishment of Cessna, Beech, Boeing, and other companies that made Wichita the center of the industry. Wichita is still a leader in military, commercial, and small aircraft production.

### 4.3 EARLY TERRITORIES<sup>3</sup>

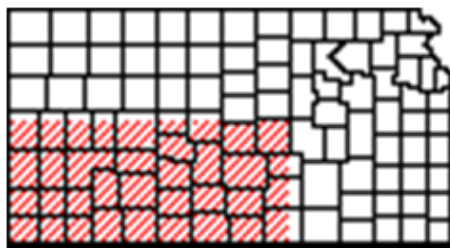
#### Otoe County



Between February 17, 1860 and February 24, 1864, Otoe County embraced townships 21, 22, 23, and the northern 2/3 of 24 in ranges 1 through 4 east of the sixth principal meridian. The boundaries were defined in the creating statute as: "Commencing at the northwest corner of Butler County; thence west to the 6th principal meridian; thence to a point 4 miles south of the 5th standard parallel, on the north line of the Osage reservation; thence east to a point due south of the

southwest corner of Butler County; thence north to the place of beginning." Named for the Otoe [Oto] Indian tribe of Nebraska, the tribal name is derived from 'wat-ota,' meaning 'seekers of pleasure' or 'lechers,' a name given them when they separated from their kindred tribes, the Iowa and Missouri. Apparently never organized, most of the territory once comprising Otoe is included in the present county of Butler, with the remainder in the eastern parts of Harvey and Sedgwick counties.

#### Peketon County



Between February 21, 1860 and February 26, 1867, Peketon County included all territory west of the 6th principal meridian, and south of township 16 south, more than one-quarter of the state. The northeast corner was at the southwest corner of Dickinson County; from which point the northern boundary of Peketon ran west past what is now the Kansas/Colorado state line into southeastern Colorado, and the eastern boundary went south to the border of Indian Territory (now the state of

Oklahoma). "Peketon" is possibly from a Sac Indian word meaning flat land, but no definitive explanation has ever been found. Although Peketon County had a county seat (Beach Valley), it was never organized, and its territory became a part of Marion County in 1867.

#### Washington County



Between August 30, 1855 and February 20, 1857, Washington County's boundary was described as "Commencing at the southern boundary of the territory of Kansas, 15 miles west of a due south course from the mouth of Walnut creek, on the Arkansas river, and running from thence north 100 miles, thence west to the east line of Arapahoe county, thence south along said line to the place of beginning." The legislative Act of 1855 originally created Washington County which included all

of the unorganized territory in the south and west of the territory. It included the area of the present counties of Barber, Barton, Clark, Comanche, Edwards, Ford, Grant, Gray, Greeley, Hamilton, Harper, Harvey, Haskell, Hodgeman, Kearney, Kingman, Kiowa, Lane, the southwest corner of Marion, the southern part of McPherson, Meade, Morton, Ness, Pawnee, Pratt, Reno, Rice, Russell, Scott, Sedgwick, Seward, Stafford, Stanton, Stevens, nearly all of Sumner, and Wichita. The County was named in honor of George Washington (1732-1799), first president of the United States. The name of Washington was given to a northeastern county in February 1857, leaving the original territory without a name until Peketon County

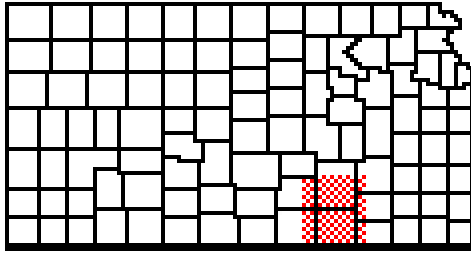
<sup>3</sup> Kansas State Historical Society

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

was established in February 1860. Washington County was never organized, and there is no evidence that a county seat was ever established.

### Hunter County



Between August 30, 1855 and February 24, 1864, the boundaries of Hunter County were created as: "Beginning at the southeast corner of Butler County; thence south to the southern boundary of the territory; then west 30 miles; thence north to a point west of the point of beginning; then 30 miles to the place of beginning." The new county was thus thirty miles east to west and about seventy-eight miles north to south. Probably named for Robert Mercer Taliaferro Hunter (1809-

1887), a Virginia congressman and senator, who favored the admission of Kansas under the Lecompton Constitution. He was expelled from the Senate in 1861 for supporting the rebellion, and he served in the Confederate Senate and as Confederate Secretary of State. Hunter County was one of the original 33 counties created by the first territorial legislature in 1855. In 1860, Irving County was created out of the northern part of Hunter. The county was never organized, and in 1864 it was annexed into Butler County. The greater portion of what was Hunter County is now included in Cowley County, with the remainder scattered among Sedgwick, Sumner, Butler, Elk, Chautauqua, and Greenwood counties.

#### 4.4 EARLY TOWNS AND CITIES

**Afton** – The post office was established June 22, 1874 until July 10, 1886.

**Aleppo** – A small hamlet of Sedgwick County is situated about 15 miles west of Wichita, the county seat, and 5 miles northwest of Goddard, from which place the inhabitants receive mail by rural free delivery. Goddard is the most convenient railroad station.<sup>4</sup> The post office was established May 26, 1891 until December 14, 1903.

**Andale** – An incorporated town of Sedgwick County named after the founder's names Anderson and Dale, is a station on the Missouri Pacific R. R., in Sherman Township, 19 miles northwest of Wichita. The post office was established January 16, 1889. Originally established June 4, 1863, the town of Magnolia in Allen County was discontinued and reinstated in Sedgwick County February 27, 1877 until June 26, 1879. The town of Magnolia was again moved to present day Andale. Andale has a bank, a money order post office with one free delivery route which supplies mail to the inhabitants of that section of the county, a Catholic church and school, some good mercantile establishments, express and telegraph facilities, and does considerable shipping of grain and other farm products. The population in 1910 was 237.

**Anness** – Established February 25, 1887 until January 31, 1952. Originally established July 15, 1879, the town of Kalamazoo in Kingman County was discontinued and reinstated in Sedgwick County March 16, 1883 until February 25, 1887 where it was moved to the site of Anness. A money order post office of Sedgwick County, is in Erie township, some 30 miles southwest of Wichita and not far from the Sumner county line. It is a station on the Atchison, Topeka & Santa Fe R. R. that runs from Wichita to Englewood, has a grain elevator, an express office, and through its retail stores supplies the people of that section with staple articles. The population was reported as 70 in 1910.

**Bayneville** – Established September 3, 1884 until June 30, 1934.

**Bel Aire** – Originally formed in January 1955 as an improvement district, the district was incorporated as a City on November 26, 1980 after the unanimous approval of the three members of the Sedgwick County Board of Commissioners, and became a city of the Third Class ahead of Park City. The City of

---

<sup>4</sup> Kansas: A Cyclopaedia of State History, Standard Pub. Co. Chicago : 1912

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

Bel Aire received State recognition to become a City of the Second Class in 1998. The one-million gallon water tower was constructed in 2002 along with a water and sewer plant.

**Bentley** – A town in Sedgwick County named for Orsemus Hills Bentley, a state senator and one of the leading promoters of the Kansas Midland Railroad, later part of the Frisco, is located near the Arkansas river in Eagle township, and is a station on the St. Louis & San Francisco R. R., about 20 miles northwest of Wichita. The post office was established on March 6, 1883. It has a bank, a weekly newspaper (the News), a money order post office, telegraph and express service, telephone connection, and is the principal trading and shipping point for that section of the county. The population in 1910 was 200.

**Birch** – Established February 11, 1879 until April 24, 1879, and again established July 23, 1879 until July 14, 1894.

**Blendon** – Established January 18, 1875 until January 10, 1884 when it moved to present day Goddard.

**Camp Davidson / Butterfield / Beecher** – In order to protect settlers from hostile Indians and outlaw bands during the Arkansas River crossing, a detachment from Fort Harker was sent to establish Camp Davidson in June 1868 which was located on the convergence of the Little Arkansas and Arkansas Rivers (near Wichita North High School) on or near the site where J. R. Mead founded his trading post in the fall of 1863. The post changed its name to Camp Butterfield in October 1868 until finally Camp Beecher in November 1868 before the outpost was abandoned in October 1869.

**Cheney** (see also Marshall) – Established September 20, 1883. Originally established May 8, 1876 until September 20, 1883, the town of Marshall moved to present day Cheney. An incorporated city of the third class in Sedgwick County named after Benjamin P. Cheney, of Boston, a onetime director of the Santa Fe Railroad, is located in Morton township, 26 miles west of Wichita, and is a station on the Wichita & Pratt division of the Atchison, Topeka & Santa Fe R. R. It has 2 banks, a grain elevator, a weekly newspaper (the Sentinel), hotels, mercantile houses, good public schools, etc. The population in 1910 was 734. From its international money order post office three rural routes emanate, supplying daily mail to a large number of inhabitants of the Ninnescah valley. It has express, telegraph and telephone facilities, and is probably the most important shipping point on that division of the Santa Fe, with the exception of Kingman.

**Clarion** – Established June 2, 1871 until January 23, 1882. The town was re-established March 1882 until January 8, 1885.

**Clearwater** – In 1868, Edward Murray settled on the north bank of the Ninnescah River and established a trading post for Texas cattlemen. Later it was taken over and renamed the Ninnescah Ranch which became a notorious place for outlaws complete with saloons. It was first settled in 1870 and on April 5, 1871, the town of Clear Water (Indian word for Ninnescah) was established near the abandoned Ninnescah Ranch. In 1872, four streets were platted north/south and east/west and consisted of 252 lots with only a dozen marked for buildings. In 1874, the town experienced an Indian scare of reports of burning and scalping; however, the Indians never came within 70 miles of the area. By the summer of 1876, Mr. Fred Barber got a contract to break ground on the present site of Clearwater (one mile southeast of Clear Water). It was not until 1884 when the Missouri Pacific Railroad built a line to Clearwater and the Santa Fe Railroad in 1886 that the town of Clear Water finally disappeared on February 17, 1894 when the post office moved to Clearwater.<sup>5</sup> By 1910, it was reported the town had a population of 569. In 1910, Clearwater had two banks, a money order post office with three rural routes, express and telegraph offices, telephone connections, a weekly newspaper (*The Courier*), Baptist, Christian, Methodist and Presbyterian churches, good public schools, and is the principal trading and shipping point for a rich agricultural district in the Ninnescah valley.

---

<sup>5</sup> *Ghost Towns of Kansas, Volume 2, Daniel Fitzgerald, 1979*



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

**Clonmel** – Established March 14, 1905 until June 30, 1938.

**Colwich** – Colwich was named for the Wichita and Colorado Railway (Col - Wich) which was responsible for the town being started, although several other possibilities exist for the name, to include naming the town Louisa. After Eldridge and Hatfield disappeared, they lost their buildings and people to Colwich in late 1885 and early 1886. On September 1, 1885, the Eagle Townsite Company purchased the southeast quarter of Section 16 and granted a right-of-way to the Wichita and Colorado Railway on November 9, 1885. Between November 20, 1885 and January 1, 1886, 150 lots were sold, and the town was incorporated June 6, 1887. The earliest newspapers were *The Colwich Rambler* (February 10 to March 10, 1887) and *The Colwich Courier* (April 28, 1887 to December 30, 1892). Hog and cattle stockyards were built to the east of the depot in 1887. The opening of the Oklahoma Territory in 1893 and an economic slump in the Wichita area during the 1890's contributed to a significant loss of population. Although the railroad's water tanks were considered the first fire protection, sometime around 1900 firefighting equipment was purchased and used by volunteers, and notifications were made through the local telephone operator. The Westar Energy Gordon Evans Station went into service in 1961 and is located adjacent to the east city limits.<sup>6</sup>

**Coronado** – Established February 23, 1877 until January 9, 1882.

**Cosmosa** – Established June 13, 1870 until April 21, 1871 before changing its name to Park City which was abandoned on April 24, 1876.

**Cowskin** – Established December 8, 1870 until February 25, 1873 when the name was changed to Waco before finally discontinuing on January 14, 1905.

**Delano** – Established April 5, 1871 until January 14, 1876, and again April 7, 1879 until December 6, 1880 before finally annexed to the City of Wichita.

**Derby** – Originally established as Sand Ford September 30, 1870, the name was changed to El Paso March 13, 1871. However, but because of confusion of the Texas town, there name was changed to Derby on July 5, 1881. Legend has it a railroad engineer saw some lads on their horses rushing up to meet the train and the scene reminded him of an English derby. The town is located on the Arkansas River and the Atchison, Topeka & Santa Fe R. R. 11 miles southeast of Wichita. It has a bank, a money order post office with three rural routes, telegraph and express offices, telephone connections, Catholic, Evangelical and Presbyterian churches, good public schools, several general stores, a hotel, etc., and is the principal shipping point for a rich agricultural district in the Arkansas valley. The population in 1910 was 261.

**Diana** – Established March 26, 1878 until August 1, 1881.

**Dry Creek** – Established April 5, 1871 until October 15, 1872.

**Eastborough** – In 1928, when Alton Smith announced "Wichita's finest residential section," the Fourth National Bank had just installed the city's first air-conditioning equipment; an airplane had just made the first night landing at Municipal Airport; and Wichita No. 1, a gusher, was brought in on the northern outskirts of Wichita. Eastborough was originally envisioned by Burdon Hunter, a British architect, and planned an English village complete with quaint English streets, named and patterned after the small boroughs of his native land. Eastborough's first developers included Alton H. Smith; Harrison W. Albright; and Harry T. Morgan. They planned the 215 acre tract, as Hunter had envisioned. Sale of Eastborough Village started April 10, 1929, but because the oil boom there was a lack of streets or adequate sewer system which resulted in its only appeal to be annexed by Wichita in 1930, which was turned down. That same year, with the Chamber of Commerce urging and supporting it, Eastborough Estates was formed to rescue the area. It was planned to incorporate when the first thirty homes were completed. The Woodlawn Addition operated by Earl Hutton had opened 12 years before Eastborough and already was sold out. The two subdivisions

---

<sup>6</sup> Colwich Community Pictorial History, 1972

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

were ready to incorporate as a third class city. However, they could not agree upon a name for the street between them. The Woodlawn Addition wanted the street named Woodlawn. The Eastborough Addition wanted it named Eastborough Avenue. No mention was made as to who would pave it. Alas, all was resolved - the original tract plus Woodlawn (a four square block area) incorporated as a 425 acre third class city June 1, 1937 upon the approval of the Sedgwick County commissioners. Since 1937, Eastborough has developed into a small town covering two square miles with 21 streets. The city of the third class, once a long way from Wichita, is now completely surrounded by the larger city of the first class. There were several failing attempts to "annex" Eastborough; however, it is said that in 1951 or 1952 Pat Patterson got a Kansas City, Kansas Representative to pass a bill stating Eastborough could annex Wichita.

**Eldridge** – Union Township had its beginnings in 1869 when Henry Pate and his four sons pre-empted 1,200 acres of land. The first settlement in Union Township was Eldridge, which was located three miles north and one-half miles west of Colwich on the Charles Hyde farm in Section 4. Supplies and mail had to be brought down river by boat from Park City, located five miles east of his farm. Eldridge was named after Mr. Hyde's colonel in the Civil War, and the post office was granted May 22, 1872. Eldridge School (District 59), organized in 1873 and located in Section 33 in Eagle Township, was the first district that served people in Colwich.<sup>7</sup> The post office closed April 3, 1886.

**Fayette** – Established May 12, 1875 until March 17, 1884.

**Ferris** – Established May 15, 1877 until October 3, 1882.

**Finlay** – Originally established March 20, 1877 until March 19, 1879 when the name was changed to Herald before finally discontinuing until November 21, 1882.

**Furley** – A village of Sedgwick County and a station on the Chicago, Rock Island & Pacific R. R. 15 miles northeast of Wichita. The post office was established September 20, 1887 and closed June 30, 1953. It had a money order post office with one rural route, a telegraph and express office, general stores and implement houses, and is the principal shipping point for a rich agricultural district in the northeastern part of the county. The population in 1910 was 52.

**Germania** – see *Saint Mark and Germania*

**Garden Plain** – One of the leading towns of Sedgwick County the township was established August 19, 1875 until it closed on January 25, 1881. The post office was re-established January 15, 1883 and the town is located in the township of the same name with a station on the Wichita & Pratt division of the Atchison, Topeka & Santa Fe R. R. 20 miles west of Wichita. In 1910, it had a bank, a money order post office with one rural route, telegraph and express offices, telephone connections with the surrounding towns, general stores, hardware and implements houses, and is the shipping point for a rich agricultural district. Garden Plain was incorporated in 1902 and in 1910 reported a population of 296.

**Gladys** – Established May 10, 1888 until November 14, 1891.

**Goddard** – The town was named for J. F. Goddard, vice-president and general manager of the Santa Fe Railroad beginning in 1910. By 1873, Attica Township was established west of Wichita and drew many settlers from eastern states and European countries. A school house was built just north of the current city of Goddard. During this time a small settlement developed ten miles west of Wichita. It was called the Ten-Mile Post, and later, it was known as the Ten-Mile Corner. A town was established February 11, 1875 and named Blendon. The Blendon Post Office was established in 1875. About the same time that Blendon was being built, another town was trying to develop southwest of Goddard on the A. L. Lyman farm. A post office, store and restaurant were established. A little creek running through the farm reminded Mary Lyman of her favorite song, "Flow Gently Sweet Afton." Consequently, she named both the creek and the post

---

<sup>7</sup> Colwich Community Pictorial History, 1972



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

office "Afton." A Methodist church was planned at Blendon during 1882-1883, but before construction started the Santa Fe Railroad made its second survey and located the railroad 1 1/2 miles south through the current city of Goddard. The town site of Goddard was platted on the John Coleman farm. He homesteaded the land in 1875. The title to the NE 1/4-31-27 Sedgwick County was acquired by a patent from the U.S. Government. This had been a part of the Osage Indians Trust Lands. In 1883 Coleman sold the farm to C. M. Faulk, who, after 30 days, sold it to E. Wilder. He platted the original town of Goddard on September 20, 1883. Goddard received its name from J. F. Goddard, a surveyor, who was also the vice president and general manager of the Santa Fe Railroad Company. By March, 1884, the railroad tracks reached the present site of Goddard. A box car, on a siding, was set up as a telegraph office. The post office was started January 10, 1884. The depot, shown above, was completed in 1886. After Goddard became a town, the Blendon and Afton post offices were combined with Goddard. Several buildings were moved to Goddard from Blendon. A two-story town hall was moved to the corner of 3rd and Oak Street and a blacksmith shop was located on Cedar Street. The lumber for the Methodist church at Blendon was reloaded, hauled to Goddard, and erected on its present site. Goddard was incorporated in 1910. Like most towns, Main Street was the primary place of business in early years. Some of the business included, W.W. Graves Restaurant and Henshaw Rooming House, A.B. Rishels's Palace Garage, the Goddard Bank which also contained the Post Office, Nolan's Mercantile store, and Kirker - Marsh Undertakers. Most of the buildings along the west side of Main Street were destroyed by fire in 1919. In the center of town, in the middle of Main Street, was an old windmill. The famous town pump was 146 feet deep. A large cement tank provided water for the horses when the farmers drove into town. The old landmark was taken down in 1953 in spite of strong opposition and Main Street was oiled. Work started on a \$104,000 sewer project and disposal plant. An \$80,000 water supply project was started including a water tower which was erected on the east side of the 100 block of North Main Street. This tower was dismantled in the late 1980's and replaced by the present water tower constructed in 1975.

**Good River** – Established May 17, 1876 until October 30, 1882.

**Greenwich** – A village of Payne township, Sedgwick County, is a station on the Missouri Pacific R. R. 10 miles northeast of Wichita. The post office was established September 3, 1874, with one rural route, an express office, general stores, a feed mill, etc., and is a shipping point of some importance. The population in 1910 was 72.

**Hatfield** – The town was located two and one-half miles east and a half mile north of Colwich. In 1883, a group of men from Wichita projected a railway line from Wichita to McPherson. Two settlers anticipating the arrival of the railroad built their corn fields into a town site. Two streets were laid out, several buildings were erected, and a post office was granted on June 20, 1884 which continued until February 1, 1886 before moving to Maize.<sup>8</sup>

**Haysville** – W. Hays came to this area in the early 1870s. Prior to his arrival here he had served as a postmaster in Colorado and as Sheriff of Sedgwick County. In 1891 he platted the land that he owned so a town could be built. This land was E 1/2 NE 1/4 of section 6 and W 1/2 NW 1/4 of section 5, Township 29 Range 1 East, Sedgwick County and totaled 161.15 acres. In 1874 a grist mill was built on the bank of the Cowskin to process corn that was harvested in the area. On November 13, 1887, Haysville was destroyed by a city-wide fire. At first there were no church buildings so meetings were held at homes, schools and the grist mill. The first churches to Haysville were the Methodist and the Prairie Home Christian Church. School District 57, Haysville's first school, was built in 1876 and consolidated with District 187 in 1946 to form District 261. The Chicago, Rock Island and Pacific Railway bought land west of Haysville's Main Street in 1892. In 1903 a depot was opened and passenger trains shuttled people to and from Wichita. Some of the first businesses in this new town were a meat market, a couple of stores, lumberyard and a blacksmith. The post office was established in 1877, and the Haysville State Bank in 1919. Haysville's entire historic district was destroyed in the 1999 tornado. Destruction of the historic buildings began at the red brick

---

<sup>8</sup> *Ibid.*

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

schoolhouse at 79th and Seneca and continued north along Main taking out the elevator, bank, churches and more. The only thing left standing on the east side of main was the original bank vault.

**Helen** – Established December 10, 1877 until November 27, 1882.

**Herald** – See Finlay

**Hukle** – Originally named Boone (Sumner County) and established January 20, 1879, Hukle was established in Sedgwick County March 11, 1887 until January 31, 1903.

**Iowaville** – Established February 20, 1874 until July 31, 1902.

**Jamesburgh** – Established June 24, 1873 until November 11, 1880 before being annexed by the City of Wichita.

**Kalamazoo** – See Anness

**Kechi** – A village in Sedgwick County Indian name for "water turtle," is located in the township of the same name on the Chicago, Rock Island & Pacific R. R., 8 miles northeast of Wichita, the county seat. The post office was established May 29, 1888. It has several stores, a feed mill, telegraph and express offices. The population in 1910 was 100.

**Lakin** – Originally established February 21, 1872 in Sedgwick County until April 2, 1873 before moving the present day Halstead (Harvey County).

**Lamont** – Established April 27, 1877 until March 24, 1884.

**Louise** – Established April 27, 1877 until March 24, 1884.

**Magnolia** (see also Andale) – The town was situated about three miles southwest of Andale with the post office established in 1877. When the Missouri Pacific Railroad bypassed the town by three miles in 1886, the town moved to the present town of Andale by 1891.<sup>9</sup>

**Manchester** – Established April 2, 1887 until September 9, 1889.

**Marshall and Bridgeport** – David Moore was the first settler in Grand River Township and in the fall of 1872 started the Lone Tree ranch (named for the only tree between Wichita and Kingman). In 1872, the towns of Marshall and Bridgeport, located only a mile apart, were begun west of the Ninnescah River. Marshall was named for *Wichita Eagle* founder Marsh Murdock, and the post office was established in Marshall in 1874. Bridgeport was established by Hiram Witten when he opened a general store two miles west of the river and one mile north of Brandis Station on the Kingman Trail (Highway 54). Bridgeport, in an effort to build a bridge across the Ninnescah River, obtained wood pilings from Medicine Lodge; however, Marshall was the first town platted and in doing so left Bridgeport a deserted town.

The Kingman Trail later became the Cannonball Green Stage Line, making regular stops at Marshall. North of the bridge a water mill was built as well as a number of stores in Marshall. During the 1880's, Marshall with a population over 100 became a flourishing trading post but missed the Santa Fe Railroad line in 1883 by 2½ miles north due to Wichita securing the right-of-way to the west line of Sedgwick County. Late in 1883, the entire town moved Cheney, and by September of that year the post office ceased operations, leaving behind a grove of Cottonwood trees beside the river.<sup>10</sup>

---

<sup>9</sup> Ghost Towns of Kansas, Volume 2, Daniel Fitzgerald, 1979

<sup>10</sup> Ibid.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

**Maize** – Named for the Indian corn produced in the area.

**Minneha** – The town moved between Cloud in Butler County and Midland in Sedgwick County between August 28, 1871 and March 8, 1880. Cloud in Butler County was renamed Andover in 1880, and in Sedgwick County Minneha was originally named Manchester before being re-established as Minneha September 9, 1889 until being discontinued October 15, 1900.

**Mount Hope** – An incorporated city of the third class in Sedgwick County and named for a town in Michigan, is located in Greeley Township on the Arkansas River and the Missouri Pacific R. R. 25 miles northwest of Wichita. The post office was established December 24, 1873. In 1910, it had a bank, a weekly newspaper (the Clarion), all lines of mercantile stores, telegraph and express offices, and a money order post office with two rural routes. The population according to the census of 1910 was 519, a gain of over 60 per cent since 1900. The town was originally founded about 1880.

**Mulvane** – Named for Topeka railroad contractor Joab Mulvane, the little incorporated city in Sumner County, though located partly in Rockford township of Sedgwick County, is on the Arkansas river and the Atchison, Topeka & Santa Fe R. R. 19 miles northeast of Wellington, the county seat, it has 2 banks, a flour mill, a feed mill, an ice and cold storage plant, electric light plant, creamery, natural gas, a weekly newspaper (the News), and a large number of well stocked retail establishments. It is supplied with telegraph and express offices and has an international money order post office with two rural routes. The population according to the census of 1910 was 1,084. The town was laid out in 1879, and the first building was erected by Dr. Whitehorn. The first store was opened by J. S. Brown, the first dwelling was built by Lee Wilson, J. N. Trickey opened the first dry goods store and the Mulvane House was erected by A. C. Crawford. The post office was established in Oct., 1879, with J. B. Brown as first postmaster.

**Newton** – Established June 6, 1871 in Sedgwick County before being transferred to Harvey County.

**North Wichita** – Established May 29, 1888 until January 31, 1901.

**Oatville** – Established October 2, 1884 until November 30, 1936.

**Ohio Centre** – Established October 6, 1873 until October 27, 1887.

**Park City (see Cosmosa)** – Park City was established in 1870, 14 miles northwest of Wichita and five miles west of Valley Center, on the north banks of the Arkansas River. At one time, Park City was the only rival to Wichita for the county seat. Wichita wanted the Santa Fe railroad south from Newton. While it was necessary to vote bonds, Park City set out to defeat those bonds. Fictitious names were used, non-residents, some dead and gone, were all used in the fight of the railroad bonds. Park City had 300 inhabitants and 1,000 votes. In the end, Wichita won out and resulted in the demise of Park City by 1879 and only leaving a depression in the ground. The current Park City began as an Improvement district in 1953 with a restaurant or two, a couple of churches and a grocery store. The district grew from a quarter section of farmland purchased by developers into a 3,321-acre (13.44 km<sup>2</sup>) community. After the unanimous approval of the three members of the Sedgwick County Board of Commissioners, led by Ron Darlington, Donovan Foster and Jack Whitson (Park City's second mayor and current city administrator), Park City became a city of the Third Class on November 26, 1980. The new city held a special election on February 17, 1981, in which Raymond J. Reiss was elected mayor along with five council members to form the first governing body. (*Park City Post*, November 2010)

**Payne** – Established February 5, 1884 until March 11, 1884.

**Peck** – Established October 27, 1887 to the present day.

**Peotone** – Established April 11, 1877 until May 27, 1899 and renamed Viola.

**Ruby** – Established February 11, 1879 until June 30, 1894.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

**Saint Mark and Germania** – By 1880, Sherman Township had been created and settled by German immigrants. The Saint Mark post office was established February 4, 1879 and discontinued December 14, 1903. Germania, located one and a half miles west of Saint Mark, was established April 9, 1877 and discontinued March 9, 1881, re-established April 19, 1881 and then discontinued November 30, 1896. Both communities had a school building, post office, stock of general merchandise, drug store, hotel, blacksmith, shoemaker, tinsmith and carpenter shop.<sup>11</sup>

**Sand Ford** – See El Paso.

**Schulte** – A hamlet in Sedgwick County is located in Waco Township. The post office was originally established June 27, 1906 until June 15, 1910. It was re-established July 30, 1910 until January 15, 1934 on the Kansas City, Mexico & Orient R. R., 12 miles southwest of Wichita, the county seat. It has a general store, livery barn, telegraph and express offices, etc. It receives mail from Oatville. The population in 1910 was 70.

**Sedgwick** – The third largest town in Harvey County and named for Sedgwick County, is located on the Atchison, Topeka & Santa Fe R. R. and the Little Arkansas river, 10 miles south of Newton, the county seat. It is an incorporated city of 626 inhabitants according to the census of 1910, has 2 banks, an opera house, a weekly newspaper (the Panagraph), telegraph and express offices, and an international money order post office with four rural routes. It is the oldest town in the county, having been laid off in June, 1870, by the Sedgwick Town Company, of which T. S. Floyd was president. The first store, which was the first in the county, was built in July of that year by William H. Owen. The post office was established June 27, 1870 with T. S. Floyd as postmaster. The money order department was added in 1877. The first school house in the county was erected here in 1870 and the first term was taught by C. S. Bullock and wife. The first newspaper was the Sedgwick Gazette, the initial number of which was issued in Jan., 1871. The Citizens' Savings bank was organized and began business in 1872. The town was incorporated as a city of the third class in March of that year. The city government was suspended in 1877 on account of a clerical error in the charter. It was revived again in 1881 and reorganization took place followed by an election of officers in April, 1882.

**Sedowa** – Established June 9, 1886 until February 28, 1903.

**Sheldon** – Originally established July 18, 1871 in Sedgwick County being transferred to Harvey County and discontinuing October 22, 1885.

**Sunny Dale** – Established February 15, 1877 until September 14, 1894 when the name was changed to Sunnydale. The settlement was disbanded July 31, 1901.

**Valley Center** – In 1870, Grant Township was established, which included the present townships of Grant and Valley Center. Alexander Jester was one of the first settlers three miles northwest of Valley Center (named for the topography of the area) in 1868.<sup>12</sup> The post office was established April 25, 1872 until February 9, 1874. It was re-established on June 24, 1875 and later the city was incorporated as a city of the third class in Sedgwick County. In the spring of 1885, as Wichita experienced a growth boom and in an effort to have workers in Wichita commute back and forth to Valley Center, a means of transportation was needed. A transit company was organized to build and manage an interurban between Wichita and Valley Center (see *Transportation*). The interurban owners added a park, constructed a dam on the river for boating, a swimming pool, baseball diamond, and other amenities to attract people. The first businesses included an overall factory and broom factory, and in 1886 Burton Car Works and a livery stable.<sup>13</sup> In 1910, the town had a broom manufacturing establishment, a bank, a weekly newspaper (the Index), schools and

---

<sup>11</sup> Colwich Community Pictorial History, 1972

<sup>12</sup> Valley Center: Its Founding & Major Events, Frank Hutchings, Valley Center, 1976

<sup>13</sup> The Founding of Valley Center, Genevieve May Rapp, Pgs 67-74, Wichita, 1931

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

churches, a number of general stores, telegraph and express offices, and an international money order post office with three rural routes. The population in 1910 was 381. This is the shipping and receiving point for a large agricultural and stock raising district and is headquarters for a number of men extensively engaged in stock breeding.

**Viola** – An incorporated city of the third class in Sedgwick County and named after the township in which it is located, is on the Atchison, Topeka & Santa Fe and the Kansas City, Mexico & Orient railroads, 24 miles southwest of Wichita, the county seat. It has a bank, a telephone exchange owned by a local company, general stores, telegraph and express offices, and a money order post office with one rural route. The population in 1910 was 156. It is located in a good agricultural district for which it is the receiving and shipping point.

**Waco** – Formerly known as Cowskin, the town is in Sedgwick County, is located 12 miles south of Wichita and 4 from Haysville, the nearest shipping point. It has one general store. Mail is delivered from Peck. The population in 1910 was 41.

**Wichita** – The history of the city begins with the establishment of a trading post at that point in 1863 by J. R. Mead. The Wichita Indians were then occupying the land and the town was named for that tribe. The word means "Scattered Lodges," and for a long time the little town lived up to its appellation. As early as 1860 William Mathewson, the original Buffalo Bill, freighted through Wichita, and in 1869 settled on a claim near the town site. On July 9, 1868, a military post office was established with Col. Barr, who was in command of the militia stationed there, as postmaster.



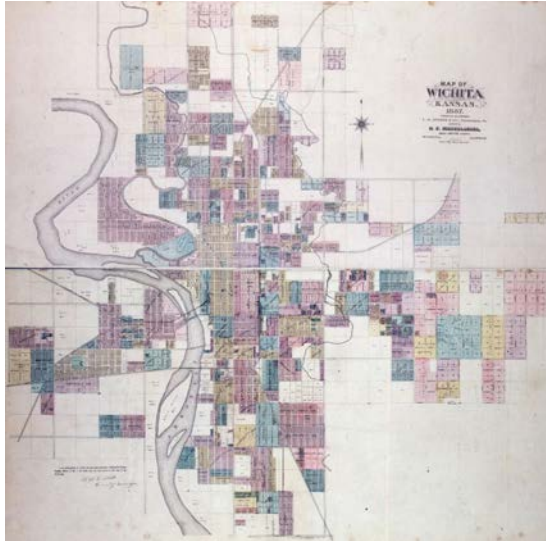
Shortly afterward a civil post office was established with Milo B. Kellogg, manager of Durfee's ranch, as postmaster. About the same time the Wichita town company was organized by Gov. S. J. Crawford, W. W. H. Lawrence, J. R. Mead, E. P. Bancroft, A. F. Horner and I. S. Munger. A survey of the site was made by Mr. Finn. William Greiffenstein bought Moore's place, now comprising a part of the city, and for a long time there was a rivalry between the two sites.

In 1870 Mr. Munger opened a hotel and the Wichita Vidette was started by F. A. Sowers. Before the railroad was completed there was bitter rivalry between Wichita and Park City, which stood 14 miles to the northwest on the Arkansas. An attempt was made to divert the cattle trade to the Park City route, and for a long time it seemed that this might be successful. However, Wichita succeeded in securing the county seat and in May, 1872, the railroad reached this point and settled the rivalry. By that time quite a city had grown up, handling the vast cattle trade of the southwest and having all the undesirable conditions connected with a rapidly growing frontier town.



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---



*1887 City Map of Wichita*

In 1871 Wichita was incorporated as a city of the third class. At the election 156 votes were polled and the following officers were elected: Mayor, E. B. Allen; attorney, D. C. Hackett; police judge, H. E. Vantrees; clerk, O. W. Brownwell; treasurer, N. A. English; marshal, M. Meagher; councilmen, W. B. Hutchinson, S. C. Johnson, C. Schattner, George Schlichter, A. H. Fabrique and George Vantillburg. The next year, having sufficient population, the form of government was changed to that of a city of the second class. In March, 1872, the United States land office was moved here from Augusta, Butler county. The first school was held in an army dugout in the winter of 1869-70. A \$5,000 school house was built in 1871.

March 18, 1871, Wichita had its first big fire when the W.R. Rouse Queensware Store, and the John Peyton Saddle and Harness Shop, burned to the

ground. The Wichita Eagle and the Wichita Beacon were both founded in 1872, and have since been among the leading newspapers of the state. The first financial institution was the Arkansas Valley bank, started in 1870 by W. C. Woodman. Although the cattle driving business closed in 1875 the growth of Wichita kept on as rapidly as before. In 1880 a board of trade was organized with \$20,000 capital, the waterworks were installed in 1882 and the street railway the next year. Improvements of all kinds went on very rapidly, new additions were laid out, lots were sold and houses built miles from the business section of the city. In 1888, on the occasion of the auction sale of the lots in a new addition, the Wichita Eagle wrote an editorial calling a halt on speculation and telling the people that the time had come to quit buying and selling at inflated values. With that the boom was over, the lots were turned back to cow pastures and cornfields and the city paid for the boom with fifteen years of comparative depression.

The Coronado club, which later became the Wichita commercial club, was organized in 1897. The chamber of commerce was organized in 1901. The growth of the city in the last ten years has been wholesome as well as remarkable. The population in 1900 was 24,671, and in 1910 it was 52,450, an increase of more than 100 per cent. The post office receipts of 1900 were \$73,934, against \$232,326 in 1910, and the bank deposits show a tenfold increase. The building permits for 1910 were three times those of 1908. Among the buildings erected in 1910 was the Beason building, which at the time was the tallest "skyscraper" in Kansas. It is ten stories high, cost \$380,000, and accommodates 1,000 people. The public and private improvements for 1910 cost \$7,000,000. Seven of the eleven banks have been organized since 1902. The value of city property and improvements is more than \$3,000,000.

There was an average of 110 freight and passenger trains per day in 1910. The value of the city's manufactured products for the year 1909 was \$9,000,000. Among the important manufacturing concerns are 5 flour mills with a daily capacity of 4,100 barrels, a broom factory with a daily capacity of 2,000 dozen, 2 packing plants with an annual production of 60,000,000 pounds, 4 alfalfa mills, 3 overall factories, 6 planing mills using more than 12,000 cars of lumber annually, and 6 foundries. There are in all 230 different manufacturing concerns in the city, and 138 wholesale houses, shipping over 50,000 cars of the finished product to its tributary territory. The wholesale and jobbing interests are represented by 500 traveling men who live in the city, and the volume of business in 1909 was \$30,000,000.

By 1910, the area of Wichita is about 20 square miles, with 30 miles of paving, 35 miles of street railway, 6 miles of water mains, 75 miles of sewer, 11 public parks, 100 miles of natural gas mains, 6,500 telephones in use, 16 publishing houses, 2 daily newspapers (the *Beacon* and the *Eagle*), 20 public school buildings, 3 Catholic academies, 2 business colleges, an art school, 2 music conservatories, 2 colleges ranking with



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

the best in the state—Fairmount College and Friends' University—11 banks, good hotels, etc. The amount spent for building in 1910 was \$6,000,000. There are a number of large office buildings and department stores, 6 sanitariums, 10 theaters, one of the finest Masonic buildings in the country, costing \$250,000, a Masonic home and grounds worth a similar amount, a \$150,000 Federal building, and a city hall which cost about the same, a chamber of commerce, a commercial club, a fair association which holds one of the largest fairs in the state, a Commercial League, 2 country clubs, owning fine buildings, all of which are busy promoting the development and best interests of the town. The women's clubs, of which there are four, have memberships of several hundred each and large, well-furnished club rooms.

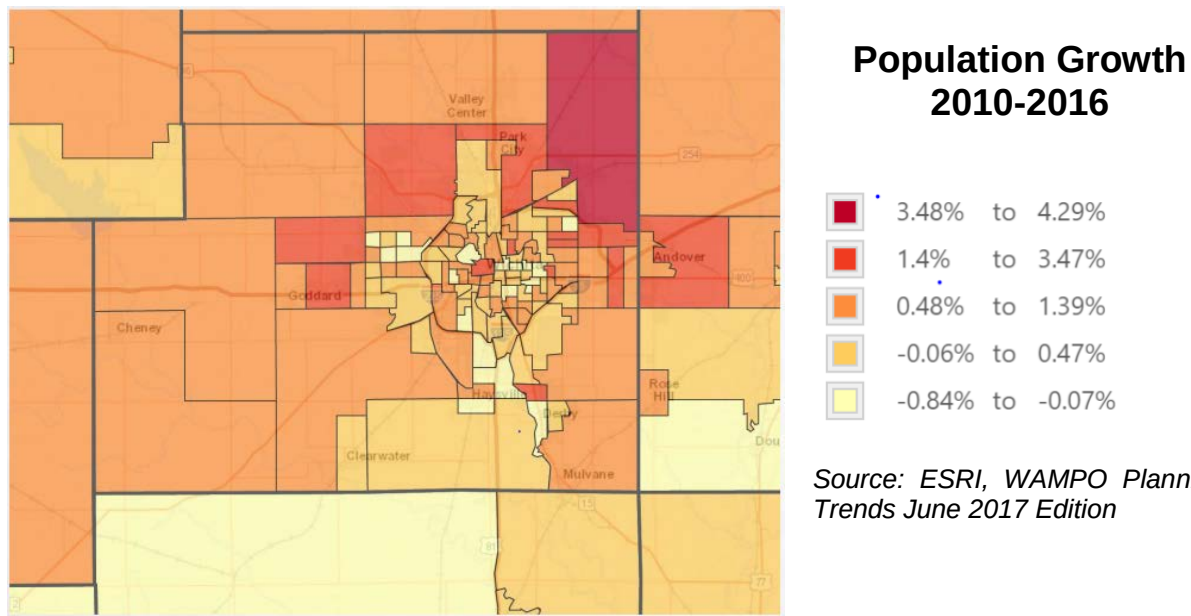
**Wichita Heights** – Established May 22, 1888 until October 15, 1900.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 5 DEMOGRAPHICS<sup>14</sup>

#### 5.1 POPULATION

Sedgwick County is situated in the South-Central portion of Kansas in the Arkansas River Valley. The April 1, 2010 U.S. Census indicated there were 498,365 residents (192,806 households) identified within a 997.51 square mile area or 499.6 persons per square mile. The 2015 U.S. Census estimate indicates 511,995 residents. The county seat and largest city within the county is Wichita with a 2016 estimated population of 389,902. The City of Wichita land area as of May 2017 was 164.3 square miles. Wichita is the largest city in Kansas and is a regional center of business, education, healthcare and entertainment, having more than one million people living within 100 miles of Wichita. Wichita State University's Center for Economic Development and Business Research has projected county population to be 606,752 in 2040.



Other communities within Sedgwick County (with 2010 population data) include: Andale (928), Bentley (530), Derby (22,158), Eastborough (773), Haysville (10,826), Bel Aire (6,769), Park City (7,297), Valley Center (6,822), Clearwater (2,481), Goddard (4,344), Maize (3,420), Cheney (2,094), Colwich (1,327), Viola (130), Mulvane (6,111), Sedgwick (1,695), Mount Hope (813), Garden Plain (773), Oaklawn-Sunview CDP (3,276), and Kechi (1,909).

According to Wichita State University's Center for Economic Development and Business Research (CEDBR) *Kansas Population Projections, 2014-2064*, Kansas population growth is expected to be 0.4 percent between 2019 and 2054, while those aged 65 and over are expected to rise 1.54 percent between 2014 and 2064 making this group an estimated 22.5 percent of the overall population. Kansas' working age (18 to 64) is expected to drop from 60.7 percent in 2014 to 55.2 percent in 2059. Youth under 18 years of age will also experience a decline, from 22.9 percent of the population in 2014 to 19.7 percent in 2059.

<sup>14</sup> <http://www.wampoks.org/Publications/Metropolitan+Transportation+Plan+2035.htm>

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

The following township populations are provided (excluding cities) in descending order.

### 2010 Census Township Populations

|               |        |              |       |
|---------------|--------|--------------|-------|
| Rockford      | 22,784 | Illinois     | 1,860 |
| Riverside     | 13,615 | Garden Plain | 1,838 |
| Salem         | 9,486  | Sherman      | 1,716 |
| Kechi         | 9,027  | Afton        | 1,531 |
| Gypsum        | 7,379  | Eagle        | 1,205 |
| Attica        | 6,725  | Greeley      | 1,035 |
| Grant         | 4,973  | Payne        | 937   |
| Park          | 4,615  | Waco         | 725   |
| Valley Center | 4,356  | Grand River  | 603   |
| Minneha       | 3,417  | Lincoln      | 523   |
| Ninnescah     | 3,231  | Viola        | 479   |
| Morton        | 2,667  | Erie         | 100   |
| Union         | 2,410  | Delano       | 11    |
| Ohio          | 1,980  |              |       |

Comparisons of township populations (excluding cities) between the 2000 and 2010 census are shown:

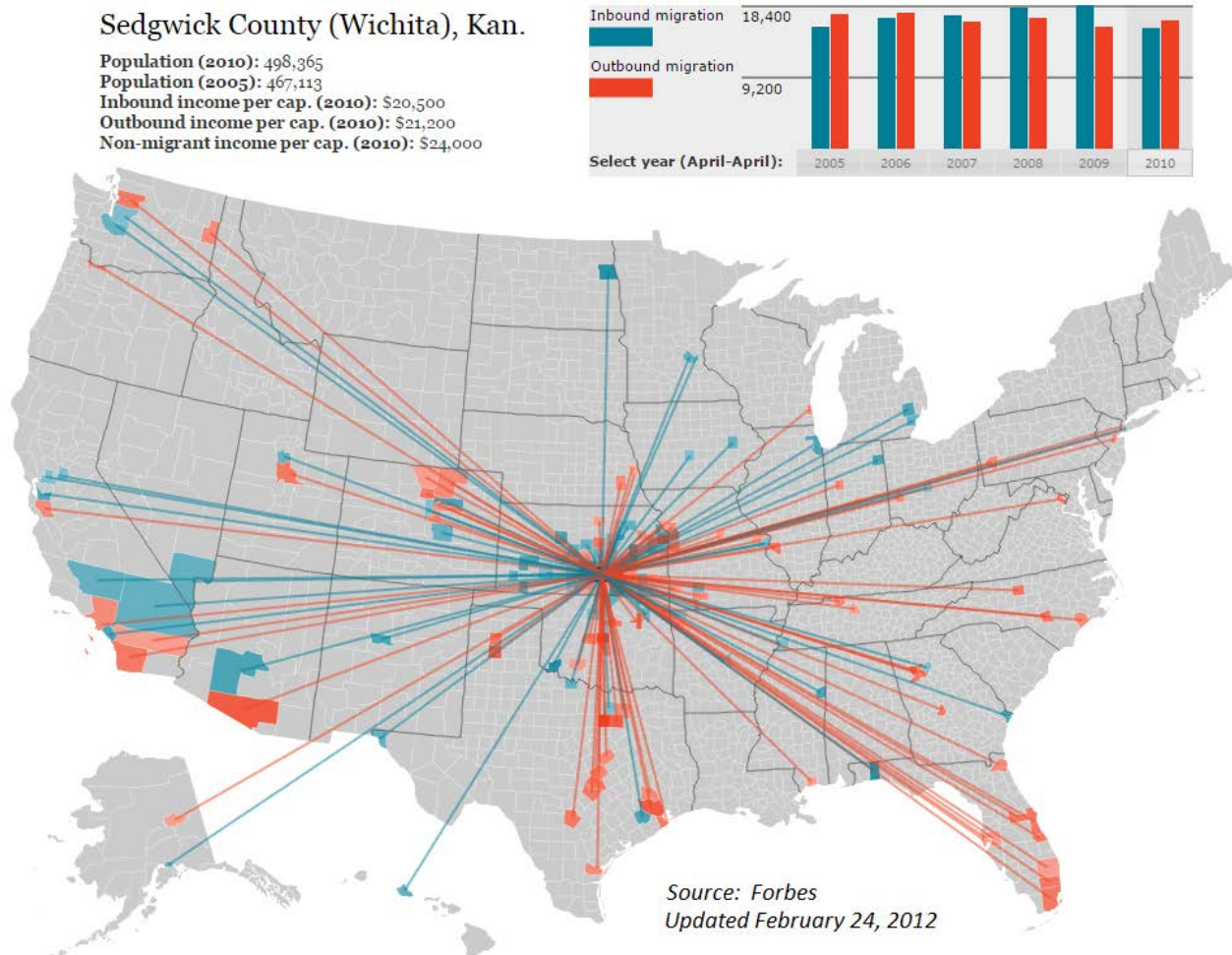
| 2000 U.S. CENSUS POPULATION |                          |                    |                           |                     |                    | 2010 U.S. CENSUS POPULATION |                          |                    |                           |                     |                    |
|-----------------------------|--------------------------|--------------------|---------------------------|---------------------|--------------------|-----------------------------|--------------------------|--------------------|---------------------------|---------------------|--------------------|
|                             | GREELEY<br>1,094         | EAGLE<br>1,069     | VALLEY<br>CENTER<br>3,642 | GRANT<br>3,710      | LINCOLN<br>473     |                             | GREELEY<br>1,035         | EAGLE<br>1,205     | VALLEY<br>CENTER<br>4,356 | GRANT<br>4,973      | LINCOLN<br>523     |
|                             | SHERMAN<br>1,362         | UNION<br>2,156     | PARK<br>4,128             | KECHI<br>8,041      | PAYNE<br>1,119     |                             | SHERMAN<br>1,716         | UNION<br>2,410     | PARK<br>4,615             | KECHI<br>9,027      | PAYNE<br>937       |
| GRAND<br>RIVER<br>607       | GARDEN<br>PLAIN<br>1,780 | ATTICA<br>4,959    | DELANO<br>196             |                     | MINNEHA<br>5,084   | GRAND<br>RIVER<br>603       | GARDEN<br>PLAIN<br>1,838 | ATTICA<br>6,725    | DELANO<br>11              |                     | MINNEHA<br>3,417   |
| MORTON<br>2,380             | AFTON<br>1,290           | ILLINOIS<br>1,620  | WACO<br>3,381             | RIVERSIDE<br>15,694 | GYPSUM<br>5,822    | MORTON<br>2,667             | AFTON<br>1,531           | ILLINOIS<br>1,860  | WACO<br>725               | RIVERSIDE<br>13,615 | GYPSUM<br>7,379    |
| ERIE<br>106                 | VIOLA<br>547             | NINNESCAH<br>2,913 | OHIO<br>1,146             | SALEM<br>8,411      | ROCKFORD<br>20,019 | ERIE<br>100                 | VIOLA<br>479             | NINNESCAH<br>3,231 | OHIO<br>1,980             | SALEM<br>9,486      | ROCKFORD<br>22,784 |

### PERCENT CHANGE 2000 - 2010

|                         |                        |                  |                          |                    |                  |
|-------------------------|------------------------|------------------|--------------------------|--------------------|------------------|
|                         | GREELEY<br>-5.4        | EAGLE<br>11.2    | VALLEY<br>CENTER<br>16.4 | GRANT<br>25.3      | LINCOLN<br>9.5   |
|                         | SHERMAN<br>20.6        | UNION<br>10.6    | PARK<br>10.6             | KECHI<br>10.9      | PAYNE<br>-16.3   |
| GRAND<br>RIVER<br>-0.01 | GARDEN<br>PLAIN<br>3.1 | ATTICA<br>26.3   | DELANO<br>-94.4          |                    | MINNEHA<br>-32.8 |
| MORTON<br>10.8          | AFTON<br>15.7          | ILLINOIS<br>12.9 | WACO<br>-78.6            | RIVERSIDE<br>-13.2 | GYPSUM<br>21.1   |
| ERIE<br>-5.7            | VIOLA<br>-12.4         | NINNESCAH<br>9.8 | OHIO<br>42.1             | SALEM<br>11.3      | ROCKFORD<br>12.1 |

### 5.2 MIGRATION

#### [Forbes American Migration Interactive Map](#)



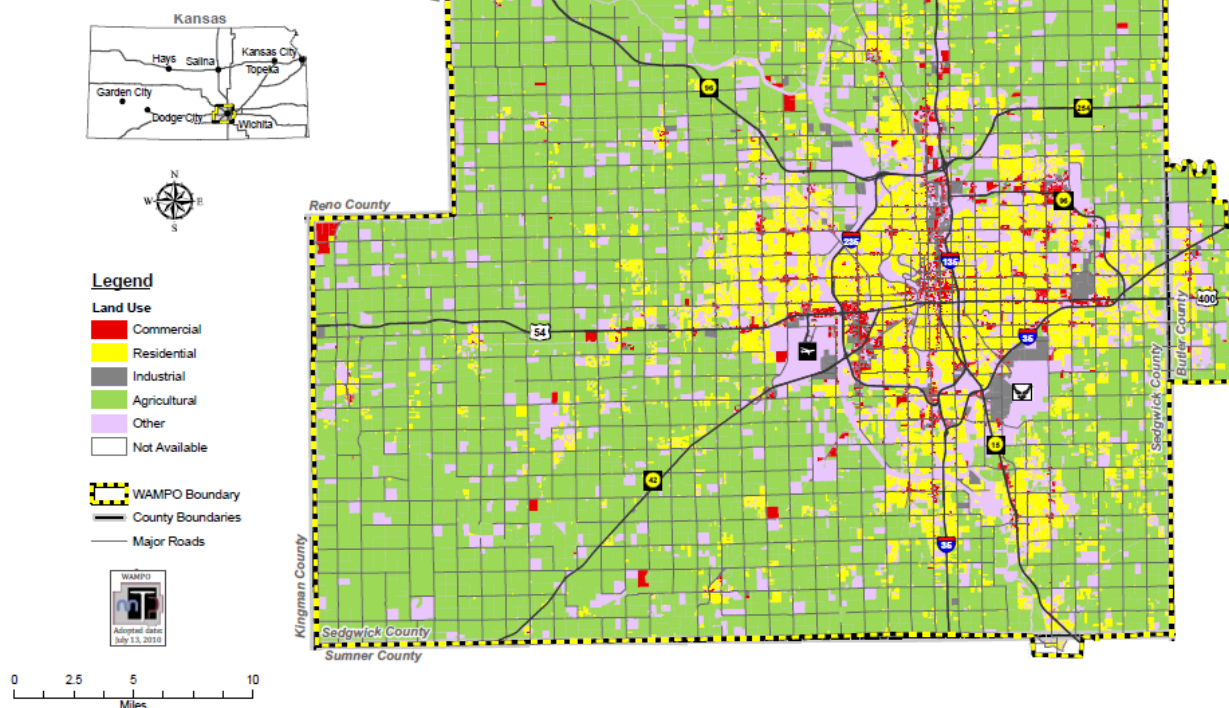
*Note: Blue counties reflect migration to Sedgwick County while red counties reflect migration away from Sedgwick County.*

### 5.3 LAND USE

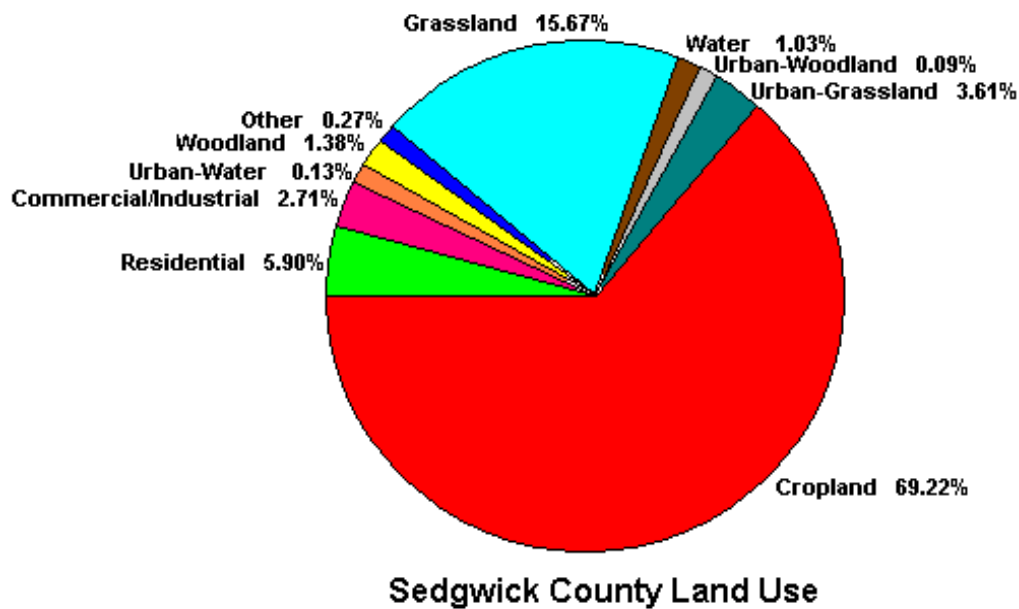
Density of land development also affects travel patterns and the built environment. Like many urban areas, the population density of the Wichita urban area decreased over the last several decades. Density went from 1,718 people per square mile in 1985 to 1,338 people per square mile in 2007. This means that the people in the region have spread out. Decreasing population density, in addition to the spreading out of land uses, means that people in the region need to go farther to get from their home to work and other common destinations.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### Existing Land Use



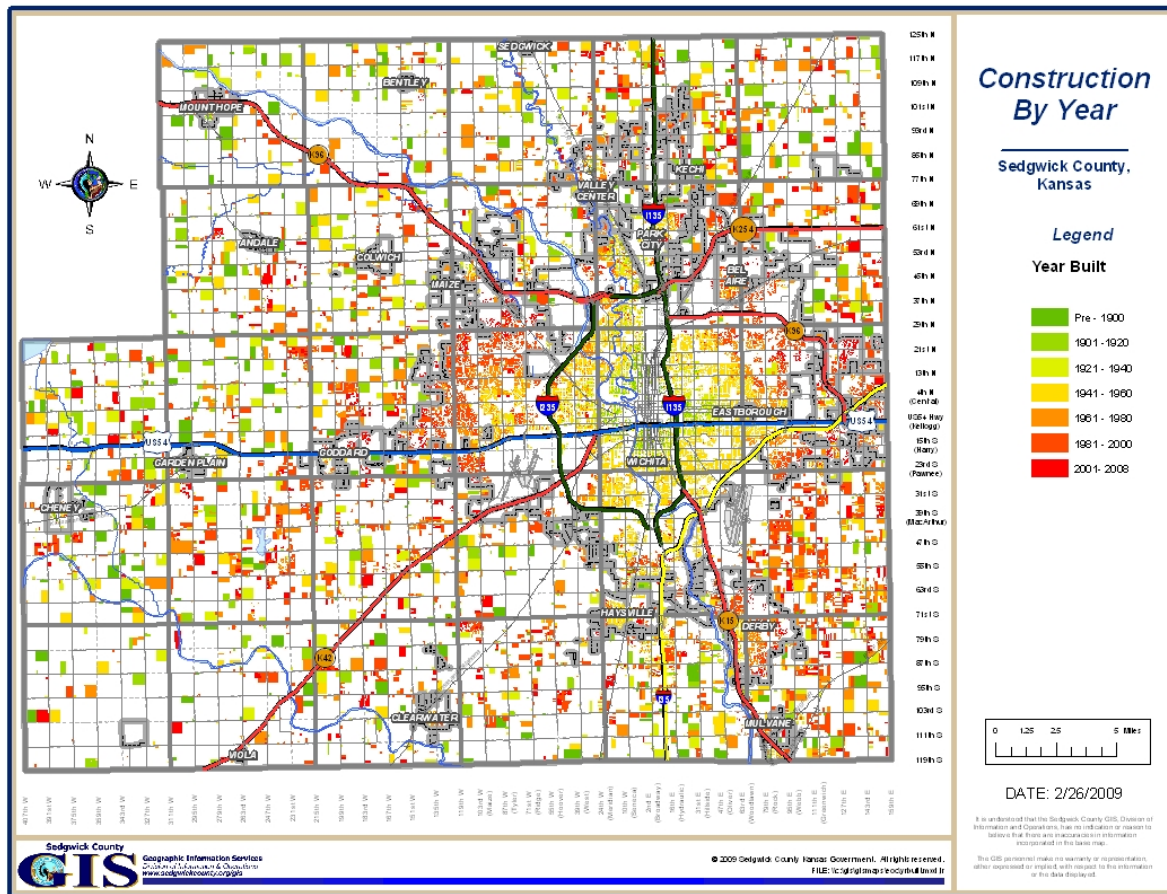
Source: WAMPO Metropolitan Transportation Plan 2035





## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

The following map shows the year of construction for residential and commercial facilities in Sedgwick County.

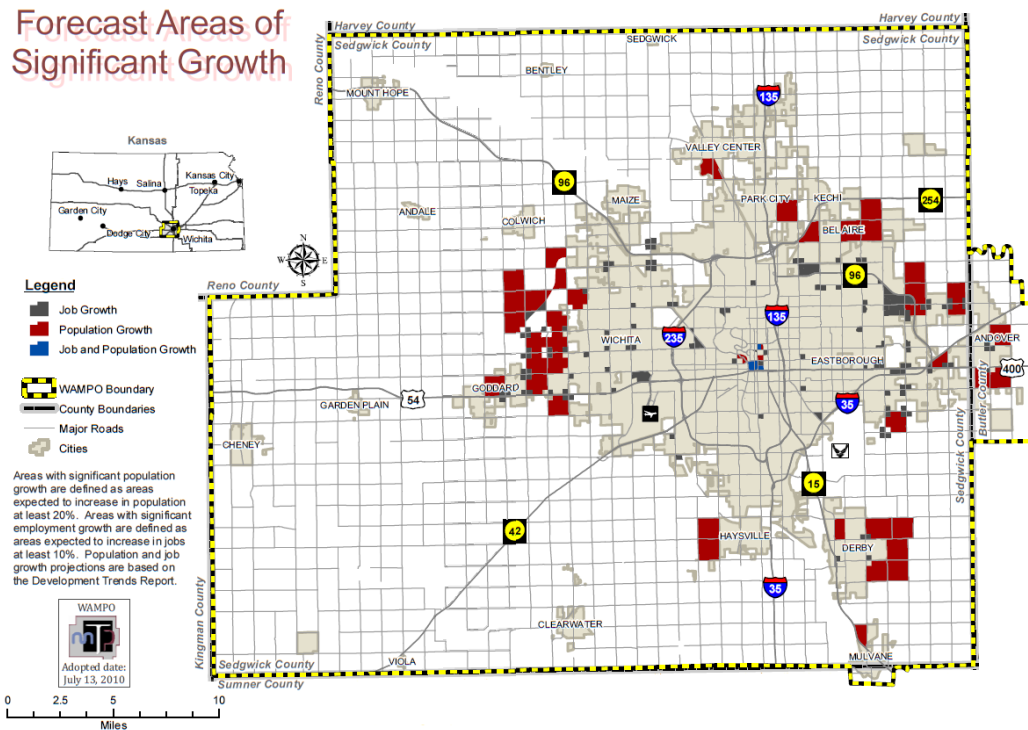




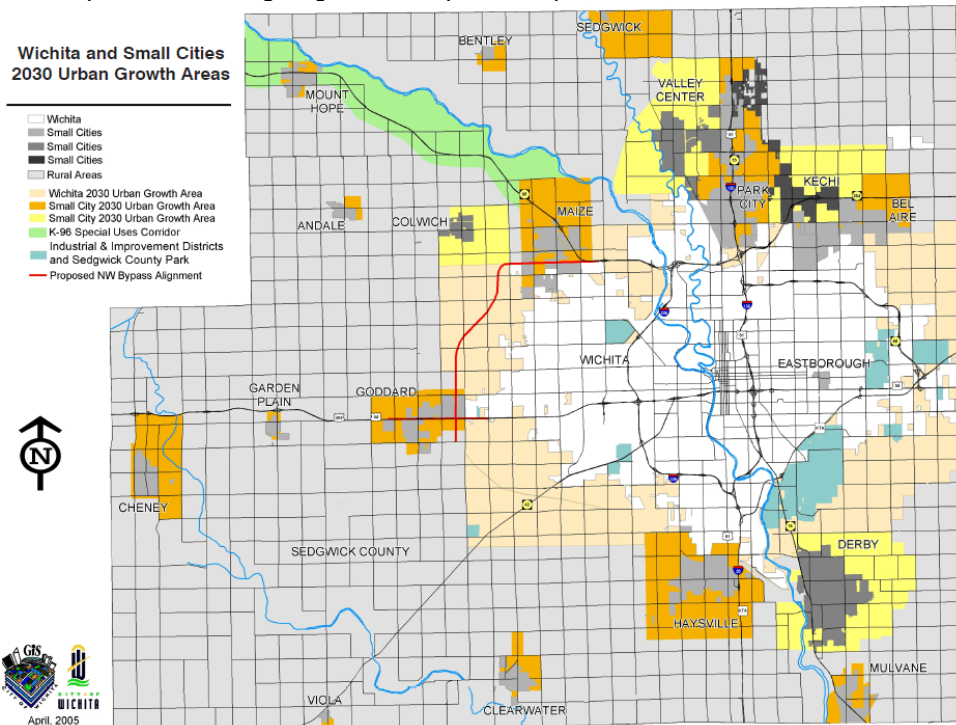
# 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

## 5.4 PROJECTED GROWTH

The following map shows the forecasted growth of jobs and population and does not reflect anticipated local government boundaries.



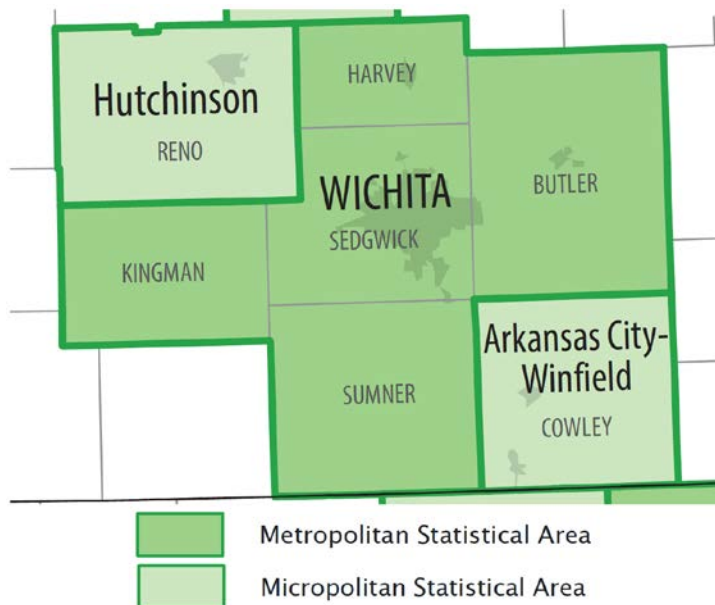
The following map shows anticipated local government boundaries by the year 2030 as projected by the Wichita Area Metropolitan Planning Organization (WAMPO):



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 5.5 METROPOLITAN STATISTICAL AREA

Sedgwick County is also part of the Metropolitan Statistics Area (MSA) that consists of Butler, Harvey, Kingman, and Sumner Counties. The 2010 U.S. Census reported a total of 630,919 people residing within the Wichita MSA, and an additional 10,157 residents estimated for 2014. According to the [Greater Wichita Economic Development Coalition](#), It is a relatively young population with a median age of 35.2 years (national median age 37.3 years.) About 84% of metro residents live in an urban setting.



#### Wichita MSA 2014 Estimate Population

|                 |                |
|-----------------|----------------|
| Butler County   | 66,227         |
| Harvey County   | 34,820         |
| Kingman County  | 7,698          |
| Sedgwick County | 508,803        |
| Sumner County   | 23,528         |
| <b>Total:</b>   | <b>641,076</b> |

#### Wichita MSA 2040 Population

|                 |                |
|-----------------|----------------|
| Butler County   | 84,406         |
| Harvey County   | 39,409         |
| Kingman County  | 5,067          |
| Sedgwick County | 606,752        |
| Sumner County   | 16,997         |
| <b>Total:</b>   | <b>752,631</b> |

Source: [KU Institute for Policy & Social Research](#) / U.S. Census Bureau

The following table provides comparisons between each of the Wichita MSA counties based on the population figures shown:

U.S. CENSUS BUREAU COUNTY QUICK FACTS – POPULATION

| Population Variable                     | Butler | Harvey | Kingman | Sedgwick | Sumner |
|-----------------------------------------|--------|--------|---------|----------|--------|
| 2014 U.S. Census, Estimate              | 66,227 | 34,820 | 7,698   | 508,803  | 23,528 |
| Population Change (2010-2014)           | 0.5%   | 0.4%   | -2.0%   | 2.1%     | -2.5%  |
| Under 5 Years Old (2014)                | 6.0%   | 6.9%   | 5.4%    | 7.6%     | 6.6%   |
| Under 18 Years Old (2014)               | 26.0%  | 25.2%  | 21.9%   | 26.5%    | 24.9%  |
| 65 Years and Older (2014)               | 14.0%  | 17.9%  | 21.6%   | 12.8%    | 17.1%  |
| Language Other than English (2009-2013) | 3.2%   | 9.0%   | 2.5%    | 13.6%    | 1.9%   |
| Persons Below Poverty Level (2009-2013) | 8.4%   | 12.8%  | 12.5%   | 15.3%    | 13.4%  |

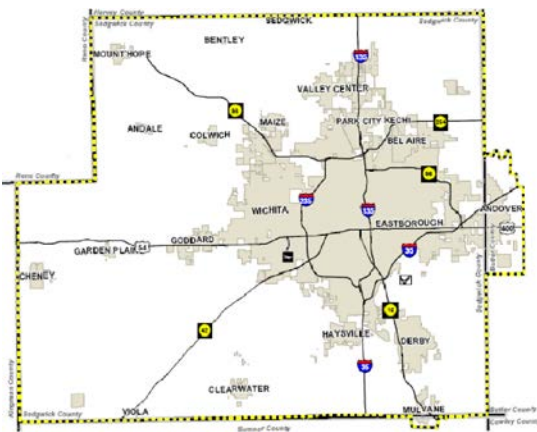
Source: U.S. Census Bureau

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 5.6 WICHITA METRO WORKFORCE PROFILE<sup>15</sup>

Manufacturing accounts for roughly 18.1% of Wichita metro area employment, almost double the national percentage (8.9%) and the highest in the Midwest. Large manufacturers commonly run traditional 3-shift operations or flexible 24-hour schedules. The labor force is highly skilled, in large part due to the high concentration of manufacturing firms in the area using high technology design and production methods. According to a Milken Institute study, Wichita has the highest concentration of aircraft and aircraft parts manufacturing employment (skills) in the nation. Wichita area manufacturers also utilize these precision production skills to produce high value-added products such as industrial-commercial machinery, computer equipment, fabricated metal products, instrumentation and controls, photographic equipment, plastic and composite products, chemicals, petroleum refining equipment and electronic equipment. Of metro area residents age 25 and over, 27.7% are high school graduates and 27.8% hold bachelors or advanced degrees. The Wichita metro area civilian labor force was 304,678 persons with an unemployment rate of 5.1%, representing about 15,425 persons. The average annual pay for all sectors was \$43,706.

### 5.7 WICHITA AREA METROPOLITAN PLANNING ORGANIZATION (WAMPO) REGION<sup>16</sup>



This region includes all of Sedgwick County, a portion of Butler County including Andover, and a small portion of Sumner County including Mulvane. The WAMPO region includes a total of 21 cities both inside and outside of the urbanized area.

The median age of residents in the WAMPO region is 34; 33 for males and 35 for females. The median age of residents in the region is slightly younger than the residents in the State of Kansas and the nation, where the median age is 36. The aging population will affect the future transportation system. A large segment of the population (the Baby Boomers) who are currently in their 40s, 50s, and early 60s will age into their 60s, 70s,

and 80s over the course of this plan. As this segment of the population ages, changes in the way they currently use the transportation system could occur. For example, some Baby Boomers might rely more on transit, some might move to an assisted living facility that provides a communal bus for its residents, some might continue to drive, and others might rely on friends and family for transportation.

### RECENT TRENDS

Statewide racial and ethnic composition is comparable to that of the nation. The fastest growth has been among Asians and persons of Hispanic origin. Hispanic population growth was 33% from 2009 to 2013 compared to 14% nationally. Asian population growth was 14% compared to 15% nationally. Given higher growth rates for minority populations, the area is forecasted to become even more diverse.<sup>17</sup>

### RACIAL PROFILE AND LANGUAGE<sup>18</sup>

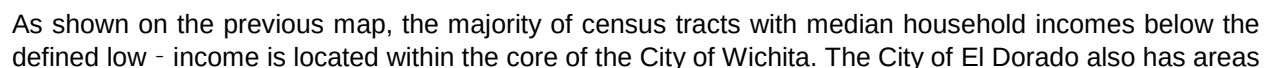
According to 2015 U.S. Census Bureau American Community Survey data, the majority of the population (83.3%) is classified as non-Hispanic. Whites/Caucasian constituted the majority at 75.7%. The black/African American population grew 11.9%, and the Hispanic population increased to 16.7%. The Asian population also grew to 6.1% while American Indians were 1.2%. Other race/ethnic origins were reported at 5.1%. Language other than English spoken at home is 13.2%.

<sup>15</sup> Greater Wichita Economic Development Coalition

<sup>16</sup> <http://www.wampoks.org/Publications/Metropolitan+Transportation+Plan+2035.htm>

<sup>17</sup> Greater Wichita Economic Development Coalition

<sup>18</sup> US Census Bureau, Quickfacts,



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

in which the population is identified as being low - income. This map identifies potential areas of low - income cliental and is not to be used to identify poverty levels.

### HOUSING

For 2013, there were 213,024 housing units in Sedgwick County of which 21.3% were multi-unit structures and 65.5% were homeowners. . The number of housing units is projected to increase by approximately 21% to 254,000 by 2035. The average growth rate per year of the number of housing units mirrors the yearly growth rate of the population at 0.8 % per year. The number and location of these housing units impact the demand for transportation services.

### 5.7 SUSCEPTIBLE POPULATIONS

#### 5.7.1 ELDERLY

As the elderly population (65+) continues to grow, the demands of specialized transportation and transit services in the CTD #12 region consisting of Butler, Harvey and Sedgwick Counties are expected to also grow. Harvey County has the largest percentage of elderly individuals (17%), while Sedgwick County has the least with 11.2% of its population identified as elderly. The elderly make up 12.5% of Butler County's population.

#### 5.7.2 FUNCTIONAL NEEDS/DISABILITY

After the 2000 census, the U.S. Census Bureau stopped collecting information on disabilities on their questionnaires and is now reported by the American Community Survey (ACS) every five years. The U.S. Census Bureau utilizes ACS information along with others and reports Sedgwick County has an average of 8.4% of individuals that have a disability. This constitutes 42,972 of individuals within the reported 511,574 population of Sedgwick County that have one or more of the following disabilities: sensory, physical, mental, self-care/independent living.

However, the ACS reports on these disabilities with go-outside-home and employment as additional disabilities. If all disabilities are used, Sedgwick County has a high of 25.16% or 129,010 individuals aged 5 and older. The following table and disability definition breakdown are provided below for specific information.

| <b>Disability / Age Group / Type</b> | <b>Total in Sedgwick County<sup>1</sup></b> | <b>% of County Population<sup>2,3</sup></b> |
|--------------------------------------|---------------------------------------------|---------------------------------------------|
| Individuals Aged 5 to 15 Years       | 5,451                                       | 1.06                                        |
| - Sensory Disability                 | 729                                         | 0.14                                        |
| - Physical Disability                | 743                                         | 0.15                                        |
| - Mental Disability                  | 3,295                                       | 0.64                                        |
| - Self-Care Disability               | 684                                         | 0.13                                        |
| Individuals Aged 16 to 64 Years      | 84,552                                      | 16.5                                        |
| - Sensory Disability                 | 6,947                                       | 1.4                                         |
| - Physical Disability                | 16,999                                      | 3.3                                         |
| - Mental Disability                  | 9,743                                       | 1.9                                         |
| - Self-Care Disability               | 4,621                                       | 0.9                                         |
| - Go-Outside-Home Disability         | 14,825                                      | 2.9                                         |
| - Employment Disability              | 31,417                                      | 6.1                                         |



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

| Disability / Age Group / Type              | Total in Sedgwick County <sup>1</sup> | % of County Population <sup>2,3</sup> |
|--------------------------------------------|---------------------------------------|---------------------------------------|
| Individuals Aged 65 Years and Older        | 39,007                                | 7.6                                   |
| - Sensory Disability                       | 6,344                                 | 1.2                                   |
| - Physical Disability                      | 14,117                                | 2.8                                   |
| - Mental Disability                        | 4,847                                 | 0.9                                   |
| - Self-Care Disability                     | 4,608                                 | 0.9                                   |
| - Go-Outside-Home Disability               | 9,091                                 | 1.8                                   |
|                                            |                                       |                                       |
| <b>Total Individuals with Disabilities</b> | <b>129,010</b>                        | <b>25.16</b>                          |

Notes:

<sup>1</sup>2015 American Community Survey Disabilities Data

<sup>2</sup>U.S. Census Bureau 2015 Population Estimate as of July 1 for Sedgwick County is 511,574

<sup>3</sup>U.S. Census Bureau Percent for 2015 is reported as 8.4 (excludes Employment)

### Breakdown of Disability Definitions per American Community Survey

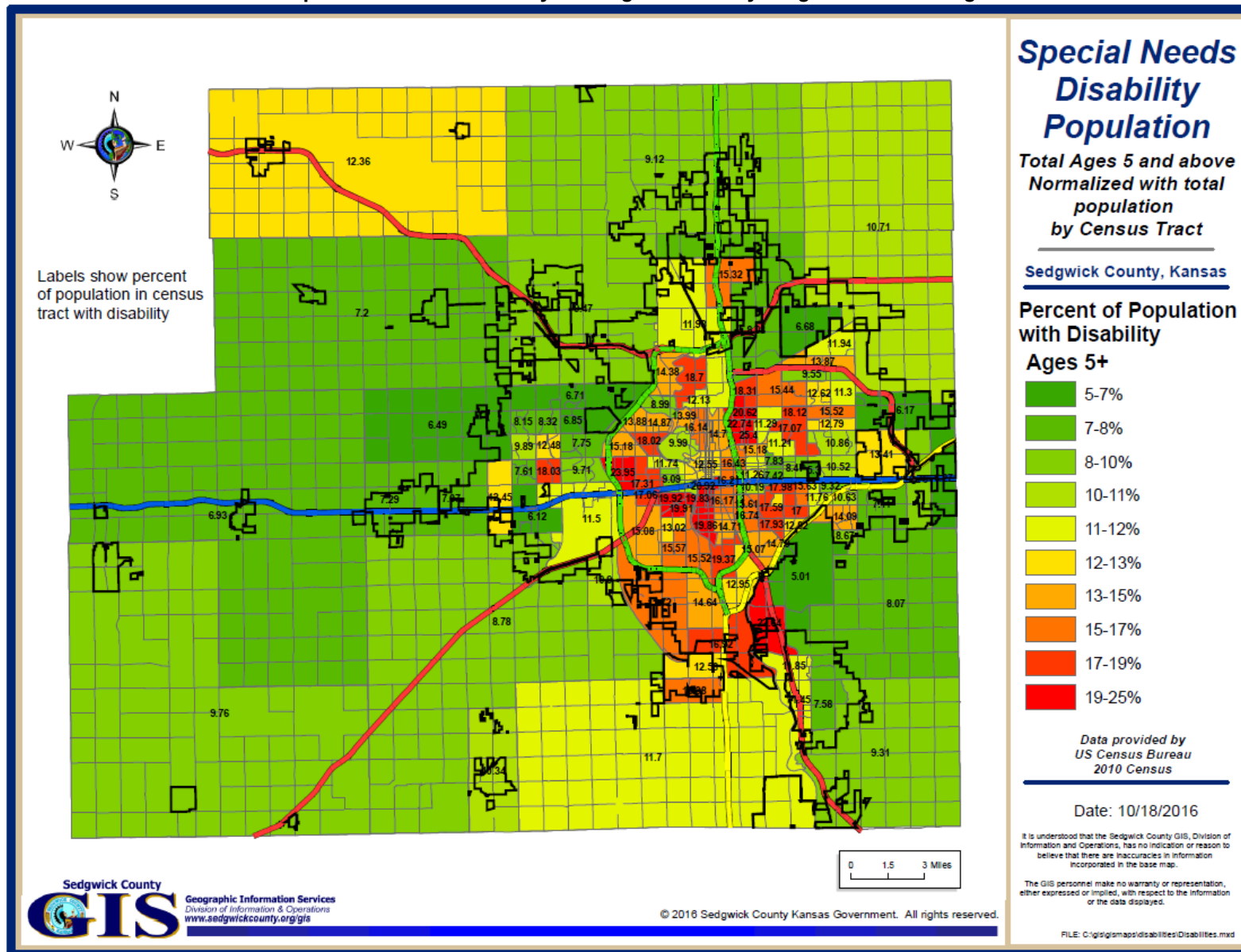
- **Sensory Disability** Conditions that include blindness, deafness, or a severe vision or hearing impairment.
- **Physical Disability** Conditions that substantially limit one or more basic physical activities such as walking, climbing stairs, reaching, lifting, or carrying.
- **Mental Disability** Because of a physical, mental, or emotional condition lasting 6 months or more, the person has difficulty learning, remembering or concentrating.
- **Self-care Disability** Because of a physical, mental, or emotional condition lasting 6 months or more, the person has difficulty dressing, bathing, or getting around inside the home.
- **Go-outside-home Disability** Because of a physical, mental, or emotional condition lasting 6 months or more, the person has difficulty going outside the home alone to shop or visit a doctor's office.
- **Employment Disability** Because of a physical, mental, or emotional condition lasting 6 months or more, the person has difficulty working at a job or business.

Maps showing percent of population with disabilities by age and type in Sedgwick County are shown on the following pages and are based on 2010 U.S. Census blocks using 2015 ACS information which last reported this category.



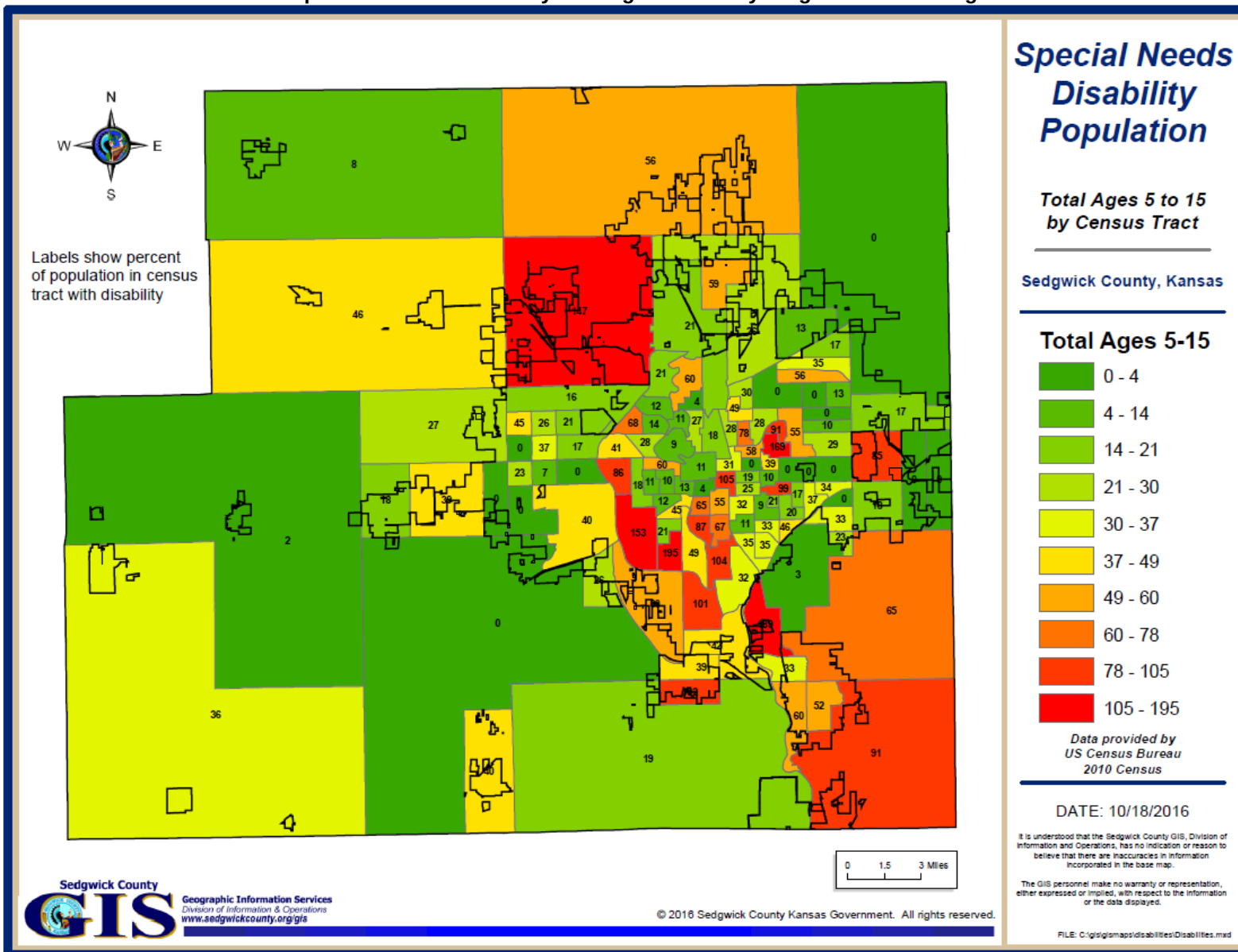
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### Percent of Population with a Disability in Sedgwick County – Aged 5 Years of Age and Older



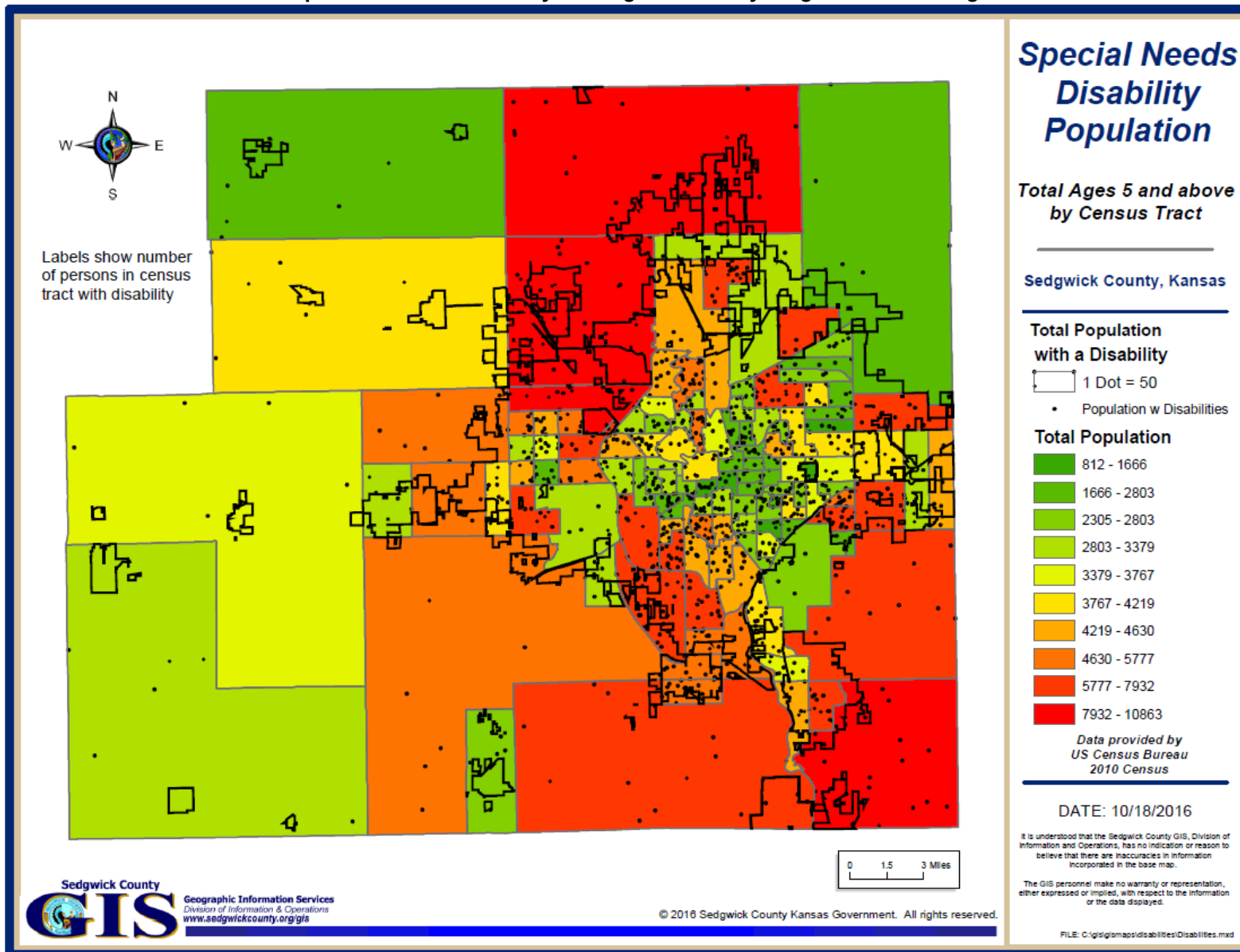
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### Number of Population with a Disability in Sedgwick County – Aged 5 Years of Age and Older



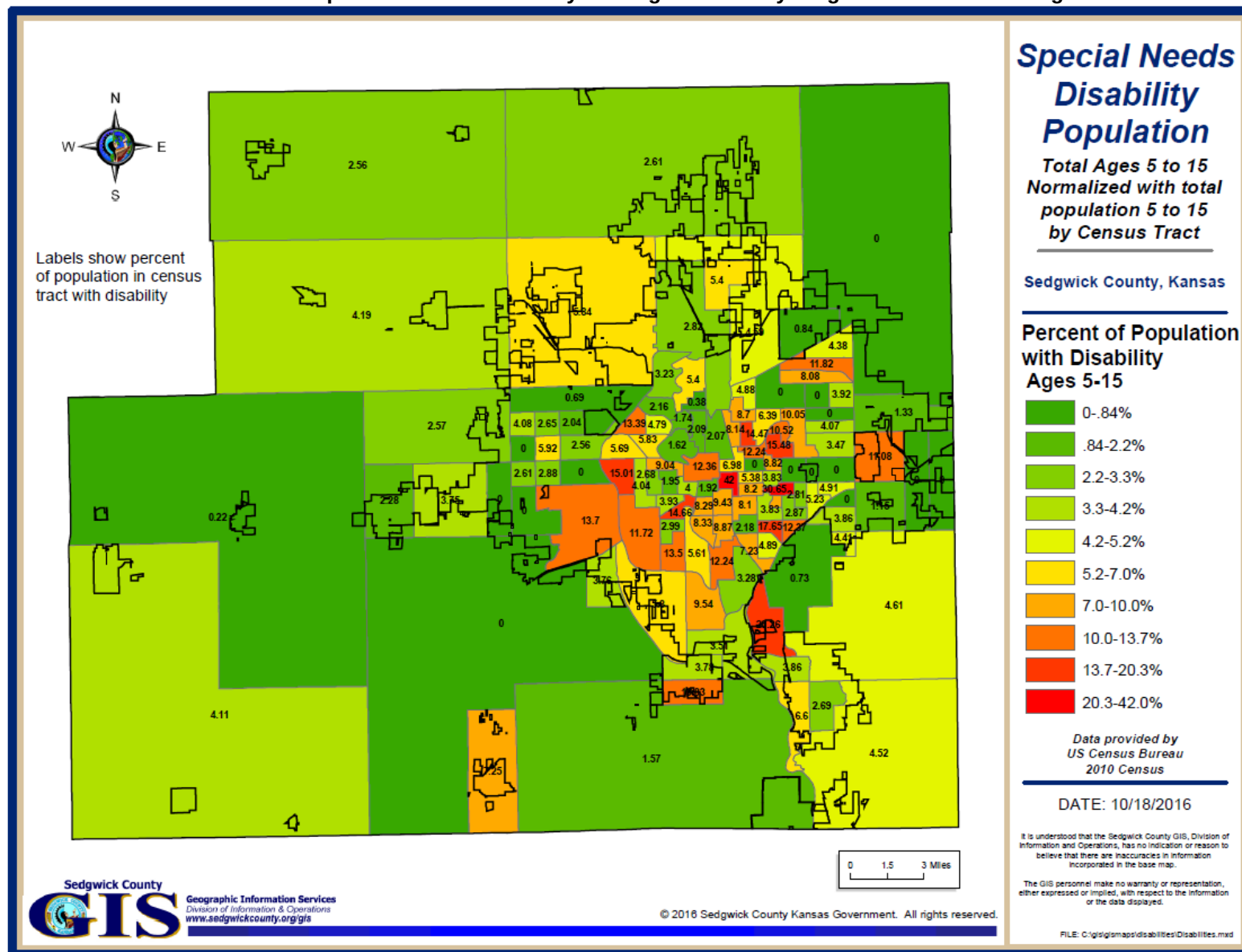
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### Number of Population with a Disability in Sedgwick County – Aged 5 Years of Age and Older



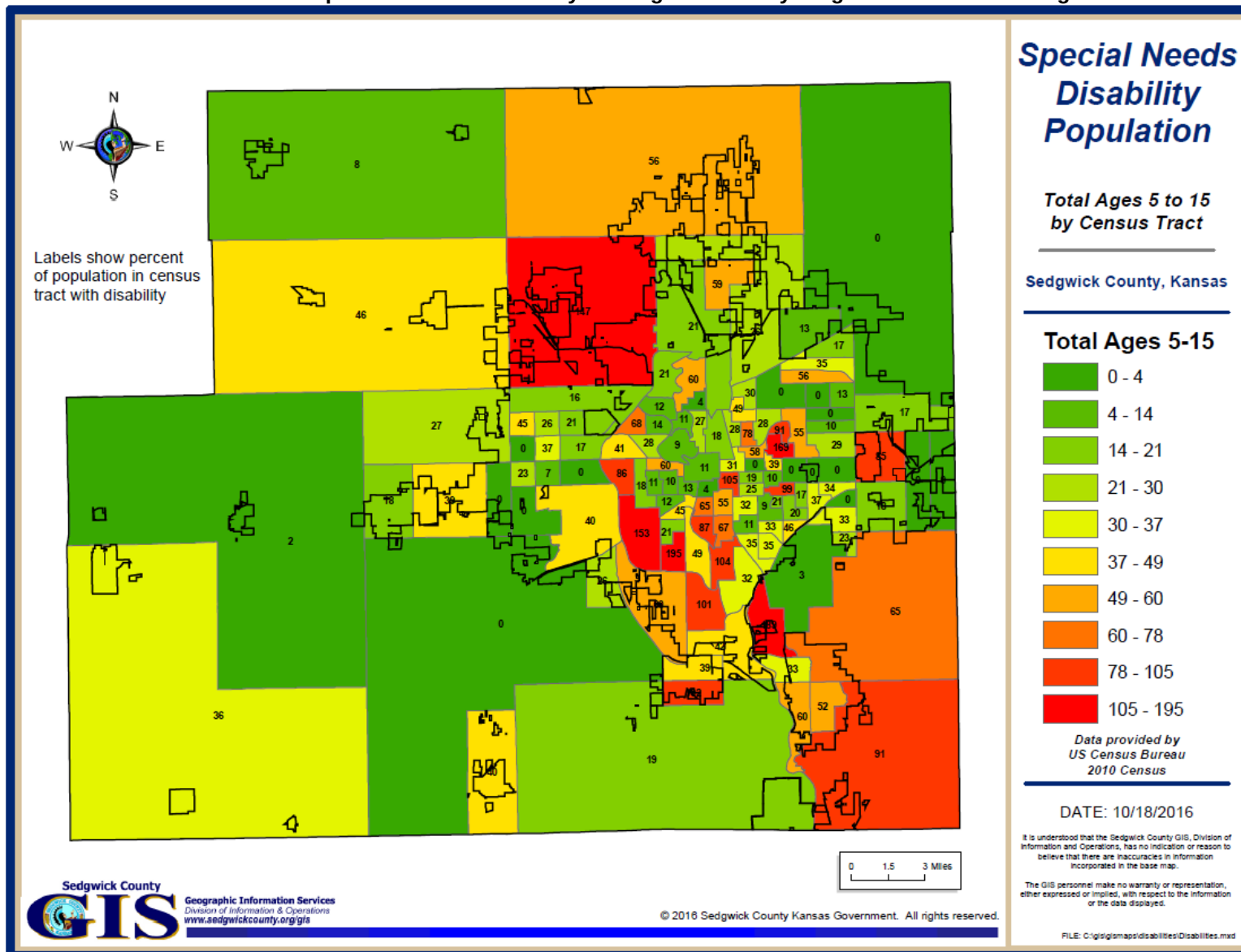
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### Percent of Population with a Disability in Sedgwick County – Aged 5 to 15 Years of Age



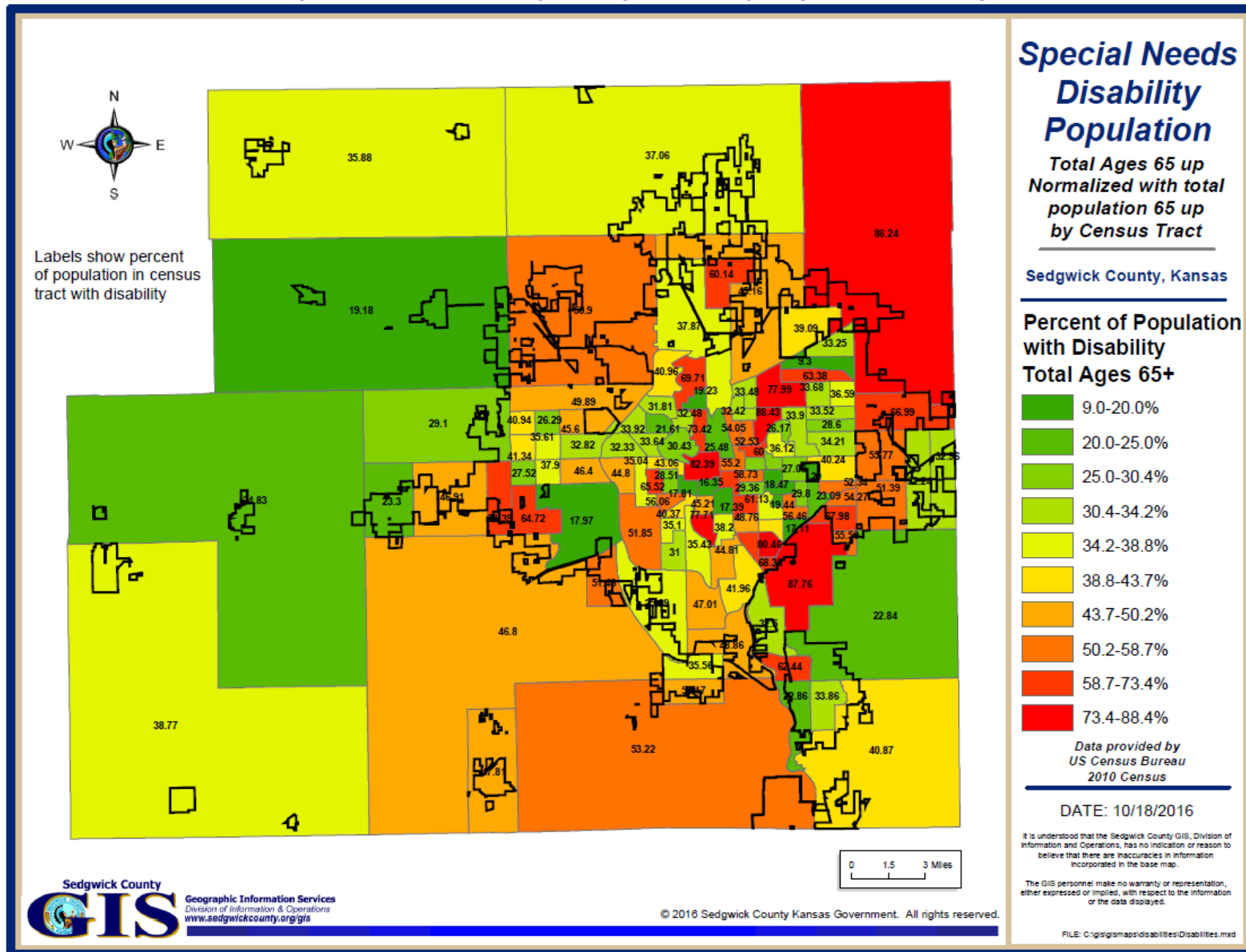
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

Number of Population with a Disability in Sedgwick County – Aged 5 to 15 Years of Age



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

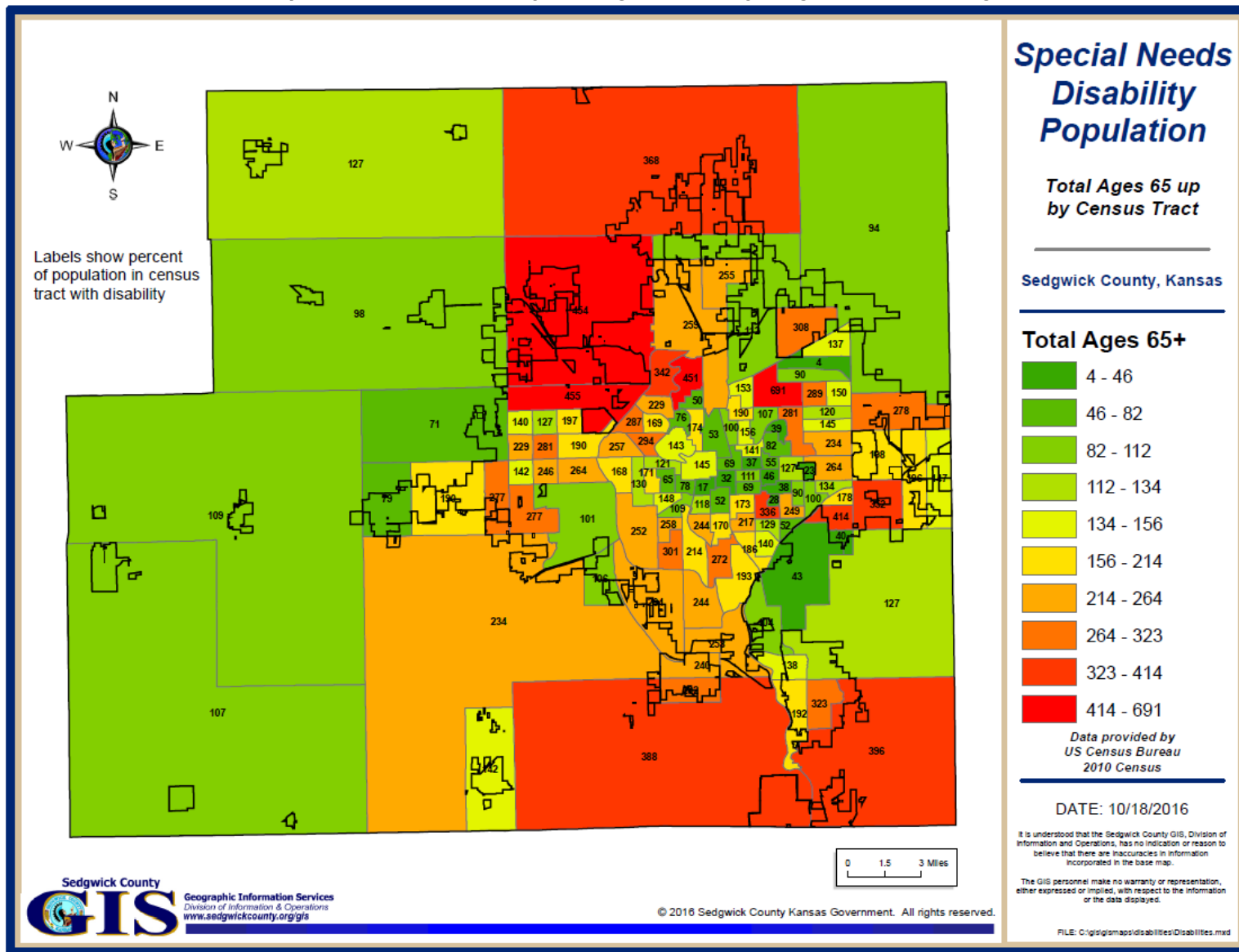
### Percent of Population with a Disability in Sedgwick County – Aged 65 Years of Age and Older





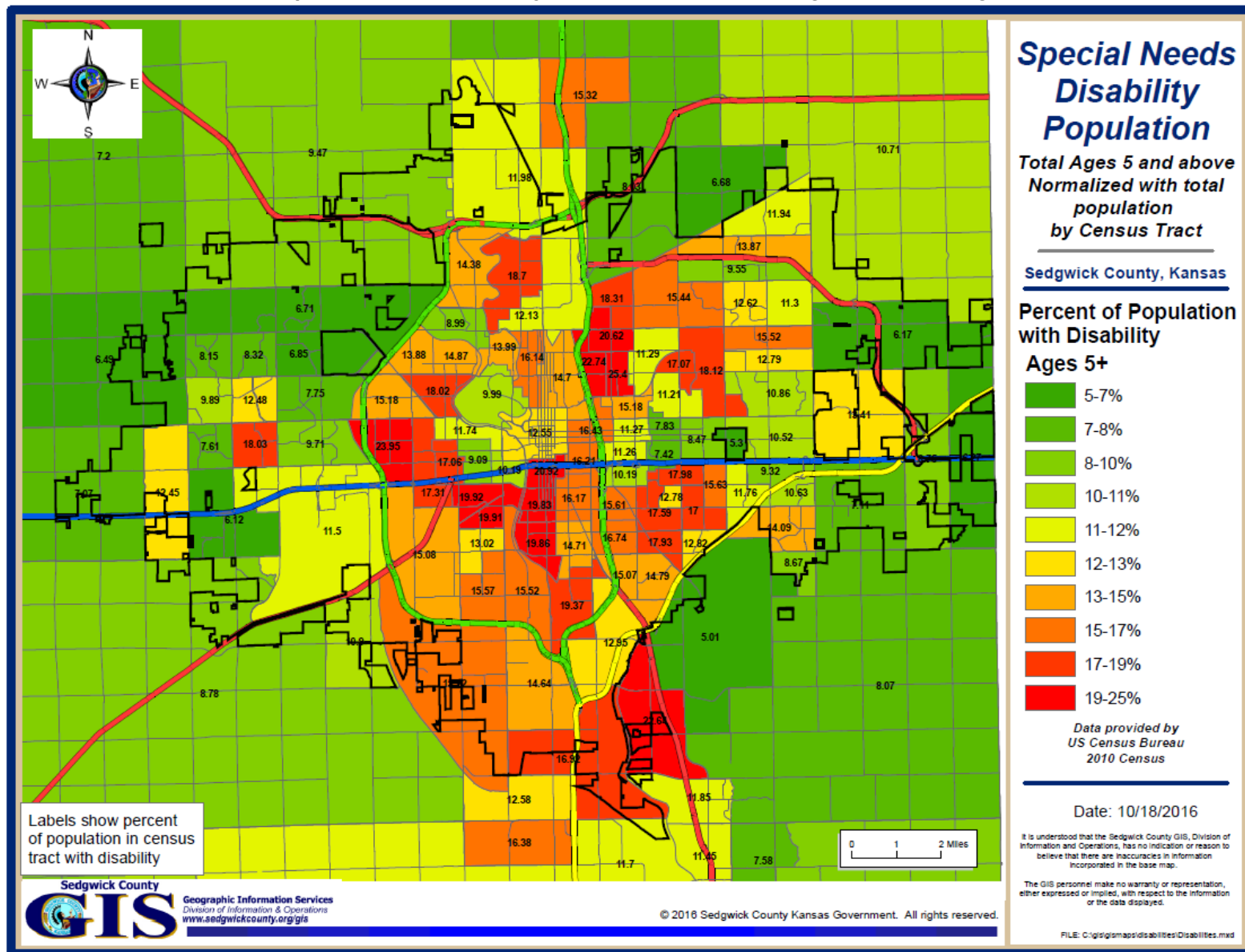
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### Percent of Population with a Disability in Sedgwick County – Aged 65 Years of Age and Older



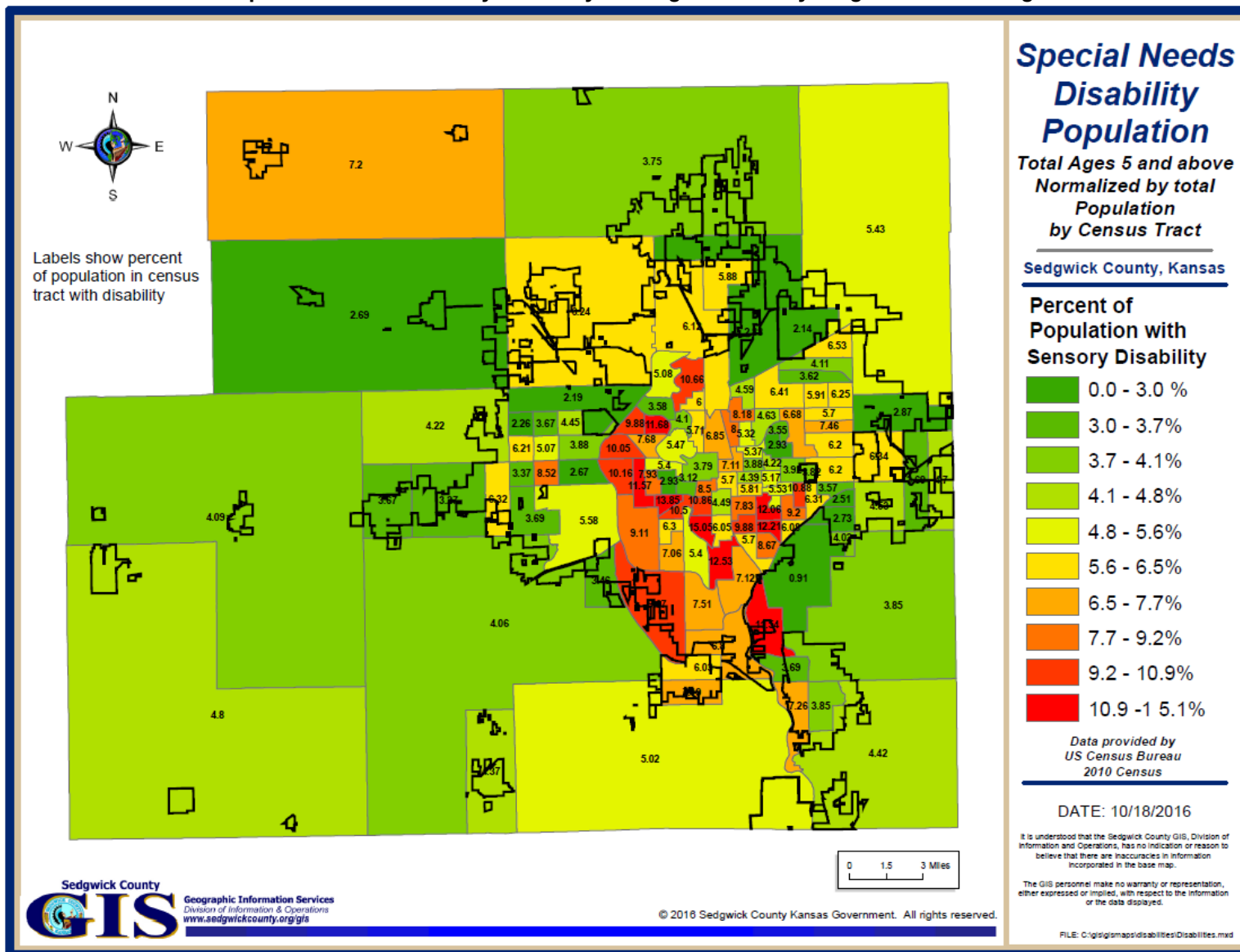
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### Percent of Population with a Disability in Wichita Metro Area – Aged 5 Years of Age and Older



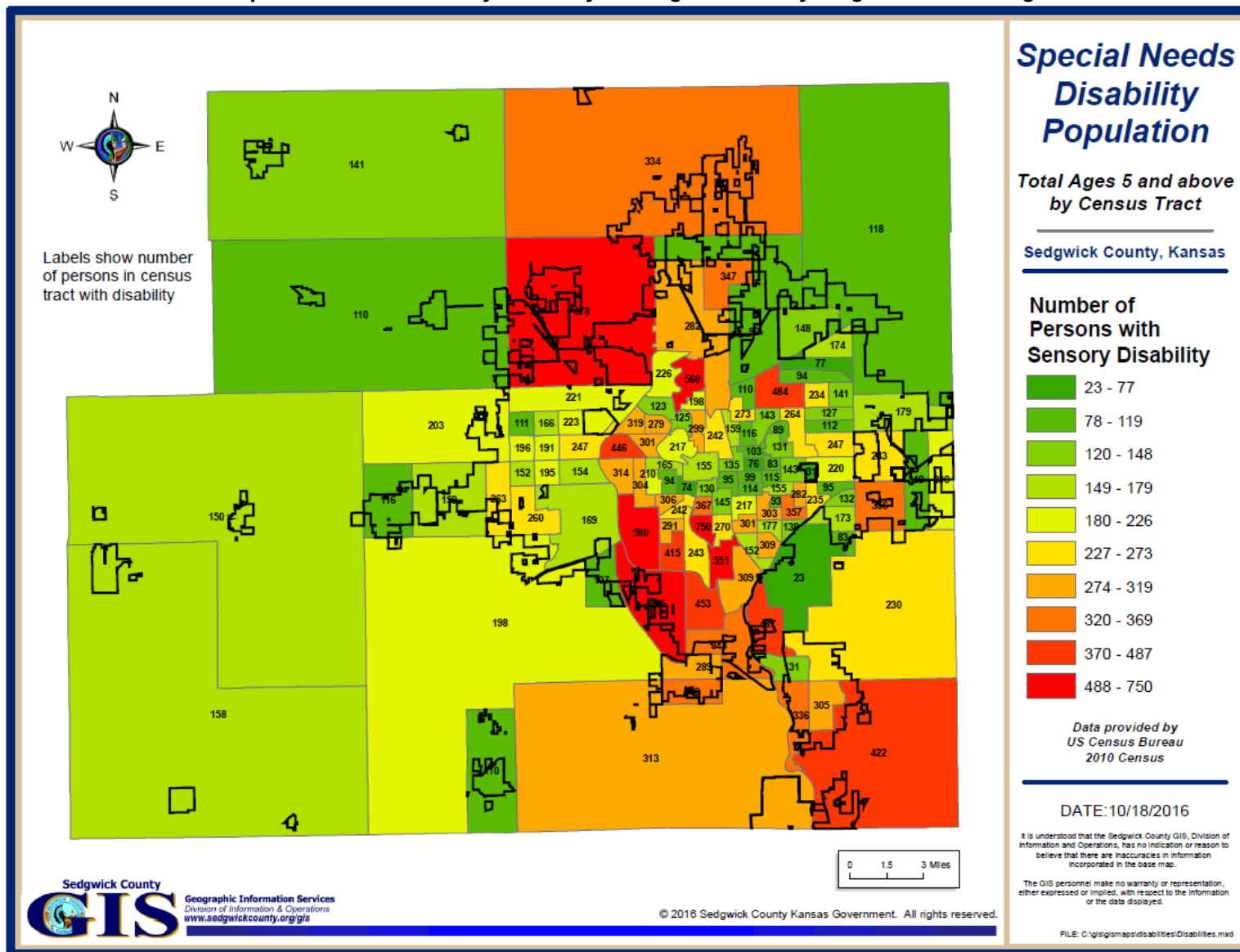
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

Percent of Population with a Sensory Disability in Sedgwick County – Aged 5 Years of Age and Older



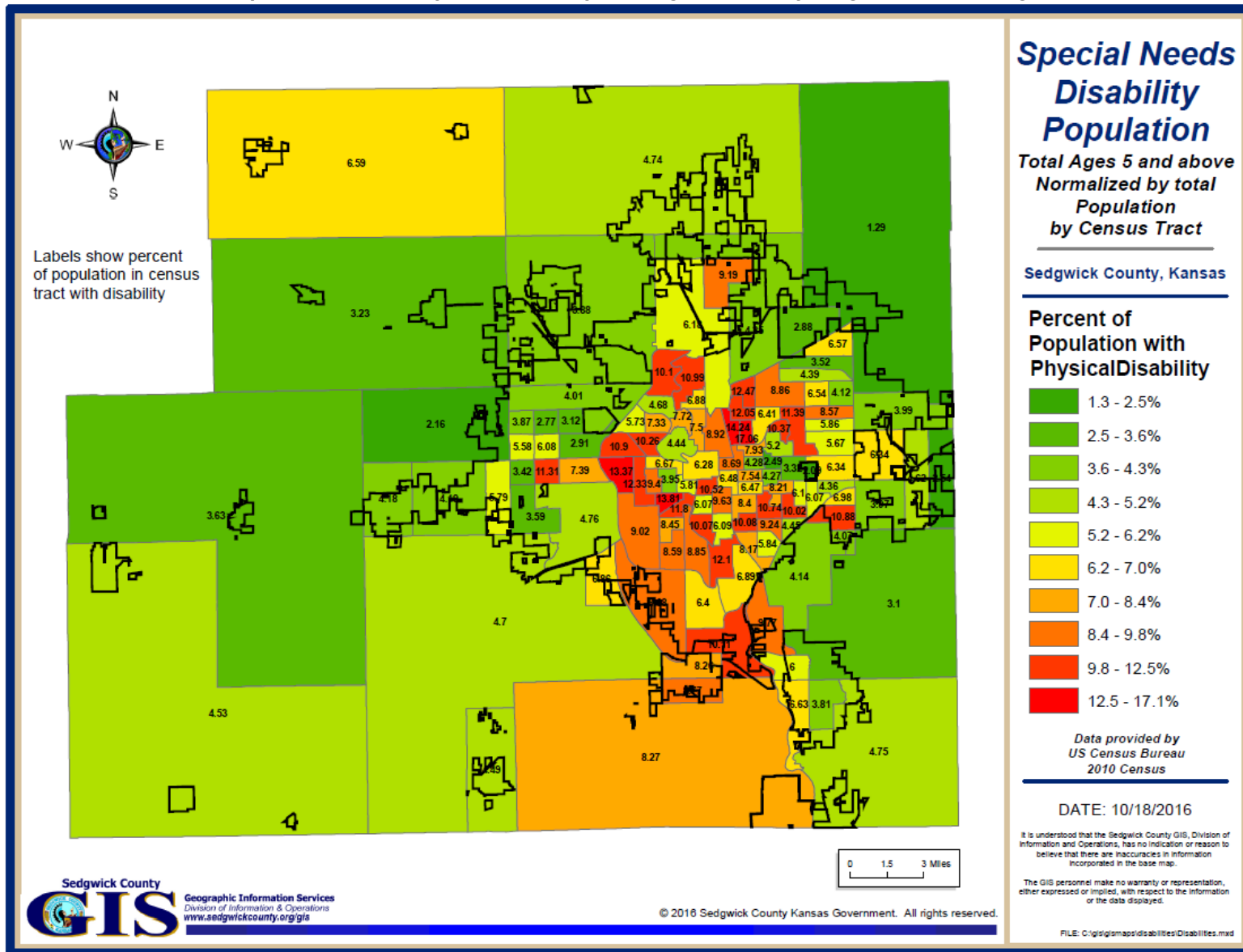
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

Number of Population with a Sensory Disability in Sedgwick County – Aged 5 Years of Age and Older



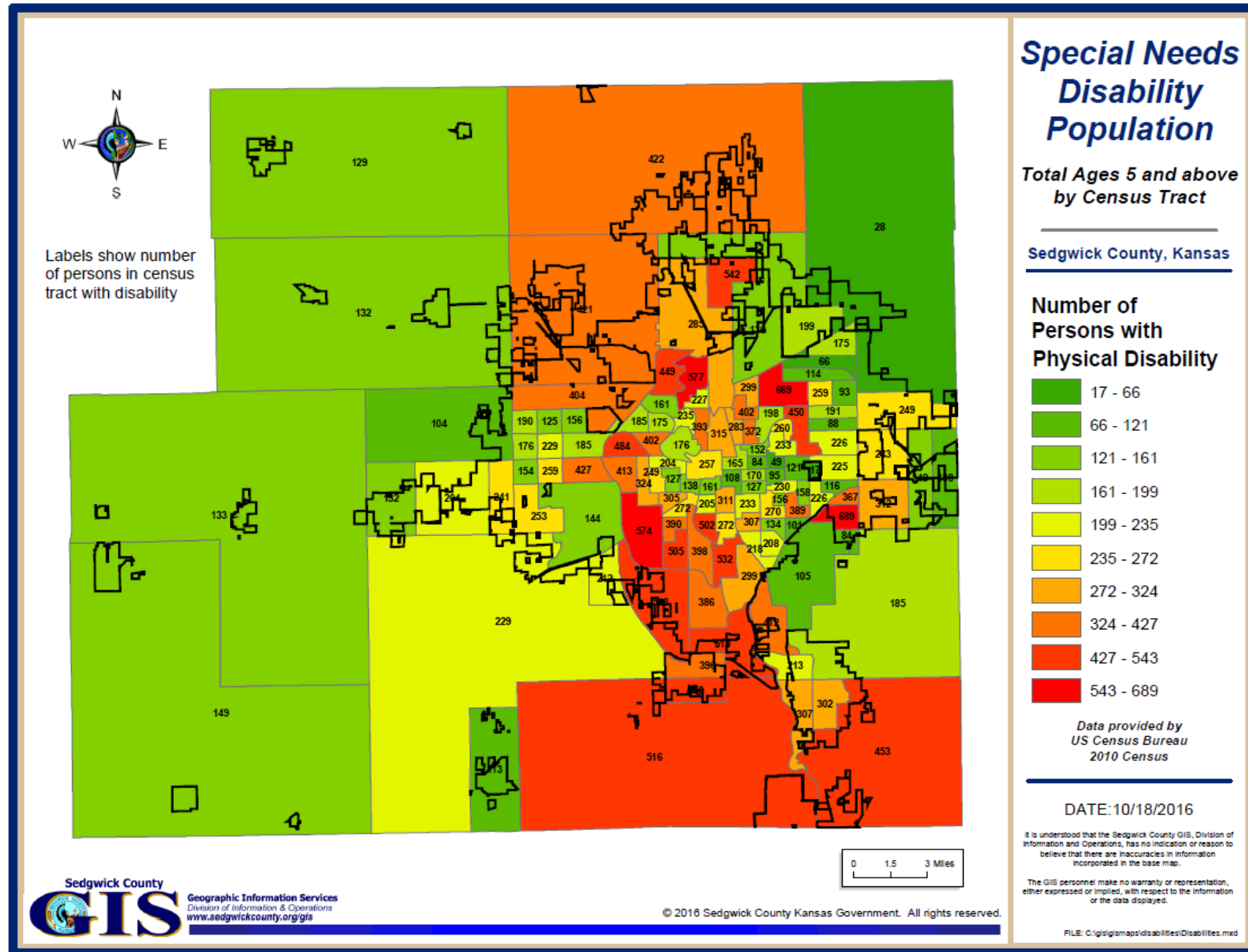
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### Percent of Population with a Physical Disability in Sedgwick County – Aged 5 Years of Age and Older



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

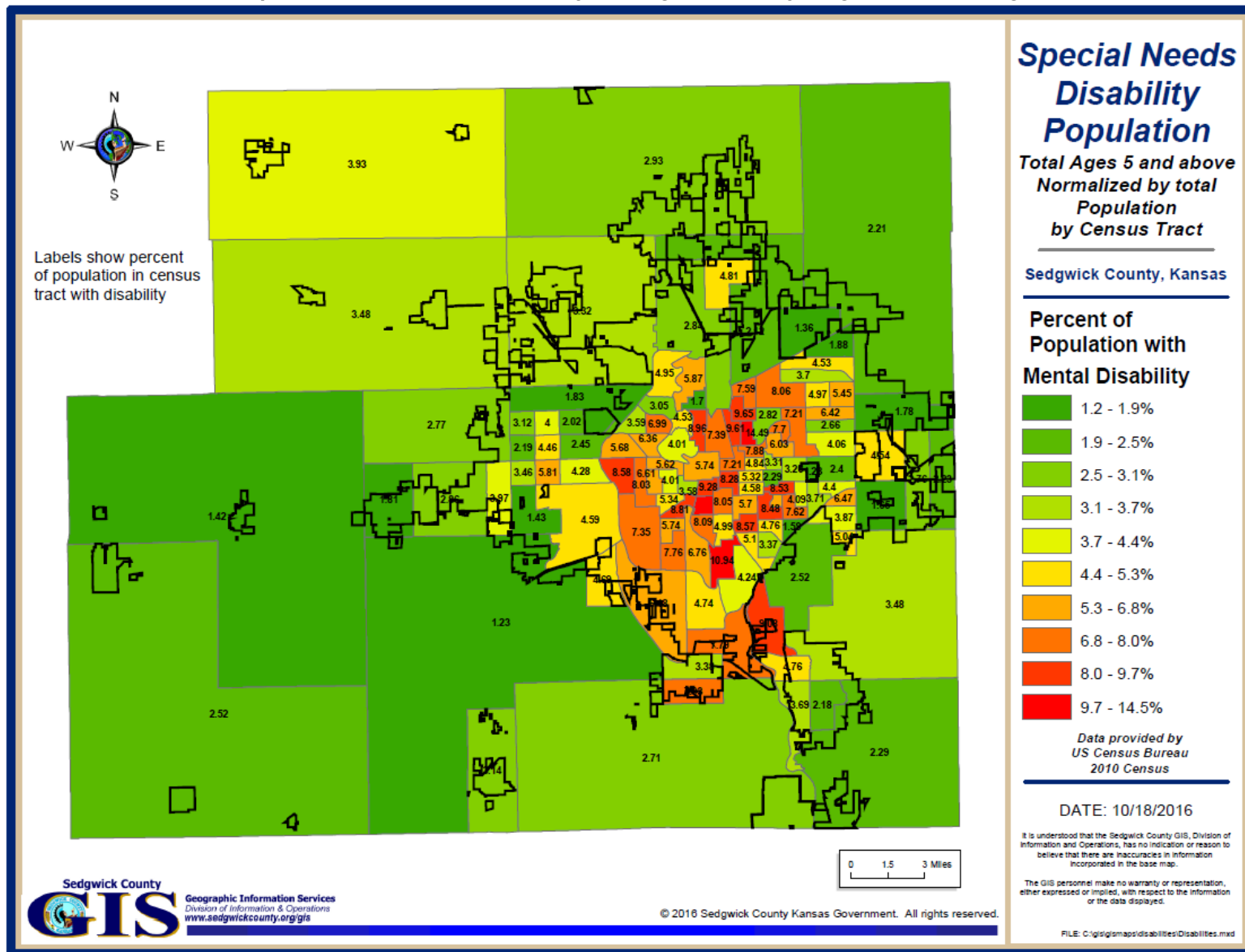
### Number of Population with a Physical Disability in Sedgwick County – Aged 5 Years of Age and Older





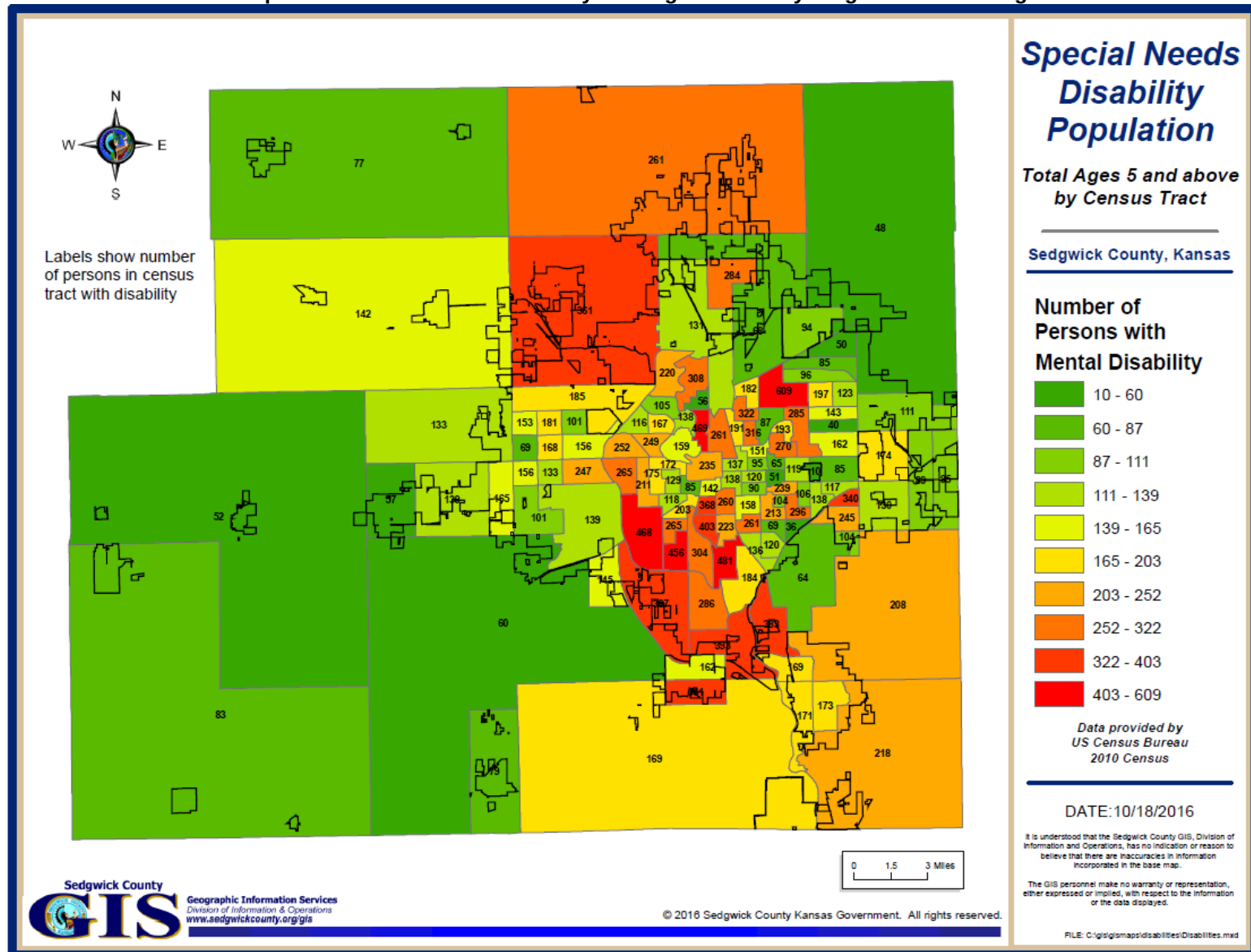
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### Percent of Population with a Mental Disability in Sedgwick County – Aged 5 Years of Age and Older



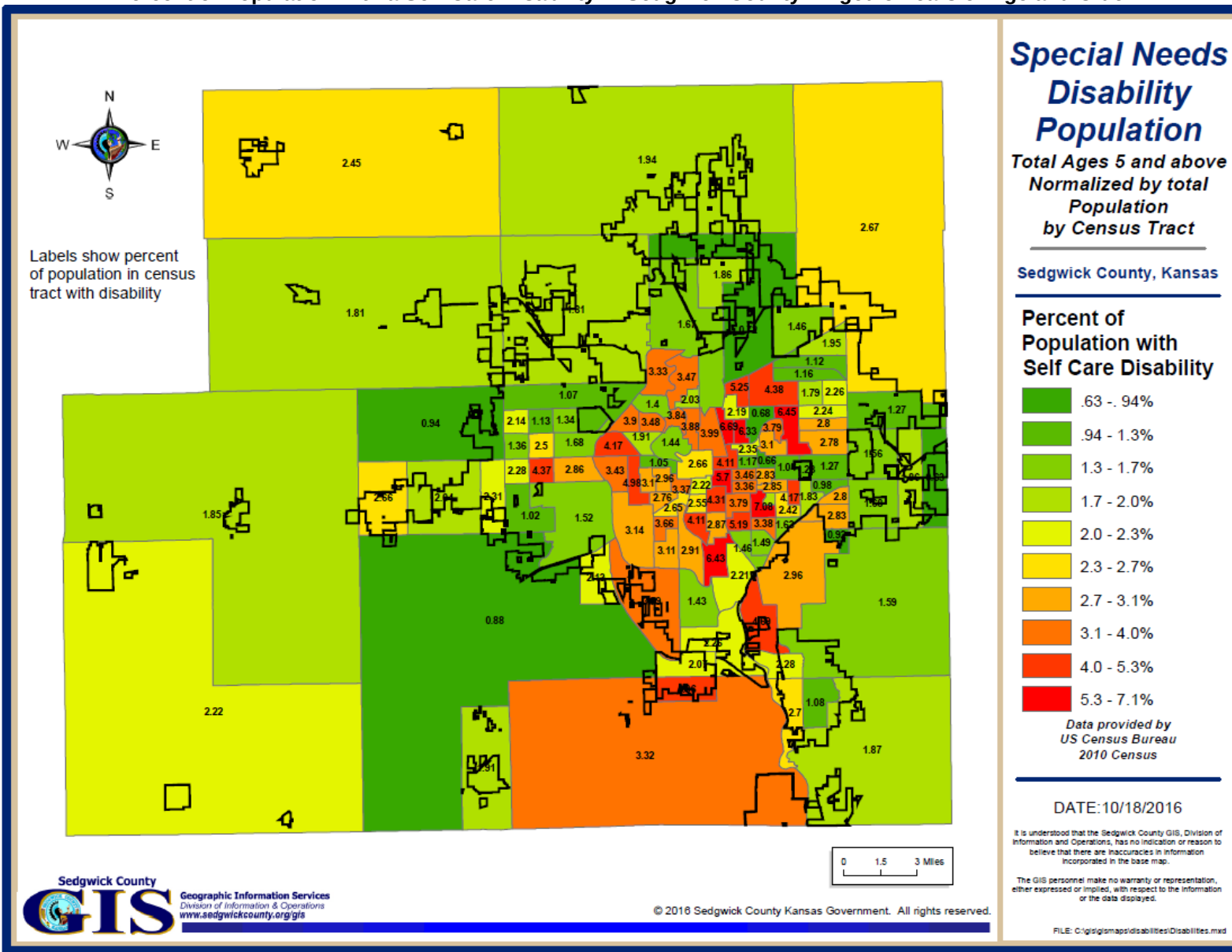
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### Number of Population with a Mental Disability in Sedgwick County – Aged 5 Years of Age and Older



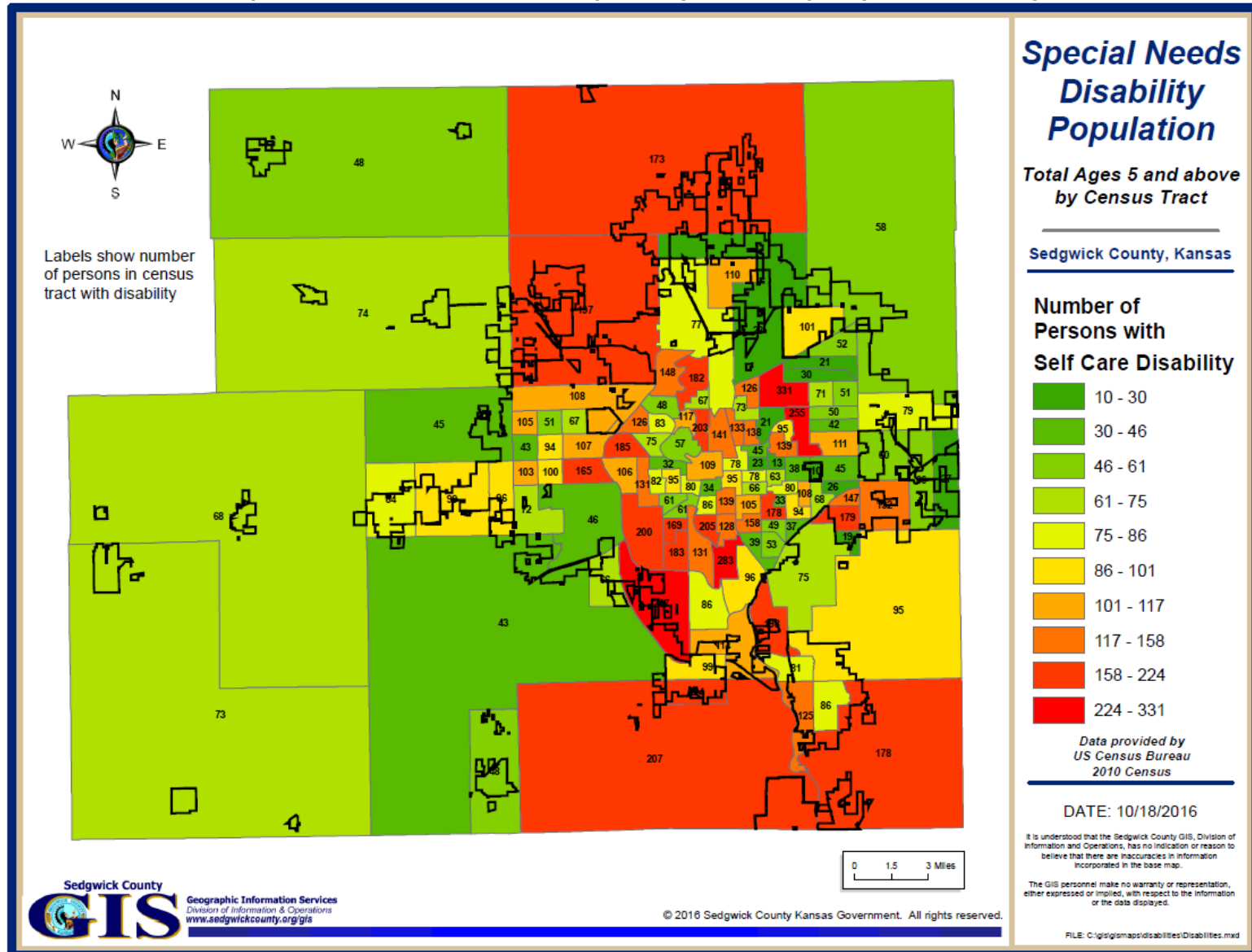
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

Percent of Population with a Self-Care Disability in Sedgwick County – Aged 5 Years of Age and Older



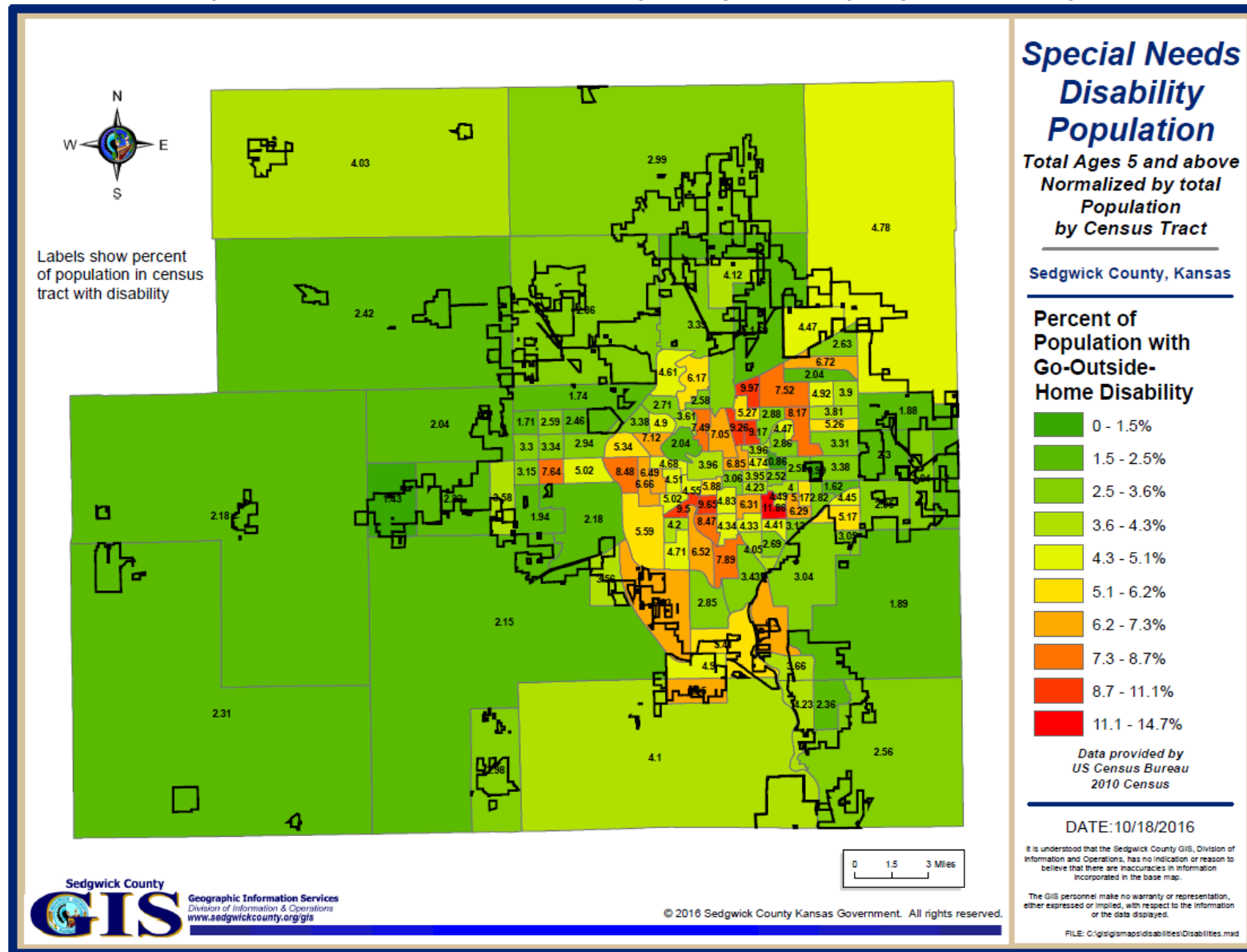
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### Number of Population with a Self-Care Disability in Sedgwick County – Aged 5 Years of Age and Older



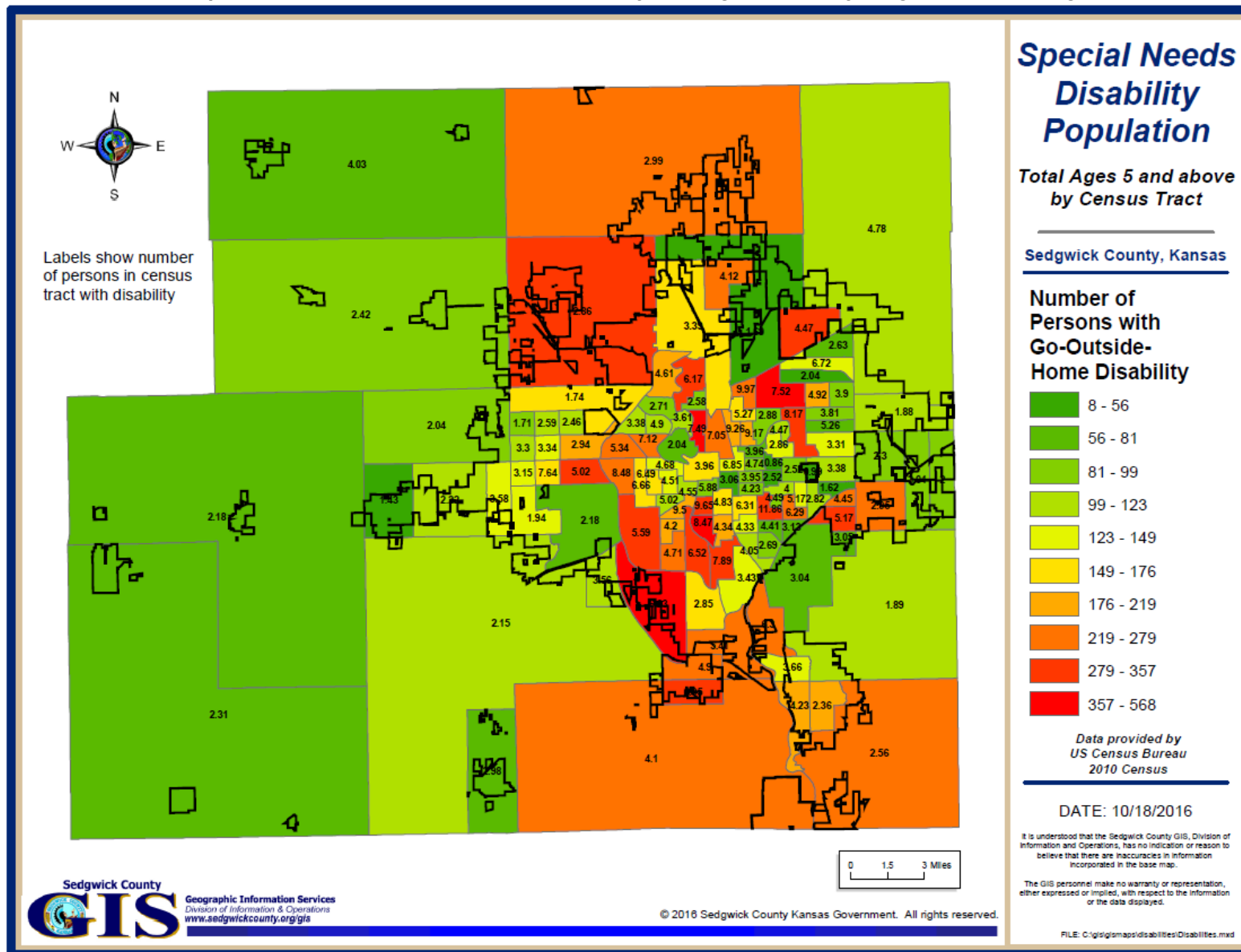
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### Percent of Population with a Go-Outside-Home Disability in Sedgwick County – Aged 5 Years of Age and Older



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### Number of Population with a Go-Outside-Home Disability in Sedgwick County – Aged 5 Years of Age and Older





## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### 5.7.3 SPECIAL NEEDS CONSIDERATIONS

With the occurrence of a hazard event, the population groups that are most at risk are “Special Needs” populations. A Special Needs person is one who would require special assistance in the event of a hazard, more so than the average person. These populations include individuals (primarily non-workers) located in hospitals, nursing homes, group homes, schools, jails and prisons, and other such facilities. Special needs groups require assistance not just during a hazard event, but also before and after the event (i.e. during mitigation/preparation and response/recovery efforts). Disasters are socially created; therefore, mitigation efforts should focus on those populations that are most vulnerable. A spatial hazards evaluation of potential risks to special needs populations helps to identify visually where there is an intersection between the locations of hazard occurrences and Special Needs populations. This is essential in determining where to direct future efforts and resources.

### 5.7.4 HOMELESSNESS AND POVERTY

According to the 2016 United Way of the Plains Point-in-Time Homeless Survey<sup>19</sup>, 571 people were identified as homeless, of which 492 were sheltered and 79 were unsheltered. A total of 39 were classified as chronically homeless based on U.S. Department of Housing and Urban Development (HUD) criteria.

#### *Homeless Shelters*

- St. Anthony Family Shelter (Catholic Charities) – 13 units providing emergency shelter and case management services for families with children.
- Emergency Lodge (Salvation Army) – 18 bed emergency shelter providing crisis assessment, prevention, intervention, stabilization, information/referral services to homeless families and single women in Wichita who are without services.
- Harbor House (Catholic Charities) – 13 room shelter serving victims of domestic violence.
- Inter-Faith Inn (Inter-Faith) – 24-hour full service facility for homeless individuals and families.
- Ti-Wiconi Safe Haven (Inter-Faith) – full service facility for the chronically mentally ill homeless in Wichita.
- Open Door (United Methodist) – provides food, clothing and shelter
- StepStone – The organization owns and operates 9 two- and three-bedroom homes and 5 two-bedroom duplex units in Wichita and helps women and children who have been victims of domestic violence.
- Transitional Housing Program (Salvation Army) – 24 bed facility with a comprehensive program designed to assist homeless families and single women achieve the skills and abilities to live independently.
- Wichita Children's Home – is the only emergency, temporary residential center for children in Sedgwick County.
- Union Rescue Mission - provides food, clothing and shelter to homeless men 18 years of age and older.
- Lord's Diner (Wichita Catholic Diocese) – serves 450 people nightly

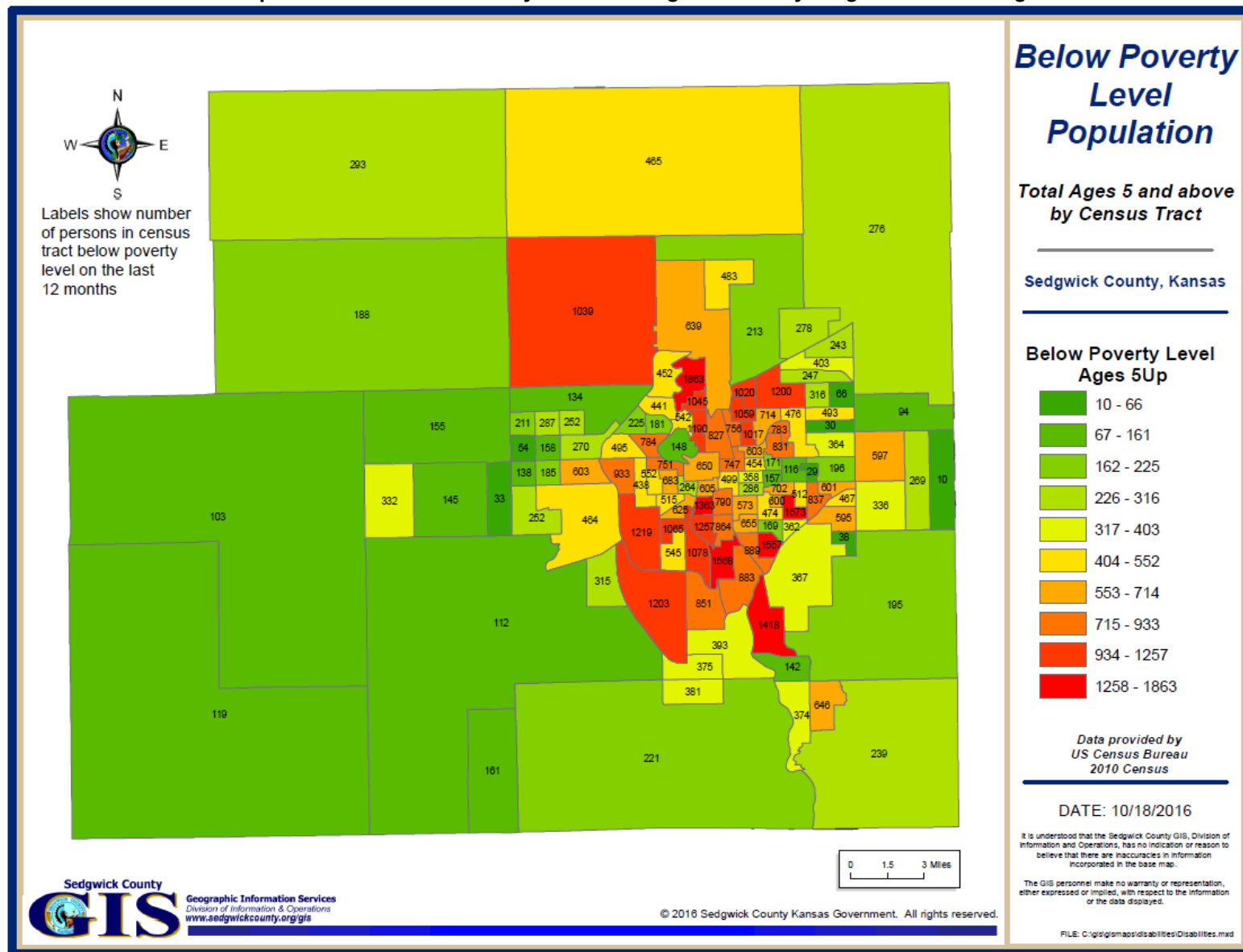
The U.S. Census Bureau's Small Area Income and Poverty Estimates (SAIPE) program provides annual estimates of income and poverty statistics, and is primarily used to provide estimates of income and poverty for the administration of federal programs and the allocation of federal funds to local jurisdictions. In addition to these federal programs, state and local programs use the income and poverty estimates for distributing funds and managing programs. These estimates combine data from administrative records, postcensal population estimates, and the decennial census with direct estimates from the American Community Survey to provide consistent and reliable single-year estimates. The following map shows the density of individuals below the poverty level in Sedgwick County which is report at 13.5% for 2015.

---

<sup>19</sup> <http://www.unitedwayplains.org/the-2016-point-in-time-homeless-count-shows-overall-1-8-percent-increase-in-homelessness-but-58-5-percent-decrease-in-chronic-homelessness-in-sedgwick-county>

# 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

## Number of Population Below the Poverty Level in Sedgwick County – Aged 5 Years of Age and Older



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### 5.8 SOCIAL VULNERABILITY INDEX (SoVI) <sup>20</sup>

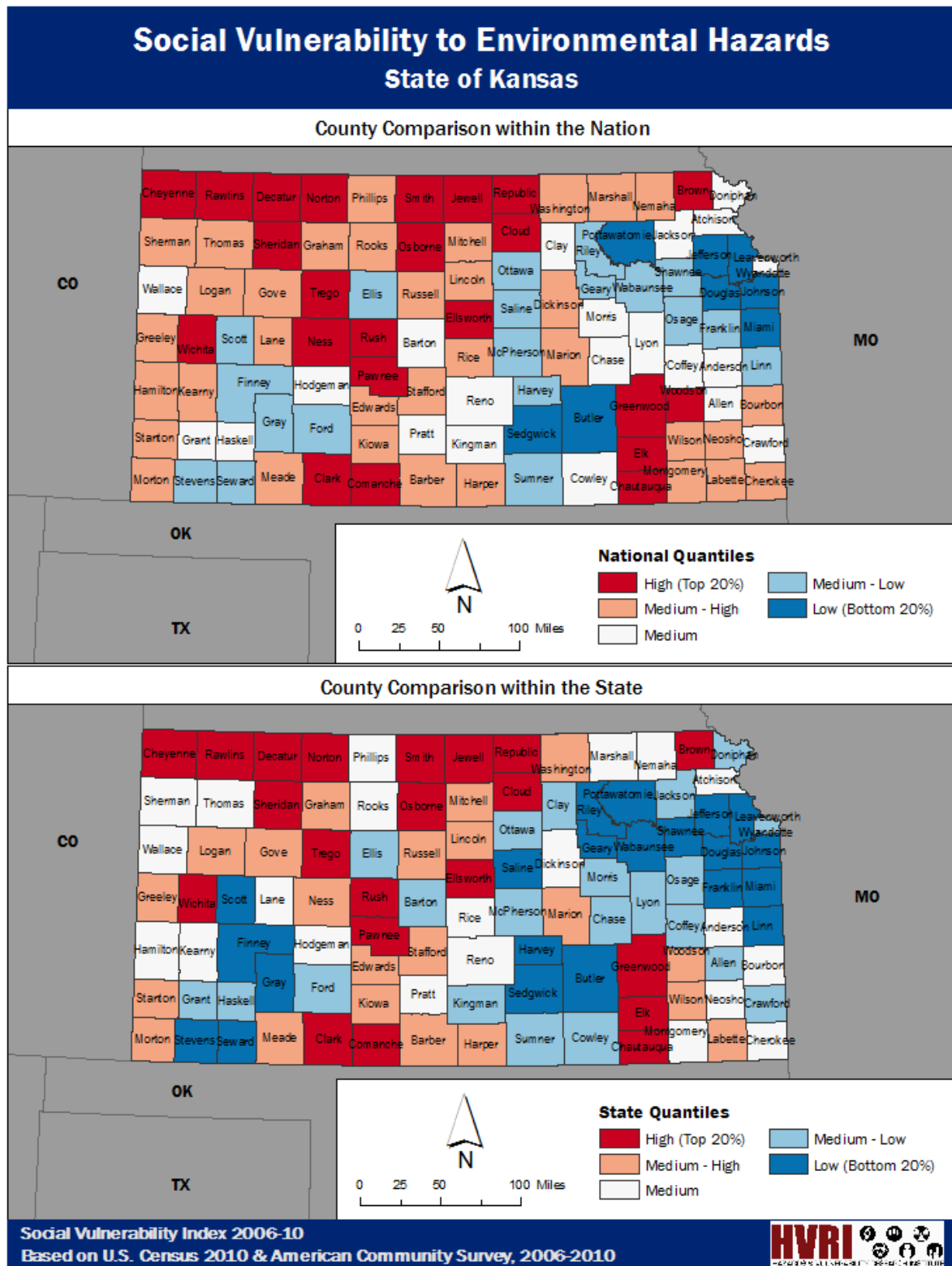
Social vulnerability is influenced by factors such as age, race and ethnicity, gender, education, disabilities, and financial resources (Cutter et al., 2000). The Social Vulnerability Index (SoVI) measures the social vulnerability of U.S. counties to environmental hazards. The index is a comparative metric that facilitates the examination of the differences in social vulnerability among counties. SoVI is a valuable tool for policy makers and practitioners. It graphically illustrates the geographic variation in social vulnerability. It shows where there is uneven capacity for preparedness and response and where resources might be used most effectively to reduce the pre-existing vulnerability. SoVI also is useful as an indicator in determining the differential recovery from disasters.

The index synthesizes 29 socioeconomic and built environment variables, which the research literature suggests contribute to reduction in a community's ability to prepare for, respond to, and recover from hazards. The data were culled from national data sources, primarily those from the United States Census Bureau.

The socioeconomic and built environment data were compiled and geo-referenced by the Hazards Research Lab at the University of South Carolina. The socioeconomic and built environment variables were standardized and input into a principal components analysis to reduce the number of variables into a smaller set of indicators. Adjustments were made to the component's directionality (negative, positive) to insure that positive loadings were associated with increasing vulnerability, and negative loadings with decreasing vulnerability. Once the directions of the loadings were determined, the components were added together to determine the numerical social vulnerability score for each county. For SoVI 2006-10, there are seven significant components and these explain 72% of the variance in the data. Among them are socioeconomic status, elderly and children, development density, rural agriculture, race, gender, ethnicity, infrastructure employment, and county debt/revenue. As shown below and the following maps, Sedgwick County is Low in social vulnerability rankings within the State of Kansas and nationally.

---

<sup>20</sup> <http://webra.cas.sc.edu/hvri/products/sovi.aspx>



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 5.9 EXPOSURE OF BUILT ENVIRONMENT

As indicated in the 2013 Kansas Hazard Mitigation Plan<sup>21</sup>, this section quantifies the buildings exposed to potential hazards in Sedgwick County. The following table provides the value of the county's built environment, which in addition to the population information presented above forms the basis of the vulnerability and risk assessment presented in this plan.

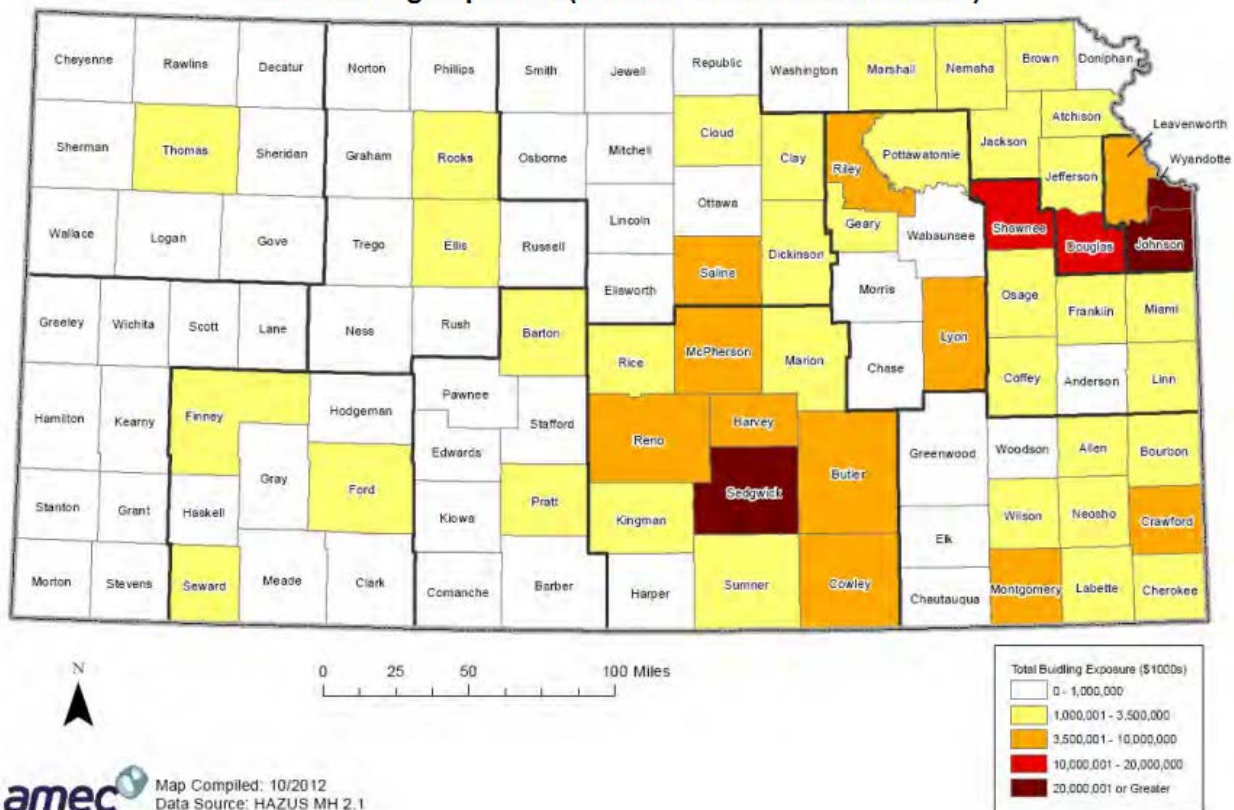
**Estimated Replacement Value of Buildings by Category  
(2008 VALUATIONS)**

| Residential<br>(\$1,000) | Commercial<br>(\$1,000) | Industrial<br>(\$1,000) | Agriculture<br>(\$1,000) | Religion<br>(\$1,000) | Government<br>(\$1,000) | Education<br>(\$1,000) | Total<br>(\$1,000) |
|--------------------------|-------------------------|-------------------------|--------------------------|-----------------------|-------------------------|------------------------|--------------------|
| 22,273,136               | 5,886,388               | 2,209,049               | 81,213                   | 584,172               | 129,534                 | 365,407                | 31,528,899         |

**Estimated Replacement Value of Building's Contents by Category  
(2006 Valuations)**

| Residential<br>(\$1,000) | Commercial<br>(\$1,000) | Industrial<br>(\$1,000) | Agriculture<br>(\$1,000) | Religion<br>(\$1,000) | Government<br>(\$1,000) | Education<br>(\$1,000) | Total<br>(\$1,000) |
|--------------------------|-------------------------|-------------------------|--------------------------|-----------------------|-------------------------|------------------------|--------------------|
| 11,144,058               | 6,612,111               | 3,178,432               | 81,213                   | 584,172               | 141,262                 | 383,762                | 22,125,010         |

**Total Building Exposure (Structure and Content Values)**



The figure above shows the distribution of the value of this exposure across the state. This information was derived from inventory data associated with FEMA's loss estimation software HAZUS-MH 2.1 (February 2012). HAZUS-MH classifies building stock types into seven categories: residential, commercial, industrial,

<sup>21</sup> [http://www.kansastag.gov/AdvHTML\\_doc\\_upload/KHMP%20Chapter%203%20Risk%20Assessment%20part%201.pdf](http://www.kansastag.gov/AdvHTML_doc_upload/KHMP%20Chapter%203%20Risk%20Assessment%20part%201.pdf)

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

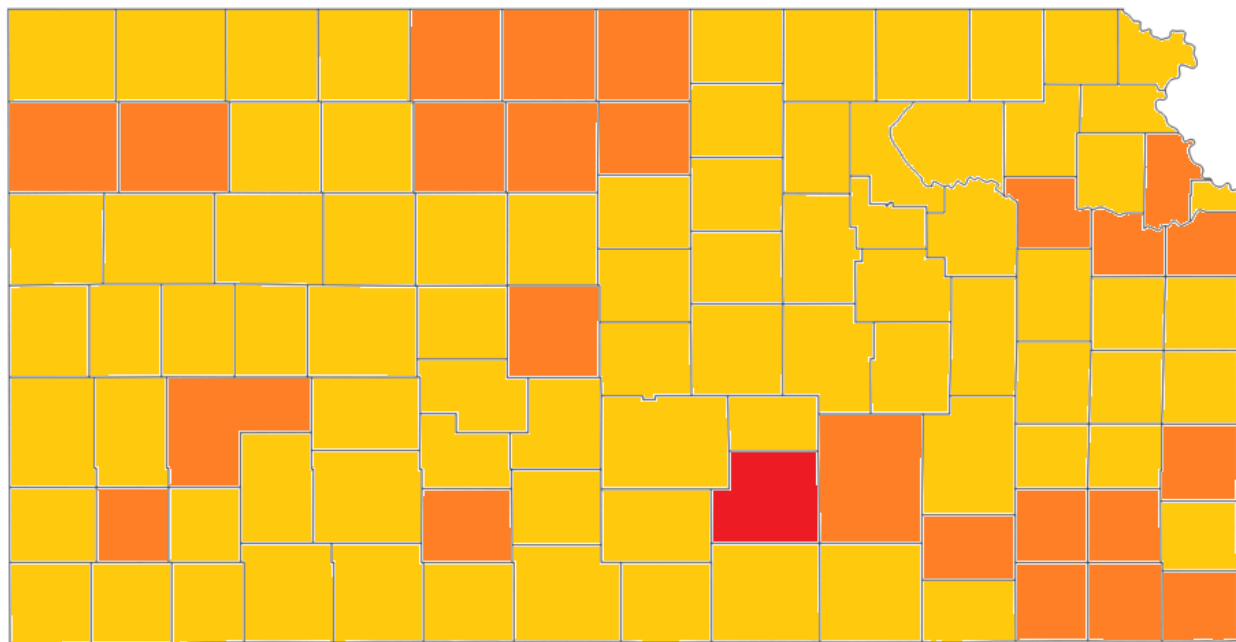
agriculture, religion, government, and education. Values associated with each of these categories reflect 2006 valuations, based on R.S. Means with replacement costs. The exposure value of buildings is incorporated as a factor in vulnerability assessments for hailstorm, tornado, windstorm, and winter storm hazards.

### 5.10 SPATIAL HAZARD EVENTS AND LOSSES DATABASE FOR THE U.S. (SHELDUS) <sup>22</sup>

SHELDUS is a county-level hazard data set for the U.S. for 18 different natural hazard events types such as thunderstorms, hurricanes, floods, wildfires, and tornadoes. For each event the database includes the beginning date, location (county and state), property losses, crop losses, injuries, and fatalities that affected each county.

The data were derived from several existing national data sources such as National Climatic Data Center's monthly Storm Data publications and NGDC's Tsunami Event Database. Only those events that generated more than \$50,000 in damages or at least one death were included in SHELDUS. Since 1995, SHELDUS additionally includes all events that are reported in NCDC's Storm Data with a specific dollar amount.

### Total Losses from Natural Hazards Between 1960 and 2014



*(Ref. Data and maps were compiled and geo-referenced by the Hazards Research Lab at the University of South Carolina)*

<sup>22</sup> <http://webra.cas.sc.edu/hvri/products/sheldus.aspx>

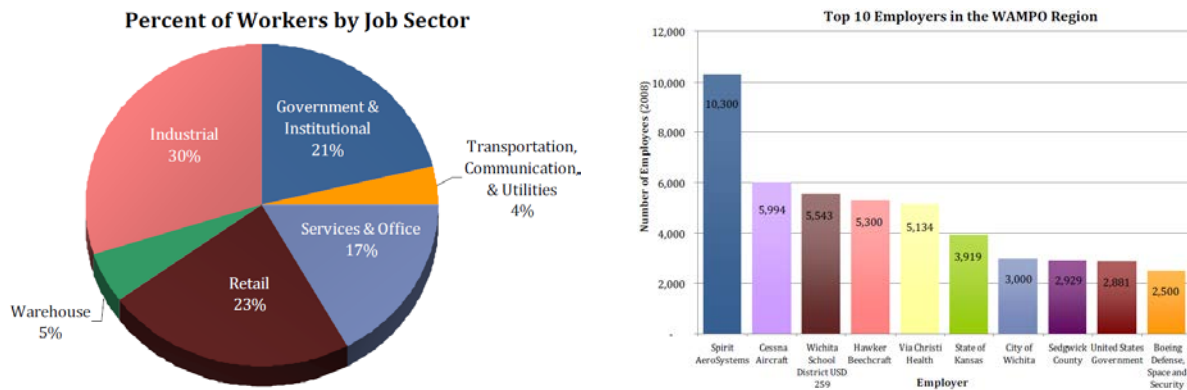


## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 5.11 INDUSTRY OVERVIEW

The total number of jobs in the WAMPO region in 2008 was approximately 292,000. By 2035 the number of jobs is expected to increase 21% to approximately 352,000 jobs. The anticipated annual rate of job growth mirrors the anticipated population growth rate at 0.8% per year

The types of jobs that are in the region can be classified in two general categories: retail and non-retail. A much larger percentage of the work force, 77% (223,832 workers), was employed in *non-retail jobs* in 2008. The remaining 23% (67,850 workers) of the work force was employed in *retail jobs*. However, by 2035 the percentage of people employed in retail jobs is expected to increase to 26%. An increase in retail jobs could potentially have a significant impact on the transportation system since retail centers or stores are destinations for not only employees, but customers and freight movers as well.



### Industry Type

The City of Wichita sits within a large trade area that encompasses a population of more than 1 million people within a 100-mile radius. The MSA includes Butler, Harvey, Sedgwick, and Sumner counties. Sedgwick County represents the largest portion of the area's population with an estimated 503,889 residents in 2012. Forbes.com ranked Wichita 112 for Best Places for Business and Careers. From the earliest days of the aircraft industry, Wichita has been a leading producer of general aviation and commercial aircraft. McConnell Air Force Base was activated in 1951 and has remained an important factor in the community. Wichita maintains a moderate cost-of-living rate of 90.9, which is below average among 289 urban areas in the United States. Wichita has a large manufacturing industry. The Herfindahl Index of Industrial Specialization is a measure of the size of firms in relation to the industry and an indicator of the amount of competition among them. The result is proportional to the average market share, weighted by market share. As such, it can range from 0 to 1.0, moving from employment evenly distributed across all sectors to all employment concentrated in one sector. An analysis of employment data from the BEA.gov website revealed that Wichita has a Herfindahl Index of .89 which means that employment is more concentrated in a few sectors. This is largely due to the high percentage of jobs in the manufacturing industry, which is 17 percent according to BEA statistics.

According to information contained in the U.S. Census Bureau's 2010 Business Patterns Report, there were 12,119 establishments and 225,261 paid employees with an annual payroll of over \$9.2 billion. on the following page were identified in Sedgwick County.

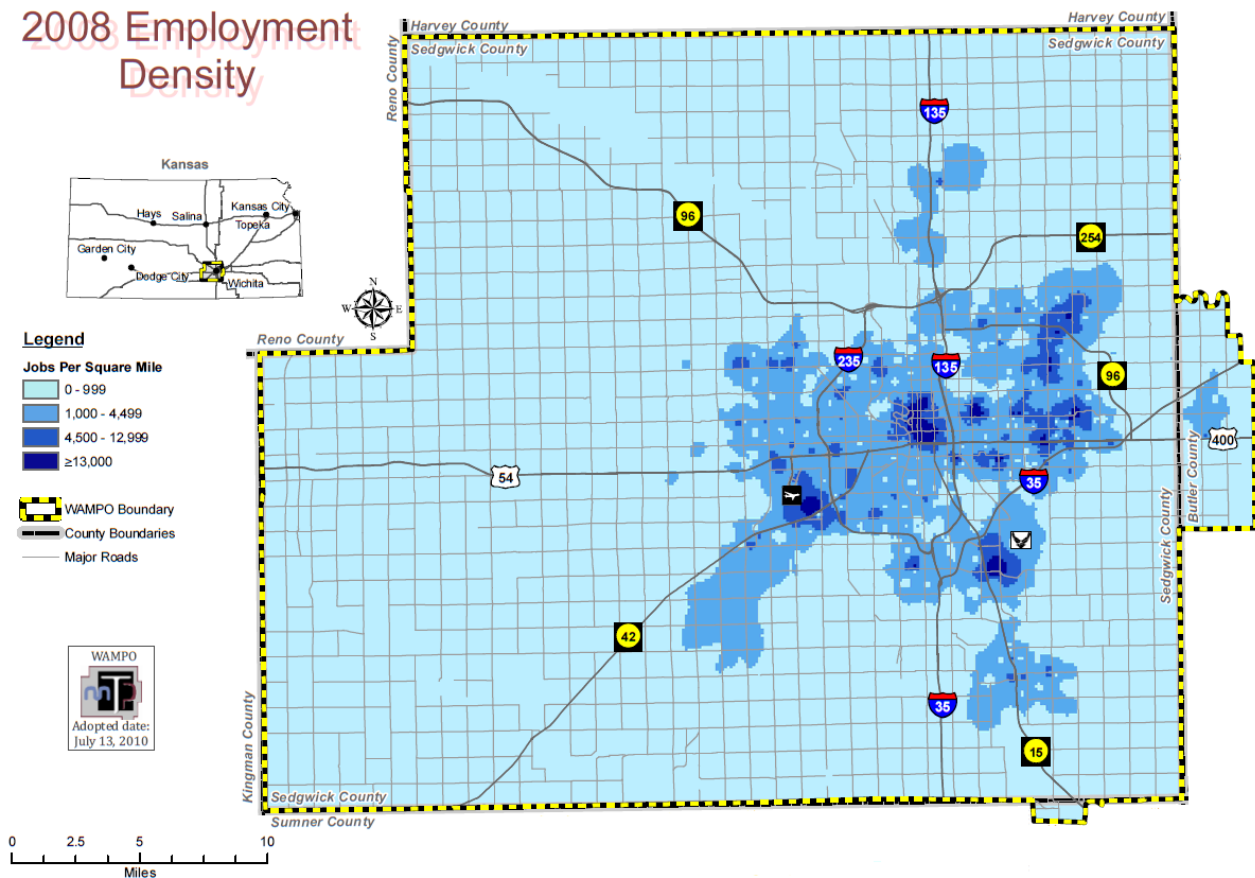
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### MAJOR INDUSTRY

| NAICS Code | Description                                            | No. of Establishments | No. of Paid Employees |
|------------|--------------------------------------------------------|-----------------------|-----------------------|
| 11         | Forestry, Fishing, Hunting, and Agriculture Support    | 4                     | 6                     |
| 21         | Mining                                                 | 141                   | 1,225                 |
| 22         | Utilities                                              | 15                    | 753                   |
| 23         | Construction                                           | 1,169                 | 12,609                |
| 31-33      | Manufacturing                                          | 537                   | 46,253                |
| 42         | Wholesale Trade                                        | 712                   | 10,455                |
| 44-45      | Retail Trade                                           | 1,692                 | 26,753                |
| 48-49      | Transportation and Warehousing                         | 325                   | 7,185                 |
| 51         | Information                                            | 185                   | 4,819                 |
| 52         | Finance and Insurance                                  | 920                   | 9,190                 |
| 53         | Real Estate and Rental and Leasing                     | 587                   | 4,159                 |
| 54         | Professional, Scientific and Technical Services        | 1,167                 | 10,265                |
| 55         | Management of Companies and Enterprises                | 131                   | 8,201                 |
| 56         | Admin, Support, Waste Management, Remediation Services | 631                   | 12,572                |
| 61         | Educational Services                                   | 123                   | 4,430                 |
| 62         | Health Care and Social Assistance                      | 1,313                 | 32,721                |
| 71         | Arts, Entertainment and Recreation                     | 148                   | 2,942                 |
| 72         | Accommodation and Food Services                        | 1,103                 | 20,840                |
| 81         | Other Services (Except Public Administration)          | 1,200                 | 9,999                 |
| 99         | Unclassified Establishments                            | 16                    | 13                    |
|            | Total                                                  | 12,119                | 225,261               |

Ref: U.S. Census Bureau 2010 County Business Patterns (NAICS)

### 2008 Employment Density



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

Wichita has a variety of industries, providing products and services that are recognized world-wide. There are over 12,000 business establishments in the Wichita metro area, more than 97% of which are small-to medium-sized firms with less than 100 employees.

### MAJOR EMPLOYERS – LOCAL/FULL TIME

| Company                                         | Product/Service                                    | Local Full-Time Employment |
|-------------------------------------------------|----------------------------------------------------|----------------------------|
| Spirit AeroSystems                              | Aircraft Assemblies                                | 10,900                     |
| Via Christi Health                              | Health Care                                        | 5,899                      |
| Unified School District 259 Wichita             | Public School District                             | 5,606                      |
| Cessna Aircraft -- Division of Textron Aviation | Aircraft                                           | 5,400                      |
| McConnell Air Force Base                        | Air Force Base                                     | 5,094                      |
| State of Kansas                                 | State Government                                   | 3,992                      |
| Koch Industries                                 | Manufacturing, Energy and Commodities              | 3,500                      |
| Beechcraft -- Division of Textron Aviation      | Aircraft                                           | 3,372                      |
| Bombardier Learjet                              | Aircraft                                           | 2,855                      |
| City of Wichita                                 | Municipal Government                               | 2,800                      |
| U.S. Government                                 | Federal Government                                 | 2,620a                     |
| Sedgwick County                                 | County Government                                  | 2,618                      |
| Wesley Medical Center                           | Health Care                                        | 1,867                      |
| Wichita State University                        | Public Higher Education                            | 1,847                      |
| AGCO Corp. - Hesston Operations                 | Agricultural Equipment                             | 1,590                      |
| Dillons Food Stores                             | Grocery Stores                                     | 1,500                      |
| United School District 260 Derby                | Public School District                             | 1,012                      |
| Cargill Meat Solutions                          | Meat Products                                      | 1,000                      |
| Johnson Controls-UPG Wichita                    | Manufacturing                                      | 998                        |
| Robert J. Dole VA Medical Center                | Veterans Medical Center                            | 934                        |
| Cox Communications                              | Broadband Communications and Entertainment Company | 822                        |
| Unified School District 261 Haysville           | Public School District                             | 800                        |
| U.S. Postal Service                             | Federal Mail Delivery Service                      | 741b                       |
| Unified School District 373 Newton              | Public School District                             | 700                        |
| Unified School District 266 Maize               | Public School District                             | 670                        |
| Unified School District 265 Goddard             | Public School District                             | 639                        |
| Intrust Bank                                    | Financial Services                                 | 638                        |

Source: Greater Wichita Partnership, 2014

**Note:**

*a Data as of March 2014. Civilians only. Does not include employees of the U.S. Postal Service.*

*b Data reflects employees at the Wichita Post Office, the Wichita Processing and Distribution Center and the Wichita Customer Care Center. The Remote Encoding Center, which was included in 2013 counts is being closed.*

## **SECTION 3**

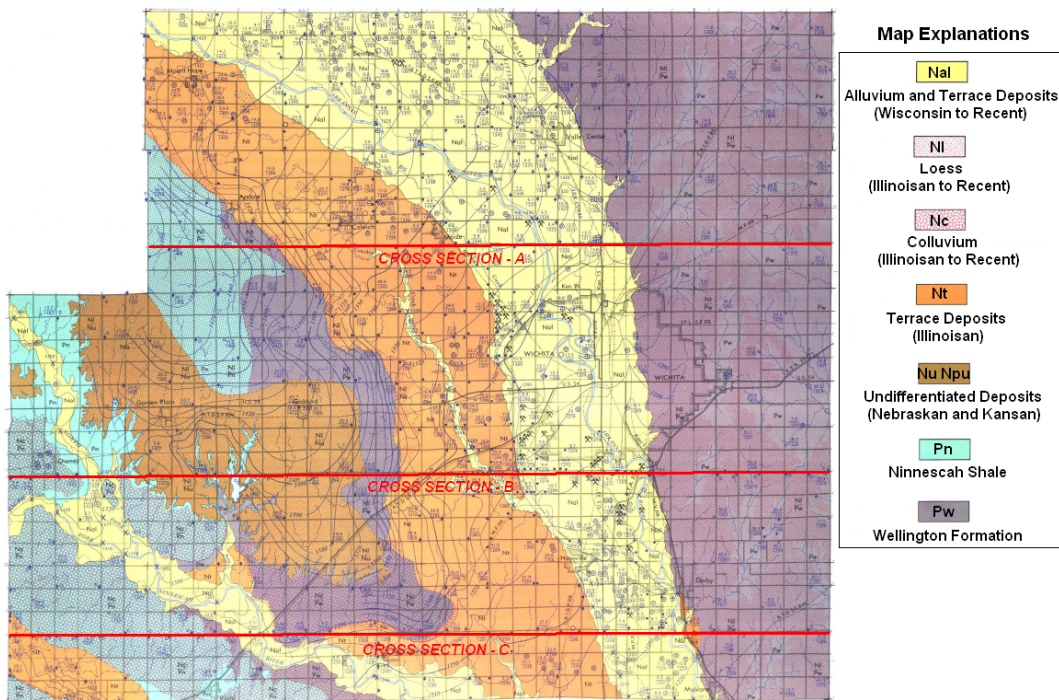
# **GEOGRAPHY**

# 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

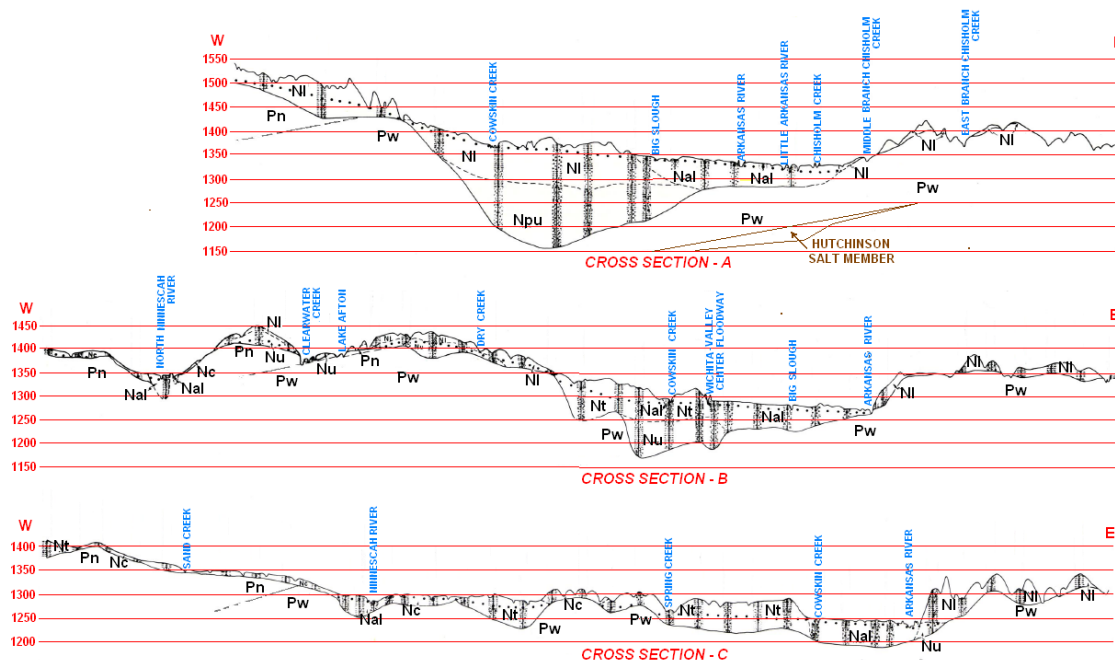
## 6 GEOLOGY/HYDROGEOLOGY<sup>23</sup>

Except for the northeast corner, the county lies within the Arkansas River Lowlands section of the Central Lowland physiographic province. The highest point, about 1,540 feet above mean sea level (MSL), is on the west edge approximate five miles southwest of Andale. The lowest point, about 1,220 feet above MSL, is where the Arkansas River flows out of the county to the south.

### DEPOSITS AND DEPTHS



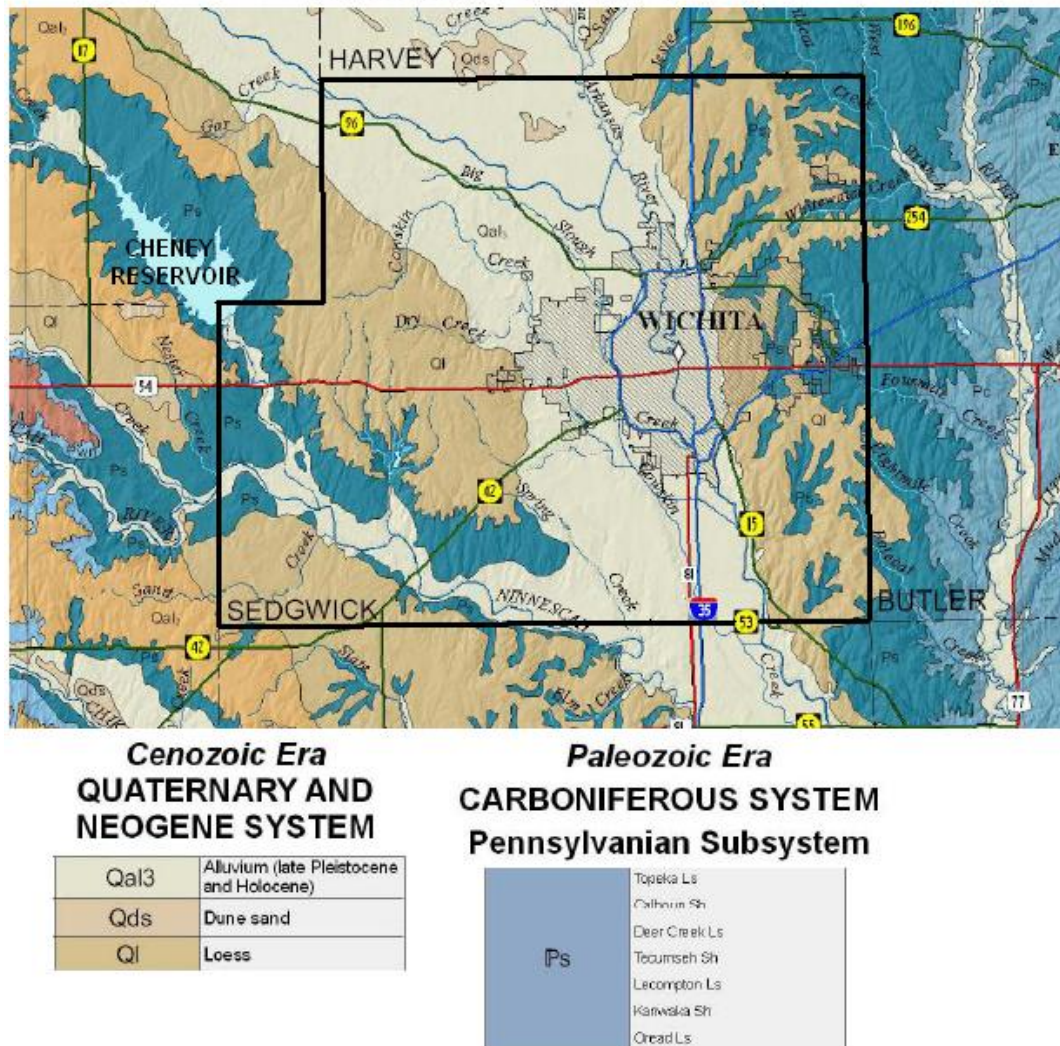
Source: KGS Bulletin 176, Plate 1



<sup>23</sup> <http://www.kgs.ku.edu/General/Geology/Sedgwick/index.html>



# SURFICIAL GEOLOGY OF SEDGWICK COUNTY

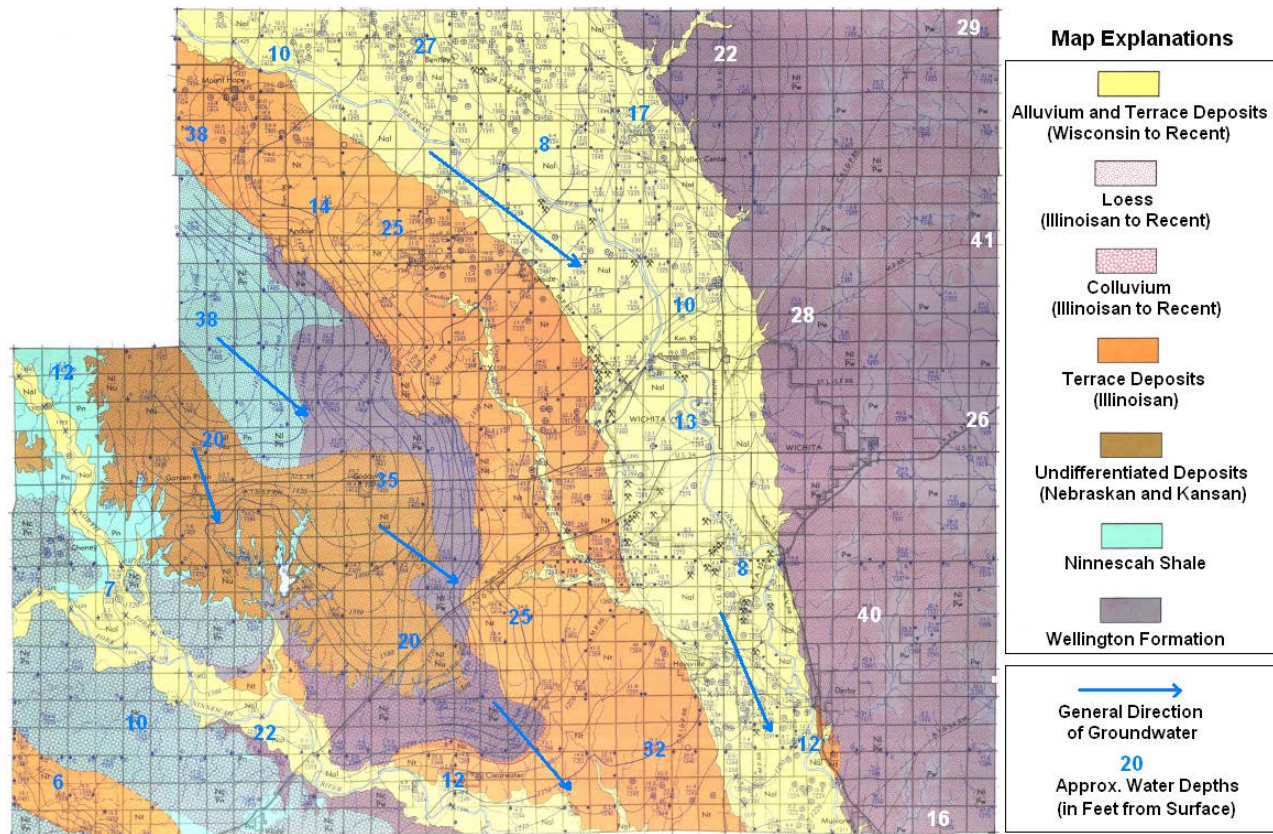


## 6.1 GEOHYDROLOGY

The Arkansas River enters the county at the northwest corner, flows in a southeasterly direction to a point north of Wichita, where it turns south and flows out of the county near the southeast corner. The Little Arkansas River enters the county near the center of the north boundary, flows east-southeast, and joins the Arkansas River at Wichita. South of the Arkansas River, drainage is by Big Slough, Cowskin Creek, the Ninnescah River, and their tributaries. A narrow strip along the eastern edge of the county is drained by east-flowing tributaries of the Walnut River (Walnut River Basin).



## HYDROLOGY AND DEPOSITS IN SEDGWICK COUNTY



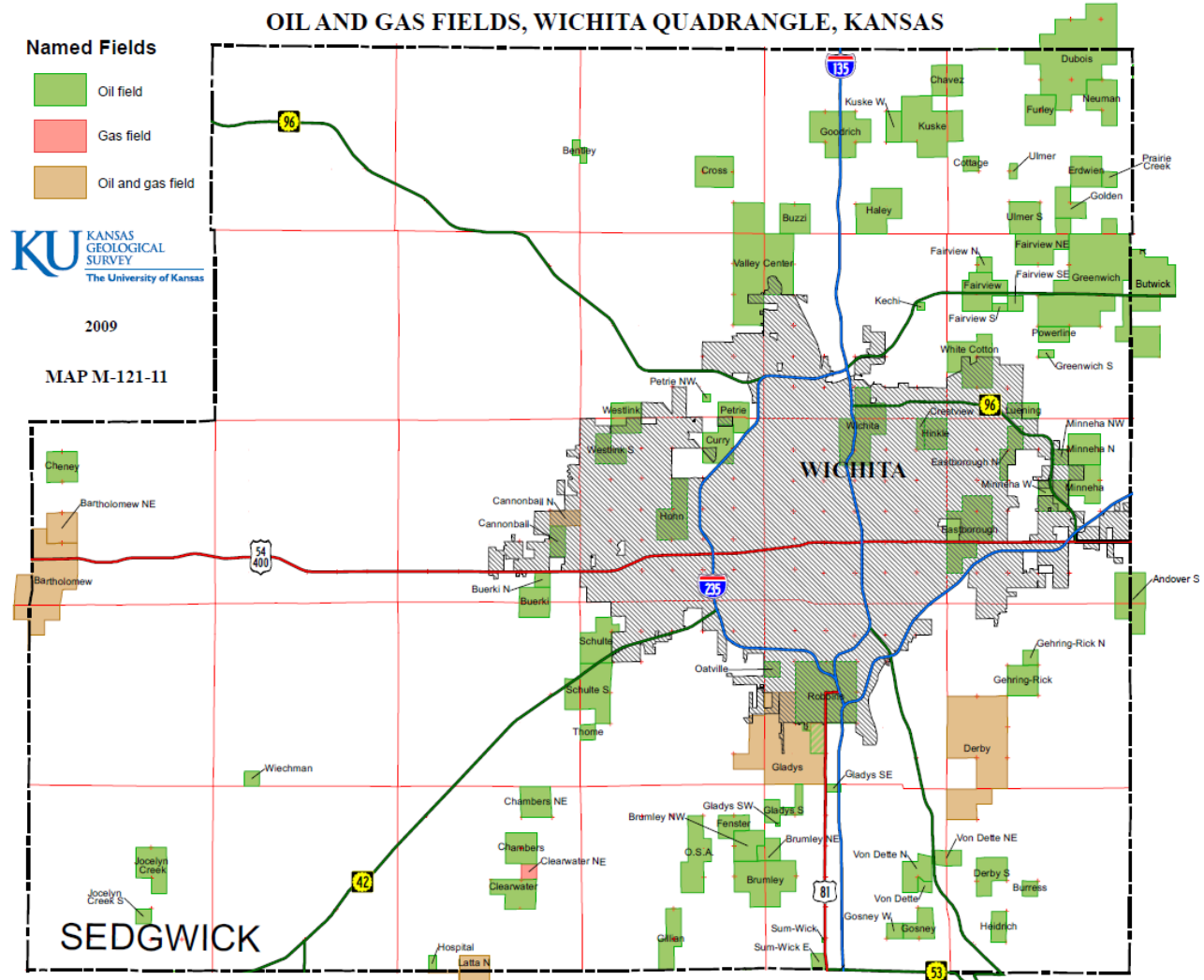
Source: KGS Bulletin 176, Plate 1

Drainage of the county is by way of the Arkansas River and its tributaries mainly within the Lower Arkansas Basin. Sub-basins located within the Lower Arkansas Basin include: Gar-Peace; North Fork Ninnescah; South Fork Ninnescah; Ninnescah; Middle Arkansas-Slate; Little Arkansas; Upper Walnut River; and, Lower Walnut River.

Mineral resources in Sedgwick County include oil and gas, salt, gypsum, anhydrite, sand, and gravel. Oil was first discovered in 1928. Hutchinson Member salt deposits in the Wellington Formation of early Permian age underlie the western half of the county. The deposits range in thickness from a feather edge near the center of the county to about 300 feet along the western edge. Gypsum and anhydrite are in the Wellington Formation east of the Arkansas River Valley. Sand and gravel deposits of Pleistocene age underlie about one-third of the county with most pits near the Arkansas and Little Arkansas Rivers.

# 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

## 6.2 OIL AND GAS



The map shown above shows 68 active oil and gas fields in Sedgwick County and account for average of 123 oil wells (128 in 2010) and 4 gas producing wells. There are also 23 abandoned oil and gas fields in Sedgwick County which include:

|                    |                  |                   |
|--------------------|------------------|-------------------|
| Cannonball North   | Gladys Southeast | Minneha Northwest |
| Chambers Northeast | Gladys Southwest | Oatville          |
| Chavez             | Greenwich South  | Petrie Northwest  |
| Cottage            | Hinkle           | Prairie Creek     |
| Crestview          | Hohn             | Schulte           |
| Eastborough        | Kechi            | Sum-Wick          |
| Eastborough North  | Kerley           | Ulmer             |
| Gehring-Rick       | Minneha          |                   |

According to Kansas Geological Survey information, the total estimated production for these fields was reported to be 121,975 barrels (bbls) of crude oil and 12,379 million cubic feet of natural gas for the year 2009. The following tables show the field names, production zones, year of discovery, amount of oil produced, amount of gas produced, total acreage of the field, and number of wells per field.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### OIL AND GAS FIELDS IN SEDGWICK COUNTY

| FIELD                 | PROD ZONES                                                  | DISCOVERY | OIL PROD | GAS PROD | ACRES | WELLS |
|-----------------------|-------------------------------------------------------------|-----------|----------|----------|-------|-------|
| ANDOVER SOUTH         | STALNAKER, SIMPSON                                          | Jan-37    | 55090    |          | 1120  | 23    |
| BARTHOLOMEW           | KANSAS CITY, MISSISSIPPIAN                                  | Jan-46    | 3863774  | 140068   | 2880  | 101   |
| BARTHOLOMEW NORTHEAST | MISSISSIPPIAN                                               | Jan-84    | 243304   | 786460   | 640   | 13    |
| BENTLEY               | KANSAS CITY, HUNTON                                         | Jan-34    | 23362    |          | 160   | 11    |
| BRUMLEY               | KANSAS CITY, MISSISSIPPIAN, SIMPSON                         | Jan-55    | 310746   |          | 1600  | 32    |
| BRUMLEY NORTHEAST     | MISSISSIPPIAN                                               | Jan-84    | 56260    |          | 320   | 3     |
| BRUMLEY NORTHWEST     | MISSISSIPPIAN                                               | Jan-56    | 314399   |          | 560   | 12    |
| BUERKI                | MISSISSIPPIAN                                               | Jan-76    | 280539   |          | 640   | 25    |
| BUERKI NORTH          | MISSISSIPPIAN                                               | Jan-77    | 1844     |          | 160   | 4     |
| BURRESS               | SIMPSON                                                     | Jan-86    | 43625    |          | 160   | 7     |
| BUTWICK               | MISENER, MISSISSIPPIAN, HUNTON, SIMPSON                     | Jan-49    | 172479   |          | 2520  | 54    |
| BUZZI                 | HUNTON                                                      | Jan-58    | 443718   |          | 640   | 22    |
| CANNONBALL            | MISSISSIPPIAN                                               | Jan-63    | 160614   |          | 320   | 10    |
| CANNONBALL NORTH      | MISSISSIPPIAN                                               | Jan-76    |          |          | 320   | 2     |
| CHAMBERS              | KANSAS CITY, MISSISSIPPIAN                                  | Jan-48    | 274187   |          | 640   | 21    |
| CHAMBERS NORTHEAST    | MISSISSIPPIAN                                               | Jan-56    | 219123   |          | 640   | 12    |
| CHAVEZ                | BURGESS                                                     | Jan-72    | 3373     |          | 640   | 12    |
| CHENEY                | MISENER, VIOLA                                              | Jan-35    | 60097    |          | 640   | 12    |
| CLEARWATER            | KANSAS CITY, MISSISSIPPIAN                                  | Jan-44    | 356803   |          | 800   | 19    |
| CLEARWATER NORTHEAST  | LANSING-KANSAS CITY                                         | Jan-82    |          | 34703    | 160   | 1     |
| COTTAGE               | BURGESS                                                     | Jan-53    |          |          | 160   | 7     |
| CRESTVIEW             | BURGESS                                                     | Jan-51    |          |          | 160   | 2     |
| CROSS                 | KANSAS CITY, HUNTON                                         | Jan-29    | 175426   |          | 800   | 24    |
| CURRY                 | KANSAS CITY, VIOLA, SIMPSON                                 | Jan-29    | 1057640  |          | 720   | 30    |
| DERBY                 | STALNAKER                                                   | Jan-44    | 12825    | 6869     | 4000  | 39    |
| DERBY SOUTH           | SIMPSON                                                     | Jan-80    | 442308   |          | 640   | 30    |
| DUBOIS                | BURGESS                                                     | Oct-57    | 3165063  |          | 4000  | 172   |
| EASTBOROUGH           | MISSISSIPPIAN, VIOLA                                        | Jan-29    | 9406478  |          | 1760  | 120   |
| EASTBOROUGH NORTH     | MISSISSIPPIAN, HUNTON                                       | Jan-38    | 91525    |          | 480   | 11    |
| ERDWIEN               | BURGESS                                                     | Jan-62    | 119187   |          | 640   | 24    |
| FAIRVIEW              | KANSAS CITY, BURGESS, MISSISSIPPIAN, HUNTON, VIOLA, SIMPSON | Jan-48    | 1096573  |          | 920   | 87    |
| FAIRVIEW NORTH        | BURGESS, MISSISSIPPIAN                                      | Jan-48    | 210641   |          | 160   | 16    |
| FAIRVIEW NORTHEAST    | BURGESS, MISSISSIPPIAN                                      | Jan-59    | 535377   |          | 1120  | 25    |
| FAIRVIEW SOUTH        | BURGESS                                                     | Jan-50    | 10787    |          | 80    | 11    |
| FAIRVIEW SOUTHEAST    | BURGESS                                                     | Jan-77    |          |          | 160   | 2     |
| FENSTER               | MISSISSIPPIAN, SIMPSON                                      | Jan-85    | 28810    |          | 400   | 14    |
| FURLEY                | BURGESS                                                     | Jan-58    | 253968   |          | 640   | 43    |
| GEHRING-RICK          | MISSISSIPPIAN                                               | Jan-52    |          |          | 640   | 15    |

| FIELD               | PROD ZONES                                      | DISCOVERY | OIL PROD | GAS PROD | ACRES | WELLS |
|---------------------|-------------------------------------------------|-----------|----------|----------|-------|-------|
| GEHRING-RICK NORTH  | SIMPSON                                         | Jan-82    | 67193    |          | 160   | 9     |
| GILLIAN             | SIMPSON                                         | Jan-61    | 2754495  |          | 680   | 33    |
| GLADYS              | KANSAS CITY, MISSISSIPPIAN                      | Jan-54    | 18423649 |          | 3900  | 349   |
| GLADYS SOUTH        | MISSISSIPPIAN                                   | Jan-55    | 155679   |          | 480   | 23    |
| GLADYS SOUTHEAST    | MISSISSIPPIAN                                   | Jan-55    |          |          | 80    | 8     |
| GLADYS SOUTHWEST    | KANSAS CITY                                     | Jan-55    |          |          | 10    | 4     |
| GOLDEN              | BURGESS, MISSISSIPPIAN                          | Jan-63    | 97663    |          | 480   | 17    |
| GOODRICH            | LANSING, MISSISSIPPIAN, HUNTON                  | Jan-28    | 6669451  |          | 1520  | 115   |
| GOSNEY              | MISSISSIPPIAN                                   | Jan-77    | 3116     |          | 480   | 8     |
| GOSNEY WEST         | MISSISSIPPIAN                                   | Jan-84    | 1937     |          | 160   | 1     |
| GREENWICH           | MISSISSIPPIAN, HUNTON, VIOLA, SIMPSON, ARBUCKLE | Jan-29    | 14503420 |          | 4240  | 313   |
| GREENWICH SOUTH     | MISSISSIPPIAN                                   | Jan-45    |          |          | 80    | 15    |
| HALEY               | KANSAS CITY, HUNTON                             | Jan-67    | 143730   |          | 1120  | 19    |
| HEDRICH             | SIMPSON                                         | Jan-82    | 6058     |          | 320   | 8     |
| HINKLE              | PENN. CONGL.                                    | Jan-46    |          |          | 480   | 4     |
| HOHN                | KANSAS CITY                                     | Jan-45    |          |          | 960   | 16    |
| HOSPITAL            | SIMPSON                                         | Jan-80    | 849      |          | 80    | 3     |
| JOCELYN CREEK       | SIMPSON                                         | Jan-77    | 41942    |          | 800   | 8     |
| JOCELYN CREEK SOUTH | KANSAS CITY                                     | Jan-88    | 32566    |          | 160   | 3     |
| KECHI               | BURGESS                                         | Jan-29    |          |          | 40    | 8     |
| KERLEY              | SIMPSON                                         | Dec-59    |          |          | 40    | 6     |
| KUSKE               | BURGESS, MISSISSIPPIAN                          | Jan-29    | 1127496  |          | 1920  | 97    |
| KUSKE WEST          | CHEROKEE                                        | Jan-69    | 96090    |          | 320   | 18    |
| LATTA NORTH         | LANSING-KANSAS CITY                             | Sep-56    | 62098    | 338257   | 640   | 15    |
| LUENING             | SIMPSON                                         | Jan-51    | 52500    |          | 320   | 12    |
| MINNEHA             | ARBUCKLE                                        | Jan-51    |          |          | 720   | 32    |
| MINNEHA NORTH       | SIMPSON, ARBUCKLE                               | Jan-60    | 56998    |          | 640   | 12    |
| MINNEHA NORTHWEST   | SIMPSON                                         | Jan-51    |          |          | 160   | 3     |
| MINNEHA WEST        | SIMPSON                                         | Jan-65    | 1666     |          | 640   | 3     |
| NEUMAN              | BURGESS, MISSISSIPPIAN                          | Jan-57    | 188300   |          | 800   | 29    |
| O.S.A.              | SIMPSON                                         | Jan-62    | 2003861  |          | 1080  | 69    |
| OATVILLE            | SIMPSON                                         | Jan-37    |          |          | 160   | 5     |
| PETRE               | VIOLA                                           | Jan-45    | 324708   |          | 560   | 26    |
| PETRE NORTHWEST     | VIOLA                                           | Jan-51    |          |          | 40    | 8     |
| POWERLINE           | MISSISSIPPIAN, HUNTON, SIMPSON                  | Jan-84    | 65673    |          | 320   | 12    |
| PRAIRIE CREEK       | MISSISSIPPIAN                                   | Jan-52    |          |          | 160   | 6     |
| ROBBINS             | MISSISSIPPIAN                                   | Jan-29    | 6434226  |          | 2920  | 92    |
| SCHULTE             | MISSISSIPPIAN, SIMPSON                          | Jan-34    | 209023   |          | 840   | 36    |

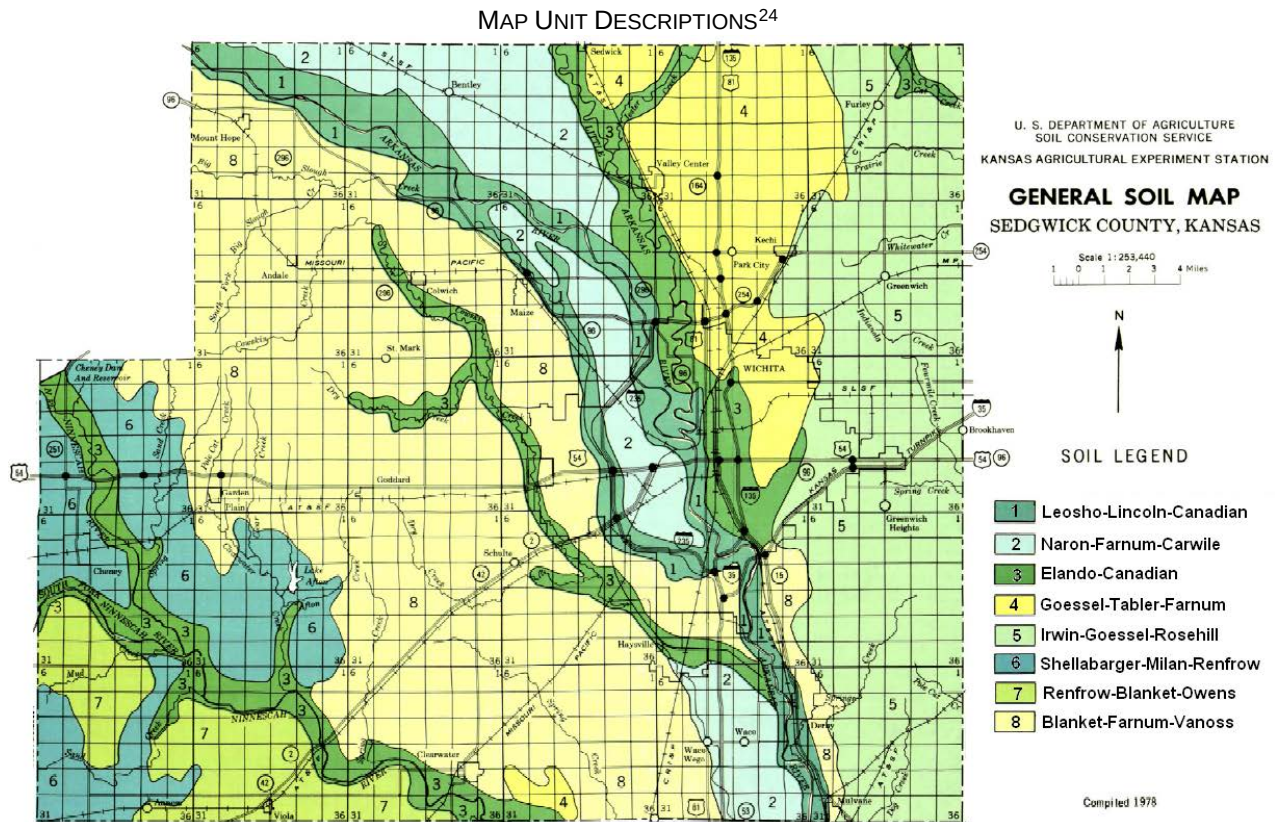
### OIL AND GAS FIELDS IN SEDGWICK COUNTY

| FIELD               | PROD ZONES                                                  | DISCOVERY | OIL PROD | GAS PROD | ACRES | WELLS |
|---------------------|-------------------------------------------------------------|-----------|----------|----------|-------|-------|
| SCHULTE SOUTH       | MISSISSIPPIAN                                               | Jan-55    | 282443   |          | 1440  | 25    |
| SUM-WICK            | KANSAS CITY                                                 | Jan-62    |          |          | 10    | 4     |
| SUM-WICK EAST       |                                                             | Jan-83    | 66960    |          | 160   | 5     |
| THOME               | LANSING-KANSAS CITY                                         | Jan-84    | 20202    |          | 160   | 4     |
| ULMER               | BURGESS                                                     | Jan-59    |          |          | 80    | 32    |
| ULMER SOUTH         | BURGESS                                                     | Jan-59    | 331372   |          | 640   | 9     |
| VALLEY CENTER       | KANSAS CITY, MISENER, MISSISSIPPIAN, HUNTON, SIMPSON, VIOLA | Jan-28    | 25473122 |          | 3840  | 267   |
| VON DETTE           | MISSISSIPPIAN                                               | Jan-70    | 55590    |          | 160   | 5     |
| VON DETTE NORTH     | MISSISSIPPIAN, SIMPSON                                      | Jan-84    | 334171   |          | 560   | 17    |
| VON DETTE NORTHEAST | SIMPSON                                                     | Jan-83    | 35495    |          | 320   | 11    |
| WESTLINK            | LANSING-KANSAS CITY, MISSISSIPPIAN                          | Jan-81    | 49932    |          | 640   | 8     |
| WESTLINK SOUTH      | MISSISSIPPIAN                                               | Jan-81    | 9114     |          | 480   | 3     |
| WHITE COTTON        | BURGESS                                                     | Jan-48    | 798991   |          | 1360  | 59    |
| WICHITA             | VIOLA, SIMPSON                                              | Jan-57    | 3031554  |          | 1600  | 97    |
| WIECHMAN            | SIMPSON                                                     | Jan-80    | 8417     |          | 160   | 3     |



# 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

## 6.3 SOILS – GENERAL



**Leosho-Lincoln-Canadian:** Occupying about eight percent of the county, these floodplain and terrace soils are shallow to deep over sand; are nearly level and somewhat poorly drained, well drained, and somewhat excessively drained; have a sandy substratum; and formed in alluvial sediments. The majority of soil types include Leosho (25%), Lincoln (20%), and Canadian (20%). About 35% of the remaining soils include the well drained Elandco, Naron and Pratt soils; and, the poorly drained Plevna and somewhat poorly drained Waldeck soils.

**Naron-Farnum-Carwile:** Located in terrace positions above flood plain soils and below upland soils and occupying about nine percent of the county, these soils are deep, nearly level, well drained and somewhat poorly drained soils that have loamy subsoil; formed in old alluvial sediments. Loam and sandy substratum soils include Naron (40%) and Farnum (25%); while the remaining soils are Carwile (25%) and a 10% mixture of somewhat poorly drained Drummond soils, well drained Farnum soils, and moderately well drained Tabler soils.

**Elandco-Canadian:** Occupying about eight percent of the county, these floodplain and terrace soils are deep, nearly level, and well drained with loamy subsoil formed in alluvial sediments. Soil consistency is about 45% Elandco, 30% Canadian, and 25% of the following soil types: somewhat poorly drained Leosho soils; somewhat excessively drained Lincoln soils; poorly drained Plevna soils; moderately well drained Tabler soils; and, somewhat poorly drained Waldeck soils.

**Goessel-Tabler-Farnum:** Occupying about nine percent of the county and located on terraces and uplands east of the Little Arkansas River and north of Wichita, these soils are deep, nearly level, gently sloping, moderate to well drained soils that have a clayey or loamy subsoil; formed in old alluvial sediments. Soil

<sup>24</sup> Soil Survey of Sedgwick County, Kansas, U.S. Dept of Agriculture, 1979

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

consistency is about 30% Goessel, 25% Tabler, 25% Farnum, and 20% of the following well drained soil types: Blanket, Elandco, Irwin, and Rosehill soils.

Irwin-Goessel-Rosehill: Occupying about 17 percent of the county and located on uplands in the eastern part of the county, these soils are deep to moderately deep, nearly level to sloping, moderately to well drained soils that have a clayey subsoil; formed in old alluvial sediments and shale residuum. Soil consistency is about 35% Irwin, 25% Goessel, 20% Rosehill, and 20% of the following: well drained Blanket, Clime, Elandco, and Farnum soils; and, moderately well drained Tabler soils.

Shellabarger-Milan-Renfrow: Occupying about nine percent of the county and located on uplands in the southwestern part of the county adjoining the Ninnescah River drainage system, these soils are deep, gently sloping to sloping, well drained soils that have a loamy or clayey subsoil; formed in old alluvial sediments and shaly clay residuum. Soil consistency is about 25% Shellabarger, 25% Milan, 25% Renfrow, and 30% of the following: well drained Blanket, Canadian, Farnum, Naron, Owens, and Vernon soils; moderately well drained Tabler soils; somewhat poorly drained Crawile soils; and, poorly drained Plevna soils.

Renfrow-Blanket-Owens: Occupying about five percent of the county and located on uplands in the western part of the county in the Ninnescah River watershed, these soils are deep and shallow, nearly level to strongly sloping, well drained soils that have clayey subsoil; formed in clay shale residuum and old clayey alluvial sediments. Soil consistency is about 50% Renfrow, 30% Blanket, 10% Owens, and 10% of the following: well drained Milan and Vernon soils; moderately well drained Tabler soils; and, somewhat poorly drained Carwile soils.

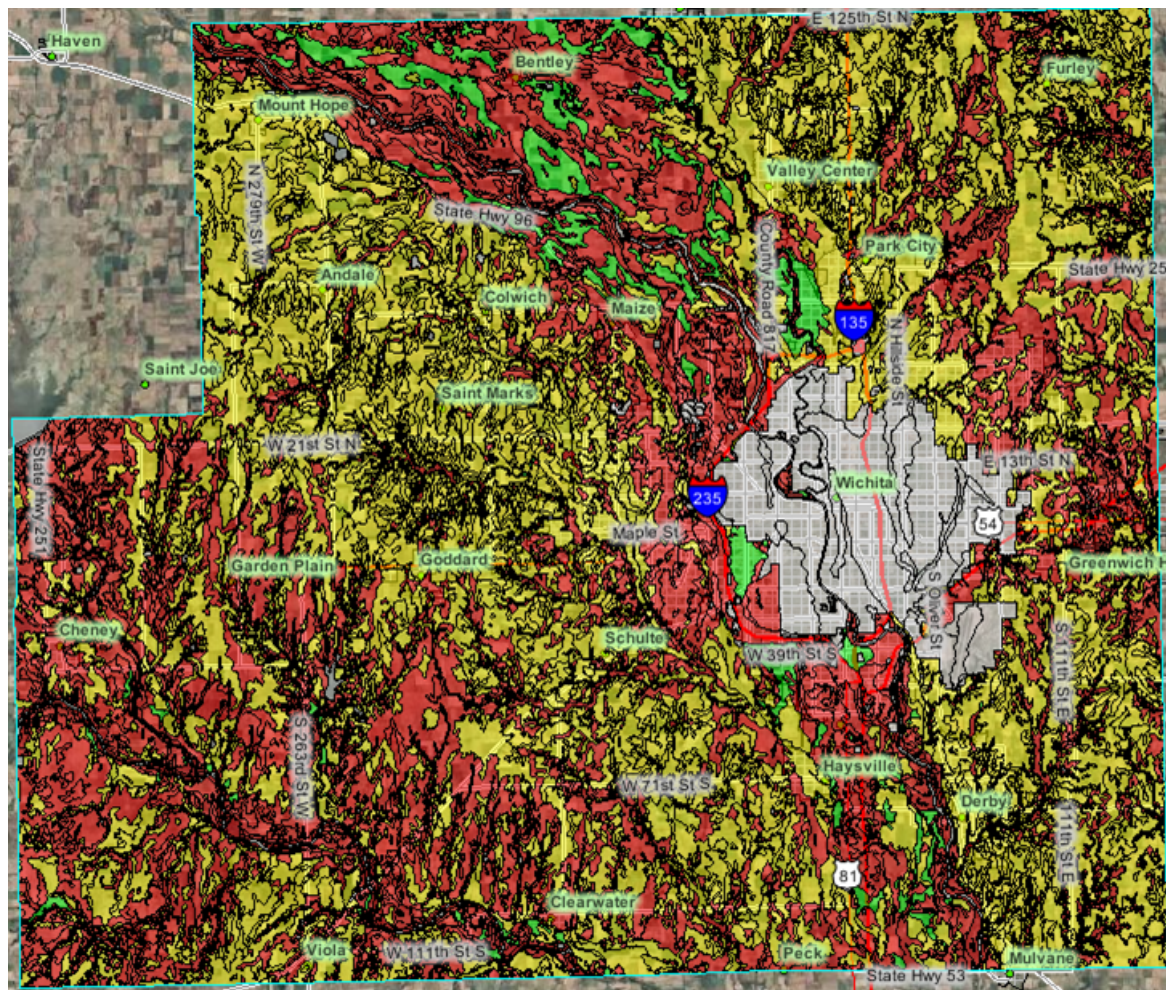
Blanket-Farnum-Vanoss: Occupying about 35 percent of the county and located on uplands in the central third of the county, these soils are deep, nearly level to sloping, well drained soils that have loamy or clayey subsoil; formed in old clayey, silty, and loamy sediments. Soil consistency is about 35% Blanket, 30% Farnum, 15% Vanoss, and 20% of the following: well drained Elandco and Milan soils; moderately well drained Tabler soils; and, somewhat poorly drained Drummond and Waurika soils.



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 6.4 SOILS – ANIMAL DISPOSAL AND DEBRIS

The following United States Department of Agriculture (USDA) interactive map<sup>25</sup> shows soils within the Area of Interest (AOI) that may or may not be considered for large animal disposal:



#### Catastrophic Mortality, Large Animal Disposal

##### Summary by Rating Value

| Rating                             | Acres in AOI     | Percent of AOI |
|------------------------------------|------------------|----------------|
| Somewhat limited (Yellow)          | 325,509.1        | 50.4%          |
| Very limited (Red)                 | 253,361.0        | 39.2%          |
| Not limited (Green)                | 21,947.3         | 3.4%           |
| Null or Not Rated                  | 44,837.8         | 6.9%           |
| <b>Totals for Area of Interest</b> | <b>645,655.2</b> | <b>100.0%</b>  |

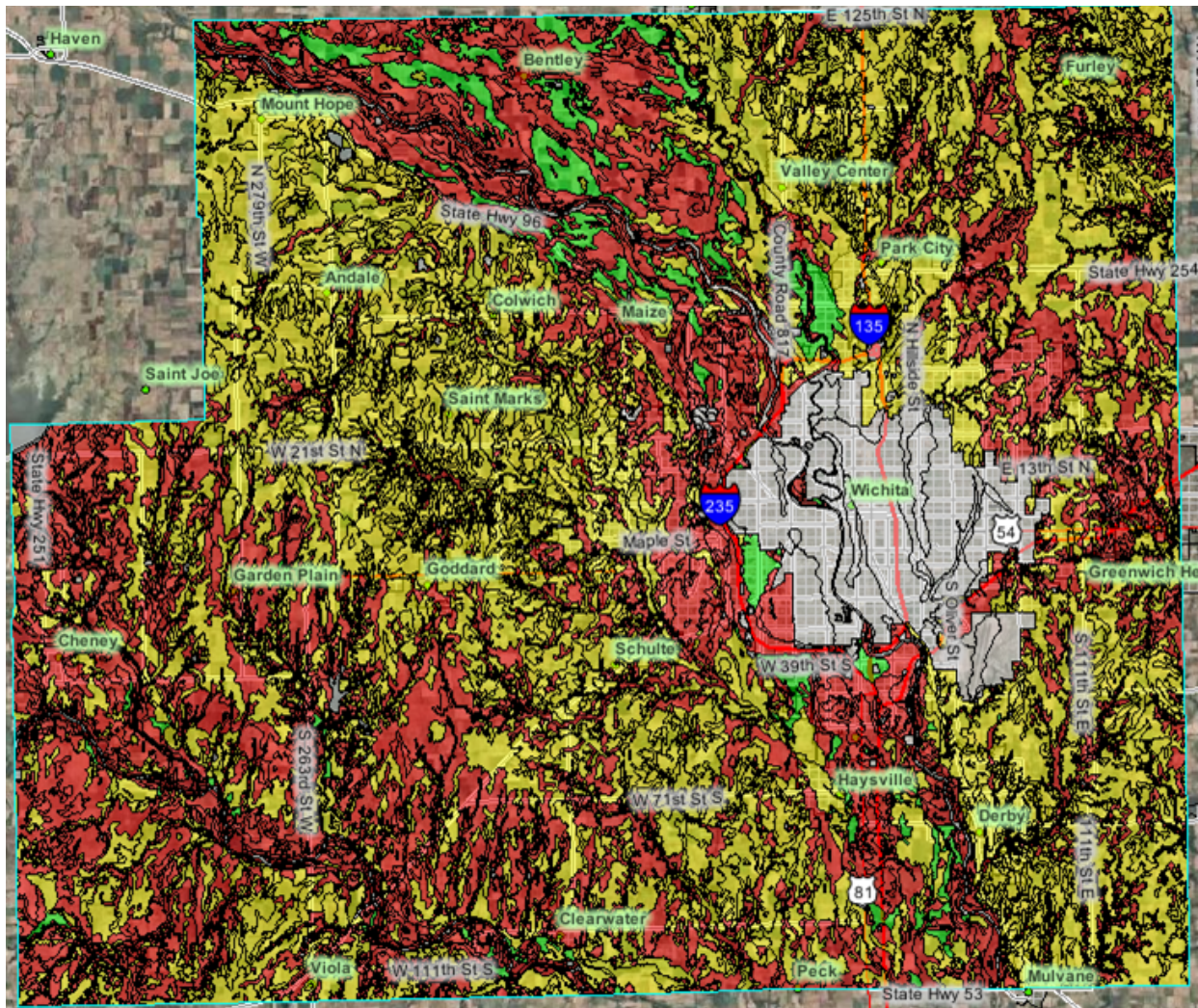
"Catastrophic mortality, large animal disposal" is a method of disposing of dead animals by placing the carcasses in successive layers in an excavated trench or pit. The carcasses are spread, compacted, and covered daily with a thin layer of soil that is excavated from the trench or pit. When the trench or pit is full, a final cover of soil material at least 2 feet thick is placed over the filled trench area or burial pit. (Source: USDA -NCRS)

<sup>25</sup> <http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

The following United States Department of Agriculture (USDA) interactive map shows soils within the Area of Interest (AOI) that may or may not be considered for large scale debris and rubble:



### Rubble and Debris Disposal, Large-Scale Event

#### Summary by Rating Value

| Rating                             | Acres in AOI     | Percent of AOI |
|------------------------------------|------------------|----------------|
| Somewhat limited (Yellow)          | 302,284.0        | 46.8%          |
| Very limited (Red)                 | 276,586.2        | 42.8%          |
| Not limited (Green)                | 21,947.3         | 3.4%           |
| Null or Not Rated                  | 44,837.8         | 6.9%           |
| <b>Totals for Area of Interest</b> | <b>645,655.2</b> | <b>100.0%</b>  |

*Burial of rubble and debris in an expeditiously constructed landfill is a method of disposing of material that has been rendered unsafe and unusable by the effects of a large-scale disaster, either natural or man-made, often affecting tens of counties or parishes. Many homes and business structures are rendered unfit for occupancy, either by destruction or contamination. Such a landfill involves excavating a large pit or trench, placing the rubble and debris in the trench, and covering each layer with a blanket of soil material. A final blanket of cover material is placed over the whole facility when completed. (Source: USDA - NCRS)*

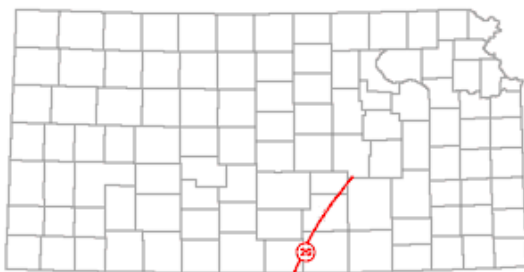
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 6.5 SEDGWICK BASIN PROVIDENCE/ANTICLINES

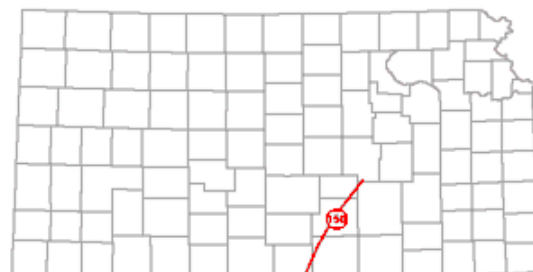
The Sedgwick Basin, a broad south-plunging shallow embayment of the Anadarko Basin covers an area of about 8,500 sq mi in south-central Kansas encompassing 9 counties. It is bounded by the Central Kansas Uplift to the west, the Nemaha Anticline to the east, and the Anadarko Basin to the south. The northern margin is the poorly defined structural saddle dividing it from the Salina Basin. A series of narrow anticlines that are sub parallel to the Nemaha Anticline provide the primary traps.<sup>26</sup> It is a major pre-Desmoinesian post-Mississippian structural feature. The Nemaha Anticline bounds the basin on the east, the Pratt Anticline forms its west flank, and an indistinct saddle separates it from the Salina Basin on the north. The strata in the basin are characterized by facies change and by increased thickness southward from the shelf area into the deeper part of the Anadarko Basin proper.

Surface beds are Permian and Tertiary in age. The "Equus beds" of Pleistocene age form an extensive cover over the northern part of the basin, obscuring the bedrock. Sedimentary rocks of Cambrian-Ordovician, Silurian-Devonian, Mississippian, and Pennsylvanian-Permian age are as much as 5,500 feet thick in the deepest part of the basin.

Several minor structures, approximately parallel with the Nemaha Anticline, have been recognized in the basin. These include the Bluff City Anticline, Conway Syncline, Elbing Anticline, Halstead-Graber Anticline, and the southern end of the Voshell Anticline.<sup>27</sup>



The Bluff City anticline, which approximately parallels the Abilene anticline, extends from the Florence-Urschel field in Marion County through the Elbing field in northwest Butler County to Bluff City in southeast Harper County. The Valley Center oil field may be regarded as being on the Bluff City structure.



A deeply buried structure in Sedgwick County that contains the Valley Center oil pool (produces from the Viola) is known as the Valley Center anticline. The fold is developed principally in Mississippian and older rocks and probably is faulted. It may be regarded as lying in the long structural trend known as the Bluff City anticline.<sup>28</sup>

The Sedgwick Basin is an important hydrocarbon producing area in Kansas. Subsurface structural and isopach (thickness) maps and cross-sections illustrate the depositional and tectonic history of the area. It has undergone several episodes of compression followed by tensional deformation during the Paleozoic, which formed anticlinal and fault bounded structures that were conducive to hydrocarbon accumulation. Also, there were several episodes of sea-level fall and attending subaerial exposure that produced unconformities and reservoir porosity. Approximately 110 million barrels of oil and 118 MCF of natural gas have been produced over the last 92 years in the area. The Sedgwick Basin was an embayment of the epicontinental Permian sea. There are two large structures in the area; the Elbing anticline and the Valley Center anticline. Hydrocarbons appear to have accumulated on the crest of these structures in multiple horizons. Each horizon has unique characteristics that enable them to hold hydrocarbons.<sup>29</sup>

<sup>26</sup> *Salina Basin Province and Sedgwick Basin Province, Kansas Geological Survey*

<sup>27</sup> *Geologic History of Kansas, Kansas Geological Survey, Bulletin 162*

<sup>28</sup> *Kansas Geological Survey, Bulletin 90, Part 6 "Geologic Structures in Kansas"*

<sup>29</sup> *Depositional and Structural History of the Sedgwick Basin, South Central Kansas in Relation to Petroleum Entrapment, Jessica A. Puyear, S. J. Mazzullo, Department of Geology, Fairmount College of Liberal Arts and Sciences*



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

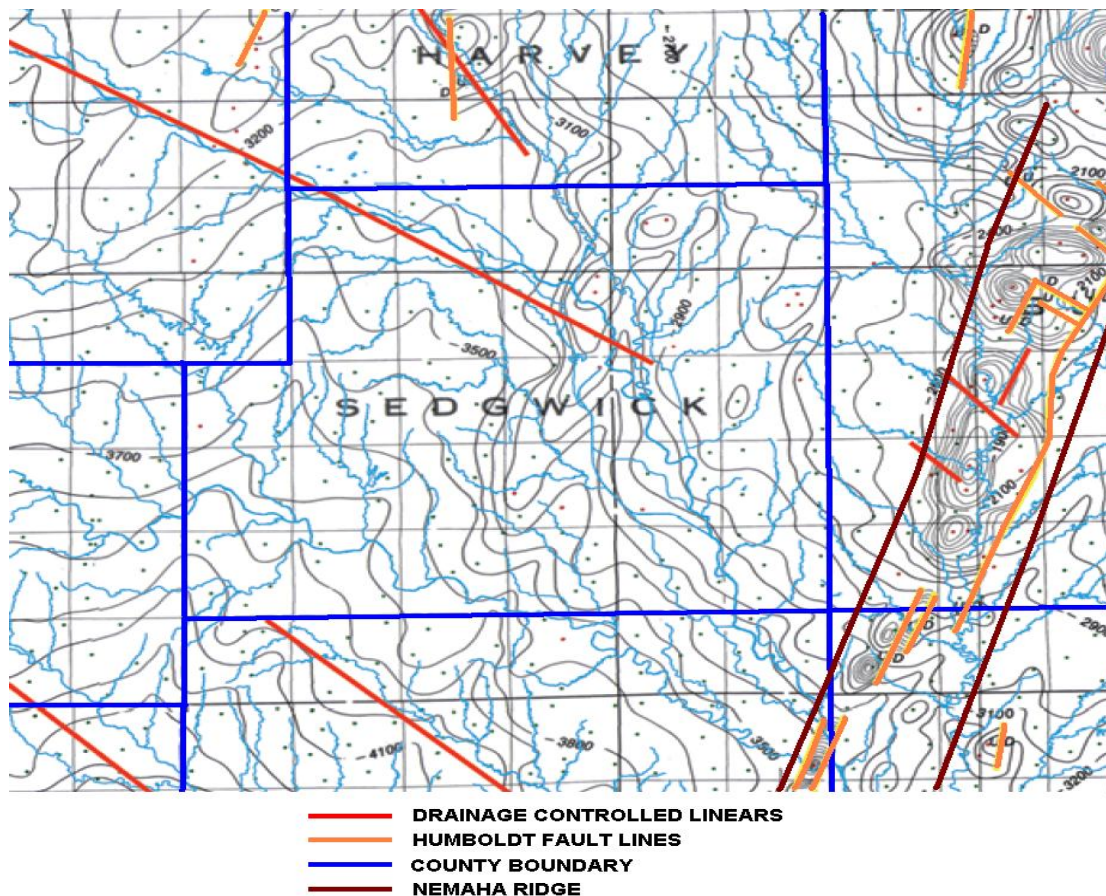
## 6.6 SINKHOLES (SEE ALSO KARST)

Sinkholes are formed either by solution-subsidence or solution-collapse and have been reported in 26 of the 105 Kansas counties. Surface sinkholes, where numerous, affect ground-water conditions of the area. The geographic distribution of many sinkholes, is controlled by the outcrop or subcrop pattern of a relatively soluble stratigraphic unit. Pierce and Courtier (1937) found that recent sinkholes on the Mississippian surface in southeastern Kansas are controlled to some extent by the location of old sinkholes; seemingly, these areas are more susceptible to recurrent slump. In McPherson, Harvey, and Sedgwick Counties the sinkholes have formed near the eastern limit of the Wellington salt (Williams and Lohman, 1949).

## 6.7 FAULTS

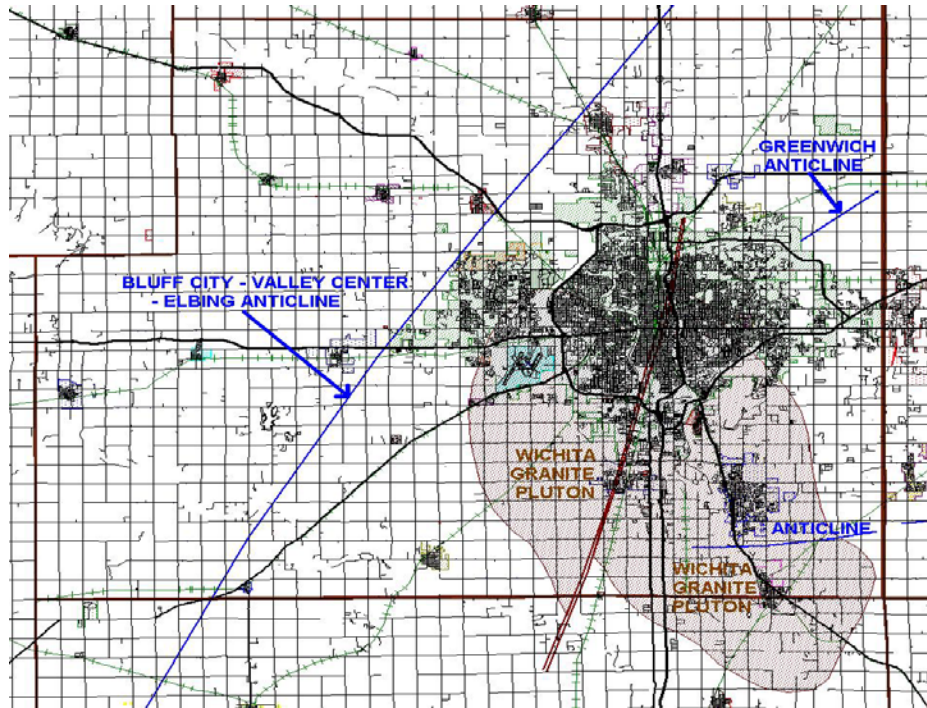
A portion of the KGS Preliminary Lineament Map of Kansas by Lee Gerhardt (Bulletin 250, Part 1) shows the proximity of Sedgwick County to the Nemaha Ridge and Humboldt Fault Zone

## RELATIONSHIP OF GEOLOGIC FEATURES TO SEDGWICK COUNTY



Three anticlines or ridges shown below have been identified in Sedgwick County and are classified by the KGS as inactive faults (Fig. 5). The Bluff City-Valley Center-Elbing Anticline is a result of reverse faulting and associated with the Midcontinent Rift. Interpreted left-lateral offset in the Wichita igneous complex (Wichita Granite Pluton) demonstrating left-lateral wrench faulting along the southern portion of the Nemaha. A 4 mi (6 km) offset is believed to have occurred contemporaneously with the uplift of the Nemaha.

## MAP OF INACTIVE FAULTS, SEDGWICK COUNTY



Evidence of extension of the Chesapeake Fault Zone from Missouri into Kansas has recently been recognized. Although it is not continuous, the northwest-trending disturbed zone is traceable for a distance of almost 600 miles in Missouri, Kansas, and Nebraska. The structure is essentially a grade 6 to 10 miles wide with the floor down dropped as much as 1,000 feet. In Wabaunsee County the Nemaha Anticline is cut by the feature.<sup>2</sup>

### 6.8 SALT CONTAMINATION OF GROUND WATER IN SOUTH CENTRAL KANSAS<sup>30</sup>

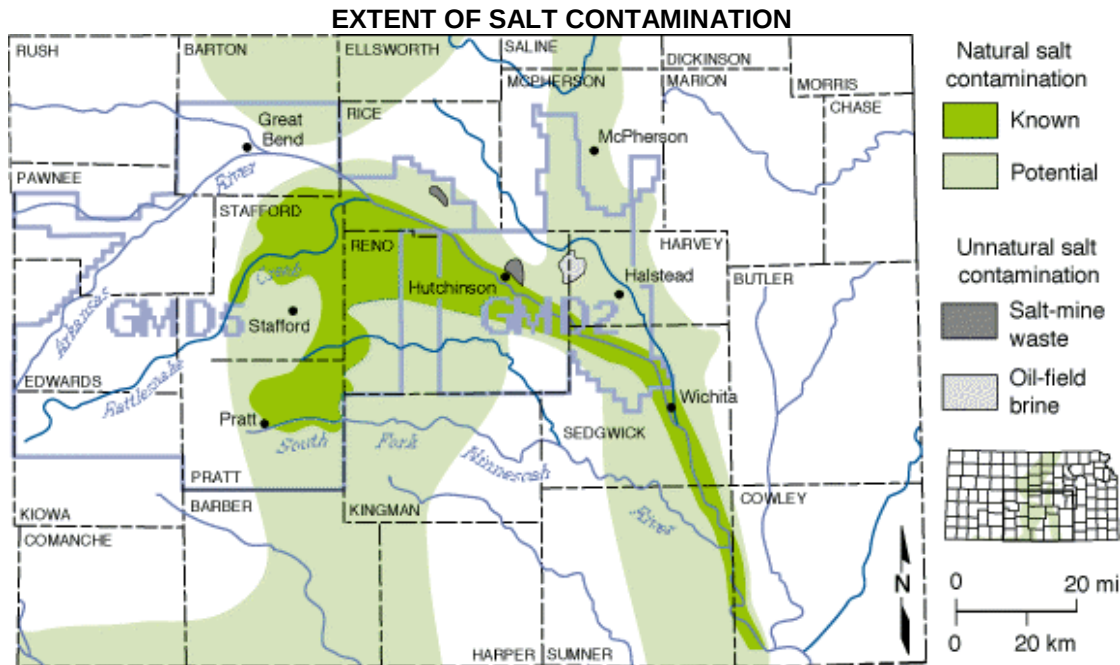
South-central Kansas contains unconsolidated (uncemented) sand and gravel aquifers of the Great Bend Prairie, the Equus Beds, and the Arkansas River valley. Areas with known or potential saltwater contamination in south-central Kansas are shown below. Areas identified as "known" natural salt contamination have saltwater within the freshwater aquifer. In the areas labeled "potential" natural salt contamination, subsurface bedrock formations containing salt or saltwater are in contact with the overlying freshwater aquifers.

Possible sources of excess salinity in ground water include 1) recharge by irrigation water, 2) contamination of surface water or soil by waste water, road salt, and other sources, 3) contamination by oil-field brine and salt-mine waste, and 4) naturally occurring sources of salt.

Recharge by irrigation water and contaminated surface-water typically causes modest salinity increases in ground water, while contamination by oil-field brines and salt mining can be highly concentrated. Salt contamination associated with oil or mining activities is typically localized.

<sup>30</sup> [http://www.kgs.ku.edu/Publications/pic2/pic2\\_1.html](http://www.kgs.ku.edu/Publications/pic2/pic2_1.html)





Natural sources of salt contamination of freshwater aquifers include salt- and saltwater-bearing bedrock formations. Severe drought can lead to salt-contamination problems not observed during normal or excess precipitation. During periods of little or no recharge, ground water continues to discharge naturally from freshwater aquifers, decreasing the thickness of the freshwater zone overlying the saltwater. Regional pumping is likely to be greater during droughts and can further decrease the thickness of the freshwater aquifer.<sup>31</sup>

### 6.9 HUTCHINSON SALT MEMBER

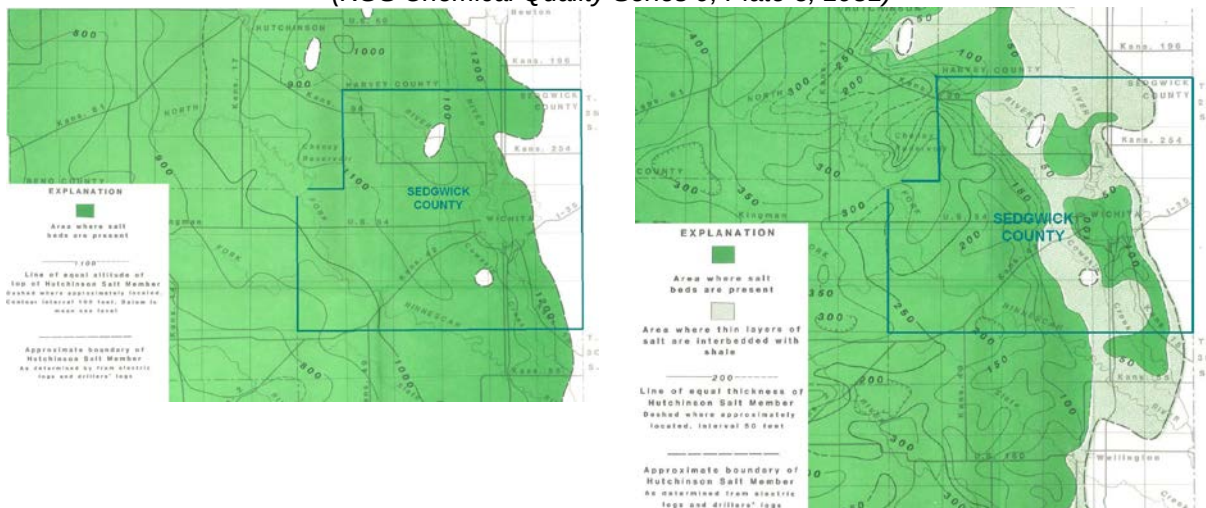
During most of the Permian Period, shallow seas covered what is now Kansas. When the Hutchinson Salt Member formed, the sea was restricted to central Kansas probably as an isolated arm of the main ocean to the south, or cut off entirely. The rate of evaporation exceeded the inflow of water, and as evaporation continued and the salt content of the water increased, thick layers of salt built up on the sea bottom.

Degradation in the chemical quality of freshwater in streams and aquifers has adversely affected the suitability of water for public use. This degradation commonly occurs as a result of the natural discharge of saline water from the Wellington Formation. The dissolution, generally caused by fresh water from surficial deposits penetrating the member) occurs along the eastern edge of the Hutchinson Salt Member shown in the maps below, and gypsum units of the Wellington Formation where they are in proximity to freshwater systems. Dissolution of the salt has resulted in the formation of a discontinuous zone of solution cavities and collapsed beds. This zone, which extends southward from Salina toward the Oklahoma State line, is termed the Wellington Aquifer (approximately 1,500 square miles).

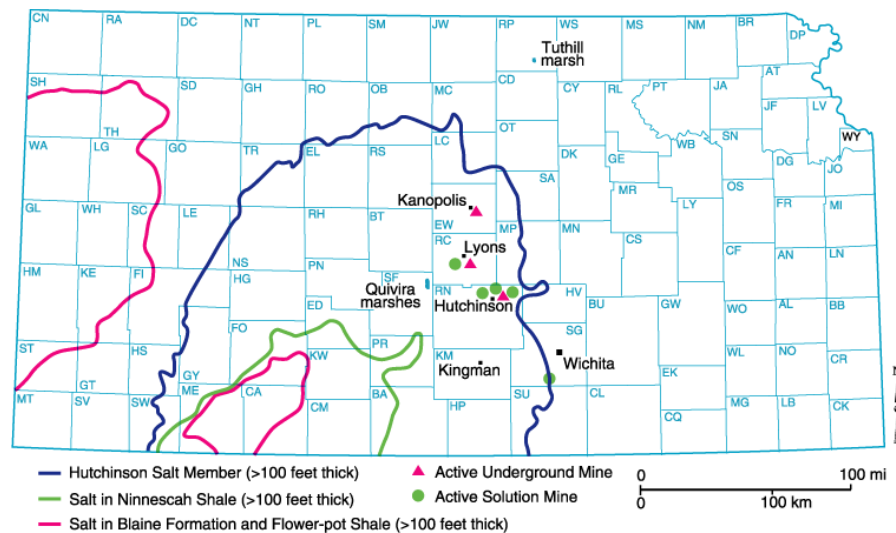
<sup>31</sup> Salt in Kansas, Kansas Geological Survey, Bulletin 214

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

MAPS OF TOP AND THICKNESS OF THE HUTCHINSON SALT MEMBER WITH STRUCTURE CONTOURS  
(KGS Chemical Quality Series 9, Plate 3, 1981)



The lower portion of the Wellington Formation ranges in thickness between 150 feet in Saline County to 250 feet in Sumner County, averaging about 200 feet thick. The Hutchinson Salt Member overlies the lower Wellington Formation, and the upper Wellington member (averaging 250 feet thick) consists of gray shale with minor amounts of gypsum, anhydrite, dolomite, and siltstone. Above the Wellington Formation is Ninnescah Shale with up to 300 feet in overlying undifferentiated Tertiary and Quaternary deposits.



The eastern edge of the Hutchinson Salt Member is actively being eroded, or dissolved, by contact with ground water. Salt is mined in Kansas using two methods: underground mining and solution mining. Because Kansas is in the central part of the U.S. and relatively close to major natural gas fields, a number of pipelines run through the state. These pipelines take advantage of hydrocarbon storage facilities in the salt in central Kansas.

Salt dissolution, either natural or human-induced, is also responsible for surface subsidence areas (sinkholes) in Kansas. Salt layers in the subsurface are dissolved by water, creating underground void spaces. When those voids can no longer support the weight above, the rock layers collapse, causing subsidence at the ground surface. Human-induced subsidence areas are rare, but when they occur, they are usually attributed to salt mining or oil and gas operations.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

The Hutchinson Salt Member of the Permian Wellington Formation is present in the subsurface under much of central and south-central Kansas. The Hutchinson Salt Member is seen as a laterally persistent but thin rock unit covering 27,000 square miles within the State of Kansas. The updip east edge is solution-eroded due to natural access to the water table.

For over 100 miles, time active dissolution front in which the Hutchinson Salt is being dissolved by ground water on its updip east edge is marked by the erratic and poorly mapped "Wellington lost circulation zone" of oil well drillers. This is a zone of partial to total dissolution of rock salt due to natural causes in which the void space created by salt removal has only partially been closed by collapse and gravity slumping, leaving cavernous void space forming a brine-filled conduit which is capable of either yielding large quantities of brine when pumped or of taking large quantities of fluid such as drilling mud.

The only natural dissolution of the Hutchinson Salt occurs along this updip east salt face. In Pleistocene time and continuing to the present, surface subsidence above the solution front resulted in sink and valley formation. A succession of such subparallel north-south valleys, now sediment filled, formed as the salt dissolved and the salt front receded westward. In the deepest part of the solution-slump valleys near the Little Arkansas River in Sedgwick County, formed as a result of the removal of 300 feet or more of salt, the water-bearing sand and gravel fill of Pleistocene age reaches a thickness of 275 feet.<sup>32</sup>

The ultimate physical cause of the sinkholes has been and is the removal of salt by solution from the underlying Wellington formation. Bass (1926a) has shown that the salt beds in the Wellington extend into this area and that the line of sinkholes in McPherson, Harvey, and Sedgwick counties practically coincides with the present eastern margin of the salt beds.<sup>33</sup>

### 6.10 KARST

As indicated by the Kansas Geological Survey (KGS), Karst features in carbonate and evaporite-bearing rocks pose significant engineering hazards and challenges for the protection of water supplies from contamination in parts of Kansas. Elsewhere in the state, playas, (pseudo-karst features) may act as sources of recharge to underlying shallow aquifers and may be in need of protection from plugging or ground-water contamination from agricultural practices.

Evaporite dissolution has been and is on-going in parts of central and western Kansas due to both natural processes and human activities and has resulted in features ranging over several orders of magnitude in size. In western Kansas playas are common features on the High Plains surface where it is underlain by thick sequences of unconsolidated Cenozoic deposits.

Where these geomorphic features occur near urban areas, such as Wichita and Hutchinson, and along the transportation routes, they may present construction problems or impact water supplies that were unforeseen during project planning. Karst can be either of the following types of features:

- All of the diagenetic features - macroscopic and microscopic, surface and subterranean - that are produced during the chemical dissolution and associated modification of a carbonate sequence (James and Choquette, 1988, pg. 2); or,
- A solution-controlled landform type, characterized by an exclusive surface morphology, subsurface drainage and collapse features, which is specifically developed in calcareous rock. (Sweeting, 1973, pg.333)

Sinkholes (dolines) are closed depressions. They can be cone or bowl shaped and circular or elliptical in plan view. The diameter is usually greater than the depth. Average dolines vary in size from 2-100 meters deep and from 10-1,000 meters in diameter. Dolines are regarded as the fundamental unit of karst relief. (Sweeting, 1973)

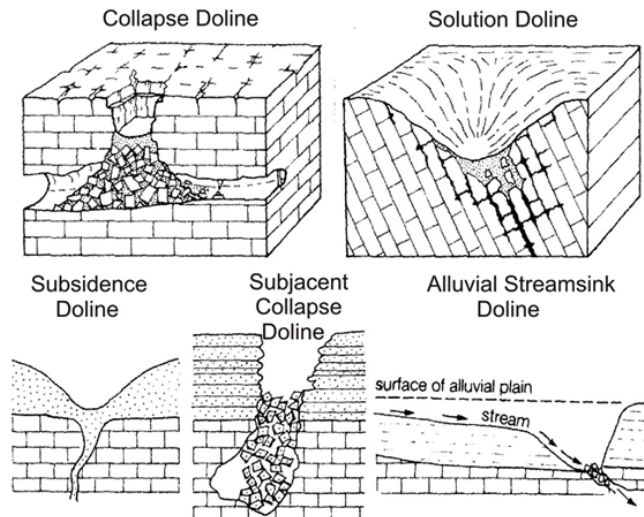
---

<sup>32</sup> Part I: Salt Deposits of Kansas: Regional Geology-Hutchinson Salt Member of the Wellington Formation, Kansas Geological Survey Bulletin 214

<sup>33</sup> South-Central Kansas – Geologic History, Kansas Geological Survey, Bulletin 79

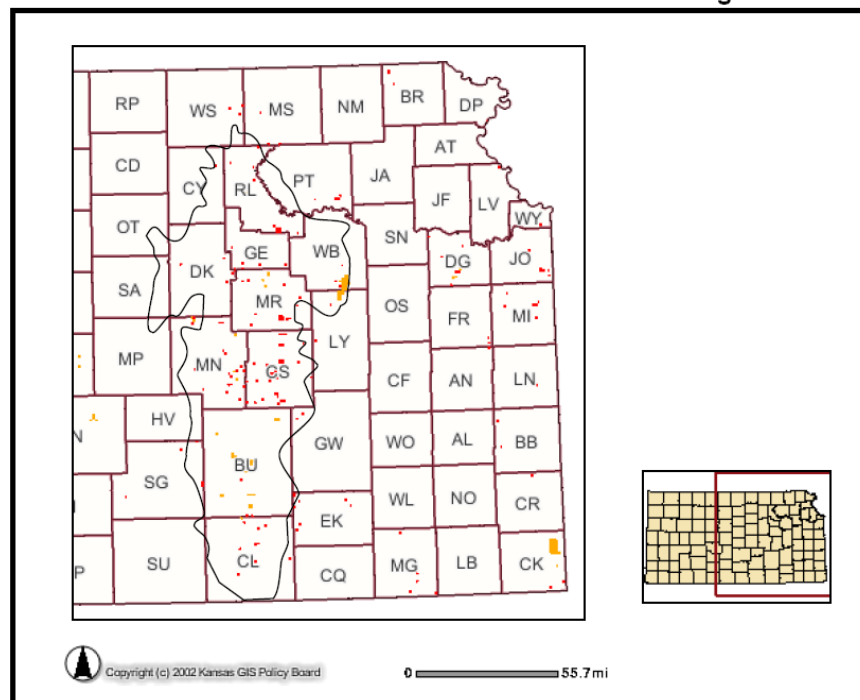
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

Collapse features are closed depressions formed by subsurface collapse that may or may not be the result of subaerial karst. Dissolution by circulation of deep-seated hydrothermal fluids and structural collapse above tectonic pullaparts are other possible mechanisms for the formation of these features. Five major classes of dolines have been recognized by Jennings (1985):



<http://www.kgs.ku.edu/SEISKARST/definitions.html>

### Distribution of Karst Features in the Flint Hills Region



[http://www.kgs.ku.edu/geohydro/karst/karst\\_view.cfm](http://www.kgs.ku.edu/geohydro/karst/karst_view.cfm)<sup>34</sup>

Shown above is distribution of karst features in the Flint Hills region (outlined in black) and adjacent areas of eastern Kansas. Plotted on the map are 1-mile square sections of land where spring and sinkhole

<sup>34</sup> Kansas Geological Survey Open File Report 2005-50, Midcontinent Meeting for the National Karst Map Project-Field Trip Notes



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

locations have been documented in the literature. Sections in yellow and red indicate areas the occurrence of sinkholes and springs, respectively. Modified from the Karst Data Viewer

Karst features in the Flint Hills region includes eastern Sedgwick County where the Wellington Formation is located, and where several sinkhole areas have been identified. Areas north and east of Sedgwick County have been shown to have continued movement of groundwater through the limestones which have created an integrated network of solution-widened fractures and conduits of varying size. The character of the bedrock units changes from interbedded shales and limestones to interbedded fractured and slumped shales and solutioned evaporates. Variable thicknesses of Pliocene to Recent sediments mantle the bedrock in much of the Wellington-McPherson and Arkansas River Lowland regions. At the surface closed depressions mark subsidence features resulting from natural or anthropogenically-induced dissolution.

Natural evaporite dissolution in Central Kansas has impacted the Lower Permian Wellington Formation, the Ninnescah Shale, overlying Lower Cretaceous bedrock units, and Cenozoic deposits. The Wellington consists of a lower unnamed member, the middle Hutchinson Salt Member, and an upper unnamed member. The Hutchinson Salt is present in the subsurface under much of central and south central Kansas and adjacent north central Oklahoma. The Hutchinson is almost entirely bedded salt with minor interbedded shales, anhydrite, and gypsum. The upper member of the Wellington and the overlying Ninnescah consist primarily of gray shale and siltstone with minor amounts of gypsum and anhydrite. Lower Cretaceous units consist of shales, siltstones, and sandstones that belong to the Kiowa and Dakota formations. Unconsolidated Tertiary and Quaternary deposits overlie the bedrock surface over much of this part of central Kansas, including the Equus beds, and alluvium and terrace deposits associated with the Smoky, Saline, Solomon, and Arkansas River valleys. Dip on the bedrock units is westward, and the updip edge of the Hutchinson Salt Member trends from Salina southward through Newton, Wichita, and Wellington.

Evolution of the Smoky Hill and the Arkansas drainages is intimately tied to subsidence along the updip edges of the Permian bedrock units due to evaporite dissolution, primarily in the Hutchinson Salt Member of the Wellington Formation. Recurrent deep-seated structural movement of basement blocks has activated new and reactivated existing fracture sets, which allowed small downward flows of fresh groundwater across dominantly shaly rocks. Throughout the Cenozoic, erosion has been actively stripping off the overlying Cretaceous and Permian bedrock units, bringing the updip edge of the evaporite-bearing rocks closer to land surface and within the realm of circulating fresh ground water. Unloading associated with erosion of the overburden changed the stress field and resulted in the development of joint and fracture systems in the Permian shale and siltstone units above the evaporite deposits. These joints and fracture systems facilitated greater downward flows of ground water across the low permeability shales and siltstones of the upper Wellington and Ninnescah. Within the shale units, volume expansion associated with the conversion of anhydrite to gypsum would have also opened new fractures in the shales and siltstones. Thus, the shallow fresh ground water system began to dissolve the evaporites and initiate subsidence of the overlying strata.

Dissolution removed evaporites causing fracturing of the overlying shale and siltstone units and subsidence of the land surface, all of which helped to localize the river drainage and alluvial deposition along the developing dissolution zone. Consequently, Equus beds sediments now fill a 50-mile long trench along a corridor of more than 300 square miles in extent from McPherson to Wichita created by the dissolution of more than 200 feet of halite. Collectively, the fractured shale and karstified underlying Chase Group limestone units form a zone eastward of the dissolution front extending from Salina southward to the Kansas-Oklahoma border and is referred to the Wellington aquifer. With the drainage localized above the dissolution zone, fracturing and subsidence of overlying shales and siltstones accelerated due to increased flushing by local ground water flow systems. In some cases overlying, permeable sand and gravel deposits filled open fractures and solution channels to enhance permeability of the brecciated bedrock. These fracture fillings resulted in a more integrated network of permeable fractures that increased the flow rate of the shallow ground water system and the intensity of the evaporite dissolution. Increased intensity of the dissolution has resulted in coalescence of sinkhole and closed depression features into subsidence basins and has further enhanced fracture and solution channel permeability. The formation of sinkholes and subsidence features at the surface is a reminder that the dissolution front and adjacent dissolution zone continue to develop naturally and in many cases, enhanced by human activity.



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

Conceptual modeling indicates that groundwater in the Wellington aquifer moves southward and the flow is controlled by the combined effects of topographic relief, regional variations in aquifer permeability and thickness, and the effects of underground disposal of oil-field brines. Local flow systems associated with the river valleys are believed to be the primary cause of salt dissolution and the local development of the Wellington aquifer framework. Although previous investigations indicate dissolution has occurred through the Quarternary period, dissolution has accelerated in the last half century as a result of extensive oil and gas drilling and related activities.

KGS's October 2010 project report "Modeling CO<sub>2</sub> Sequestration in Saline Aquifer and Depleted Oil Reservoir to Evaluate Regional CO<sub>2</sub> Sequestration Potential of Ozark Plateau Aquifer System, South-Central Kansas" is helping to identify lineaments, potential fracture systems, faults, and karst features in a regional study area which includes Sedgwick County. This project focuses locally on the Mississippian reservoir and the underlying Arbuckle Group Saline Aquifer at the Wellington Field area, Sumner County, Kansas, encompassing approximately ten square miles, and regionally on the Arbuckle Group Saline Aquifer extending over a 20,000+ square mile area across 17+ counties in southern Kansas. Currently, the basement structure maps from gravity/magnetic analysis is being compared with Arbuckle structural maps and remote sensing analysis to characterize fault/fracture in the Arbuckle Group Saline Aquifer. A flow-unit based geomodel has been constructed, using depth-constrained cluster analysis of petrophysical data, over a 9-Township area around the Plant Site Disposal Well #10, Sedgwick County, Kansas, and initial simulation studies show that aquitards within the Arbuckle prevent vertical migration of the CO<sub>2</sub> plume towards the primary cap rock.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 7 THREATENED AND ENDANGERED SPECIES

State and federally listed species are protected in Kansas as designated by the *Kansas Nongame and Endangered Species Conservation Act* of 1975. The act places the responsibility for identifying and undertaking appropriate conservation measures for listed species directly upon the Department of Wildlife and Parks through statutes and regulations. Regulations require the department to issue special action permits for activities that affect species listed as threatened and endangered in Kansas. Department personnel conduct environmental reviews of these proposed activities, and if necessary issue action permits with special conditions that help offset negative effects to listed species and critical habitats.

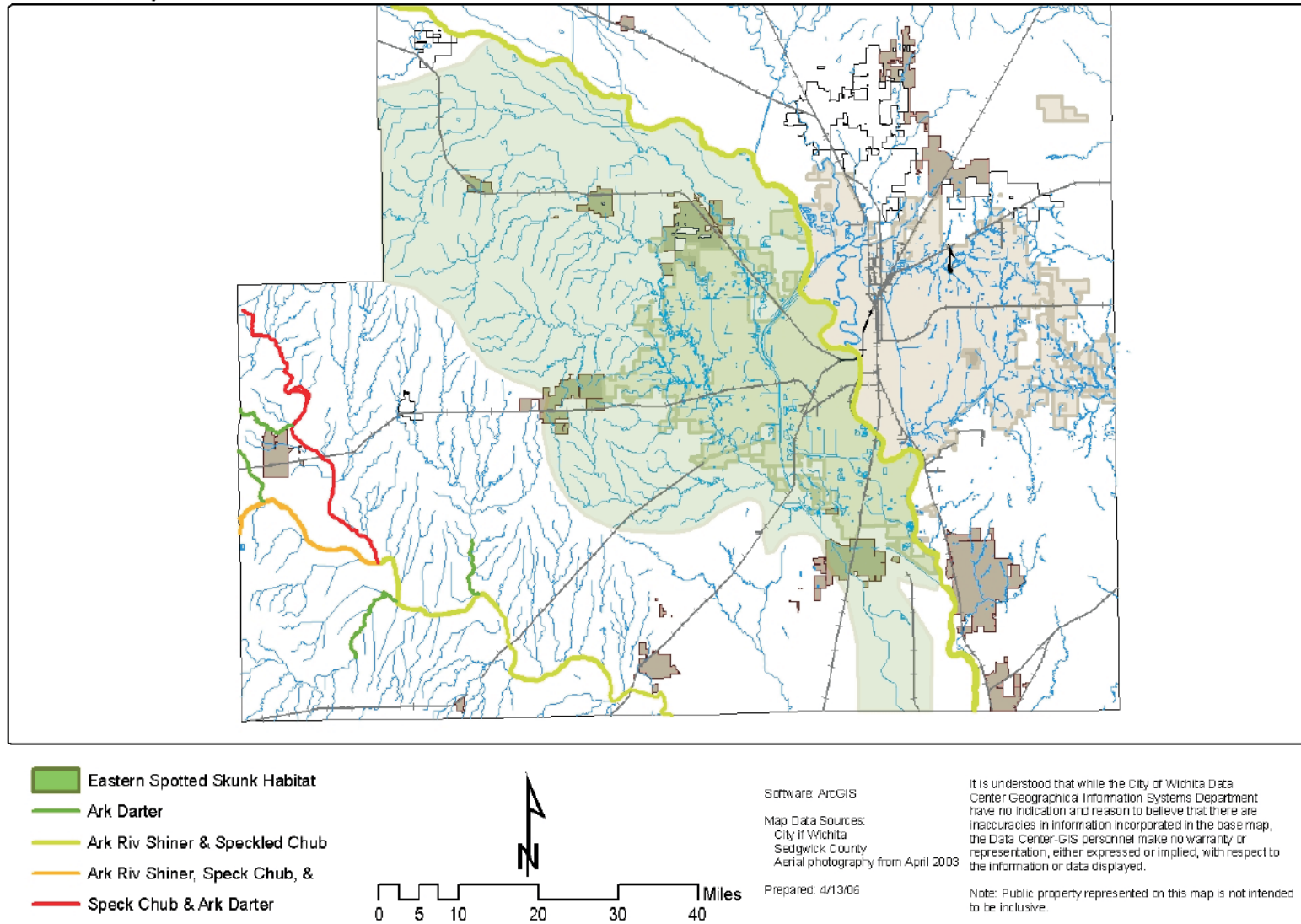
The tables below show the numbers of threatened, endangered, species in need of conservation, and candidate species identified with Sedgwick County. A map showing the general locations of these species is shown on the next page.

| THREATENED (THR) & ENDANGERED (END) SPECIES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Arkansas Darter</b> <i>Etheostoma cragini</i><br>State: THR Federal: CAN Critical Habitat: YES<br><b>Arkansas River Shiner</b> <i>Notropis girardi</i><br>State: END Federal: THR Critical Habitat: YES<br><b>Arkansas River Speckled Chub</b> <i>Macrhybopsis tetranema</i><br>State: END Federal: NA Critical Habitat: YES<br><b>Bald Eagle</b> <i>Haliaeetus leucocephalus</i><br>State: THR Federal: THR Critical Habitat: YES<br><b>Eastern Spotted Skunk</b> <i>Spilogale putorius</i><br>State: THR Federal: NA Critical Habitat: YES<br><b>Eskimo Curlew</b> <i>Numenius borealis</i><br>State: END Federal: END Critical Habitat: NO                                                          | <b>Least Tern</b> <i>Sterna antillarum</i><br>State: END Federal: END Critical Habitat: NO<br><b>Piping Plover</b> <i>Charadrius melodus</i><br>State: THR Federal: THR Critical Habitat: NO<br><b>Silver Chub</b> <i>Macrhybopsis storeriana</i><br>State: END Federal: NA Critical Habitat: YES<br><b>Snowy Plover</b> <i>Charadrius alexandrinus</i><br>State: THR Federal: NA Critical Habitat: NO<br><b>Whooping Crane</b> <i>Grus americana</i><br>State: END Federal: END Critical Habitat: NO<br>Legend: CAN – Candidate, NA – Not Applicable                                                                                                 |
| SPECIES IN NEED OF CONSERVATION (SNC)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Black Tern</b> <i>Chlidonias niger</i><br>State: SNC Federal: NA Critical Habitat: NA<br><b>Bobolink</b> <i>Dolichonyx oryzivorus</i><br>State: SNC Federal: NA Critical Habitat: NA<br><b>Cerulean Warbler</b> <i>Dendroica cerulea</i><br>State: SNC Federal: NA Critical Habitat: NA<br><b>Chihuahuan Raven</b> <i>Corvus cryptoleucus</i><br>State: SNC Federal: NA Critical Habitat: NA<br><b>Eastern Hognose Snake</b> <i>Heterodon platirhinos</i><br>State: SNC Federal: NA Critical Habitat: NA<br><b>Ferruginous Hawk</b> <i>Buteo regalis</i><br>State: SNC Federal: NA Critical Habitat: NA<br><b>Golden Eagle</b> <i>Aquila chrysaetos</i><br>State: SNC Federal: NA Critical Habitat: NA | <b>Plains Minnow</b> <i>Hybognathus placitus</i><br>State: SNC Federal: NA Critical Habitat: NA<br><b>River Shiner</b> <i>Notropis blennioides</i><br>State: SNC Federal: NA Critical Habitat: NA<br><b>Short-eared Owl</b> <i>Asio flammeus</i><br>State: SNC Federal: NA Critical Habitat: NA<br><b>Southern Flying Squirrel</b> <i>Glaucomys volans</i><br>State: SNC Federal: NA Critical Habitat: NA<br><b>Western Hognose Snake</b> <i>Heterodon nasicus</i><br>State: SNC Federal: NA Critical Habitat: NA<br><b>Whip-poor-will</b> <i>Caprimulgus vociferus</i><br>State: SNC Federal: NA Critical Habitat: NA<br>Legend: NA – Not Applicable |

Source: Kansas Department of Wildlife and Parks, Threatened and Endangered Species

### Threatened or Endangered Species Habitat Within Sedgwick County

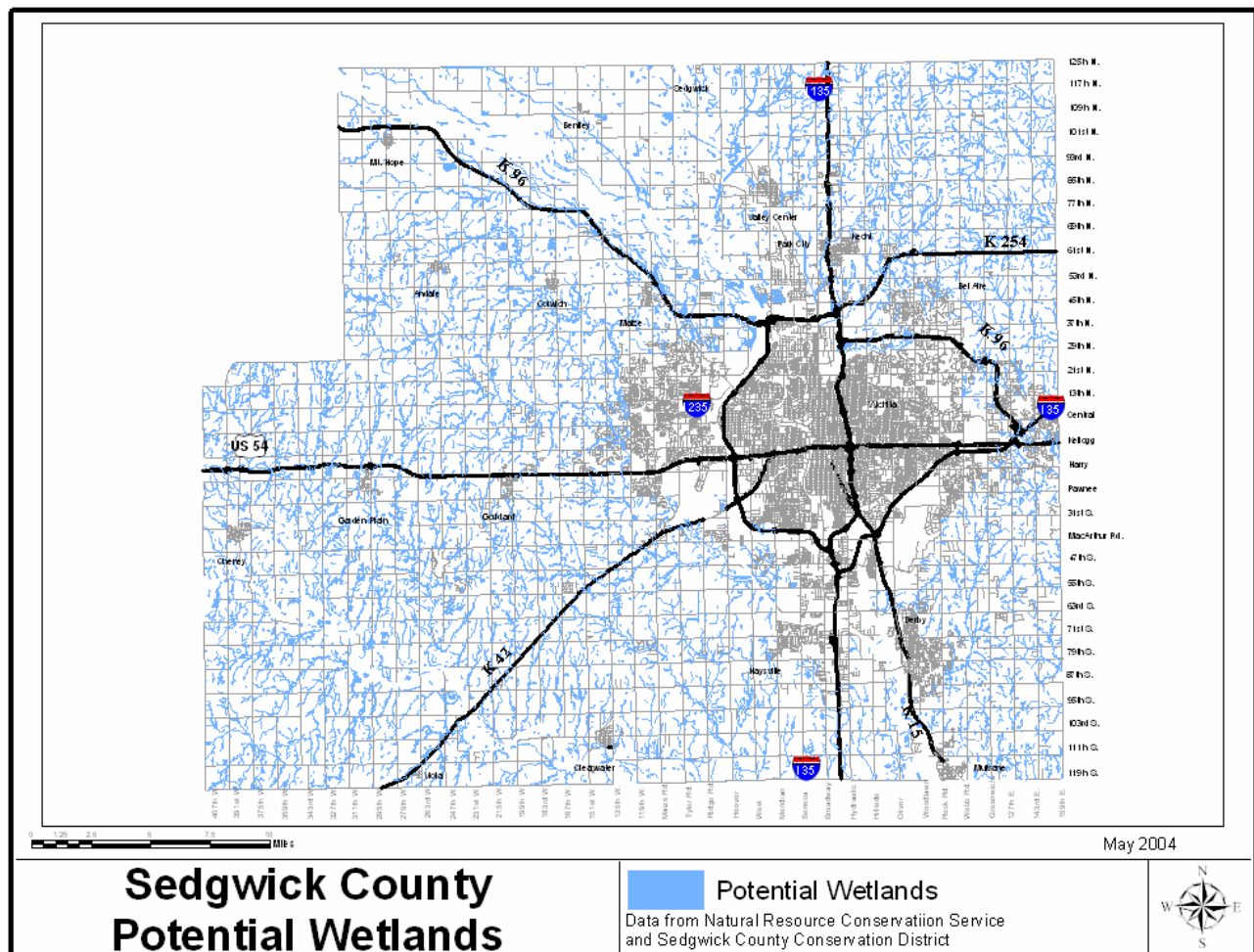
As identified by KDWP



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 8 WETLANDS

An area is classified as a wetland if it displays three criteria: Hydric soils; hydrophytic vegetation; and wetlands hydrology. Sedgwick County has two soils that have been designated as hydric soils (soils that typically hold water). Plevna soils are almost always wetlands and Carwile soils can also be wetlands. Additionally, the Natural Resource Conservation Service has determined 10,357 acres of wetlands exist on 497 agricultural tracts in the County. These wetlands generally exist on Plevna or Carwile soils.



Sedgwick County has soils that contain small areas of inclusions which may be wetlands. Soils which may have inclusions are: Blanket Silt Loam (Ba), Elandco Silt Loam (Ea), Elandco Silt Loam, frequently flooded (Ec), Farnum Loam (Fa), Farnum Loam, 1-3% Slope (Fb), Lesho Loam (La), Lincoln (Lb), Pratt Loamy Fine Sand (Pc), Tabler-Drummond Complex (Tb), Vanoss Silt Loam (Va), Waldeck Sandy Loam (Wa), and Waurika Silt Loam (Wb).

Further information can be found in the Sedgwick County Water Supply and Wastewater Management Assessment (2004) report from the Sedgwick County Conservation District. Individual township maps with potential identified areas are available through Sedgwick County Emergency Management.

## **SECTION 4**

### **SECTOR SPECIFIC AREAS**



# 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

## 9 SECTOR SPECIFIC AREAS

### 9.1 AGRICULTURE AND FOOD SECTOR

This sector provides for the fundamental need for food. The infrastructure includes supply chains for feed and crop production. This sector also carries out the post harvesting of the food supply, including processing and retail sales. Threats to this sector include physical vulnerabilities. The following agencies are responsible for this sector:

Local: Sedgwick County Extension Office

State: Kansas Department of Agriculture

Federal: Department of Agriculture and Department of Health and Human Services

The Agriculture and Food Sector is vast, comprising the Nation's agricultural production and food systems from farm to table. Because of the open nature of many portions of the Agriculture and Food Sector, attacks using food or agricultural infrastructure or resources as a means to deliver biological, chemical, or radiological agents could have a devastating impact on public health and the economy.

The sector includes the supply chains for feed, animals, and animal products; crop production and the supply chains of seed, fertilizer, and necessary related materials; and the post-harvesting components of the food supply chain, from processing through distribution to consumption.

Agroterrorism supported critical infrastructure/key resource assessments helps to identify vulnerabilities and potential mitigation strategies for those identified vulnerabilities. Agroterrorism targets include livestock, crops, water supplies, food in grocery stores, farm workers, food processors, and restaurants.

The Agriculture and Food Sector shares dependencies and interdependencies with other CIKR sectors, including: Banking and Finance, Chemical, Energy, Government Facilities, Healthcare and Public Health, Information Technology, Transportation Systems, and Water.

AGRICULTURE ESTIMATES FOR SEDGWICK COUNTY KANSAS (2013-2015)

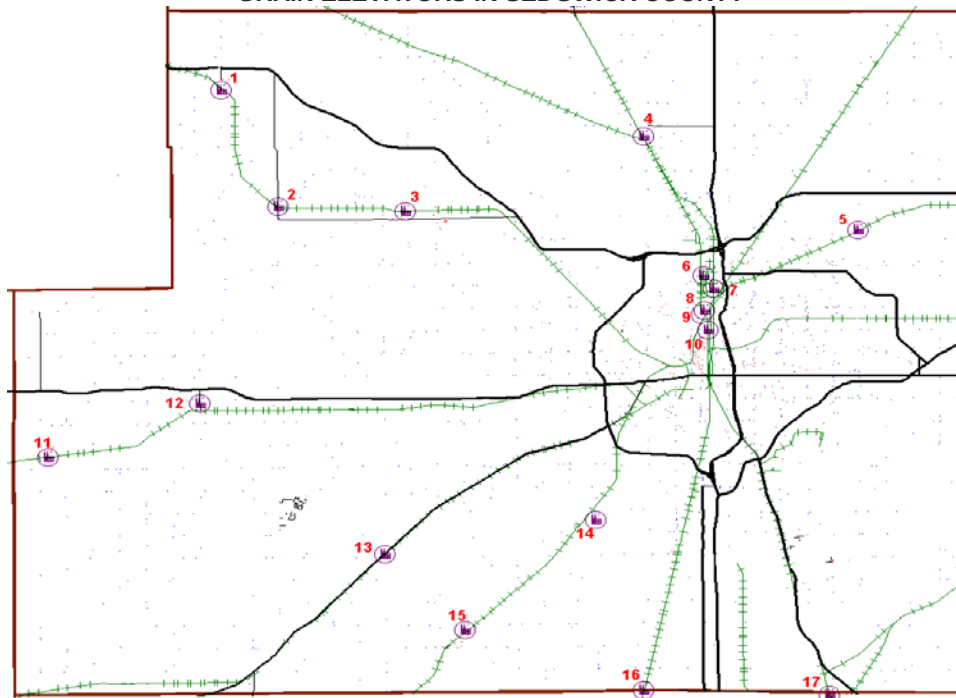
| Crop         | Planted (acres)    | Harvested (acres)  | Yield per harvested acre (bushels) | Production (bushels) |
|--------------|--------------------|--------------------|------------------------------------|----------------------|
| Corn         | 40,400             | 38,800             | 152.5                              | 5,916,000            |
| Cotton       | 1.3                | 1.2                | 520 Pounds                         | 1,300 Bales          |
| Sorghum      | 39,400             | 39,300             | 75.6                               | 2,970,000            |
| Soybeans     | 35.1               | 34.7               | 40.0                               | 1,388.5              |
| Winter Wheat | 175,600            | 174,010            | 38.3                               | 6,656,000            |
| Livestock    | Beef Cow Inventory | Milk Cow Inventory | Total Cows Including Calves        | Hogs Inventory       |
| Cattle       | 14,500             | 1,800              | 30,000                             | -                    |
| Hogs         | -                  | -                  | -                                  | 2,000                |

Source: USDA National Agricultural Statistics Service (NASS) – Kansas Field Office

There are 16 grain elevators located in Sedgwick County at the following locations: Andale, Furley, Cheney, Clearwater, Clonmel, Colwich, Garden Plain, Haysville, Mount Hope, Peck, Valley Center, and Wichita. An additional grain elevator is located near the Sedgwick-Sumner County line in Mulvane.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

GRAIN ELEVATORS IN SEDGWICK COUNTY



| Map No. | Company                     | Map No. | Company                          |
|---------|-----------------------------|---------|----------------------------------|
| 1       | Halstead Coop - Mount Hope  | 10      | Cargill Inc                      |
| 2       | Andale Coop – Andale        | 11      | Garden Plain Coop - Cheney       |
| 3       | Andale Coop – Colwich       | 12      | Garden Plain Coop - Garden Plain |
| 4       | Andale Coop - Valley Center | 13      | Garden Plain Coop - Clonmel      |
| 5       | Andale Coop – Furley        | 14      | Gavilon Grain LLC - Haysville    |
| 6       | Bartlett Grain Co LP        | 15      | Mulvane Coop - Clearwater        |
| 7       | Mid Kansas Coop             | 16      | Mulvane Coop - Peck              |
| 8       | Bartlett Grain Company Inc  | 17      | Mulvane Coop - Mulvane           |
| 9       | CCGP Inc                    |         |                                  |

Note: Andale Coop elevators typically utilize truck grain haulers only and ship to Wichita for processing

| Company/Terminal                                                  | Total storage capacity in bushels | Loadout capacity in bushels per hour (bph) | Wheat Flour Capacity (cwts) | Receiving   | Loadout     | Railroad Carriers          |
|-------------------------------------------------------------------|-----------------------------------|--------------------------------------------|-----------------------------|-------------|-------------|----------------------------|
| Cargill - Horizon Milling LLC–NA<br>715 E 13 <sup>th</sup> Street | 5,000,000 Upright                 | 10,000                                     | 21,000                      | Rail, Truck | Rail, Truck | BNSF, Union Pacific        |
| Cereal Food Processors, Inc<br>701 East 17 <sup>th</sup> Street   | 2,000,000 Upright                 | N/A                                        | 16,000                      | Rail, Truck | N/A         | BNSF, Union Pacific        |
| Western Grain, Inc<br>3101 N Washington                           | 1,285,000 Upright<br>710,000 Flat | 16,000                                     | N/A                         | Rail, Truck | Rail, Truck | BNSF, Union Pacific        |
| Gavilon Grain LLC<br>5755 S Hoover Road                           | 22,549,000 Upright                | 56,000                                     | N/A                         | Rail, Truck | Rail, Truck | BNSF, KO                   |
| Bartlett Grain Company, Inc<br>3311 N Emporia                     | 10,340,027 Upright                | 50,000                                     | N/A                         | Rail, Truck | Rail, Truck | BNSF, Union Pacific, Other |
| ADM/Farmland<br>1400 E 25 <sup>th</sup> Street                    | 10,503,000 Upright                | N/A                                        | N/A                         | Rail, Truck | Rail, Truck | BNSF                       |
| Farmers Grain Cooperative<br>3101 N Washington Street             | 1,985,000 Upright                 | 16,000                                     | N/A                         | Rail, Truck | Rail, Truck | BNSF, Union Pacific        |

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### Food Processors and Rendering Plants

#### Cargill, Inc

Corporate Offices:  
Cargill Cattle Feeders & Meat Solutions, 151 N Main Wichita KS  
Research & Development, 2901 N Mead Wichita KS

Grain and Oilseed Supply Chain – NA (GOSCNA) Division:  
Crush Facility, 1425 N Mosley Wichita KS  
Main Office, 715 E 13<sup>th</sup> Street Wichita KS  
Refinery, 1417 N Barwise Wichita KS

### Flour Blending

Premier Blending Inc  
816 E Funston Wichita KS  
Custom formulating, processing, packaging, and distributing flour based mixes and season blends in a 60,000 square foot facility  
Railroad: BNSF  
Switching Carrier: BNSF

### Meat Rendering Plant

Darling International (formerly National By-Products LLC)  
2155 N Mosley Wichita, KS

Largest publicly traded food processing by-products recycling company in the United States. The Company recycles used restaurant cooking oil and by-products from the beef, pork and poultry processing industries into useable products such as tallow, feed-grade fats and meat and bone meal.

### Meat Processors

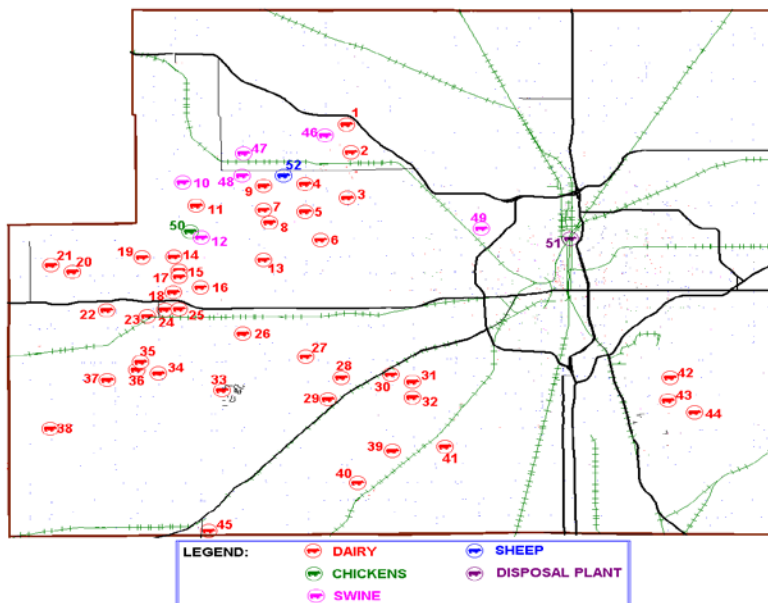
- Dold Foods (Division of GA Hormel Co Inc)  
2929 Ohio Wichita, KS
- Farmland Foods Inc  
2323 S Sheridan Wichita, KS
- Indian Hills Meat & Poultry  
920 E Lewis Wichita, KS
- Cargill Meat Solutions Corp  
151 N Main Street, Wichita KS
- Walton's Inc.  
3639 N Comotara Street, Wichita KS
- Swiss Burger Brand Meat Co  
3763 N Emporia Street, Wichita KS
- Native American Ent  
230 N West Street, Wichita KS
- Yoder Meats  
798 N West Street, Wichita KS
- S&S Meats  
5331 E Kellogg Drive, Wichita KS
- Sig's Gourmet Butcher Shop  
300 S Baltimore, Derby KS
- Richards Cold Storage  
111 S Park Avenue, Valley Center KS
- Mini Super Aguascalientes  
3363 E 47<sup>th</sup> Street S, Wichita KS
- E Z Choice Meats  
1940 E Diedrich Street, Haysville KS
- Stroot Locker Inc  
115 N 1<sup>st</sup> Avenue, Mulvane KS
- Stroot Locker Inc  
111 N Main Street, Goddard KS

### Food Service Distributor

F&E Wholesale Grocery, Inc.  
(Wichita, KS 67201  
(Branch of Ben E. Keith Foods, ninth largest broad-line foodservice distributor in the nation)

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

The following map shows the locations of licensed feedlots and animal disposal facilities located within Sedgwick County as reported by the Kansas Department of Health and Environment, and the Kansas Animal Health Department with color coded map locations. A table reflecting the owners, types of livestock and number of animals typically maintained at those locations are also shown with corresponding map locations.



### FEEDLOTS AND DISPOSAL FACILITIES IN SEDGWICK COUNTY

| MAP NO. | FACILITY                   | MAP NO. | FACILITY                      |
|---------|----------------------------|---------|-------------------------------|
| 1       | Simon Dairy Farm           | 27      | Richard J Kramer              |
| 2       | Linnebur Farms             | 28      | John Dugan                    |
| 3       | Wilfred & Agnes Doll       | 29      | Lloyd Youngers Dairy          |
| 4       | Gerald Ballmann            | 30      | Francis & Catherine Farms Inc |
| 5       | Betzen Farm                | 31      | Emmett M Simon                |
| 6       | Simon Gorges Joint Venture | 32      | Charles E Becker              |
| 7       | Seiwert Dairy              | 33      | Stuhlsatz Farms               |
| 8       | Mathias F Simon            | 34      | Leon Zoglman Dairy            |
| 9       | Simon Farms                | 35      | Jerome May                    |
| 10      | Meyersick Hog Feeders      | 36      | Joseph Baalman                |
| 11      | Fred E Hammertzheim        | 37      | Hillman Farms                 |
| 12      | Louis & Earl Wetta         | 38      | Wells M & M Dairy             |
| 13      | Felix Gorges               | 39      | David Klausmeyer              |
| 14      | Klein Dairy                | 40      | Dan Lauer Dairy Farm          |
| 15      | Sliv's Boy Dairy           | 41      | Jim Simon                     |
| 16      | 3K Holstein Farm Inc       | 42      | La Pasture                    |
| 17      | Hays-Z-Acres               | 43      | Ray Kennedy                   |
| 18      | Honey-May Farm             | 44      | John Wehman                   |
| 19      | Simon farms Partnership    | 45      | Pauly's Five Star Dairy Inc   |
| 20      | Phil Blocker               | 46      | William Spexarth              |
| 21      | Goode Dairy                | 47      | Karole Martin                 |
| 22      | W Dean Lorenz              | 48      | R & V Hog Farm                |
| 23      | Thomas M Schauf            | 49      | Carp Brothers                 |
| 24      | John A Leis                | 50      | Wetta Egg Farm                |
| 25      | Gerald Martin              | 51      | National By-Products          |
| 26      | Seidl Dairy                | 52      | Smarsh Farms                  |

# 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

## 9.2 BANKING AND FINANCE SECTOR

This sector provides the financial infrastructure and consists of commercial banks, insurance companies, mutual funds, government-sponsored enterprises, pension funds, and other financial institutions that carry out transactions including clearing and settlement. Threats to this sector include cyber and physical vulnerabilities. The following agencies are responsible for this sector:

State: Office of the State Bank Commissioner  
Federal: Department of the Treasury

The Banking and Finance Sector is the backbone for the world economy, overseeing:

- Deposit, consumer credit, and payment systems.
- Credit and liquidity products.
- Investment products.
- Risk-transfer products (including insurance).

As direct attacks and public statements by terrorist organizations demonstrate, the sector is a high-value and symbolic target. Additionally, large-scale power outages, recent natural disasters, and economic troubles demonstrate the wide range of potential threats facing the sector. Faced with these threats, financial regulators and private-sector owners and operators work collaboratively to maintain a high degree of resiliency. Terrorist organizations view the sector as a valuable and symbolic target. Large-scale power outages, recent natural disasters, and economic troubles demonstrate the range of potential threats facing the sector. The Banking and Finance Sector shares dependencies and interdependencies with other CIKR sectors, including: Communications, Energy, Information Technology, and Transportation Systems.

BANK TOTAL CONSOLIDATED ASSETS IN WICHITA AREA

| Bank                            | Consolidated Assets (\$) | Wichita MSA Deposits (\$) | Net Loans/Leases (\$) |
|---------------------------------|--------------------------|---------------------------|-----------------------|
| Bank of America NA              | 1,482,278,257            | 1,831,339                 | 713,726,969           |
| Wells Fargo & Co                | 1,102,278,000            | 496,875                   | 709,941,000           |
| Bank of the West                | 57,652,826               | 168,953                   | 42,056,143            |
| Commerce Bank NA                | 18,337,244               | 711,788                   | 9,278,001             |
| UMB Bank                        | 10,694,374               | 91,210                    | 3,661,017             |
| Capitol Federal Savings Bank    | 9,813,409                | 527,920                   | 5,123,037             |
| Intrust Bank                    | 3,705,025                | 2,483,584                 | 2,306,136             |
| Simmons First National Bank     | 1,938,992                | 127,998                   | 1,038,197             |
| RCB Bank Pioneer                | 1,909,097                | NA                        | 840,644               |
| Sunflower Bank                  | 1,694,138                | 78,397                    | 883,248               |
| Fidelity Bank                   | 1,640,565                | 1,164,244                 | 865,814               |
| Emprise Bank                    | 1,442,236                | 906,357                   | 748,986               |
| Central National Bank           | 837,325                  | 75,565                    | 482,214               |
| Kansas State Bank               | 733,124                  | 34,133                    | 601,921               |
| Community National Bank & Trust | 718,746                  | 51,588                    | 460,439               |
| Equity Bank NA                  | 486,030                  | 205,351                   | 277,092               |
| Southwest National Bank         | 357,123                  | 317,823                   | 307,836               |
| Bank of Kansas                  | 337,083                  | 79,034                    | 223,850               |
| First State Bank and Trust      | 289,917                  | 54,318                    | 206,236               |
| Legacy Bank                     | 247,183                  | 188,280                   | 199,794               |

Reference: *Wichita Business Journal, 2011 Book of Lists*

There are 202 banks and branches located within Sedgwick County to include the cities of Andover, Mulvane and Sedgwick. The following breakdown shows the number of banks and branches by city:

|                             |                   |
|-----------------------------|-------------------|
| Andale – 1                  | Maize – 2         |
| Andover (Butler County) – 7 | McConnell AFB – 1 |
| Bentley – 1                 | Mount Hope – 1    |



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

Cheney – 1  
Clearwater – 2  
Colwich – 1  
Derby – 14  
Eastborough – 0  
Goddard – 2  
Haysville – 5

Mulvane (Sedgwick & Sumner County) – 2  
Park City – 1  
Sedgwick (Sedgwick & Harvey County) – 1  
Valley Center – 3  
Viola – 0  
Wichita – 159

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### 9.3 CHEMICALS AND HAZARDOUS MATERIALS SECTOR

This sector consists of transforms natural raw materials into commonly used products benefiting society's health, safety, and productivity. The chemical industry represents a \$450 billion enterprise and produces more than 70,000 products that are essential to automobiles, pharmaceuticals, food supply, electronics, water treatment, health, construction, and other necessities. Threats to this sector include cyber and physical vulnerabilities. The following agencies are responsible for this sector:

State: Kansas Department of Homeland Security

Federal: Department of Homeland Security

Facilities in some manner use, manufacture, store, transport, or deliver chemicals, encompassing everything from petrochemical plants to pharmaceutical manufacturers. The Chemical Sector infrastructure can be divided into three key functional areas in the Chemical Sector value chain:

- Manufacturing plants
- Transport systems
- Distribution systems (including storage/stockpile/supply areas)

Based on the end product produced, the Chemical Sector can be divided into five segments.

- Basic Chemicals: industrial chemicals manufactured in large quantities such as sulfuric acid, nitrogen, oxygen, chlorine, and fertilizers.
- Specialty Chemicals: manufactured in lower volumes and include adhesives, sealants, flavors and fragrances, food additives, explosives, institutional and industrial cleaners, and other specialties.
- Agricultural Chemicals: chemical pesticides, fungicides, insecticides, and herbicides.
- Pharmaceuticals: includes medicines, biological products, diagnostic substances, and vitamins.
- Consumer Chemicals: generally packaged goods and include soap, detergents, bleaches, toothpaste, shampoo, cosmetics, perfume, paints, and many more.

Across the Chemical Sector, facilities are highly dependent on many other CIKR sectors to maintain operations, including: Communications, Emergency Services, Energy, Information Technology, Transportation Systems, and Water. In addition, many sectors rely on the Chemical Sector to maintain their functionality, including: Agriculture and Food, Critical Manufacturing, Defense Industrial Base, Emergency Services, and Healthcare and Public Health.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 9.4 COMMERCIAL FACILITIES SECTOR

The Commercial Facilities Sector includes a wide range of business, commercial, residential, and recreational facilities where large numbers of people congregate. Commercial facilities allow the general public to move freely without the deterrent of highly visible security barriers. However, this freedom of movement makes these facilities vulnerable to attack. This sector is diverse in both scope and function, and is divided into eight subsectors:

- Entertainment and Media
- Lodging
- Outdoor Events
- Public Assembly
- Real Estate
- Resorts
- Retail
- Sports Leagues

The Commercial Facilities Sector encompasses a wide range of facilities, such as hotels and convention centers, commercial offices and apartment buildings, stadiums, theme parks, and shopping centers.

The Commercial Facilities Sector shares dependencies and interdependencies with other CIKR sectors, including: Agriculture and Food, Banking and Finance, Communications, Defense Industrial Base, Emergency Services, Energy, Government Facilities, Healthcare and Public Health, Monuments and Icons, Postal and Shipping, Transportation Systems, and Water.

#### LODGING – HOTELS AND MOTELS

| Name                              | Occupancy | Name                          | Occupancy |
|-----------------------------------|-----------|-------------------------------|-----------|
| Hyatt Regency Hotel               | 303       | Value Place                   | 121       |
| Hilton Wichita Airport            | 302       | Wichita Super 8 Motel         | 119       |
| Wichita Marriott Hotel            | 294       | Clubhouse Inn & Suites        | 118       |
| Holiday Inn Select                | 251       | Hotel at Old Town             | 115       |
| The Broadview Hotel               | 231       | Comfort Inn South             | 114       |
| The Clarion Inn & Suites          | 185       | Candlewood Suites – Northeast | 108       |
| Holiday Inn Hotel & Suites        | 150       | Motel 6 – East                | 107       |
| Best Western Hotel & Suites North | 149       | Fairfield Inn                 | 104       |
| Motel 6 - Airport                 | 142       | Homewood Suites by Hilton     | 104       |
| La Quinta Inn & Suites            | 140       | Value Place                   | 104       |
| Best Western Airport Inn          | 129       | Value Place                   | 104       |
| Courtyard by Marriott             | 128       | Northrock Suites              | 103       |
| Hampton Inn West                  | 121       |                               |           |

#### BANQUET FACILITIES

| Name                              | Total Square Ft | Name                            | Total Square Ft |
|-----------------------------------|-----------------|---------------------------------|-----------------|
| Century II Convention Center      | 198,800         | Wichita Country Club            | 14,000          |
| Eberly Farms Inc                  | 130,000         | Wichita Scottish Rite           | 11,750          |
| Hyatt Regency Wichita             | 31,770          | All Star Adventures             | 10,000          |
| Exploration Place                 | 29,000          | Hotel at Old Town               | 10,000          |
| The Cotillion                     | 28,500          | The Palomino Grill at Terradyne | 10,000          |
| The Broadview Hotel               | 24,370          | Corporate Caterers of Wichita   | 7,700           |
| Best Western Airport Inn          | 22,240          | Botanica, The Wichita Gardens   | 6,315           |
| Hilton Wichita Airport            | 22,000          | Garvey Center                   | 6,000           |
| Best Western Hotel & Suites North | 16,104          | Tallgrass Country Club          | 5,200           |

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

|                  |        |                       |       |
|------------------|--------|-----------------------|-------|
| Wichita Marriott | 15,000 | Courtyard by Marriott | 4,500 |
|------------------|--------|-----------------------|-------|

---

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### MALLS AND SHOPPING CENTERS

| Name                            | Name                          |
|---------------------------------|-------------------------------|
| Bradley Fair                    | Normandie Village             |
| The Waterfront                  | Northwest Centre              |
| Brittany Center                 | Old Town District             |
| Brookhollow Center              | Parklane Shopping Center      |
| Carriage Park                   | Pawnee Plaza Mall             |
| Clifton Square Shopping Village | Plaza West Shopping Center    |
| Comotara Center                 | Simons Towne East Square Mall |
| Delano Shopping District        | Simons Towne West Square Mall |
| Eastgate Plaza                  | The Shops at Tallgrass        |
| Maple Ridge Centre              | Twin Lakes Shopping Center    |
| NewMarket Square                | Wichita Mall                  |

### ANNUAL CONVENTIONS AND EVENTS<sup>35</sup> (2013 Figures)

| Name                                                | Estimated Attendance | Name                                                        | Estimated Attendance |
|-----------------------------------------------------|----------------------|-------------------------------------------------------------|----------------------|
| Wichita River Festival                              | 360,000              | Wichita Kennel Club<br>Sunflower Cluster Dog Show           | 20,000               |
| Automobilia's Moonlight<br>Car Show & Street Party  | 130,000              | Wichita Farm & Ranch Show                                   | 20,000               |
| National Baseball Congress                          | 75,000               | Women's Fair                                                | 16,000               |
| Wichita Symphony<br>Orchestra 2012-2013             | 60,000               | Autumn & Art                                                | 15,000               |
| Music Theater of Wichita<br>Summer Series           | 59,000               | Prairie Fire Marathon                                       | 15,000               |
| Parade of Homes                                     | 40,000               | Wichita Flight Festival                                     | 15,000               |
| Preferred Health Systems<br>Wichita Open            | 40,000               | Mid America Youth<br>Basketball Boys National<br>Tournament | 12,000               |
| Wichita Area Builder's<br>Association Home Show     | 40,000               | The Park City Chill                                         | 12,000               |
| KSHSAA State Track &<br>Field Championships         | 33,500               | Susan G Komen Wichita<br>Race for the Cure                  | 11,000               |
| Outdoor Living &<br>Landscape Show                  | 30,000               | KSHSAA 6A State<br>Basketball Championships                 | 10,500               |
| Blacktop Nationals                                  | 25,000               | WSU Men's Basketball                                        | 10,500               |
| Mid America Youth<br>Basketball Summer Kick-<br>Off | 20,000               | Tallgrass Film Festival                                     | 10,000               |

### ARENAS AND STADIUMS

| Name               | Capacity | Name                    | Capacity |
|--------------------|----------|-------------------------|----------|
| Intrust Bank Arena | 15,000   | Lawrence Dumont Stadium | 6,111    |
| Cessna Stadium     | 30,000   | Charles Koch Arena      | 10,506   |
| Eck Stadium        | 7,851    | Hartman Arena           | 6,500    |

<sup>35</sup> Wichita Business Journal, 2013 Book of Lists



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### YMCA WICHITA AREA LOCATIONS

| Branch                                                                 | Branch                                                                     |
|------------------------------------------------------------------------|----------------------------------------------------------------------------|
| <b>Robert D. Love Central Branch YMCA</b><br>402 N. Market Wichita, KS | <b>Northwest Branch YMCA</b><br>13838 W. 21st St. North Wichita, KS        |
| <b>East Branch YMCA</b><br>9333 E. Douglas Wichita, KS                 | <b>Richard A. DeVore South Branch YMCA</b><br>3405 S. Meridian Wichita, KS |
| <b>North Branch YMCA</b><br>3330 N. Woodlawn Wichita, KS               | <b>West Branch YMCA</b><br>6940 Newell Wichita, KS                         |

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 9.5 COMMUNICATIONS SECTOR

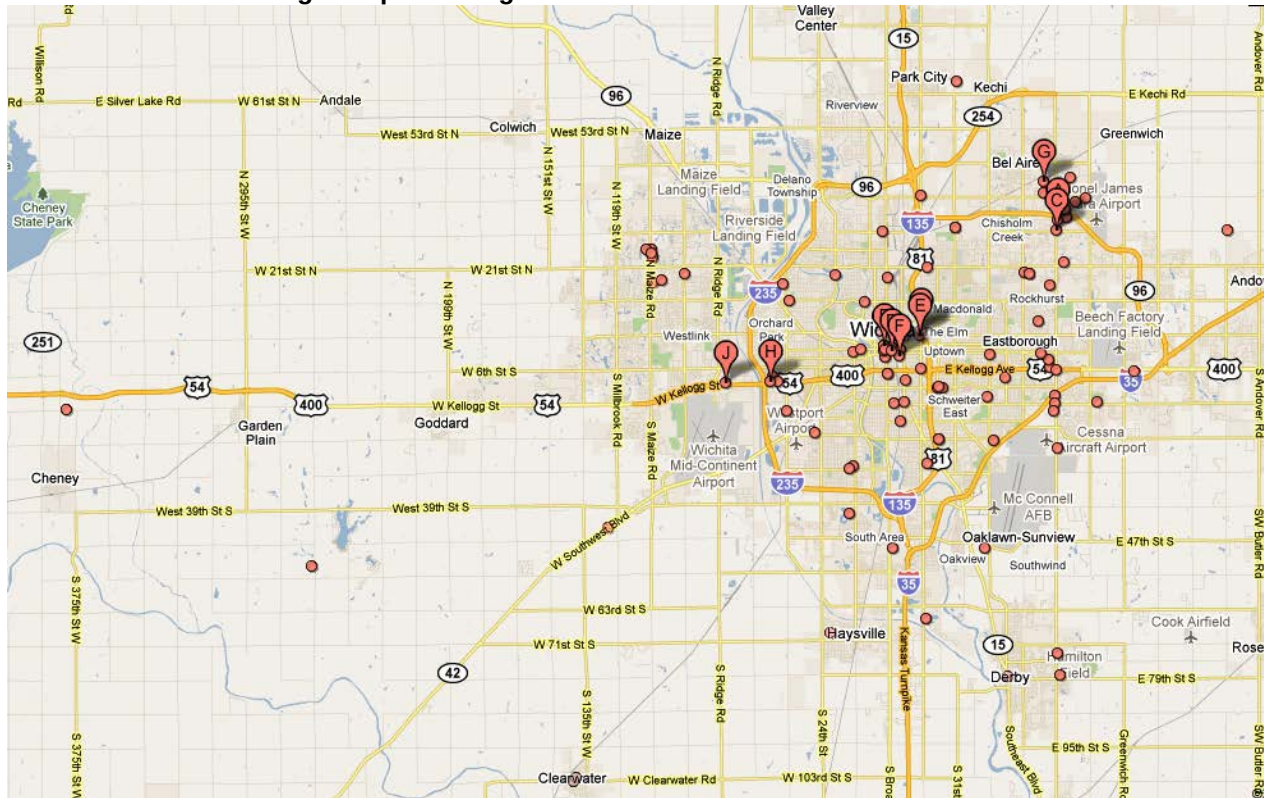
The Communications Sector is an integral component of the U.S. economy, as it underlies the operations of all businesses, public safety organizations, and government. Over the last 25 years, the sector has evolved from predominantly a provider of voice services into a diverse, competitive, and interconnected industry using terrestrial, satellite, and wireless transmission systems.

Long-established processes and procedures for network security and rapid response and recovery under all hazards ensure the continued operation of vital communications services. Focused risk management and infrastructure protection are integral to the sector's business continuity planning and network design processes.

The Communications Sector shares dependencies and interdependencies with other CIKR sectors, including: Agriculture and Food, Banking and Finance, Chemical, Defense Industrial Base, Emergency Services, Energy, Healthcare and Public Health, Information Technology, Postal and Shipping, Transportation Systems, and Water.

Six long distance landline carriers have chosen to establish local points-of-presence here, with hundreds of employees maintaining the Wichita area network.

**Google Map Showing Locations of Communications Facilities**



Nearly all of Wichita's business areas are equipped with fiber optic and are hosted by three competing networks (Cox Business Services, SBC and TelCove). All services are available in Wichita - from traditional switched and centrex-based dial tone services to self-healing SONET networks, frame relay and Advanced Intelligence Networks. Five competing long distance landline carriers are stationed in Wichita - AT&T, Gabriel Communications, MCI, Sprint and Wiltel, with one long distance point-of-presence (Sprint PCS).

The following listing shows those radio and broadcast stations within the Wichita metropolitan area as obtained from City-Data.com.

#### **STRONGEST AM RADIO STATIONS IN WICHITA:**

- KFTI (1070 AM; 10 kW; Wichita, KS; Owner: Journal Broadcast Corporation)

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

- KMYR (1410 AM; 5 kW; Wichita, KS; Owner: Agape Communications, Inc.)
- KFH (1330 AM; 5 kW; Wichita, KS; Owner: Entercom Wichita License, LLC)
- KQAM (1480 AM; 5 kW; Wichita, KS; Owner: ABC, INC.)
- KNSS (1240 AM; 1 kW; Wichita, KS; Owner: Entercom Wichita License, LLC)
- KSGL (900 AM; 0 kW; Wichita, KS; Owner: Agape Communications, Inc.)
- KRMG (740 AM; 50 kW; Tulsa, OK; Owner: CXR Holdings, Inc.)
- KFAQ (1170 AM; 50 kW; Tulsa, OK; Owner: Journal Broadcast Corporation)
- WHB (810 AM; 50 kW; Kansas City, MO; Owner: Union Broadcasting, Inc.)
- KOMA (1520 AM; 50 kW; Oklahoma City, OK; Owner: Renda Broadcasting Corp. Of Nevada)
- KGGF (690 AM; 10 kW; Coffeyville, KS; Owner: KGGF-KUSN, INC.)
- KTBZ (1430 AM; 25 kW; Tulsa, OK; Owner: Clear Channel Broadcasting Licenses, Inc.)
- KRVN (880 AM; 50 kW; Lexington, NE; Owner: Nebraska Rural Radio Association)

### **STRONGEST FM RADIO STATIONS IN WICHITA:**

- K261BL (100.1 FM; Wichita, KS; Owner: Word Of Life Ministries, Inc.)
- K204DQ (88.7 FM; Wichita, KS; Owner: Calvary Chapel Of Twin Falls, Inc.)
- KEYN-FM (103.7 FM; Wichita, KS; Owner: Entercom Wichita License, LLC)
- KYFW (88.3 FM; Wichita, KS; Owner: Bible Broadcasting Network, Inc.)
- KRZZ-FM (96.3 FM; Derby, KS; Owner: Capstar Tx Limited Partnership)
- KMUW (89.1 FM; Wichita, KS; Owner: Wichita State University)
- KRBB (97.9 FM; Wichita, KS; Owner: Capstar Tx Limited Partnership)
- KFBZ (105.3 FM; Haysville, KS; Owner: Entercom Wichita License, LLC)
- KDGS (93.9 FM; Andover, KS; Owner: Entercom Wichita License, LLC)
- KFDI-FM (101.3 FM; Wichita, KS; Owner: Journal Broadcast Corporation)
- KZSN (102.1 FM; Hutchinson, KS; Owner: Capstar Tx Limited Partnership)
- KKRd (107.3 FM; Wichita, KS; Owner: Capstar Tx Limited Partnership)
- KICT-FM (95.1 FM; Wichita, KS; Owner: Journal Broadcast Corporation)
- K218DR (91.5 FM; Bel Aire, KS; Owner: Educational Media Foundation)
- KYQQ (106.5 FM; Arkansas City, KS; Owner: Journal Broadcast Corporation)
- KANR (92.7 FM; Belle Plaine, KS; Owner: Daniel D. Smith)
- KTLI (99.1 FM; El Dorado, KS; Owner: Adonai Radio Group, Inc.)
- KHCC-FM (90.1 FM; Hutchinson, KS; Owner: Hutchinson Community Jr. College)
- KMXW (92.3 FM; Newton, KS; Owner: Journal Broadcast Corporation)
- KFXJ (104.5 FM; Augusta, KS; Owner: Journal Broadcast Corporation)

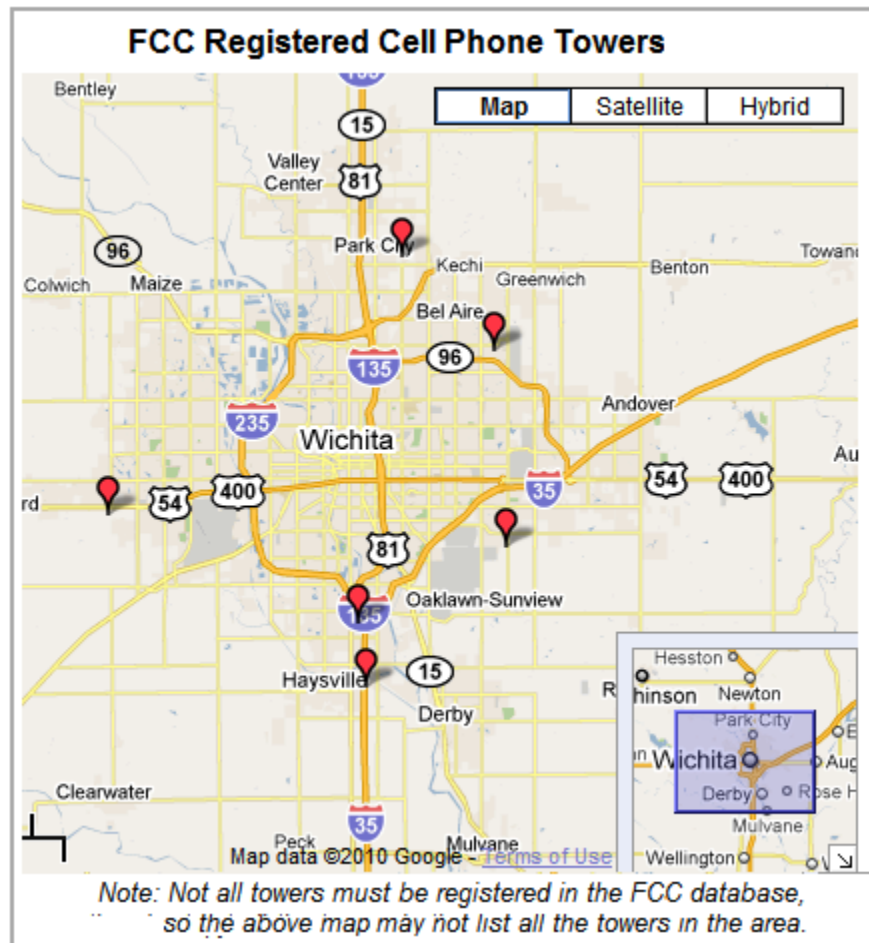
### **TV BROADCAST STATIONS AROUND WICHITA:**

- KTQW-LP (Channel 53; Wichita, KS; Owner: Knowledge L.C.)
- K59DA (Channel 59; Wichita, KS; Owner: Trinity Broadcasting Network)
- K15DD (Channel 15; Wichita, KS; Owner: Ventana Television, Inc.)
- KFVT-LP (Channel 40; Wichita, KS; Owner: Locke Supply Co.)
- KSNW (Channel 3; Wichita, KS; Owner: Emmis Television License Corporation Of Wichita)
- KSAS-TV (Channel 24; Wichita, KS; Owner: Clear Channel Broadcasting Licenses, Inc.)
- KAKE-TV (Channel 10; Wichita, KS; Owner: Gray MidAmerica TV Licensee Corp.)
- KWCV (Channel 33; Wichita, KS; Owner: WLBB Broadcasting, L.L.C.)
- KCTU-LP (Channel 55; Wichita, KS; Owner: River City Broadcasting Corp.)
- KSMI-LP (Channel 51; Wichita, KS; Owner: River City Broadcasting Corp.)
- KSCC (Channel 36; Hutchinson, KS; Owner: Mercury Broadcasting Company, Inc.)
- KWCH-TV (Channel 12; Hutchinson, KS; Owner: Media General Broadcasting Of So. Carolina Holdings, Inc.)
- KPXS (Channel 8; Hutchinson, KS; Owner: Kansas Public Telecommunications Service, Inc.)

### **Federal Communications Commission (FCC) Towers and Licenses**

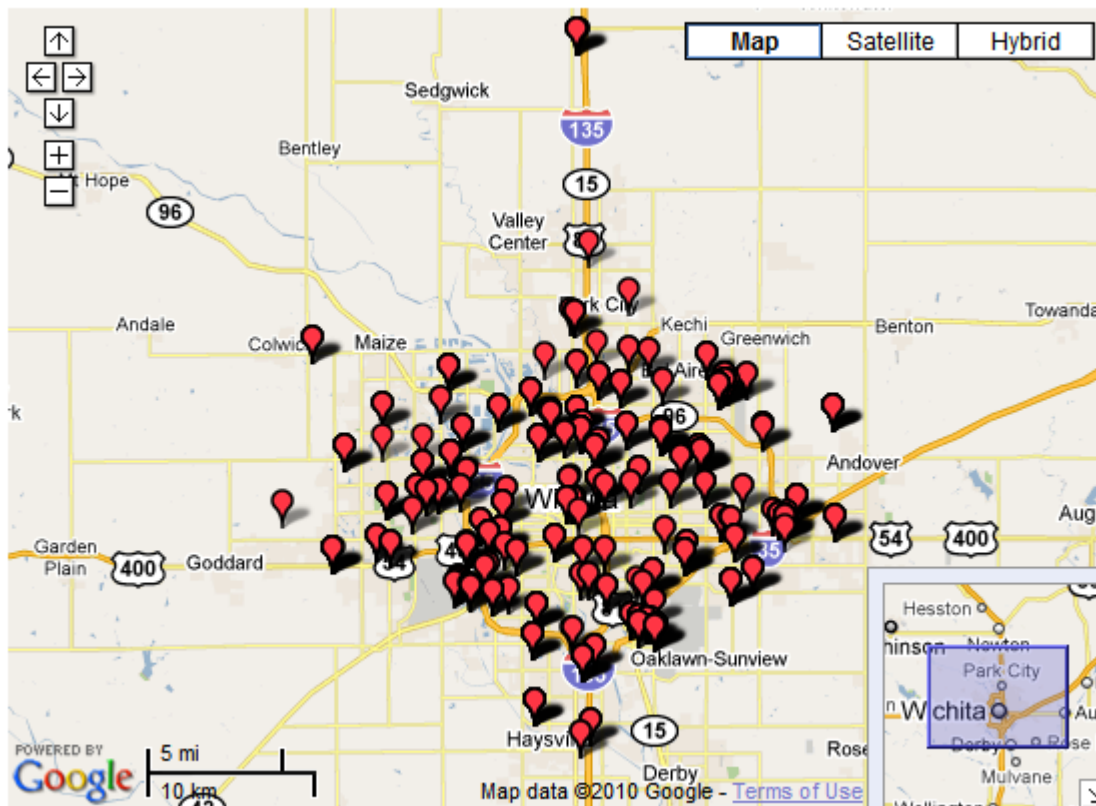
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

FCC Registered Cell Phone Towers: 6  
FCC Registered Antenna Towers: 648  
FCC Registered Commercial Land Mobile Towers: 19  
FCC Registered Private Land Mobile Towers: 180  
FCC Registered Broadcast Land Mobile Towers: 24  
FCC Registered Microwave Towers: 325  
FCC Registered Paging Towers: 34  
FCC Registered Maritime Coast & Aviation Ground Towers: 89  
FCC Registered Amateur Radio Licenses: 1,261



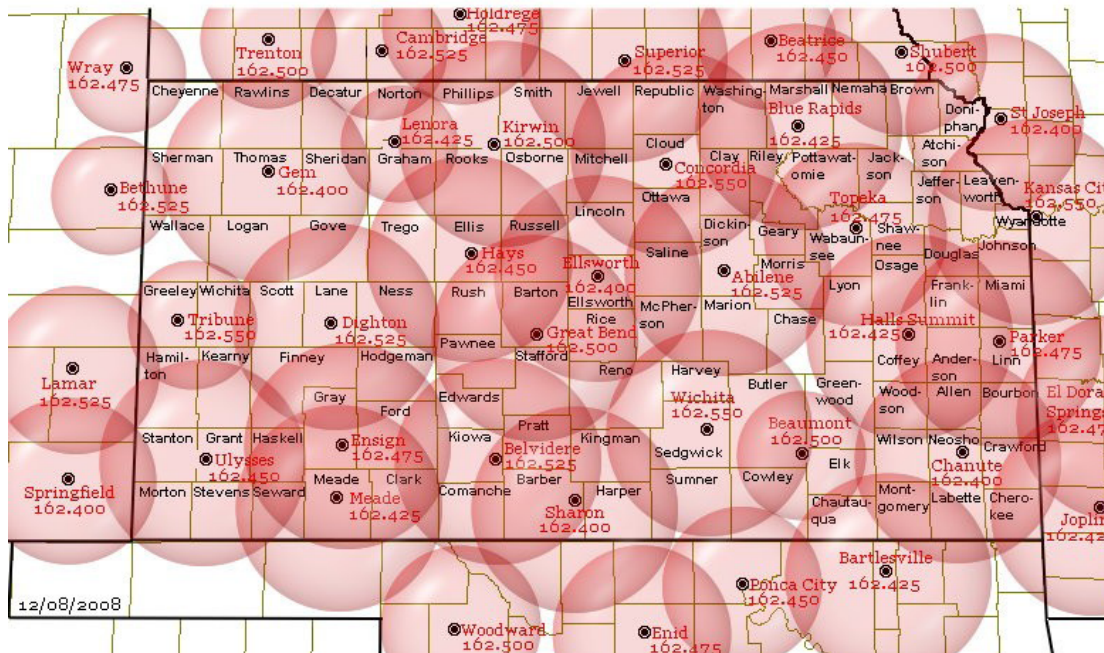


### FCC Registered Antenna Towers in Wichita, KS



*Note: Not all towers must be registered in the FCC database, so the above map may not list all the towers in the area.*

### Kansas Area NOAA All-Hazards Weather Radio Stations





## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### 9.6 CRITICAL MANUFACTURING SECTOR

The Critical Manufacturing Sector is composed of four broad manufacturing industries: primary metal manufacturing; machinery manufacturing; electrical equipment, appliance, and component manufacturing; and transportation equipment manufacturing.

Primary Metal Manufacturing Industry – comprised of two manufacturing and processing industries:

- The iron and steel mills and Ferro alloy manufacturing industry includes the direct reduction of iron ore; manufacturing pig iron in molten or solid form; converting pig iron into steel; and manufacturing Ferro alloys. In addition, this industry involves making steel; manufacturing shapes such as bars, plates, rods, sheets, strips, or wire; and forming pipe and tube.
- Alumina and aluminum production and processing, the second primary metal manufacturing industry, converts aluminum-bearing bauxite ore into products such as alumina, aluminum ingots, and rolled or drawn aluminum products including plate, sheet, foil, and extrusions.

Machinery Manufacturing Industry – manufactures engine, turbine, and power transmission equipment. Machinery manufacturing includes generators, governors, and water, gas, steam, wind, and hydraulic turbines.

Electrical Equipment, Appliance, and Component Manufacturing – produces a wide variety of electrical equipment and parts including power, distribution, and specialty transformers; electric motors, generators, and motor generator sets; switchgear and switchboard apparatus; relays; and industrial controls.

Transportation Equipment Manufacturing – comprised of three related industries:

- Motor Vehicle Manufacturing: produces passenger cars, trucks, locomotives, motorcycles, motorcycle parts and components, and commercial ships.
- Aerospace Product and Parts Manufacturing: produces commercial and private aircraft; aircraft components and avionics; and satellites, space platforms, and launch vehicles.
- Railroad Rolling Stock Manufacturing: manufactures and rebuilds locomotives and their frames and parts. Additionally, this industry provides rail, light-rail, and rapid-transit cars for freight and passenger service, as well as railroad and track-maintenance equipment.

The Critical Manufacturing Sector shares dependencies and interdependencies with other CIKR sectors, including: Chemical, Communications, Defense Industrial Base, Emergency Services, Energy, Information Technology, and Transportation Systems.

#### **AIRCRAFT MANUFACTURING**

Wichita ranks first in the world in production of general aviation aircraft and is also an important centre for military aircraft manufacture. Learjet, now owned by Bombardier, Beech Aircraft, now owned by Hawker, and Cessna, now a Textron company, remains in Wichita because of their large manufacturing equipment investments and a skilled labor pool. About two-thirds of Wichita's manufacturing base is made up of airplane building, employing about 44,000 people.

- AIR-MAC, Inc Quality CNC Machining Aircraft Products - Over 32 years of experience in CNC machining top quality aircraft, auto and other products.
- Ametek B & S Aircraft Parts - FAA approved repair station with the ability to overhaul / repair starter generators, fuel systems, boost pumps and more.
- Apex Engineering Inc. - Aircraft parts and assemblies
- Bombardier Aerospace - Manufacturer of Advanced Business Jet Aircraft. The world's fourth largest manufacturer of civil aircraft.
- Cessna Aircraft Company - Worldwide headquarters supporting a fleet of 2,400 Citation jets and 150,000 piston and turboprop aircraft.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

- Excel Manufacturing, Inc. - Aircraft structural component, commercial precision parts, machining and sheet metal fabrication
- Graco Supply Co. - Quality adhesives, sealants, paints, coatings, primers, lubricants, tapes, cleaners and MRO products for the Aerospace, Aircraft and Industrial markets.
- H & H Tool LLC - Full line of Monogram Wedgelock fasteners and tooling.
- Hawker Beechcraft - Worldwide headquarters and principal business aviation manufacturing site.
- L & M Aircraft LLC - Distributor of aircraft parts for corporate and light planes that are not readily available through ordinary distributors or manufacturing channels.
- Spirit AeroSystems - The world's largest supplier of commercial airplane assemblies and components.

### OTHER MANUFACTURING

According to the Wichita Eagle, during the past 15 years, manufacturing employment has held steady at about 26 percent.

- Architectural Art Mfg., Inc. - Extruded metal expansion joint covers and trench / access covers
- BG Products, Inc. - Manufactures and distributes specialty lubricants, greases and chemicals
- Center Industries Corporation - Nonprofit Manufacturing Company
- Chance Industries, Inc. - Builds quality amusement products for all areas of the amusement industry. Chance Rides is the largest manufacturer of amusement rides in the United States.
- Electromech Technologies - Custom design and manufacturing facility specializing in electromechanical equipment
- Galaxy Audio - Manufactures professional audio equipment
- Great Plains Industries - Design, manufacturing, and marketing liquid handling products for the chemical and petroleum industries
- Greenway Electric - Specializing in Automated Process Control Systems
- Heartland Plastics - A blow molding company that specializes in small to medium sized production runs of polyethylene and polypropylene items.
- High Touch, Inc. - Automation products and support
- Insul-Vest - Manufacturer of high temperature insulation blankets
- Isodyne, Inc. - Tool-less Braid Termination System
- KCE Welding & Fabrication - Welding and metal fabrication shop
- Koch Industries, Inc. is the second largest privately held company in the United States with interests in oil, gas, chemicals, chemical technology, agriculture, construction materials, real estate, capital services and financial investments.
- Liquidynamics - Manufacturers and suppliers of Commercial/ Industrial liquid handling equipment and components
- Love Box Company - Package Designing and Development
- MSI Automation - Source for induction heating, saw blade brazing, and heat treating equipment.
- Quality Tool Service - Tool Grinding
- Sharpline Converting, Inc. - Manufacturer of decorative pressure sensitive vinyl graphics for use on automobiles, recreational vehicles, marine products, and for architectural signage.
- Sky-Eye Camera Systems - Mobile remote-controlled video camera designed to videotape surgery and used in Anatomy classes.
- Vornado Air Circulation Systems, Inc. - Designs, manufactures and markets proprietary consumer electric air fans and heaters
- Occidental Chemicals (OxyChem) - Chemicals produced by the Wichita complex are also used in thousands of consumer products, including soaps and detergents, purified drinking water, pharmaceuticals, photographic film, skin care products, paper, processed fruits and vegetables, refrigerants, and soft drinks.
- Weckworth Manufacturing, Inc. - Contract manufacturer
- Westland Corporation - Manufactures barrels and screws for plastic processing machinery

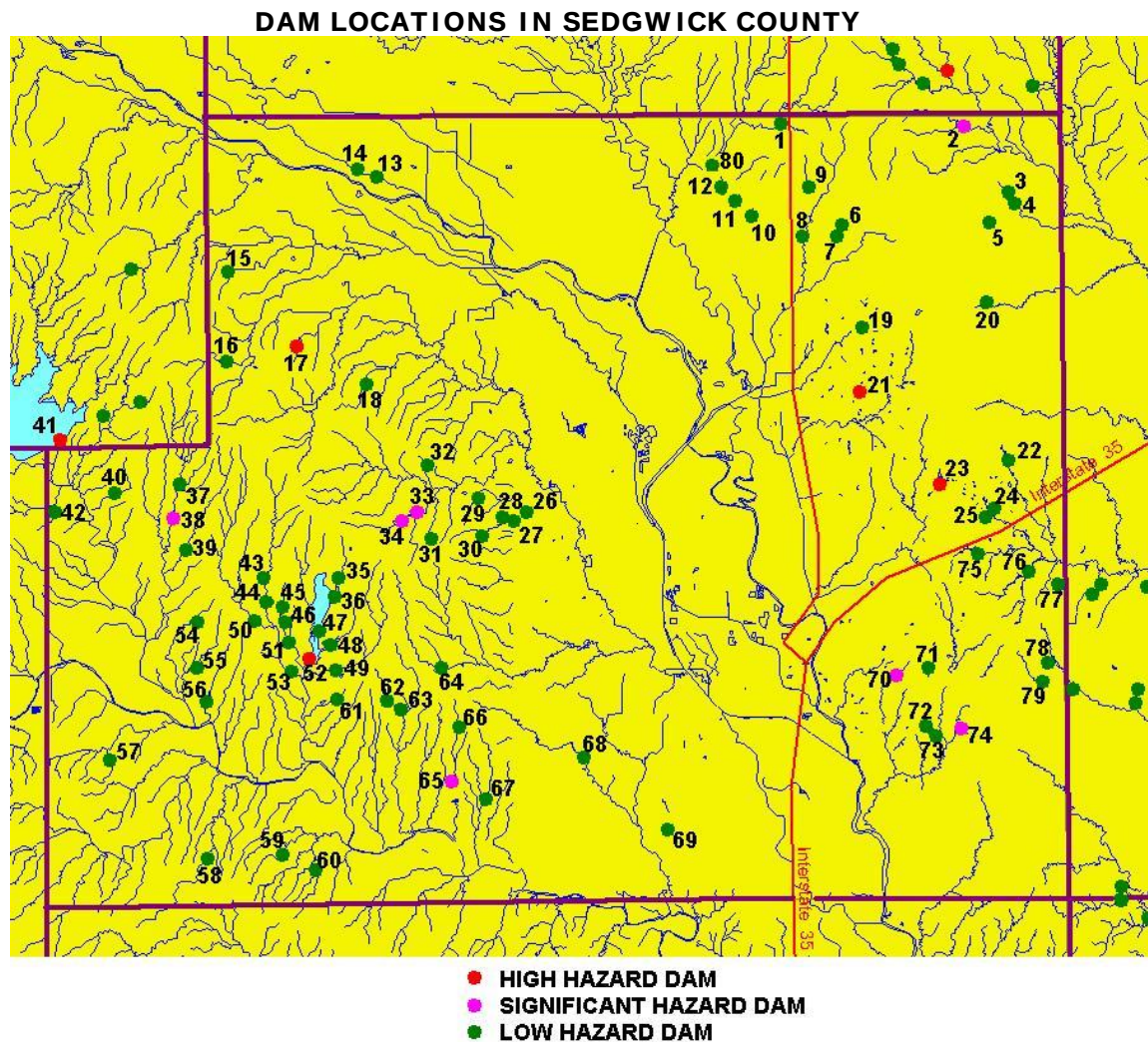
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 9.7 DAMS SECTOR

The Dams Sector is comprised of facility owners and operators at the Federal, State, and local levels, and the private sector. These assets encompass conventional dams, levees, dikes, industrial waste impoundments, and other similar water retention and/or water control facilities. Dams are vital to the infrastructure and provide a wide range of economic, environmental, and social benefits, including hydroelectric power, river navigation, water supply, flood control, and recreation.

However, dams and levees can fall victim to natural disasters or terrorist acts resulting in loss of human life, economic loss including property damage, and extensive environmental damage.

The Dams Sector shares dependencies and interdependencies with other CIKR sectors, including: Agriculture and Food, Emergency Services, Energy, Transportation Systems, and Water.



Specific information on each of the dams is located on the following pages and was provided by the Kansas Water Office and accessible through the U.S. Army Corps of Engineers *National Inventory of Dams* database. There are 26 dams that have no reported information in the database and four dams with unknown hazard classes.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### DAMS IN SEDGWICK COUNTY

| #  | Dam Name                                         | River                                  | Year Built | Storage | Owner Type  | Owner Name                  | Hazard      |
|----|--------------------------------------------------|----------------------------------------|------------|---------|-------------|-----------------------------|-------------|
| 1  | Kansas #4895                                     | Tributary – Goosebury Creek            | 1955       | 50      | -           | S & R Properties Inc        | Unknown     |
| 2  | West Sector Whitewater WS Dam 20 (Harvey County) | Tributary – Sand Creek                 | 1979       | 1973    | Local Gov't | Whitewater River Watershed  | Significant |
| 3  | Kansas #3787                                     | Tributary – Prairie Creek              | 1946       | 50      | -           | Ulmer                       | Low         |
| 4  | Kansas #3786                                     | -                                      | -          | -       | -           | -                           | -           |
| 5  | Kansas #3780                                     | Tributary – Prairie Creek              | 1945       | 60      | -           | Koerner                     | Low         |
| 6  | Kansas #3773                                     | -                                      | -          | -       | -           | -                           | -           |
| 7  | Kansas #3772                                     | -                                      | -          | -       | -           | -                           | -           |
| 8  | Kansas #3771                                     | -                                      | -          | -       | -           | -                           | -           |
| 9  | Kansas #3770                                     | -                                      | -          | -       | -           | -                           | -           |
| 10 | Kansas #3769                                     | Tributary – Chisholm Creek             | 1954       | 95      | Private     | Richetal                    | Low         |
| 11 | Kansas #3768                                     | Tributary – Chisholm Creek             | 1948       | 90      | -           | King                        | Low         |
| 12 | Kansas #3767                                     | -                                      | -          | -       | -           | -                           | -           |
| 13 | Kansas #3753                                     | Tributary - Arkansas                   | 1943       | 50      | -           | Phelps                      | Low         |
| 14 | Kansas #3750                                     | Tributary – Arkansas                   | 1946       | 90      | -           | Williams                    | Low         |
| 15 | Mt Hope WJD No. 54, DD No. 3                     | Tributary – Big Slough Creek           | 1981       | 151.24  | Local Gov't | Mt Hope WJD No. 54          | Low         |
| 16 | Kansas #3741                                     | -                                      | -          | -       | -           | -                           | -           |
| 17 | Andale WSD FRD No. A-2                           | Tributary – Cowskin Creek              | 1963       | 407.2   | Local Gov't | City of Andale              | High        |
| 18 | Kansas #3751                                     | Tributary – Cowskin Creek              | 1956       | 55      | -           | Martin                      | Low         |
| 19 | Kansas #4891                                     | Tributary – Middle Fork                | 1970       | 60      | -           | Thomison                    | Low         |
| 20 | Kansas #3781                                     | Tributary – Whitewater Creek           | 1939       | 120     | -           | Luzzati                     | Low         |
| 21 | Fawn Lake Dam, Kansas #3774                      | Tributary – East Branch Chisholm Creek | 1950       | 50      | -           | Fawn Lake Home Owners Assoc | High        |
| 22 | Kansas #3788                                     | Tributary – Fourmile Creek             | 1954       | 95      | -           | Reed                        | Low         |
| 23 | Beech Lake Dam                                   | Tributary – Gypsum Creek               | 1953       | 430     | Private     | Beech Aircraft Corporation  | High        |
| 24 | Kansas #3782                                     | Tributary – Spring Branch Creek        | 1957       | 75      | -           | Tracts                      | Low         |
| 25 | Kansas #3784                                     | Tributary – Spring Creek               | 1950       | 60      | -           | Fernpray                    | Low         |
| 26 | Rainbow Lake, Kansas #4892                       | Tributary – Cowskin Creek              | 1970       | 80      | -           | Carlson                     | Unknown     |
| 27 | Kansas #3765                                     | Tributary – Cowskin Creek              | 1940       | 50      | -           | Decker                      | Low         |
| 28 | Kansas #3764                                     | -                                      | -          | -       | -           | -                           | -           |
| 29 | Kansas #4894                                     | Tributary – Cowskin Creek              | 1979       | 146     | -           | Falkowski                   | Unknown     |



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### DAMS IN SEDGWICK COUNTY – CONT'D

| #  | Dam Name                           | River                            | Year Built | Storage | Owner Type  | Owner Name                               | Hazard      |
|----|------------------------------------|----------------------------------|------------|---------|-------------|------------------------------------------|-------------|
| 30 | Kansas #3760                       | Tributary – Cowskin Creek        | 1958       | 55      | Private     | J.R. Dine                                | Low         |
| 31 | Kansas #3759                       | -                                | -          | -       | -           | -                                        | -           |
| 32 | Kansas #3754                       | Tributary – Dry Creek            | 1936       | 55      | -           | Girrens                                  | Low         |
| 33 | Strunk (Legg) Dam, Kansas #3756    | Tributary – Dry Creek            | 1941       | 100     | -           | Harold Strunk                            | Significant |
| 34 | Kansas #3755                       | Tributary – Dry Creek            | 1957       | 75      | -           | Stockemer                                | Significant |
| 35 | Kansas #1887                       | Afton Creek Tributary            | 1934       | 57      | Private     | R.R. Moore                               | Low         |
| 36 | Kansas #1884                       | Afton Creek Tributary            | 1931       | 107     | Private     | W.E. McGreevy                            | Low         |
| 37 | Kansas #3742                       | -                                | -          | -       | -           | -                                        | -           |
| 38 | Lake 40 & 8 Dam, Kansas #3743      | Tributary – Spring Creek         | 1918       | 110     | -           | Voiture 58 of 40 & 8 Inc                 | Significant |
| 39 | Spring Creek Watershed Dam 3       | Sand Creek                       | 1962       | 853     | Local Gov't | Spring Creek Watershed                   | Low         |
| 40 | Spring Creek Watershed Dam L-1     | North Fork Tributary – Ninnescah | 1962       | 336     | Local Gov't | Spring Creek Watershed                   | Low         |
| 41 | Cheney Dam                         | North Fork Ninnescah             | 1963       | 151780  | Federal     | Dept of Interior – Bureau of Reclamation | High        |
| 42 | Kansas #3739                       | -                                | -          | -       | -           | -                                        | -           |
| 43 | Kansas #1890                       | Clear Creek                      | 1935       | 83      | Private     | Karl Koster                              | Low         |
| 44 | Kansas #1891                       | -                                | -          | -       | -           | -                                        | -           |
| 45 | Kansas #3747                       | -                                | -          | -       | -           | -                                        | -           |
| 46 | Kansas #3746                       | Tributary – Clear Creek          | 1941       | 55      | -           | Wheeler                                  | Low         |
| 47 | Kansas #1885                       | Clearwater Creek Tributary       | 1932       | 179     | Private     | Clara Lint & Walter Morris               | Low         |
| 48 | Kansas #1886                       | Clearwater Creek Tributary       | 1932       | 71      | Private     | Davis                                    | Low         |
| 49 | Walter & Anna Miller, Kansas #1893 | Afton Creek Tributary            | 1938       | 228     | Private     | Walter & Anna Miller                     | Low         |
| 50 | Kansas #1888                       | Pole Cat Creek                   | 1935       | 74      | Private     | J.H. Downing                             | Low         |
| 51 | Walter P Innes, Kansas #3748       | Clear Creek                      | 1952       | 70      | Private     | Unknown                                  | Low         |
| 52 | Lake Afton Dam                     | Tributary – Clearwater Creek     | 1942       | 6146    | Local Gov't | Sedgwick County                          | High        |
| 53 | Kansas #1892                       | Clearwater Creek Tributary       | 1936       | 94      | -           | Vanfossan                                | Low         |
| 54 | Spring Creek Watershed Dam R-1     | North Fork Tributary – Ninnescah | 1972       | 432     | Local Gov't | Spring Creek Watershed                   | Low         |
| 55 | Kansas #3744                       | -                                | -          | -       | -           | -                                        | -           |
| 56 | Spring Creek Watershed Dam R-3     | Tributary - Ninnescah            | 1962       | 610     | Local Gov't | Spring Creek Watershed                   | Low         |
| 57 | Kansas #3740                       | -                                | -          | -       | -           | -                                        | -           |
| 58 | Kansas #3745                       | -                                | -          | -       | -           | -                                        | -           |



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

|    |                                 |                          |      |    |         |          |     |
|----|---------------------------------|--------------------------|------|----|---------|----------|-----|
| 59 | Kansas #3749                    | -                        | -    | -  | -       | -        | -   |
| 60 | Jno. McQuillan,<br>Kansas #3752 | Tributary -<br>Ninnescah | 1940 | 90 | Private | Chambers | Low |

### DAMS IN SEDGWICK COUNTY – CONT'D

| #  | Dam Name                                      | River                                 | Year Built | Storage | Owner Type     | Owner Name                  | Hazard      |
|----|-----------------------------------------------|---------------------------------------|------------|---------|----------------|-----------------------------|-------------|
| 61 | Kansas #4893                                  | Tributary –<br>Clearwater<br>Creek    | 1970       | 55      | -              | Boblun                      | Unknown     |
| 62 | Kansas #3757                                  | -                                     | -          | -       | -              | -                           | -           |
| 63 | Kansas #3758                                  | -                                     | -          | -       | -              | -                           | -           |
| 64 | Kansas #3761                                  | -                                     | -          | -       | -              | -                           | -           |
| 65 | Kansas #3762                                  | Tributary -<br>Ninnescah              | 1957       | 60      | -              | Chambers                    | Significant |
| 66 | Kansas #1889                                  | -                                     | -          | -       | -              | -                           | -           |
| 67 | Kansas #3763                                  | -                                     | -          | -       | -              | -                           | -           |
| 68 | W.F. Wattles,<br>Kansas #1894                 | Spring Creek                          | 1939       | 119     | Private        | W.F. Wattles                | Low         |
| 69 | Kansas #3766                                  | -                                     | -          | -       | -              | -                           | -           |
| 70 | Haley Dam, Kansas<br>#3777                    | Dry Creek                             | 1950       | 50      | -              | Lois E Haley                | Significant |
| 71 | Kansas #3776                                  | -                                     | -          | -       | -              | -                           | -           |
| 72 | Columbian Acres<br>Dam No. 1, Kansas<br>#3778 | Tributary –<br>Spring Creek           | 1953       | 70      | -              | Columbian<br>Acres Inc      | Low         |
| 73 | Columbian Acres<br>Dam No. 2, Kansas<br>#3779 | Tributary –<br>Spring Creek           | 1953       | 70      | -              | Columbian<br>Acres Inc      | Low         |
| 74 | E.A. Goodin, Kansas<br>#3785                  | Tributary –<br>Spring Creek           | 1949       | 90      | Private        | Goodin                      | Significant |
| 75 | Kansas #3783                                  | Tributary –<br>Spring Branch<br>Creek | 11955      | 70      | -              | Arnold                      | Low         |
| 76 | Kansas #3789                                  | Tributary –<br>Spring Branch<br>Creek | 1954       | 60      | -              | Frost                       | Low         |
| 77 | Kansas #3870<br>(Butler County)               | -                                     | -          | -       | -              | -                           | -           |
| 78 | Kansas #3790                                  | -                                     | -          | -       | -              | -                           | -           |
| 79 | Middle Walnut WJD<br>No. 60, FRD No. 12A      | Tributary –<br>Eight Mile<br>Creek    | 1985       | 389     | Local<br>Gov't | Middle Walnut<br>WJD No. 60 | Low         |
| 80 | Kansas #7743                                  | Tributary –<br>Jester Creek           | 1996       | 65      | Private        | Lloyd<br>McGuiley           | Low         |

### Definitions

Storage: in acre-feet, this is defined as the total storage space in a reservoir below the normal retention level, including dead and inactive storage and excluding any flood control or surcharge storage.

Hazard definitions as defined in Kansas Administrative Regulation 5-40-9 are as follows:

**LOW HAZARD POTENTIAL (CLASS A)** – Dams located in rural or agricultural areas where failure may damage farm buildings, limited agricultural land, or county, township and private roads.

**SIGNIFICANT HAZARD POTENTIAL (CLASS B)** – Dams located in predominately rural or agricultural areas where failure may endanger few lives, damage isolated homes, secondary highways or minor railroads or cause interruption of use or service of relatively important public utilities.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

*HIGH HAZARD POTENTIAL (CLASS C)* – Dams located in areas where failure may cause extensive loss of life, serious damage to homes, industrial and commercial facilities, important public utilities, main highways or railroads.

<http://crunch.tec.army.mil/nid/webpages/nid.cfm>

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### CHENEY DAM AND RESERVOIR

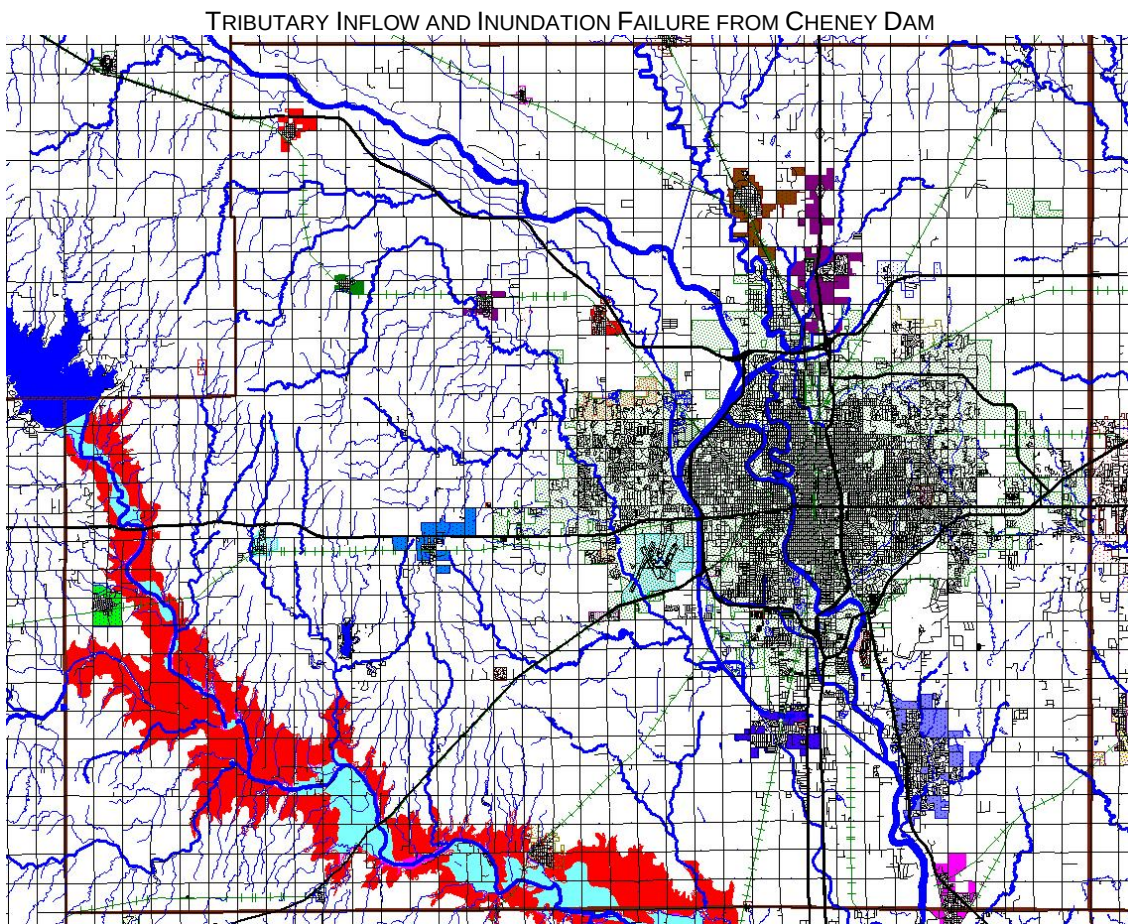
Under Public Law 86-787, the Cheney Division was authorized on September 14, 1960 by act of Congress (74 Stat. 1026). The Cheney Division of the U.S. Department of the Interior Bureau of Reclamation (DOI BOR) Wichita Project consists of Cheney Dam and Reservoir on the North Fork of the Ninnescah River. This division of the project provides a supplemental water supply to the city of Wichita, flood control for protection of downstream areas, and recreation and fish and wildlife benefits. Because of the flood control features of the division, approximately 3,700 acres of land downstream from the dam can be irrigated, although no stored water is to be provided for irrigation purposes.



Municipal water supply storage is used to supplement the present supply pumped from wells. On an equal-use basis - well water and reservoir water - the supply is estimated to be adequate until the year 2040. A pumping plant and pipeline was constructed and is operated by the city of Wichita to convey water from Cheney Dam to the water treatment plant in the city.

Construction of Cheney Dam began in 1962 and was completed in 1965. The upstream slope of the earthen filled dam is protected by soil cement, and a 12-foot

horizontal layer of topsoil and grass protects the downstream slope. Structural dam height is 126.2 feet, and the crest of the dam provides a roadway 30 feet wide. The spillway is an uncontrolled morning-glory inlet leading into a 9.5-foot circular conduit and stilling basin.



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

The river outlet works consist of an intake structure, an 11-foot-diameter conduit to the gate chamber containing two 6- by 7.5-foot high-pressure regulating gates and two 6- by 7.5-foot high-pressure emergency gates. Downstream of the river outlet works gate chamber is a 15-foot-diameter flat bottom conduit and stilling basin. The municipal outlet works consists of a vertical intake structure with four 6-foot-square motor operated slide gates for selective withdrawal of water from elevations 1379.0, 1389.0, 1399.0, and 1409.0, a foot bridge, and a 6- by 8-foot emergency gate leading into an 8-foot-diameter circular conduit to the axis of the dam, at which point flows are carried by an 8-foot-diameter steel pipe in a 12.5-foot-diameter conduit.

DOI BOR studies indicate that flooding caused by tributary inflow (similar to 100-year flooding conditions) of the Ninescah River below the Cheney Dam would be swollen to approximately one mile in width to points just south of Cheney and up to 1-1/2 miles in width as it travels southward and eastward.

Failure of the dam would cause an inundation of up to two miles from the Ninescah River, passing along Cheney on the east and north of Viola. However, the southern half of the City of Clearwater would be inundated with flood waters 33 river miles from Cheney Dam in approximately 13 hours depending on soil conditions.

### 9.7.2 LAKE AFTON PARK/KING DAM

Lake Afton Park is owned and operated by Sedgwick County and occupies a 720-acre site and is located five (5) miles southwest of the city of Goddard. The park includes a 258-acre lake with construction starting in 1939 and completed in 1942 by the federal Work Projects Administration (WPA). King Dam is located on the south end of the lake and crosses the main branch of the Clearwater Creek. The Sedgwick County Judge James V. Riddel Boy's Ranch and sewage lagoon are located immediately SW of the dam nears the spillway. The earthen dam measures 4,037 feet across with a structural height of 55 feet (dam height 47 feet) and a 400-foot spillway width. Hydraulic height is at 41 feet or six feet below dam height. Elevation of the spillway is 1,367 above mean sea level.

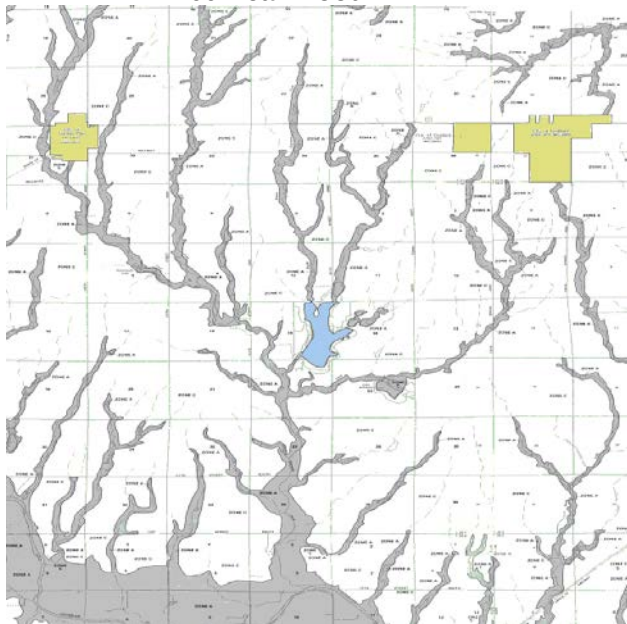
AERIAL VIEW OF LAKE AFTON PARK KING DAM



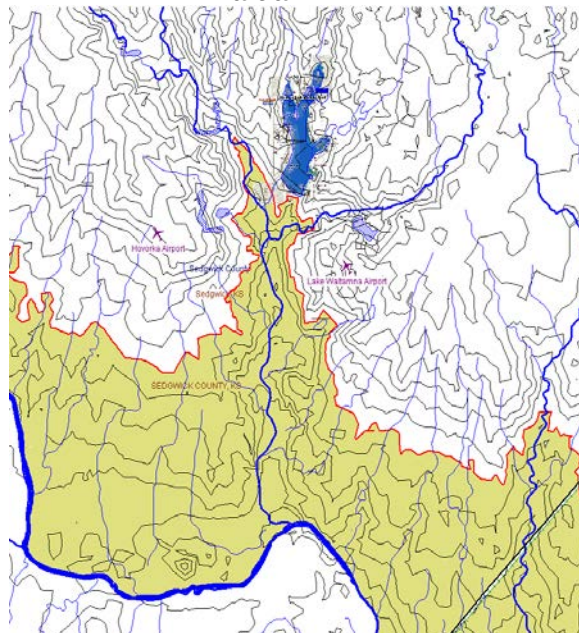
Maximum storage capacity is 6,146 acre-feet or 421,000 square yards with a drainage area of 6,579 square acres or approximately 10.3 square miles. The maps below show the 100-year flooding for Lake Afton and adjoining streams as well as failure of the dam.



**Lake Afton Flood Inundation Map  
100-Year Flood**



**Lake Afton Flood Inundation Map -  
Partial**

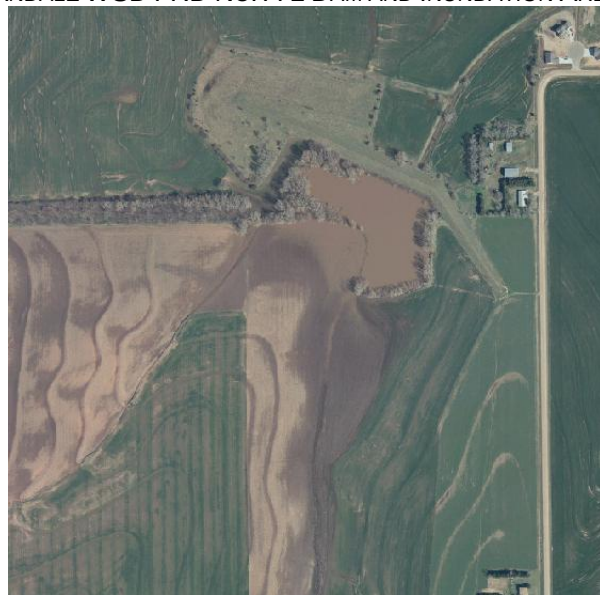


The topographic maps above generally show the approximate area affected from a 100-year flood event and a partial inundation due to failure of the dam. The impact area is estimated at 10.3 square miles and based on an elevation contouring of 1,350 feet above mean sea level, of 17 feet below spillway elevation.

### 9.7.3 ANDALE WSD FRD No. A-2 DAM

Served by a tributary from Cowskin Creek, the dam is located southwest of the City of Andale and was constructed in 1963. Length of the earthen dam is 1,500 feet and 17.5 feet wide, with a spillway width of 144 feet. Structural height is 24 feet with a hydraulic height of 21 feet. Maximum storage capacity is 407 acre-feet with a surface area of approximately ten acres. Inundation from a failure of the dam would affect an area approximately 0.8 of a square mile.

**ANDALE WSD FRD NO. A-2 DAM AND INUNDATION AREA**





## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

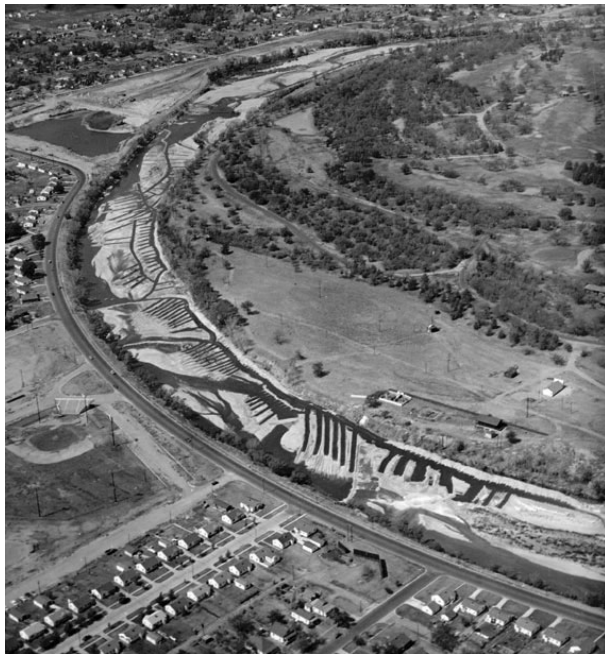
### 9.7.4 FAWN LAKE DAM (KANSAS #3774)

Served by a tributary from East Branch Chisholm Creek, the dam was constructed in 1950 and is located in southwest Bel Aire near Harding and North 37<sup>th</sup> Street. Length of the earthen dam is 430 feet and 13 feet wide. Structural height is 14 feet with a hydraulic height of 13 feet. Maximum storage capacity is 50 acre-feet. Inundation from a failure of the dam would affect an area approximately 0.3 of a square mile.

### 9.7.5 WICHITA-VALLEY CENTER LOCAL PROTECTION PROJECT

The floodway project (aka The M.S. "Mitch" Mitchell Floodway) was authorized by Congress under the Flood Control Act (approved 22 June 1936), Public Law 738, HR 8455; U.S. Army Corps of Engineers (USACE) Project Document HD 308 "Wichita-Valley Center Flood Control Project." Work was initiated by the USACE on May 8, 1950 and completed in March 1959, costing approximately \$20 million and consisting of a protected area covering about 47,000 acres or about 73.4 square miles. The protected area consists of urban and rural lands, in and adjacent to the cities of Valley Center and Wichita, Kansas, against floods from the Little Arkansas River; Arkansas River; Big Slough; Cowskin Creek; and Chisholm Creek and its west, middle, and east branch tributaries.

The project consisted of 97.3 miles of earthen levee embankment, 40.2 miles of toe drains with 68 relief wells, 40.9 miles of channels, 72 drainage structures through levees, four diversion structures, 14 floodwalls, and six (6) major pump stations. Runoff from the intercepted areas is contained in areas reserved for ponding. There are 96 ponding areas that provide storage for the proper operation of the project. The required storage is based on a once in 25-year storm frequency, which is considered to furnish a reasonable degree of protection.



1954 Levee Construction—SW Wichita



1956 Levee Construction—South Wichita

The floodway project also has a companion project, the West Branch Chisholm Creek Local Flood Protection Project. The flows of Chisholm Creek and its middle and west branch tributaries are collected by a system of levees and channels beginning about nine miles north of the Wichita and are diverted into the Arkansas River 2 miles northwest of Wichita.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

**Descriptive Data:** The average height of the levees and the average depth of the channels are 9.5 feet.

| Item of Improvement                                                 | Length in Miles |            |
|---------------------------------------------------------------------|-----------------|------------|
|                                                                     | Channel         | Levees     |
| Chisholm Creek Diversion                                            | 6.44            | ---        |
| Middle Branch Extension                                             | .08             | ---        |
| Middle Branch                                                       | 2.08            | ---        |
| West Branch                                                         | <u>1.96</u>     | ---        |
| Subtotal                                                            | 11.56           | 24.1       |
| Big Slough-Cowskin Floodway                                         | 17.21           | 34.1       |
| Arkansas River Training Levees                                      | 1.43            | 18.5       |
| Little Arkansas River Floodway                                      | 2.99            | 11.2       |
| East Branch Interception and Wichita Drainage Canal, Arkansas River | 7.67            | 0.3        |
| Riverside Levees                                                    | <u>8.5</u>      | <u>8.5</u> |
| Total                                                               | 40.86           | 97.3       |



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

The combined flows of Chisholm Creek, the Little Arkansas River, and the Arkansas River, in excess of existing channel capacities, are diverted to the west of the city of Wichita by a floodway levee system. From there, the flows are diverted to the Arkansas River at a point south of Wichita by improved channels, levees, and canals along Big Slough and Cowskin Creek. Flood flows of the east branch of Chisholm Creek are diverted into the Wichita drainage canal, which extends through the eastern portion of the city of Wichita and confluences with the Arkansas River south of the city. The average height of the levees and the average depth of the channels are 9.5 feet.

Although the USACE owns the floodway project, there is 6,400 acres of land maintained annually by the City of Wichita Public Works Storm Water Utility and jointly funded by the City of Wichita and Sedgwick County. The USACE conducts annual visual inspections of the levees and provides its findings to the City of Wichita. Since construction of the floodway, the USACE estimates the project has prevented about \$300 million in flood damages as of 2016.

### *Maintenance*

About \$6.7 billion in property is protected by the floodway system, roughly from I-235 on the west to Hillside on the east. The protected area also includes Haysville for a total of approximately 49,000 acres of urban and rural land. The Big Ditch is the first levee system in the country to undergo accreditation, part of stricter guidelines put in force since Hurricane Katrina decimated parts of New Orleans, where levees broke. The city and county missed a Feb. 2, 2009 deadline, to certify the levees that make up the Big Ditch. In an effort to re-certify the levee system, data obtained from Light Detection and Ranging (LiDAR) imaging was used and Merrick and Company used it to acquire elevation data to more accurately understand the situation and provide better flood management.

FEMA has started the decertification process and plans to draw new flood zone maps within the next two years. Consultants say four main areas within the flood control project can't be certified as effective without repairs: the Broadway Bridge between 49th and 50th streets North; a levee near 46th North and Salina; a levee near Washington and I-235; and a levee near 61st South and Madison. Repairs are needed because flood control standards are getting tougher to meet but also because the dirt levees are eroding in places due to tree roots. Engineers estimate that \$7.7 million in work will need to be done within the next five years and another \$8.4 million within the next 10 years. And \$2.3 million in fencing is needed. *Source: The Wichita Eagle*

### 9.7.6 COWSKIN CREEK LOCAL FLOOD PROTECTION PROJECT

The Cowskin Creek Basin is located in the western part of Wichita, Kansas. This basin has sustained significant recurring flooding problems directly impacting residential areas. The November 1998 flood resulted in significant damage to about 200 homes and many businesses, some of which were damaged beyond 50 percent of their value. Under Section 205 of the Flood Control Act of 1948, as amended (Continuing Authority -- Flood Control), the joint City of Wichita and U.S. Army Corps of Engineer (USACE) project is currently in the final stages of development of the construction contract plans and specifications phase. The recommended plan of improvement would include channelization of a portion of Cowskin Creek with construction of an overbank area to convey the high flows during a flood event.

### 9.7.7 COWSKIN CREEK STORMWATER MASTER DRAINAGE PLAN

An evaluation by Black and Veatch in 2003 was conducted on the storm water drainage system within the 122 square mile (78,000 acres) Cowskin Creek watershed. The watershed is generally bounded by 311<sup>th</sup> Street West, 77<sup>th</sup> Street North, 71<sup>st</sup> Street West, and Kansas Highway 42 (K-42). Tributary confluences of the Cowskin Creek include: Dry Creek, Calfskin Creek, North Fork of the Calfskin Creek, Middle Fork of Calfskin Creek, and Westlink. There were 20 potential improvement projects identified to reduce the levels of flooding in the Cowskin Creek watershed. The projects consisted of a series of natural channel improvements, detention, diversion, individual structural improvements, and home buyouts.



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### 9.8 DEFENSE INDUSTRIAL BASE SECTOR

This sector supplies the military with the means to protect the nation by producing weapons, aircraft, and ships and providing essential services, including information technology and supply and maintenance. Threats to this sector include cyber vulnerabilities. The following agencies are responsible for this sector:

State: Kansas Adjutant General/Kansas National Guard

Federal: Department of Defense/McConnell Air Force Base

The Defense Industrial Base (DIB) Sector includes hundreds of thousands of domestic and foreign entities and subcontractors that perform work for the Department of Defense (DOD) and other Federal departments and agencies. These entities research, develop, design, produce, deliver, and maintain military weapons systems, subsystems, components, or parts. Defense-related products and services provided by the DIB Sector equip, inform, mobilize, deploy, and sustain forces conducting military operations worldwide.

The size and diversity of the sector results in an extraordinarily large and complex collection of industrial sites and operators across 15 subsectors and more than 90 segments governed by multiple regulations, laws, treaties, and precedents.

The Defense Industrial Base Sector provides the products and services that are essential to mobilize and sustain the Nation's military operations. The sector includes companies performing under direct contract with the Department of Defense, its subcontractors, and companies providing materials and services. Unlike other sectors, the Defense Industrial Base is defined by the customer rather than by the goods and services themselves.

The size and diversity of the sector results in an extraordinarily large and complex collection of industrial sites and operators who work within numerous subsectors and segments, which are governed by multiple regulations, laws, treaties, and precedents. The facilities that are included in this sector are very different from one another, so standardized risk assessments are not possible.

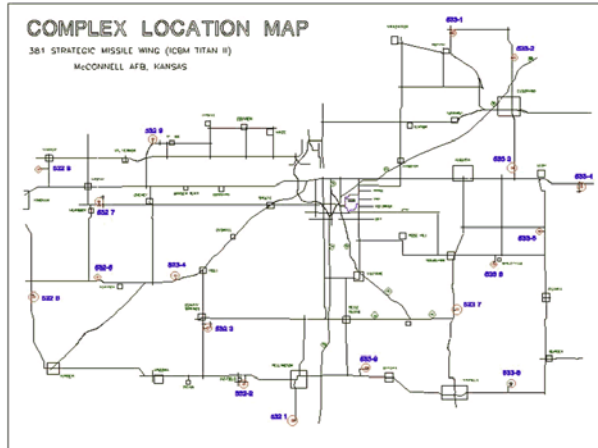
While new high-tech security and programs are both complex and expensive, defense-related businesses place a great deal of emphasis on protecting their assets and functions. The sector has prioritized the need to share information and develop assessment and security procedures that are implemented across the sector. Currently, there are no Defense Industrial Base entities based within Kingman County; therefore, this sector is not covered in this plan.

The Defense Industrial Base Sector shares dependencies and interdependencies with other CIKR sectors, including: Communications, Critical Manufacturing, Energy, Information Technology, and Transportation Systems.

#### McCONNELL AIR FORCE BASE (AFB)

McConnell's history began in October 1924, when Wichita hosted more than 100,000 people for the National Air Congress. The event was used by city planners to raise funds for a proposed Wichita Municipal Airport. The event was a success and ground-breaking ceremonies for the airport were held on Jun 28, 1929. In August 1941, the Kansas Air National Guard was activated as the first military unit assigned to the Wichita airport. Military presence at the airport consisted primarily of aircraft material and procurement operations until June 4, 1951 when the 3520th Combat Crew Training Wing was activated there to conduct B-47 combat crew training. The Air Force sought to make the airport a permanent military installation, and the city of Wichita was awarded \$9.4 million to build a new airfield, later to become known as Mid-Continent Airport. The Wichita Municipal Airport changed its name to Wichita Air Force Base on May 15, 1953. The base was renamed McConnell Air Force Base on April 12, 1954 in honor of two of the three flying McConnell brothers of World War II. Air Training Command was host at the base from 1951 through 1958, when the Strategic Air Command took over.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis



Besides hosting bombers, McConnell spent a quarter century supporting 18 Titan II missile silos of the 381st Strategic Missile Wing that were planted in the surrounding region. As with Titan II projects at Davis-Monthan, Arizona, and Little Rock, Arkansas, the construction at McConnell used a three-phase approach designed to cut down additional expenses caused by "concurrency." Using this approach, 18 silos were constructed, forming a rough horseshoe around Wichita with the open end pointing slightly to the west of north. Launcher locations for the 532nd Strategic Missile Squadron included Wellington (2), Conway Springs, Viola, Norwich, Rago, Murdock, Kingman, and Mount Vernon. The 533rd Strategic Missile Squadron would have responsibility for silos

at Potwin, El Dorado, Leon (3), Smileyville, Rock, Winfield, and Oxford. Additional support facilities were constructed on base

From 1963 through 1972, McConnell served as a Tactical Air Command base with the 381st Strategic Missile Wing as its major tenant. TAC units operating at McConnell during this period included: the 388th Tactical Fighter Wing, flying F-105s. Host unit responsibilities again transferred to SAC on Dec. 1, 1972. At that time, the 384th Air Refueling Wing arrived at McConnell, including first the 91st Air Refueling Squadron, which began air refueling operations in June 1971, and later the 384th Air Refueling Squadron, which began its KC-135A operations in September 1973. McConnell's role in support of the nation's strategic defense continued. In June 1983, Air Force officials selected McConnell to be one of the future homes for the B-1B Lancer bomber.

Meanwhile, the first KC-135R, a re-engined, quieter, more fuel-efficient version of the "Stratotanker," was received by the 384th Air Refueling Wing on July 1984. The 384th Air Refueling Wing became the host wing on June 5, 1985. By Aug. 5, 1985, McConnell became the only Air Force base to be equipped completely with R-model aircraft for its refueling operations. The 381st Strategic Missile Wing ended Titan II operations and was inactivated on August 8, 1986.

The 384th Air Refueling Wing was re-designated as the 384th Bombardment Wing (Heavy) on July 1, 1987. The new wing became one of only four B-1B units in the Air Force with the arrival of its first Lancer bomber on Jan. 4, 1988.

On April 26, 1991, a tornado touched down on McConnell, leaving a trail of devastation as it traveled southwest to northeast across the base. Nine major facilities on the main base were totally destroyed, including the hospital and most of the base's Services facilities. The base housing complex lost 102 units in the storm and ten other facilities received minor damage. There were no deaths and only 16 injuries on base. This was attributed to advance warning from McConnell's weather forecasters.

In June 1992, the Air Force realigned SAC, TAC and Military Airlift Command into two-Air Combat Command and Air Mobility Command. McConnell's 384th Bombardment Wing was renamed the 384th Bomb Wing, and the unit assumed a conventional bombing role along with its strategic mission. In October 1993, the Air Force announced the 384th Bomb Wing would inactivate, become the 384th Bomb Group for 10 months beginning Jan. 1, 1994, and begin to transfer its conventional B-1B mission to the Kansas Air National Guard unit at McConnell, the 184th Fighter Group. This KSANG unit, which became the 184th Bomb Group on July 1, 1994, is the first Air National Guard unit ever to be assigned a heavy bomber mission. In January 1994, AMC was assigned as McConnell's host major command. The 22nd Air Refueling Wing was announced as McConnell's new host unit, and the buildup of the wing's four KC-135R tanker squadrons began. By October 1994, the 22nd became one of only three Air Force core tanker wings.



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---



Today, the air base has about 3,500 military and civilian personnel and serves as home to Team McConnell. Team McConnell is primarily made up of the 22nd Air Refueling Wing (ARW), the 931st Air Reserve Group, and the Kansas Air National Guard's 184th Refueling Wing. The 22nd Air Refueling Wing, under Air Mobility Command, currently operates 63 KC-135 Stratotankers, supporting worldwide aerial refueling and airlift operations, and is one of only three supertanker wings in the Air Force.

# 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

## 9.9 Emergency Services Sector

This sector covers saving lives and property from accidents and disaster. This sector includes fire, rescue, emergency medical services, and law enforcement organizations. Threats to this sector include cyber and physical vulnerabilities. The following agencies are responsible for this sector:

Local: Fire, Law Enforcement, Emergency Medical Services, Emergency Management, Emergency Communications  
State: Kansas Division of Emergency Management, Kansas Highway Patrol, Kansas State Fire Marshal  
Federal: Department of Homeland Security, Federal Emergency Management Agency, Federal Communications Commission

The Emergency Services Sector comprises the assets, systems, networks, and functions that are critical to maintain, protect, and preserve our safety and health in case of a natural or manmade disaster or terrorist incident. By protecting these elements, the sector is better able to support all critical infrastructure, essential governmental missions, and public services. These functions are vital to community security, public health and safety, economic vitality, and way of life.

Through partnerships with public- and private-sector entities, this sector's mission is to accomplish the following:

- Save lives;
- Protect property and the environment;
- Assist communities impacted by disasters (natural or manmade); and,
- Aid recovery from emergency situations.

The Emergency Services Sector is a system of preparedness, response, and recovery that forms a coordinated approach to preventing—and mitigating the effects of—natural and manmade disasters.

Five distinct disciplines comprise this sector:

- Law Enforcement
- Fire and Rescue Services
- Emergency Management
- Emergency Medical Services
- Emergency Communications

In addition, the sector includes specialized capabilities such as Explosive Ordnance Disposal, Special Weapons and Tactics and Tactical Operations, Hazardous Materials, Search and Rescue, Urban Search and Rescue, Public Safety Answering Points, and Public Works.

The Emergency Services Sector collaborates with multiple infrastructure sectors that supply essential operational elements, including Communications, Energy, Information Technology, and Water. In addition, two sectors that support emergency responders are Healthcare and Public Health and Transportation Systems.

### 9.9.1 LAW ENFORCEMENT

#### 9.9.1.1 SEDGWICK COUNTY SHERIFF OFFICE

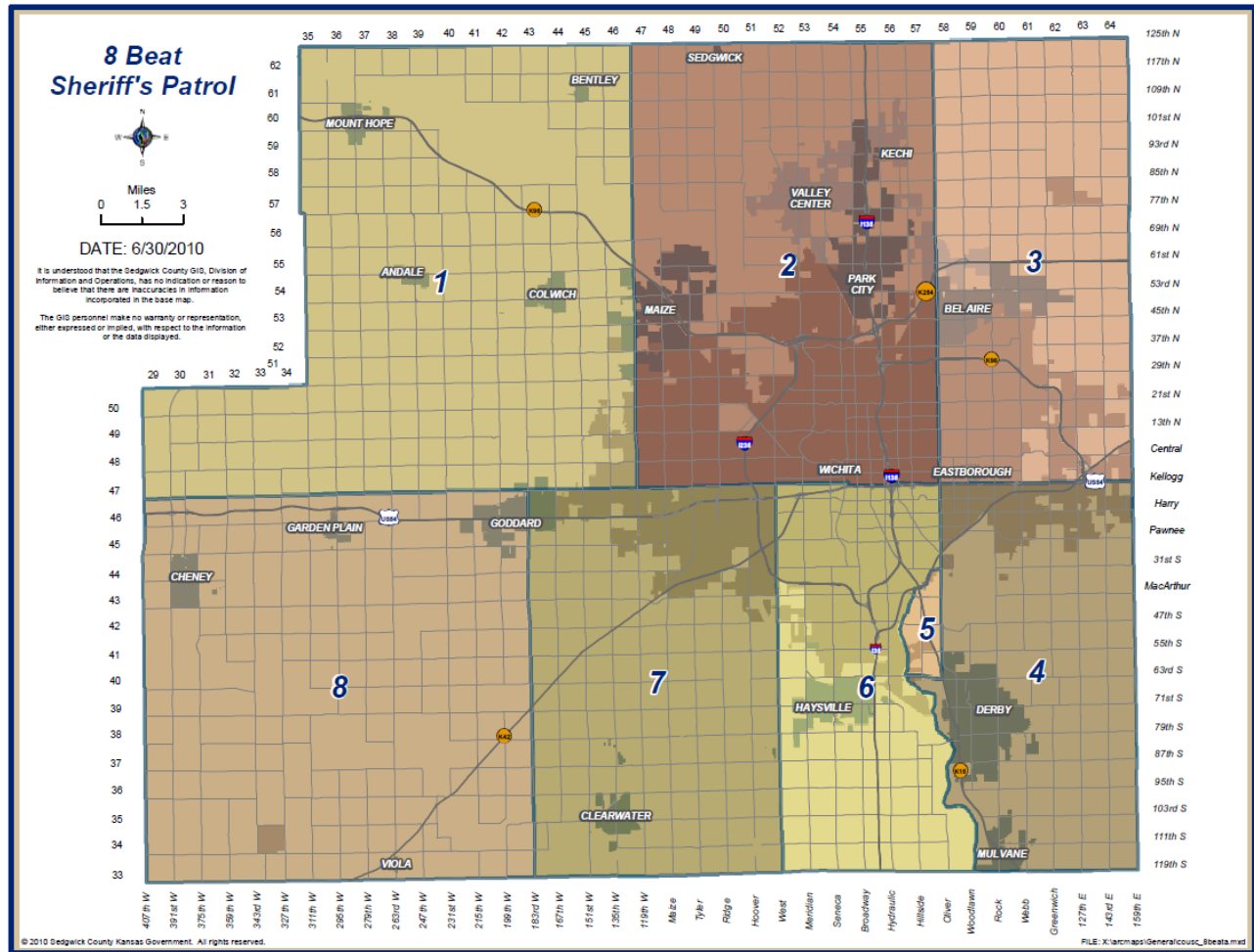
##### Law Enforcement Bureau

The Law Enforcement Bureau of the Sedgwick County Sheriff's Office is tasked with the law enforcement mission of the sheriff's office.

The Patrol Division consists of 82 authorized positions (55 road patrol) and has jurisdiction within all 1,008 square miles of Sedgwick County. It serves as first responder to calls for service originating within the

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

unincorporated areas of Sedgwick County and assists other law enforcement agencies whenever needed. The Patrol Division includes three duty watches that provide twenty-four hour coverage. The Community Liaison Unit delivers hundreds of hours of public safety programs like D.A.R.E. to the community. The Community Policing Unit which involves deputies utilizing problem solving models to address issues our citizens have encountered that may have otherwise gone unaddressed. The Canine Unit consists of three Patrol dogs and their handlers who support drug interdiction and fugitive apprehension throughout the county. The Sheriff's Office also has members assigned to the Wichita Police Department Special Weapons and Tactics (S.W.A.T.) team.



The Investigations Division is responsible for the investigation and case preparation of criminal cases that have been reported to the sheriff's office. The Division is comprised of detectives who work many varied tasks that include: general investigations, forensics laboratory, D.E.A. Task Force, Intelligence, Narcotics, E.M.C.U. (Exploited and Missing Child Unit), I.R.S. Task Force, O.R.U. (Offender Registration Unit), Records and the F.B.I. Joint Terrorism Task Force.

The Support Division is comprised of the Training Section, the Records Section and the Property and Evidence Section. The Training Section ensures ongoing recruitment, training and continuing education for all Sheriff Office employees. The Training Section also supervises the Firearm/Range that is responsible for all firearms training. Sheriff Records maintains all registration for sexual offenders within Sedgwick County, as well as all cases generated by Sheriff Deputies and all Sedgwick County Detention Facility records. The Property and Evidence Unit oversees the protection, disposal and distribution of all seized and collected property and assets.

The Judicial Division is the fourth division in the bureau, and is vital to Courtroom Security for the 18th Judicial District Court. The deputies assigned to the Court docket ensure movement of inmates to and from the courts

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

is done in a timely manner and without incident. Warrant deputies are in constant motion all over Sedgwick County obeying and serving the orders of the court. Extradition is accountable for transporting prisoners across the country as needed as well as within Kansas. The Civil Process Section is comprised of civilian personnel administering official procedure of court ordered documents.

### Detention Bureau

The Detention Bureau of the Sedgwick County Sheriff's Office is composed of a staff of 351 responsible for the operations and support divisions. Each division has a vital role in the efficient operation of the detention facility. The Operations Division addresses the day-to-day work and concerns of housing an average of 1,500 inmates in a safe, secure and humane manner. The Support Division provides those necessary services to augment and support the Operations Division. Working in a modern pre-trial housing facility is a profession that requires a deep commitment to ensuring that all inmates in the Sheriff's custody are provided with safe and humane treatment consistent with applicable standards, laws and community expectations. A commitment to public service is only the beginning. To become a detention deputy requires that one must first pass a rigorous background investigation, followed by eleven weeks of formal academy instruction. This is then followed by a six-week Field Training program. Only then is a detention deputy ready to begin a career in which not everyone can succeed. While in custody, all inmates are provided with the essentials of human life; including medical/mental health care, nutritious meals, a clean environment and the opportunity for maintaining family and personal contacts. The Detention Bureau resembles the operation of a small city. This city operates a medical clinic, a school (GED classes), postal system (the opening and inspection of inmate mail), law enforcement (to maintain discipline) and a court system (when the inmate fails to follow the facility rules).

#### Prison/Work Release Facilities

Sedgwick County Adult Detention Facility: 1,060 prisoners (expandable)  
141 W. Elm  
Wichita, Kansas

*Note: Prison composition is approximately 60% felon and 40% misdemeanor. There are currently no plans for evacuation of prisoners in the advent of a hazardous material incident.*

Sedgwick County Work Release Facility: 157 prisoners (maximum holding)  
401 S Emporia  
Wichita, Kansas

*Note: Prison composition is 100% convicted felons under the Kansas Department of Corrections. There are currently plans for evacuation of prisoners in the advent of a hazardous material incident.*

### Reserve Bureau

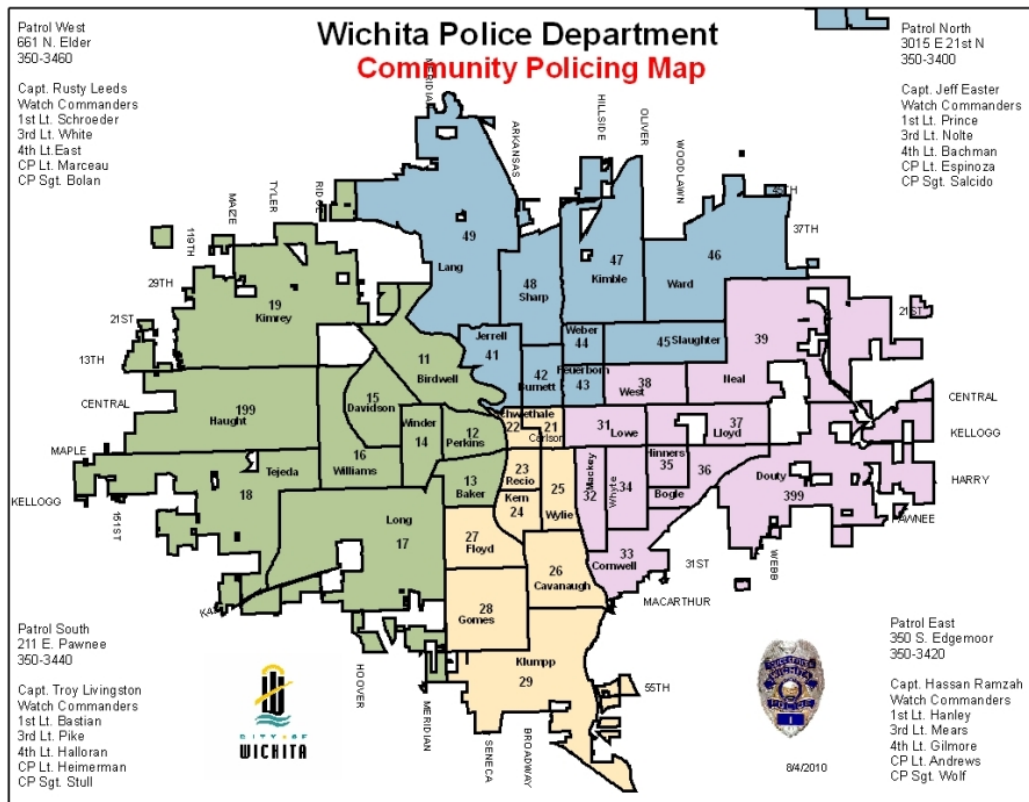
The Reserve Bureau of the Sheriff's Office was established in 1956 and worked a total of 9,175 volunteer hours in 2012. These hours were spent in patrol, warrants, investigations, tag enforcement, detention, training and special assignments. The hours worked by the Reserve are equivalent to over 4 full-time Sheriff's deputies and have a value of nearly \$200,000 for the citizens of Sedgwick County. The Reserve assisted the Sheriff's Office, Wichita Police Department and the Kansas Highway Patrol on sobriety check lanes and saturation patrols. The Reserve also provided assistance to major warrants sweeps involving the Sheriff's Office, Wichita Police and the Drug Enforcement Agency. Special assignments included community fairs at Bel Aire, Cheney, Kechi, Valley Center, Mulvane; the McConnell Air Force Base Open House and numerous fund raisers including the KAKE Wichita Marathon, Link 4 Life Run, and the Mid-West Wine Fest.

#### 9.9.1.2 WICHITA POLICE DEPARTMENT

WPD is the largest police department in the state of Kansas. It is comprised of 644 Commissioned Officers and 173 non-commissioned officers, and operates on a \$70 million yearly budget. The men and women of the Wichita Police Department proudly serve their Wichita community, which includes 382,368 citizens and covers

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

162.8 square miles. The department's operations are divided into three divisions: Field Services, Investigations and Support Services. Most of the Investigations and Support Services operations are housed in City Hall at 455 N. Main. Field Services personnel operate from four substations that are strategically located in four quadrants of the city: North, South, East and West. Each substation is home to approximately 130 commissioned and civilian employees including Beat Officers, Community Policing Beat Coordinators, School Resource Officers, Special Community Action Team Officers and Traffic Officers.



### Investigations Division

The Wichita Police Department's Investigations Division is comprised of four Bureaus; the Property Crimes Bureau, the Crimes Against Persons Bureau, the Special Investigations Bureau, and the Technical Services Bureau, which includes the Crime Lab Investigators (CSI). Personnel in these bureaus are responsible for follow-up investigations of criminal cases. They work closely with victims, witnesses, citizens, and other law enforcement agencies to solve problems and crimes. In February of 1999 the Investigations Division underwent reorganization. Five specialized sections were created in the Property Crimes Bureau consisting of Robbery/Simple Assault, Burglary, Auto Theft, Larceny, and Financial Crimes. A Gang/Felony Assault unit was created within the Crimes Against Persons Bureau to coordinate and investigate all gang related crimes.

### Field Services Division

The Wichita Police Department's Field Services Division is comprised of uniformed personnel and is organized into four bureaus. Each of the bureaus (Patrol North, Patrol South, Patrol East, **and** Patrol West) operates out of a patrol substation located in their assigned quadrants. This enables rapid response to emergency calls for services and provides easier citizen access to services. In addition each Patrol Bureau is responsible for delivering law enforcement services through the community policing philosophy.



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

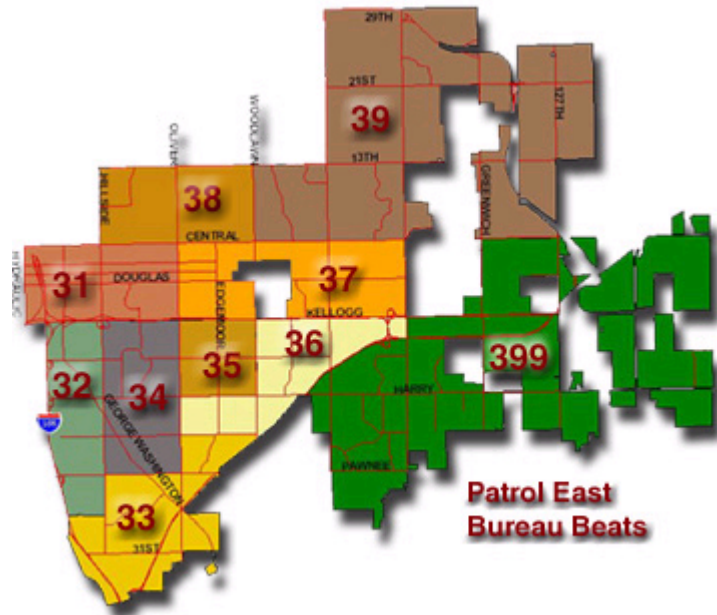
Also assigned to the Field Services Division are four SCAT units which are the enforcement teams of community policing. The Field Services Division has seven School Resource Officers assigned to area high schools to work as liaisons between the Board of Education and the Wichita Police Department.

The latest moves toward community orientated policing has been a combined and concentrated effort between the neighborhoods, businesses and the police department to address the prostitution problem and to continue to increase the quality of life for our citizens. Plus the Wichita Police Department has partnered up with the Kansas Department of Corrections and is taking an active role in the Sedgwick County Re-entry Program.

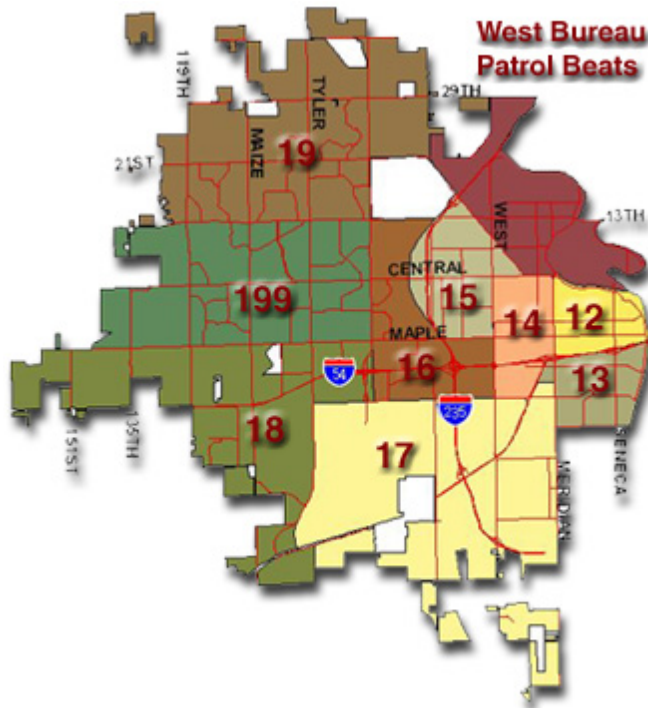
Each of the bureaus, including their respective beats, are shown below and on the following pages.

A six officer team is assigned to each of the ten patrol beats. They include four beat officers, one SCAT\* officer and one officer serving as a community policing officer. The focus of the beat team is to assess the problems within the beat and work together with the community to develop and implement solutions to those problems.

The East Bureau's Community Policing Officers are based out of the East Substation, the Towne East Square Shopping Mall located at 7700 E. Kellogg, and an Office Facility located at 4135 E. Harry. The community policing officer is responsible for collecting crime analysis and staffing information and meeting with the patrol officers, neighborhood associations, community groups, and others in order to coordinate police services that are tailored to the unique needs of the beat.



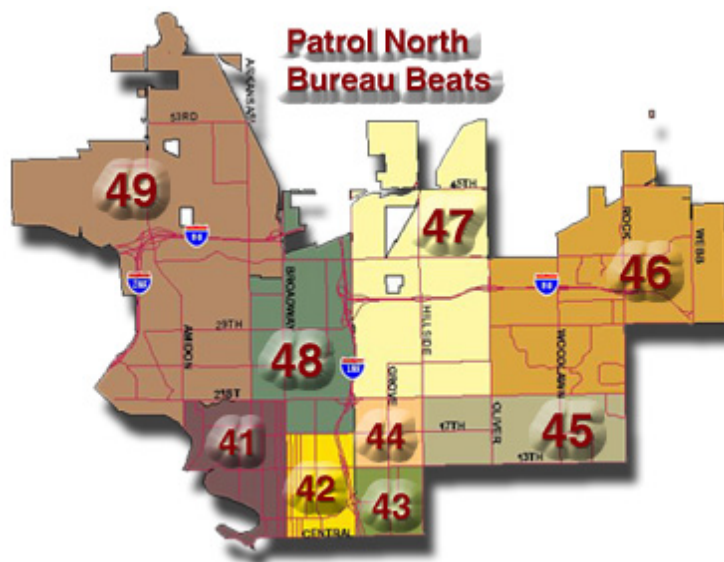
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis



A six officer team is assigned to each of the ten patrol beats. They include four beat officers, one SCAT officer and one officer serving as a community policing officer. The focus of the beat team is to assess the problems within the beat and work together with the community to develop and implement solutions to those problems.

The West Bureau's Community Policing Officers are based out of the West Substation and an office at 5803 W. Central. The community policing officer is responsible for collecting crime analysis and staffing information and meeting with the patrol officers, neighborhood associations, community groups, and others in order to coordinate police services that are tailored to the unique needs of the beat.

\*Community Enforcement Unit / Special Community Action Team (SCAT)

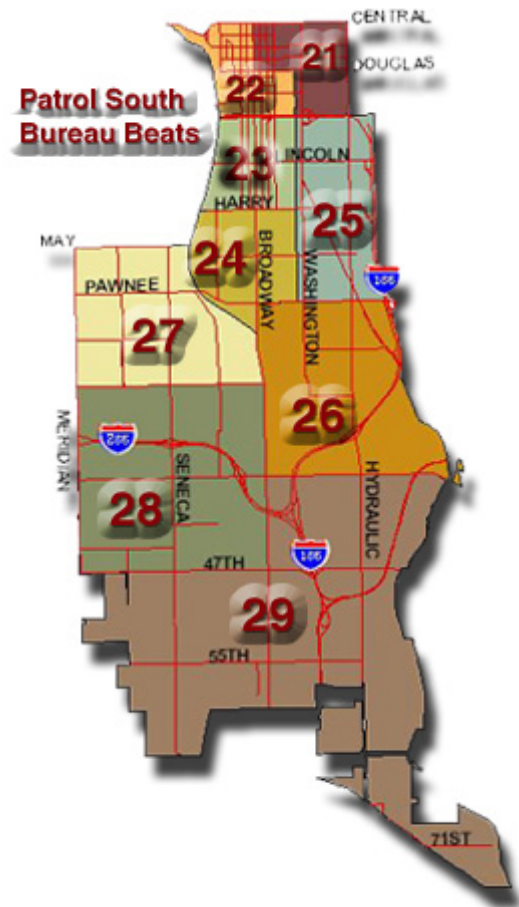


A six officer team is assigned to each of the nine patrol beats. They include four beat officers, one SCAT officer and one officer serving as a community policing officer. The focus of the beat team is to assess the problems within the beat and work together with the community to develop and implement solutions to those problems.

The North Bureau's Community Policing Officers are based out of the Atwater Neighborhood City Hall located at 2755 E. 19th St. North and Evergreen Neighborhood City Hall located at 2700 N. Woodland. The community-policing officer is responsible for collecting crime analysis and staffing information and meeting with the patrol officers, neighborhood associations, community groups, and others in order to coordinate police services that are tailored to the unique needs of the beat.

A six officer team is assigned to each of the nine patrol beats. They include four beat officers, one SCAT officer and one officer serving as a community policing officer. The focus of the beat team is to assess the problems within the beat and work together with the community to develop and implement solutions to those problems.

The South Bureau's Community Policing Officers are based out of the South Substation located at 211 E. Pawnee. The community-policing officer is responsible for collecting crime analysis and staffing information and meeting with the patrol officers, neighborhood associations, community groups, and others in order to coordinate police services that are tailored to the unique needs of the beat.



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### Support Services Division

The Support Services Division provides services to the entire department as well as the community. The Division is made up of the Administrative Services Bureau, Records Bureau, Special Operations Bureau and the Training Bureau.

The Special Operations Bureau overlooks many sections, including the Accident Follow-up Unit which investigates hit and run accidents, impaired driver violations and the charging of criminal cases. The Air Section, which serves as the full-time helicopter unit for the Police Department and the City of Wichita, and the Police Reserves also operate within the operational structure of the Bureau. In addition, four auxiliary units, the Mounted Unit, Special Weapons and Tactics Team (SWAT), Honor Guard and Explosive Ordnance Unit are assigned to Special Operations. The Administrative Services Bureau houses the Information Services Unit which collects and tracks crime data in the city. This web site and the statistical data is provided and maintained by this section.

The Warrant Office works with Municipal Court and other local, state, and federal agencies to ensure that court documents are served in a timely manner.

The Records Bureau is responsible for the entry of data and filing of incident reports and criminal cases. Our S.P.I.D.E.R. section, which stands for Special Police Information Data Entry and Retrieval, is operated within the Records Bureau and provides field officers and investigators information through the National Crime Information Computer (N.C.I.C).

The Training Bureau is responsible for recruiting, pre-employment screening and training of new officers as well as the continued training of veteran officers in such areas as firearms proficiency, use of force, and community relations.

### 9.9.1.3 OTHER MUNICIPAL DEPARTMENTS

The cities of Andale, Bel Aire, Bentley, Cheney, Clearwater, Colwich, Derby, Eastborough, Garden Plain, Goddard, Haysville, Kechi, Maize, Mount Hope, Mulvane, Park City, Sedgwick, and Valley Center each have police departments that perform routine patrols of their respective jurisdictions. The city of Viola is patrolled by the Sedgwick County Sheriff Office.

### 9.9.2 FIRE DEPARTMENTS

Sedgwick County is comprised of four (4) paid departments, seven (7) in-county volunteer departments, two (2) supporting volunteer departments.

#### *Paid Departments*

Derby Fire Department – The department was established July 1, 2005 after more than 53 years as a volunteer service. It is comprised of 10 firefighters and staff, augmented by 34 volunteer firefighters, covering a 7.4 square mile area from two (2) fire stations and almost 23,000 citizens. Firefighters respond to over 220 fire calls and almost 500 medical calls (2005) each year. The City of Derby has an ISO rating of 4.

Sedgwick County Fire District #1 – Established in 1955, this department serves ten (10) cities, covering a response area of 657 square miles from eight fire stations and approximately 85,000 citizens. A total of 138 firefighters and staff make an average of 511 fire and medical responses per month. The following Insurance Service Organization (ISO) ratings have been assigned: ISO 2 for Haysville and Bel Aire; ISO 3 for Andale, Goddard, Kechi, Maize, and Park City; ISO 4 for Bentley and Garden Plain; ISO 6 for Viola; Rural areas without fire hydrants and within five miles of a qualifying fire station are a class 5 and were previously a class 9. Rural areas over 5 miles of a qualifying fire station are a class 10 and were previously a class 10. In 2004, the department looked at optimizing response to the citizens of Sedgwick County and to reduce fire insurance premiums for rural residents. As part of the 2004 station relocation plan, six stations were to be moved for better coverage. By 2014, the sixth and final station will be relocated to raise the population coverage area within five miles of a fire station from 47 percent in 2004 to 78 percent.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

Sedgwick County Fire District #1 is also one of 11 hazardous material (hazmat) regional response teams in Kansas, consisting of nationally accredited hazardous materials technicians, are fully equipped to enter the area immediately surrounding the hazardous material in order to monitor the environment and mitigate the incident. The regional response teams comprise a network and are able to support each other with personnel and or equipment when needed. These teams can respond to most areas in Kansas within an hour or less in order to address hazmat incidents and accidents as well as terrorist events involving chemical, biological, radiological, or nuclear (CBRN) products.

Wichita Fire Department – The Wichita Fire Department was organized in 1886 when Wichita outgrew the volunteer fire companies which had protected the City since its formation as a volunteer fire company on February 14, 1871. Today, the Wichita Fire Department has evolved from its original purpose of fighting fires to its current task of providing a much broader level of emergency services to the public. Over the years, this expanded role along with a variety of community risk reduction activities and initiatives has allowed the Department to demonstrate exceptional community value. The Wichita Fire Department serves a resident population of over 382,000 people. In addition to the City of Wichita, the Wichita Fire Department also provides emergency responses throughout the metropolitan area through automatic and mutual aid agreements with surrounding jurisdictions. The Wichita Fire Department is a diverse department comprised of 412 uniformed and 11 civilian members serving within the Department's two divisions. The Emergency Operations Division is made up of 412 uniformed officers and firefighters. These members proudly serve the community by responding to fires and other emergencies from the city's 22 firehouses. In 2010, the Emergency Operations Division provided over 68,000 unit responses to over 44,000 calls for service. In addition to their traditional emergency response duties, these members are also actively involved in a number of community risk reduction initiatives. The City of Wichita retains an ISO rating of 3.

### 22 CES McConnell Air Force Base (AFB) Fire Department

McConnell's 22nd Civil Engineer Squadron firefighters train in fire safety and prevention to be capable of fire response to control and extinguish aircraft, structure, wild land and miscellaneous fires to protect Team McConnell. There are 64 firefighters and one civilian located at two stations with airfield mobile fire suppression equipment and Aircraft Fire Fighting Foam (AFFF) capability for petroleum fires. Mutual aid agreements are in place to assist local fire departments.

### *Volunteer Departments*

#### Cheney Fire Department

The City of Cheney Fire Department responds to all types of emergencies covering a 223 square mile radius outside of the City limits as well as within the City limits. The area encompasses Erie, Morton and Grand River townships in Sedgwick County, Vinita and Evan townships in Kingman County. The department, on average, responds to 250-400 fires per year. Firefighters also respond to emergencies and provide weather spotting during severe weather. The fire department consists of 22 volunteer firefighters. Fifteen are EMTs and three are certified divers. EMTs supply medical assistance at all types of emergencies as well as special events. The fire department also provides fire safety training to schools and groups interested in fire safety.

#### Clearwater Fire and EMS

Clearwater Fire Department is a 31 member volunteer organization providing fire and rescue services to southern Sedgwick County. They respond to about 100 fires and 250 EMS calls a year from one station with 3 engines, 2 tenders, 1 squad, 1 brush unit. Clearwater EMS operates two ambulances and is cross staffed by members of the fire department. Responsible for Fire Suppression, Safety and Prevention; as well as assisting Emergency Medical Services when called upon within the City of Clearwater and the surrounding area of Ninnescah Township in Sedgwick County and a part of Illinois Township in Sumner County.

#### Colwich Fire Department

The Department is staffed by volunteers and provides emergency assistance throughout the City of Colwich and surrounding Union Township. The Colwich Fire Department is comprised of 20 members and covers a 35-mile diverse response area consisting of the City of Colwich and Union Township. In addition to the rural



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

response area, fire protection responsibilities include a new 3-story low rise office and manufacturing facility employing 750 workers. There is also protection of a 25 million gallon per year ethanol plant along with a major state road and railroad passing through the area. The department also provides BLS first responder care for Sedgwick County EMS (ALS) in the response area. The current ISO rating is 5 in the city limits.

### Mount Hope Fire Department

Mount Hope Volunteer Fire Department provides protection to northwest Sedgwick County. Equipment consists of Engine 51, Tender 51, Brush 51 and 52 manned by 25 active volunteer fire fighters. The response area consists of the City of Mount Hope, Greeley Township, and the southern half of Lake Township in Harvey County adjoining Burrton Fire Township. A privately owned emergency medical service, Mount Hope Community Volunteer Ambulance Service Inc., shares the fire station. There are at least 50 fire department calls annually. The ISO rating is a 7 in the City of Mount Hope and 9 in Greeley Township.

### Mulvane Emergency Services

Mulvane Volunteer Fire Department was established in November 1905 after several major fires in 1891, 1893, and 1905. In 1986 the fire department along with emergency medical services merged to form Mulvane Emergency Services. Today Mulvane Emergency Services consists of two divisions, Mulvane Fire Rescue and Mulvane Emergency Medical Services, both staffed by over 30 paid and volunteer members. While the City of Mulvane has its own 911 dispatch center, Mulvane Emergency services also receive calls from both Sedgwick County 911 and Sumner County 911 centers. Mulvane Emergency Services serves both Sedgwick & Sumner counties and responds into Butler and Cowley counties when requested. Mulvane has an ISO rating of 3 in the city and 5 in the surrounding township service area.

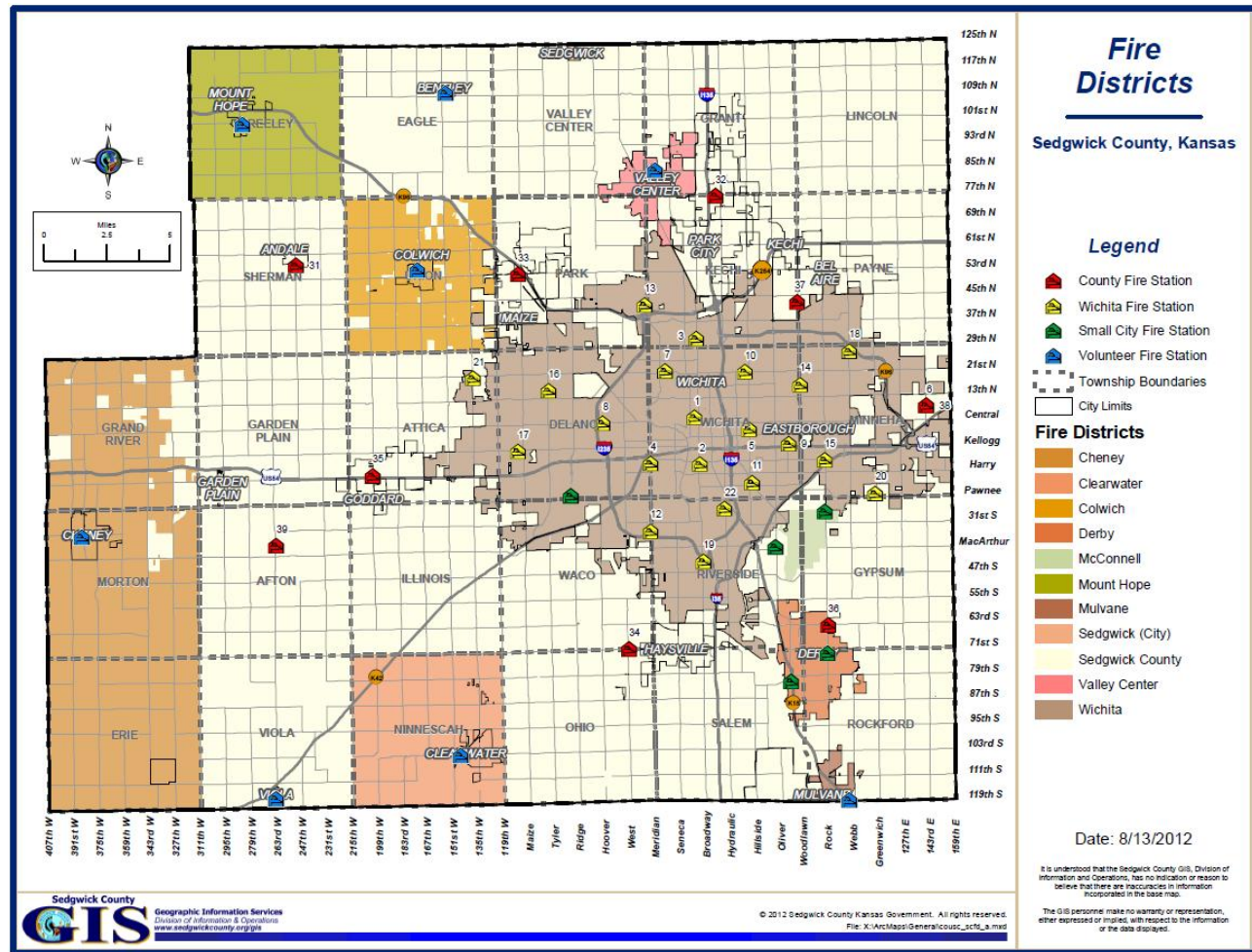
### Valley Center Fire Department

Since 1885, the Valley Center Fire Department has provided fire protection for the residents and currently is comprised of two full-time firefighters who are on duty Monday through Friday from 8:00 am until 5:00 pm, with 22 paid on-call firefighters. Response areas include the City of Valley Center and surrounding townships, and have automatic aid response with the Sedgwick County Fire Department to areas outside of the city limits. They also run mutual aid response with Colwich Fire Department and Mount Hope Fire Department. There is a fleet of six vehicles consisting of one engine, one engine / tender, two squads, one tender, and a duty officer's pickup truck. Valley Center's ISO rating is 4.

### Viola Fire Department

Viola Fire Department is a volunteer organization providing fire suppression and medical first responders to Viola Township in southwestern Sedgwick County. It works in cooperation with Conway Springs Fire Department and Sedgwick County Fire District #1. Nine volunteers respond to about 50 to 75 alarms a year from one station with one engine and two tenders.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis



**Note:**

Sedgwick County and the City of Wichita fire departments have two jointly shared response teams: a Hazardous Materials (HazMat) Team and a SWAT Medic Team made up of fire paramedics.

### 9.9.3 SEDGWICK COUNTY EMERGENCY MANAGEMENT (SCEM)

SCEM emphasizes planning, preparing, and coordinating local, state and federal governments' efforts in dealing with all types of emergencies and hazards, natural or man-made, including Homeland Security, which might affect citizens of Sedgwick County. This preparation is necessary to improve the community's overall coordination and ongoing preparedness. SCEM is the county's liaison with State and Federal agencies responsible for emergency management, and responsible for bringing together all of the needed resources during times of crisis through utilizing all governmental, public and private organizations and agencies to accomplish the appropriate response to the needs of the community during times of crisis, and the recovery period afterwards. SCEM is expected to be the Chief of Staff, Coordinator and Advisor to the local officials before, during, and following disaster emergencies. In this role, SCEM brings awareness of potential, as well as existing problems, and suggests solutions based on the needs of a community and available resources. During times of crisis the Emergency Manager keeps local officials apprised of situations in order for them to make the best decisions possible for response and recovery issues.

SCEM is the first line of contact with the State during times of crisis. The Emergency Manager is charged with requesting additional resources at the State level based upon the situation. Local disaster declarations are submitted to the Chair of the Board of County Commissioners whenever it has been determined that resources

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

will exceed what is available, and to provide mutual aid as needed to expedite the response and recovery from the disaster or emergency and submitted to the State. The Sedgwick County Emergency Operations Center (EOC), which may temporarily serve as the seat of government during times of disasters/emergencies, is activated whenever an emergency or disaster occurs and warrants the need for multiple local public agencies to interface with field operations under the Incident Commander(s). In the event of a large scale disaster, the EOC may act as part of a multi-agency coordinating system (MACS) with state and federal agencies.

### *Volunteer Services*

#### Radio Amateur Civil Emergency Service (RACES)

Founded in 1952, the RACES was established under the Federal Communications Commission Rules and Regulations, as part of the amateur radio service. The mission of RACES is to establish and maintain the leadership and organizational infrastructure necessary to provide amateur radio communications in support of emergency management entities throughout the United States and its territories. Amateur radio capabilities provide additional communications capability apart from other analog or digital systems.

#### Sedgwick County Emergency Management K9 (SCEMK9) Team

The SCEMK9 team consists of a group of dedicated and professional volunteer dog handlers, their canine partners and support personnel who conduct intense, weekly training sessions to ensure operational readiness. The team provides search dogs for the Sedgwick County and surrounding areas to Law Enforcement and Fire Rescue Agencies, when requested, at no cost to the agency or families involved. The team responds to calls for missing or lost persons, disasters, and human remains recovery.

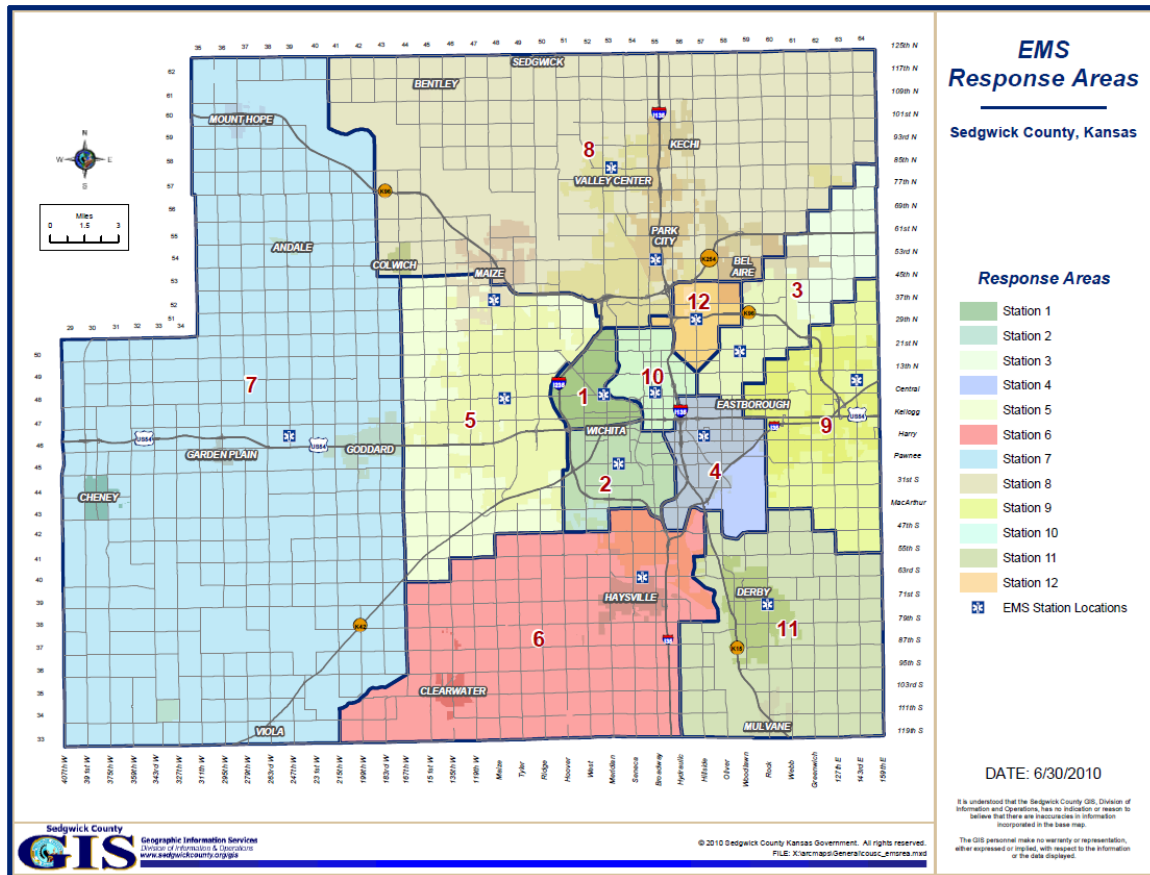
#### 9.9.4 SEDGWICK COUNTY EMERGENCY MEDICAL SERVICE (EMS)

Sedgwick County EMS is the primary agency responsible for the pre-hospital care and transportation of persons who become acutely ill or injured and are in need of ambulance transport to a hospital using Advanced Life Support ambulances. Additionally Sedgwick County EMS provides scheduled ambulance transportation services for persons who require routine transfer by ambulance based on a medical necessity.

Sedgwick County EMS serves a population of approximately 477,000 in a geographic area of approximately 1,008 square miles. There are 18 frontline ambulances in the EMS fleet that are stationed at 15 post locations throughout the County that are either owned in whole or shared with another agency. In 2008, Sedgwick County EMS responded to 47,226 calls for service. In addition to full-time and part-time staff, the Department receives first responder support from Volunteer Emergency Medical Technicians in Derby, and Valley Center and the Wichita and Sedgwick County Fire Departments.

Sedgwick County EMS is a regional Basic Life Support Training Center for the American Heart Association and paramedics offer Cardio-Pulmonary Resuscitation (CPR) classes for the community. EMS has also been proactive in the community to enhance the public's knowledge and understanding of services. In addition to CPR classes, Sedgwick County EMS frequently participates in programming in local schools. One of the most popular programs includes EMS paramedics visiting classrooms to educate children on accessing the emergency system, demonstrating EMS equipment used during service, and a tour of the ambulance. This program is designed to make them more familiar with EMS should they ever need to access the system. In addition to these programs, safety belt and child safety seats are a part of EMS injury prevention efforts. EMS staff promotes proper usage during school programs and community events.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis



### 9.9.5 SEDGWICK COUNTY EMERGENCY COMMUNICATIONS

Sedgwick County Emergency Communications is the primary answering point for 9-1-1 calls in Sedgwick County and provides dispatch services for the Sedgwick County Sheriff's Office, Sedgwick County Fire Department, and Sedgwick County Emergency Medical Service. Additionally, they provide dispatch services for the Wichita Police and Fire Departments, as well as outlying municipalities including: Andale, Bel Aire, Cheney, Clearwater, Colwich, Derby, Eastborough, Garden Plain, Goddard, Haysville, Kechi, Maize, Mount Hope, Mulvane, Park City, and Valley Center.

Emergency Communications is an accredited agency for medical responses through the National Academy of Emergency Medical Dispatch. This accreditation program dictates how the medical quality assurance is conducted – sets the minimum percentage of medical calls to review and what is to be graded. The following data is provided for the year 2012:

- Call Answered: 457,000
- Incidents Dispatched: 525,000
- Call Times: 98% answered within 15 seconds or less

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### 9.10 ENERGY SECTOR

This sector provides the electric power used by all sectors, including critical infrastructures, and the refining, storage, and distribution of oil and gas. The sector is divided into electricity and oil and natural gas. Threats to this sector include cyber and physical vulnerabilities. The following agencies are responsible for this sector:

Local: Public and Private Utilities, Petrochemical Companies

State: Kansas Division of Emergency Management/Kansas Highway Patrol, Kansas Fire Marshall

Federal: Department of Energy

The Energy Sector consists of thousands of geographically dispersed electricity, oil, and natural gas assets that are connected by systems and networks. Without a stable energy supply, health and welfare is threatened and the economy of the United States cannot function.

The energy infrastructure is divided into three interrelated segments:

- Electricity
- Petroleum
- Natural gas

The energy sector is composed of several interrelated subsectors including: electricity, petroleum, and natural gas. Each of these segments are comprised of their own production and distribution systems, over 85% of which are privately owned and operated.

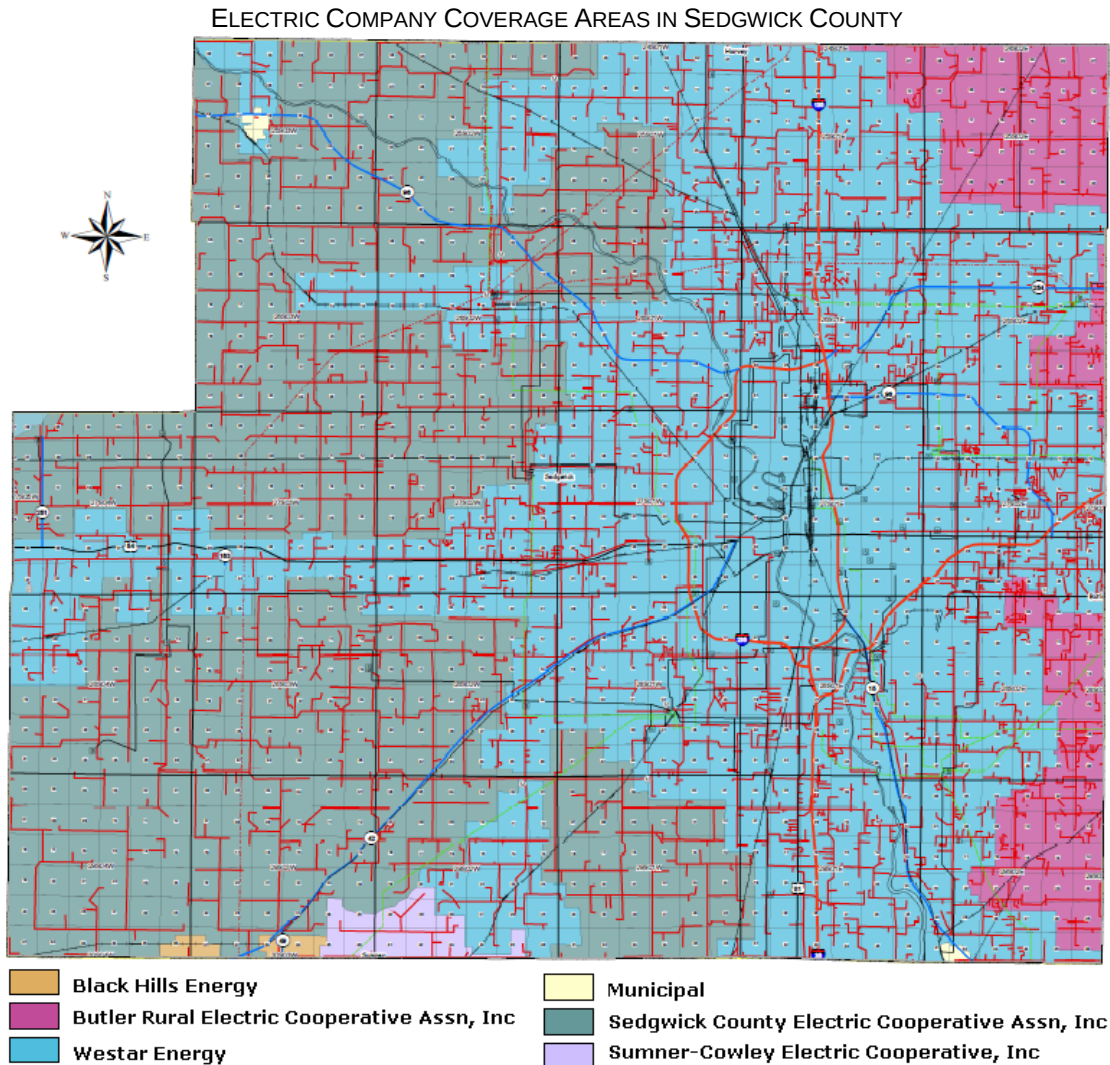
All CIKR sectors are dependent on the Energy Sector for electricity to light and operate homes, offices, and factories and on petroleum products to transport goods to and from their facilities. Many sectors are also dependent on natural gas for heating and/or product processing.

Significant interdependencies exist with the Chemical and Transportation Systems Sectors that provide critical assets and services to the production and distribution of energy. However, due to the ubiquitous use of energy, the Energy Sector shares other dependencies and interdependencies with all other CIKR sectors, including: Emergency Services, Water, Dams, Communications, Banking and Finance, and Government Facilities.

#### 9.10.1 ELECTRICAL DISTRIBUTION SYSTEM

There are five electric companies that service Sedgwick County: Butler Rural Cooperative Association, Sedgwick County Cooperative Association, Sumner-Cowley Electric Cooperative, Black Hills Energy, and Westar Energy. There is also one municipal operated electric plant operated and maintained by the City of Mulvane. Westar Energy supplies non-cooperative electric through the following plants and respective megawatts (MW): Gordon Evans Energy Center (845MW), Murray Gill Energy Center (317MW), and Wolf Creek Nuclear Generating Station in Coffey County (548MW). Fuel sources are coal (62%), natural gas – fueled oil (28%), and nuclear (10%). The following map shows the coverage areas of the electric companies:





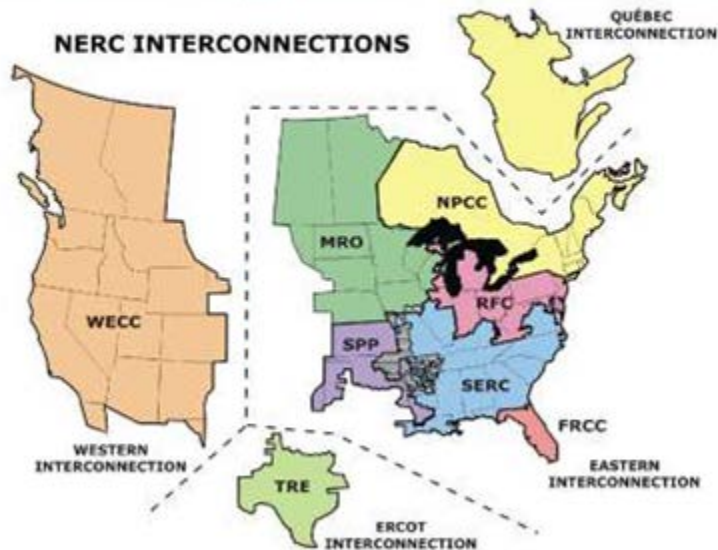
As shown in the map above, Sedgwick County is supplied by electrical power from two power stations: Lang Substation in Lyon County, and Wolf Creek Nuclear Generating Substation in Coffey County. There are two primary substations in Sedgwick County that steps down electrical services for consumers: Benton Substation near 143<sup>rd</sup> Street East and K-254, and Gordon Evans Generating Power Plant/Substation.

The Cheney substation supplies power to the Cheney reservoir pump station and is the sole line of supply of electricity. The Cheney pump station has 5-4,000 volt (135 amp) 1,000 HP pumps electronically controlled by the filter plant in Wichita (manual controls are on site). There are currently no backup generators for emergency power at the Cheney pump station in the advent of power loss. Three substations service the Wichita water (Hess) pump station, and two substations service the Wichita well field.

### 9.10.1.1 SOUTHWEST POWER POOL (SPP)

SPP is regulated by the Federal Energy Regulatory Commission (FERC). SPP was approved as a FERC Regional Transmission Organization (RTO) in 2004. SPP is a founding member of the North American Electric Reliability Council (NERC). SPP became a NERC Regional Entity in 2007, which gives the responsibility of enforcing reliability standards for users, owners, and operators of the bulk power system in the SPP footprint.

### 3 Electric Interconnections / 8 NERC Regions



This NERC map shows the other NERC Regional Entities and the three electric interconnections. (Nebraska is not included as part of the SPP region on this map, because SPP's Nebraska members are part of the MRO Regional Entity, not the SPP Regional Entity. Nebraska is part of the SPP Regional Transmission Organization.)

### Members in 9 states

Arkansas  
Kansas  
Louisiana  
Mississippi  
Missouri  
Nebraska  
New Mexico  
Oklahoma  
Texas

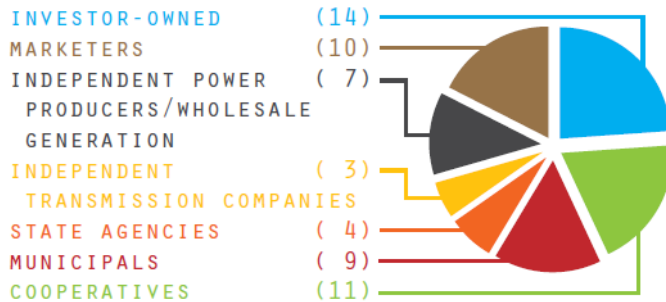
Provide services to Entergy  
on contract basis (ICT)



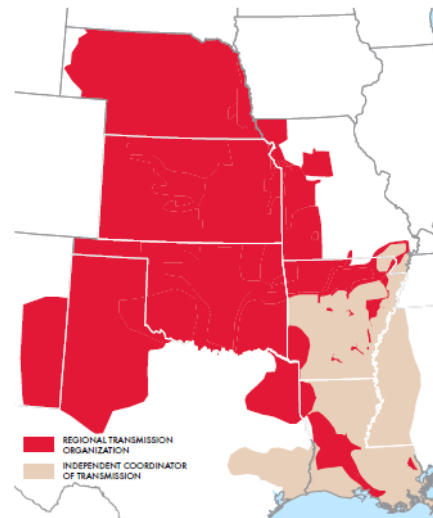
The SPP Regional Transmission Organization manages the power grid in all or part of eight states; and also have a member in Mississippi. SPP also serves as the Independent Coordinator of Transmission (ICT) for Entergy on a contract basis.

## Membership

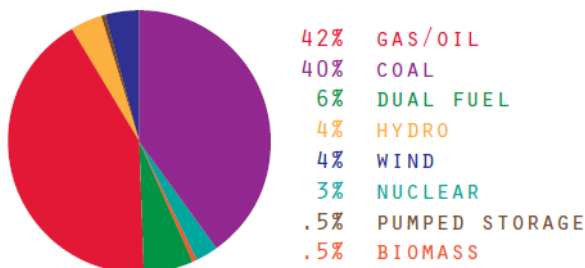
SPP's 58 diverse members serve over 5 million customers across nine states.



## Geographic and Operational Footprints



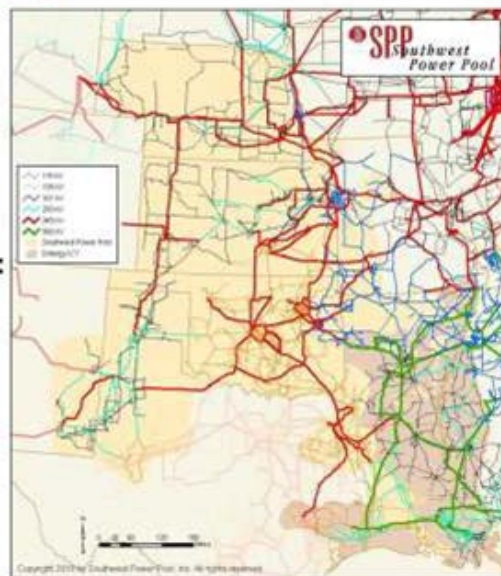
## Generating Capacity by Fuel Mix



- 370,000 square miles
- 29 Balancing Authorities
- 50,575 miles of transmission lines
- 6,079 substations
- 847 generating plants
- 2009 peak load: 47,365 megawatts (non-coincident)

## Operating Region 2010

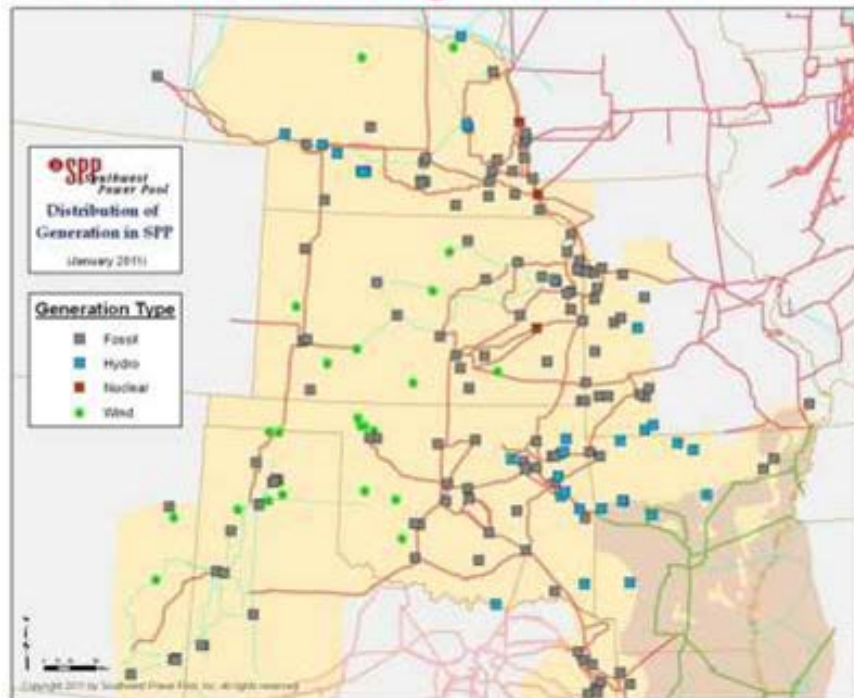
- 370,000 miles service territory
- 859 generating plants
- 6,101 substations
- 48,930 miles transmission:
  - 69 kV – 12,722 miles
  - 115 kV – 10,143 miles
  - 138 kV – 10,009 miles
  - 161 kV – 5,097 miles
  - 230 kV – 3,787 miles
  - 345 kV – 7,079 miles
  - 500 kV – 93 miles



Note: These statistics are for the RTO footprint; the map depicts transmission for both the RTO and ICT (Entergy) footprints.

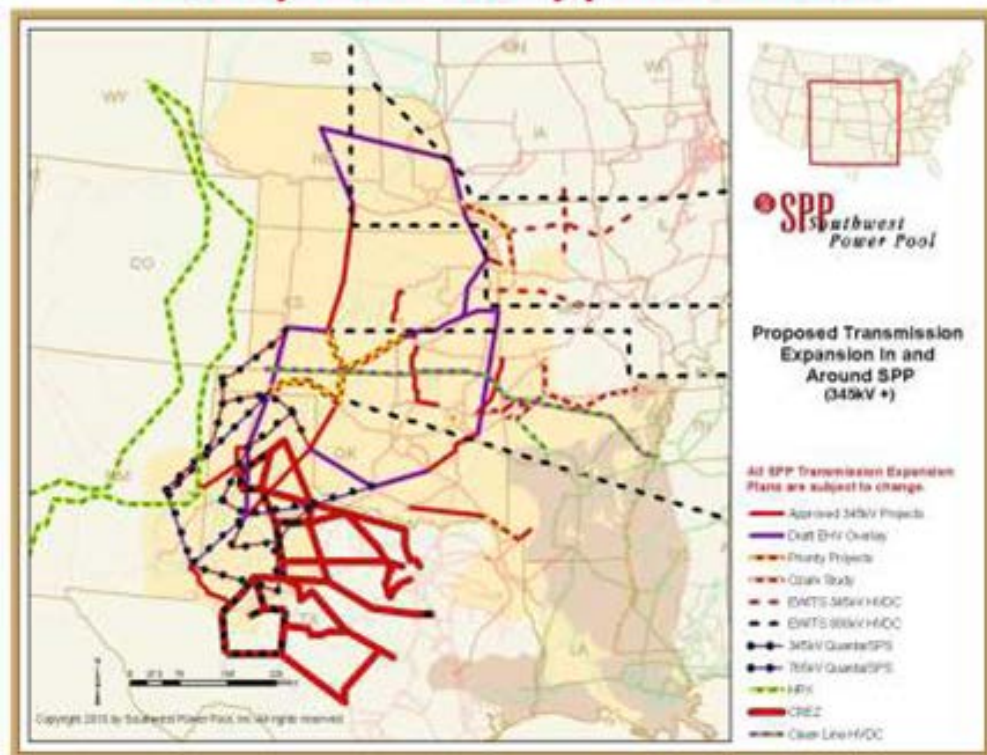


### Generating Resources

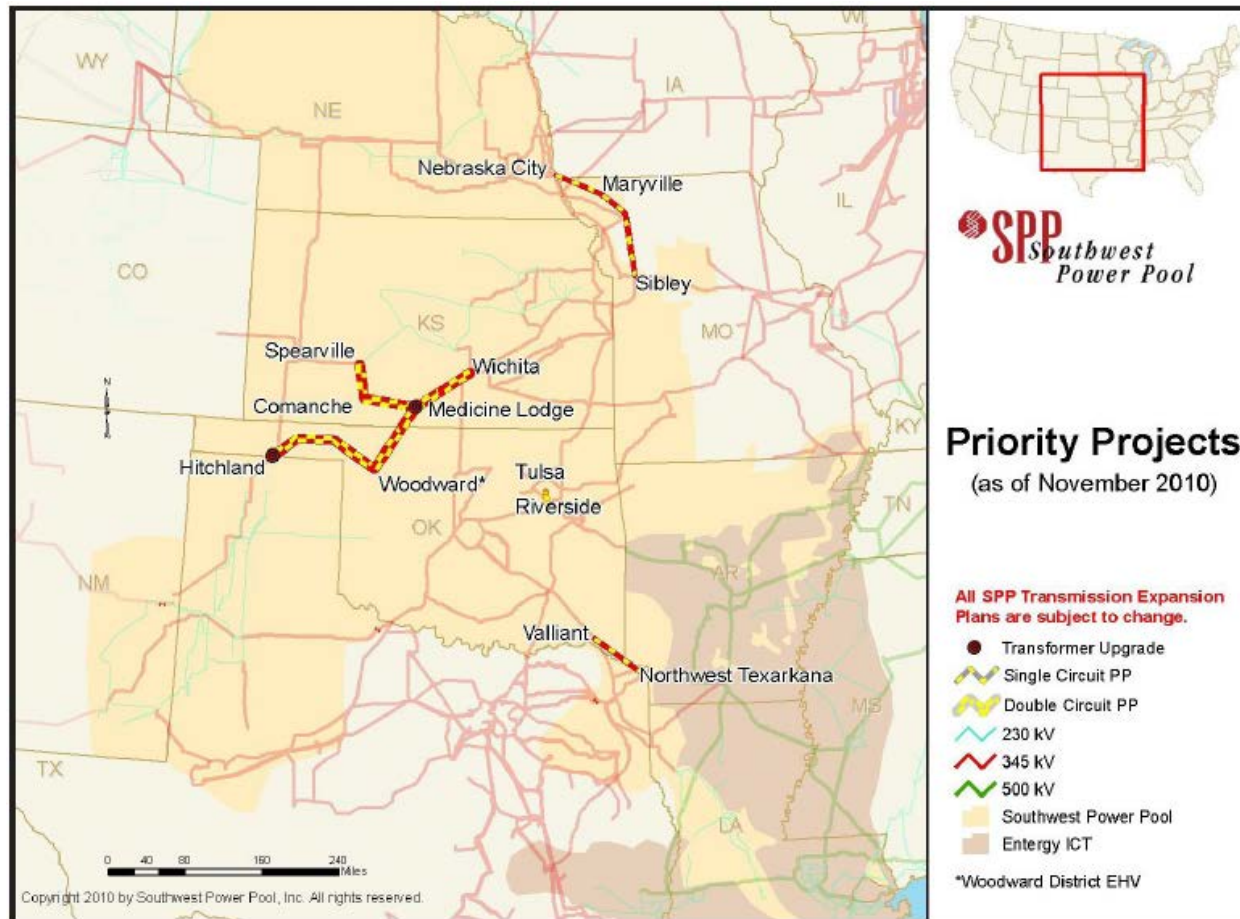


Note: As the map above shows, Kansas has both fossil and wind generating resources.

### Conceptual and Approved Plans



Note: Proposed transmission expansions into the year 2030.



### Current Priority Projects for Kansas

- Mid-Kansas Electric Company and Sunflower Electric Power Corporation to construct 55 miles 345 kV double circuit transmission line from Spearville to Comanche County in southwest Kansas
- Mid-Kansas Electric Company to construct 55 miles of double circuit 345 kV transmission line from Comanche County to Medicine Lodge in southwest Kansas
- Mid-Kansas Electric Company and Westar Energy to construct 75 miles double circuit 345 kV transmission line from Medicine Lodge to Wichita in south Kansas
- Mid-Kansas Electric Company and Oklahoma Gas and Electric Company to construct 108 miles of double circuit 345 kV transmission line from Medicine Lodge to Woodward EHV in northwest Oklahoma and southwest Kansas

### Prairie Wind Transmission Project

Prairie Wind Transmission, LLC., is a joint venture formed by Westar Energy and Electric Transmission America — a joint venture of subsidiaries of American Electric Power and MidAmerican Energy Holdings Company — to build and own new electric transmission assets in Kansas (see *note*).

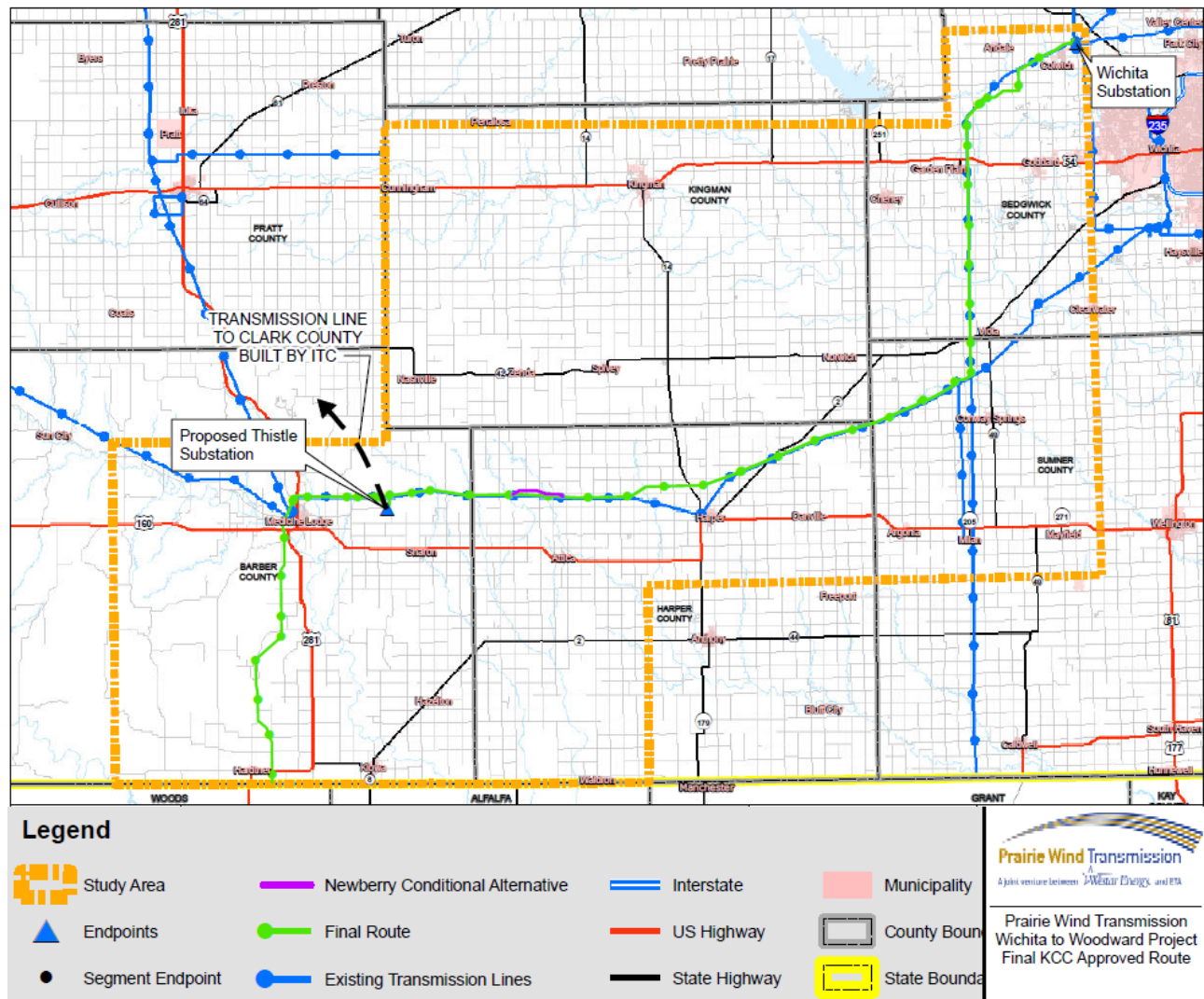
Prairie Wind Transmission is constructing approximately 108 miles of extra-high-voltage 345-kV double-circuit transmission lines linking a 345-kV substation near Wichita, Kan., to a new 345-kV substation northeast of Medicine Lodge, Kan. near the Flat Ridge I Wind Farm jointly owned by Westar Energy and BP Alternative, and then south to the Kansas/Oklahoma border. The project will provide enhanced electricity transport in Kansas and support expansion of renewable electricity generation in the region.



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

The estimated cost of the project is \$225 million; however, final costs will be dependent on the routing of the line, equipment and commodity costs. The project is anticipated to be completed in late 2014.

The following map shows the route for the Prairie Wind Transmission line:

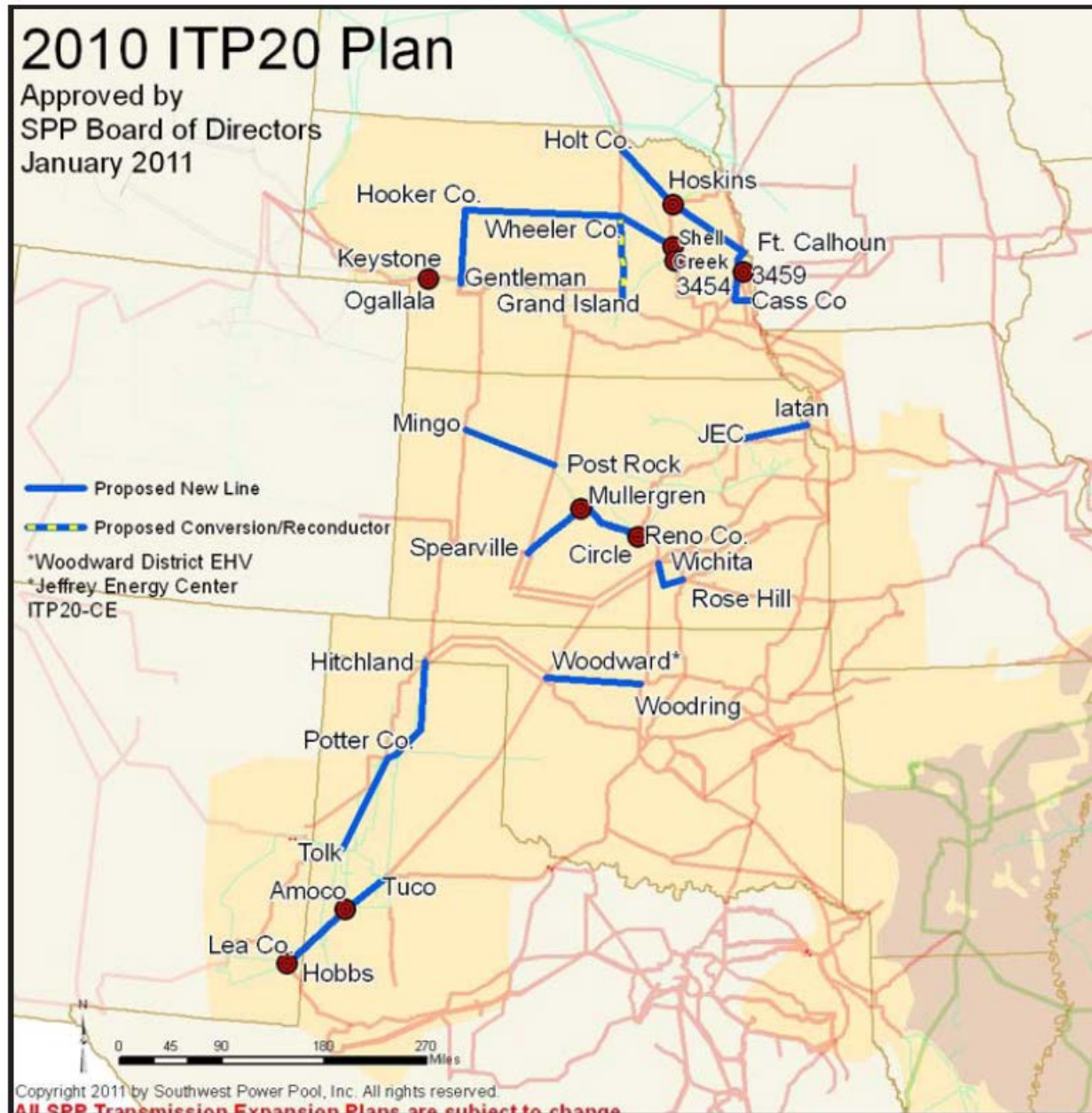


Note: <sup>36</sup>

American Electric Power is one of the largest electric utilities in the United States, delivering electricity to more than 5 million customers in 11 states. AEP ranks among the nation's largest generators of electricity, owning nearly 38,000 megawatts of generating capacity in the U.S. AEP also owns the nation's largest electricity transmission system, a nearly 39,000-mile network that includes more 765-kilovolt extra-high voltage transmission lines than all other U.S. transmission systems combined. AEP's transmission system directly or indirectly serves about 10 percent of the electricity demand in the Eastern Interconnection, the interconnected transmission system that covers 38 eastern and central U.S. states and eastern Canada, and approximately 11 percent of the electricity demand in ERCOT, the transmission system that covers much of Texas.

MidAmerican Energy Holdings Company, based in Des Moines, Iowa, is a global provider of energy services. Through its energy-related business platforms, MidAmerican provides electric and natural gas service to more than 6.9 million customers worldwide.

<sup>36</sup> [http://www.westarenergy.com/wcm.nsf/resources/2011-6-29/\\$file/2011-6-29.pdf?openelement](http://www.westarenergy.com/wcm.nsf/resources/2011-6-29/$file/2011-6-29.pdf?openelement)



SPP completed the first phase of the new ITP process: the first ITP 20-Year Assessment (ITP20). The 2010 ITP20 identified grid upgrades projected to be needed by 2030 to accommodate possible future scenarios and provide a strong transmission grid. The 2010 ITP20 Plan consists of 1,494 miles of 345 kV lines and eleven 345 kV step-down transformers.

### FUTURE TRENDS

It is forecasted that the demand for electricity in the United States will grow at an average rate of 1.57% annually for the next decade, with growth for the SPP region averaging 1.16% annually.<sup>37</sup>

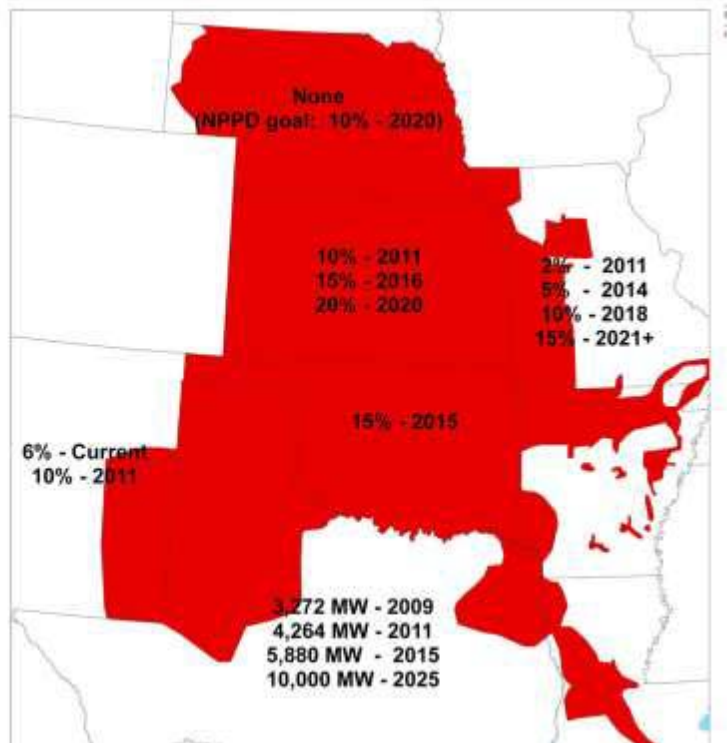
There is more potential wind energy in the footprint than SPP could absorb. We have over 28,000 MW of wind in-service and under development in the RTO generation interconnection queue, waiting to be added to the

<sup>37</sup> NERC 2009 Long-Term Reliability Assessment 2009-2018

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

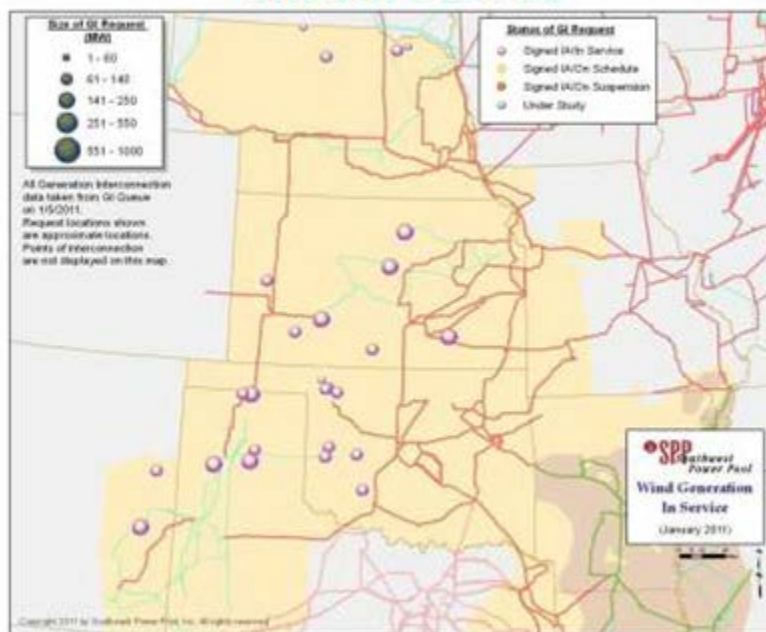
grid. Compare this to SPP's 2010 system peak on the hottest summer day of ~53,000 MW. Projections in the National Renewable Energy Lab/Department of Energy's Eastern Wind Integration and Transmission Study (EWITS) forecasts 60 – 95 GW of wind development in SPP.

### Renewable Portfolio Standards



Some states in the SPP footprint have passed standards requiring a certain amount of electricity to come from renewable sources by a deadline. If the federal government passed a renewable standard, the need would increase for the SPP region to export wind energy to other parts of the country. For Kansas, the standards project a 10% increase for 2011, a 15% increase by 2016, and a 20% increase by 2020.

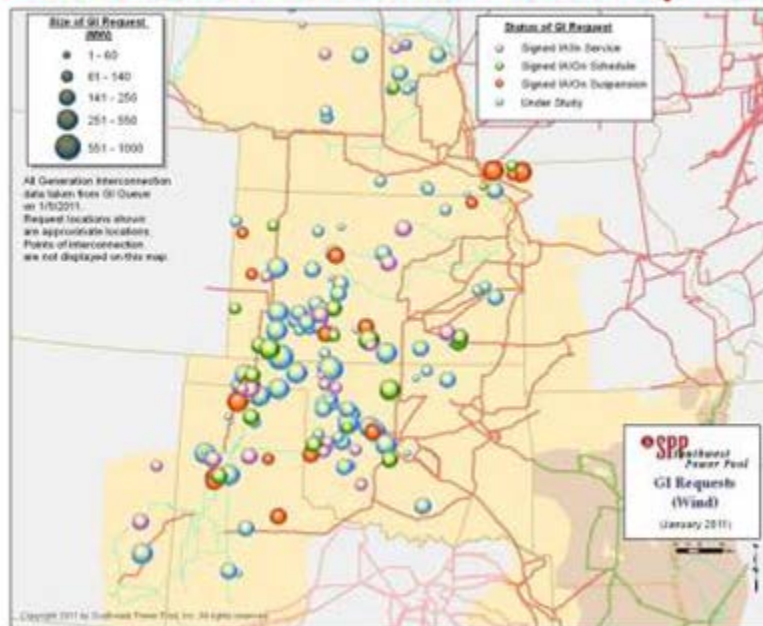
### Wind In Service



Note: Wind energy in service as of January 2011.



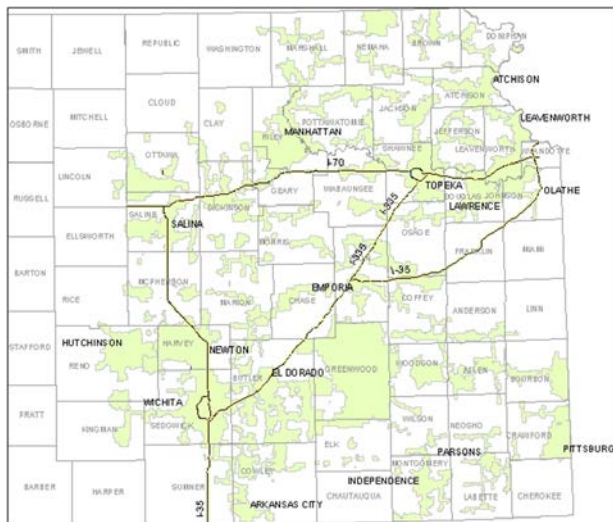
### Generation Interconnection Requests



*Note: Projected projects for wind generating locations*

#### 9.10.1.2 WESTAR ENERGY

Westar Energy is an investor-owned part of the Southwest Power Pool (SPP) and has approximately 687,000 residential, commercial and industrial customers of which 220,826 customers are in Sedgwick County.



Electrical service enters Sedgwick County via Westar Energy's 345,000-volt overhead power lines in northeast and southwest portions of the County. The electricity is supplied from two power stations: Lang Substation in Lyon County, and Wolf Creek Nuclear Generating Substation in Coffey County.

These transmission lines intersect Benton Substation (143<sup>rd</sup> Street East and K-254), and Gordon Evans Generating Power Plant/Substation prior to having electrical power stepped down for electrical services to consumers.

There are six mid-sized 138,000-volt service substations encircling the City of Wichita that supply electrical power to 43 smaller consumer oriented 64,000-volt substations.

#### *Susceptible Concerns*

Although the majority of 64,000-volt substations service block sections of the City of Wichita, several of the substations are only dedicated to one customer (i.e. Cheney reservoir pump station, OxyChem, and McConnell Air Force Base). Typically, power can be restored to affected portions of the city within several hours according to Westar Energy. Critical facilities such as hospitals have back-up emergency generators; however, health care facilities and child/day care facilities typically do not.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

The dedicated substations are not connected on a “grid” system and could be disrupted for days or longer. Water supply from the Cheney reservoir pump station would be disrupted since there is currently no backup generators for emergency power at the Cheney pump station in the advent of power loss. Both OxyChem and McConnell Air Force base would be dependent on back-up generators until electrical power could be restored. One of the additional concerns for power loss in the community would be potential mechanical failure in industrial facilities.

### 9.10.1.3 BUTLER RURAL ELECTRIC COOPERATIVE (BUTLER REC)

Butler REC supply's electric power to 7,000 meters through 1,850 miles of transmission and distribution lines and own 13 substations or delivery points. Through membership in Kansas Electric Power Cooperative, they own part of the nuclear generating facility at Wolf Creek. This also allows access to power grids, enabling the purchase of hydro-power, the least expensive power available, from the Southwest Power Pool. Butler REC provides electric power to residential, commercial and industrial accounts in portions of Butler, Chase, Cowley, Greenwood, Harvey, Marion, and Sedgwick counties.

### 9.10.1.4 SEDGWICK COUNTY COOPERATIVE ASSOCIATION

The Sedgwick County Electric Cooperative Association, Inc. has 17 employees, 5,061 services, over 4,200 members, approximately 1,090 miles of energized lines, six substations, and over 95 million kWh sold yearly.

### 9.10.1.5 SUMNER-COWLEY ELECTRIC COOPERATIVE

Sumner-Cowley currently provides electric service to rural areas in all of Sumner country, half of Cowley County, and areas of Harper, Sedgwick and Kingman counties. The service area encompasses approximately 2,500 square miles, with approximately 4,300 meters and nearly 2,000 miles of line. Headquartered in Wellington, Sumner-Cowley is one of 27 distribution electric cooperatives serving consumer members in the state of Kansas

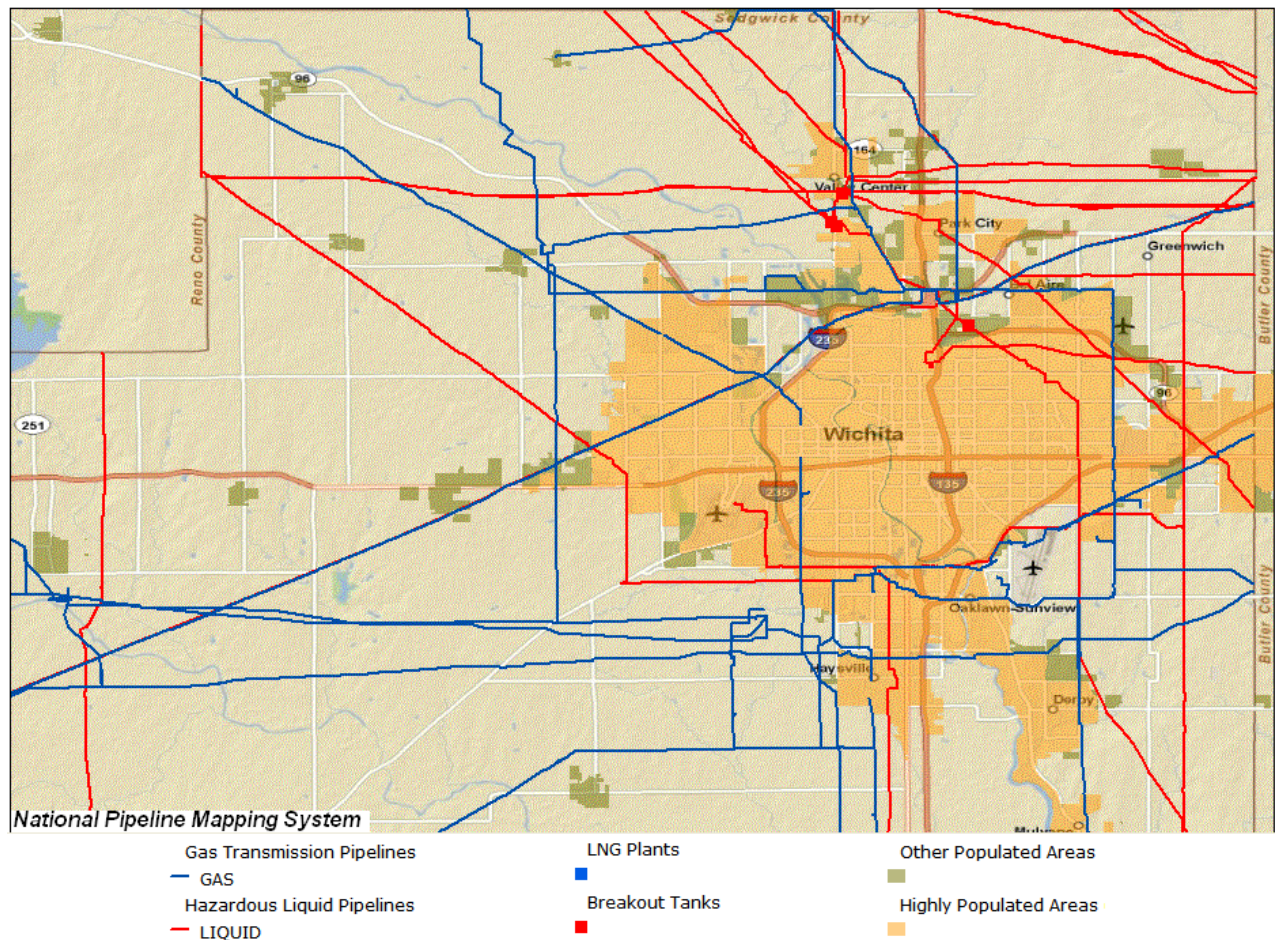


## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 9.10.2 PETROLEUM DISTRIBUTION SYSTEM

The following map shows petroleum and natural gas transmission pipelines in Sedgwick County. Transmission pipelines move products from the production area or refinery to outlets such as bulk storage terminals or loading facilities. Local distribution systems may also transport liquid petroleum and natural gas. Liquid petroleum distribution systems transport product from the bulk storage facility by rail car or tank trucks. Local natural gas distribution companies (LDCs) use pipelines to move natural gas from a city gate or town border station to distribution systems. Local distribution systems transport natural gas through mains that are usually located along or under city streets to service lines that connect to homes and businesses. Gathering pipelines link the production areas to central collection points.

**PIPELINES IN SEDGWICK COUNTY**



Williams (6-Inch Natural Gas): 102.98 Miles  
Williams Energy (6-Inch Natural Gas): 9.47 Miles  
Conoco Pipeline (10-Inch Diesel/Gasoline/Jet Fuel): 13.68 Miles  
Equilon (4, 6 & 10-Inch Crude Oil/Liquid Petroleum Gas): 28.95 Miles  
Koch Petroleum (10-Inch Refined Petroleum Products): 33.61 Miles  
Phillips Chisholm Pipeline (10-Inch Natural Gas Liquids): 19.05 Miles  
Phillips Pipeline (10-Inch Butane/Diesel/Kerosene/Propane/Gasoline): 60.89 Miles  
Farmland Industries (6-Inch Crude Oil): 19.03 Miles  
Getty Gas Gathering (12-Inch Natural Gas): 37.94 Miles  
Kansas Industries Energy Supply (4-Inch Natural Gas): 13.71 Miles  
Jayhawk (8-Inch Crude Oil): 56.07 Miles  
Kinder Morgan Energy Partners (8-Inch Liquid Petroleum Gas): 13.65 Miles  
Kaneb (8-Inch Fuel Oil/Gasoline): 12.39 Miles

## **2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis**

---

### COFFEYVILLE RESOURCES CRUDE TRANSPORTATION, LLC

Coffeyville Resources Refining & Marketing, LLC, the heart of CVR Energy's petroleum business, operates an 115,000 barrel per day highly sophisticated oil refinery located in Coffeyville, Kan. The refinery is a catalytic cracking/delayed coking refinery that processes moderately heavy, medium sulfur crude oil from a broad array of domestic and international sources and predominantly produces clean transportation products such as gasoline, diesel fuels, and propane. Of the refinery's approximate 115,000 barrel per day requirement for crude oil, about 75 percent is purchased from international and domestic crude oil suppliers, and the balance is sourced by Coffeyville Resources Crude Transportation, LLC through its 35,000 barrel per day crude oil gathering system serving Kansas, northern Oklahoma, western Missouri and southwest Nebraska. With field offices in Bartlesville, Okla., and Plainville and Winfield, Kan., the gathering system is comprised of over 300 miles of pipelines and associated tankage and truck transportation facilities.

### CONOCOPHILLIPS PIPE LINE COMPANY (CPPL)

CPPL operates more than 12,000 miles of pipeline and more than 80 storage terminals in the United States. CPPL transports both raw and finished refined products, including crude oil, propane, and refined products such as gasoline, diesel and jet fuel. Motor fuels are stored in terminals where tanker trucks pick them up for delivery to local retail outlets. CPPL operates approximately 900 miles of pipeline throughout the state of Kansas. These various pipelines transport refined petroleum products to various terminals and storage facilities within Kansas. CPPL's refined product pipelines deliver to terminals located in Oklahoma, Texas, Kansas, Missouri, Indiana, and Illinois.

### JAYHAWK PIPELINE, LLC

Jayhawk is owned by the National Cooperative Refinery Association (NCRA) in McPherson, Kansas, and transports approximately 135,000 barrels per day of crude oil in both intrastate and interstate commerce. Jayhawk connects all of the major crude oil pipelines in 22 Kansas counties and operates 850 miles of gathering and trunk lines in the states of Kansas, Nebraska, Oklahoma, and Texas.

### MAGELLAN MIDSTREAM PARTNERS, LP

Magellan operates a hazardous liquid transmission pipeline consisting of low-sulfur No. 2 fuel oil and unleaded gasoline through Sedgwick County along with a terminal at 1120 S Meridian Avenue in Valley Center.

### NATIONAL COOPERATIVE REFINERY ASSOCIATION (NCRA)

Headquartered in McPherson, NCRA is an inter-regional petroleum cooperative owned by three regional cooperatives distributing products manufactured by NCRA. NCRA owns an underground petroleum storage installation at Conway just west of McPherson and a crude oil trucking fleet of approximately 65 transports which operate in western Kansas. NCRA, which operated in six (6) Kansas counties, also owns 100% of Jayhawk Pipeline LLC, 66% of Kaw Pipe Line Company, and 50% of Osage Pipe Line LLC. Products produced include: gasoline, fuel oil #1 and #2, diesel fuel, butane, and propane.

### NUSTAR PIPELINE OPERATING PARTNERSHIP LP

NuStar Pipeline is a subsidiary of NuStar Energy LP based in San Antonio, Texas with 9,063 miles of pipelines, 86 terminal facilities, four (4) crude oil storage tank facilities, and two (2) asphalt refineries. The Central East Region, which is a subsidiary of NuStar Pipeline Operating Partnership, transports refined petroleum products, including gasoline, diesel, and propane in the Midwest. The system includes 2,530 miles of pipelines that transport an average of 203,000 barrels per day and 21 distribution terminals with a storage capacity of 4.8 million barrels. Storage facilities located at McPherson and El Dorado have a storage capacity of approximately 1.1 million barrels.

### ONEOK NORTH SYSTEM LLC

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

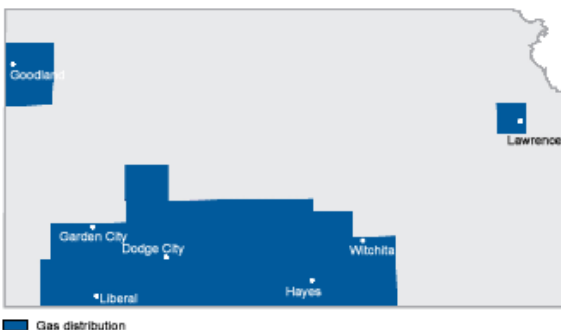
ONEOK North System is a 1,600-mile interstate common carrier pipeline system with facilities to transport, store and deliver a full range of NGL products to include: refined motor fuels, ethane, propane, butanes, and natural gasoline in 20 south/north central and northeast Kansas counties.

### SEMCRUDE, L.P.

SemCrude purchases crude oil and condensates from independent producers and operators as well as aggregators and independent refiners located in Colorado, Kansas and Oklahoma. Specifically, SemCrude gathers, transports and stores crude oil and condensates from North America's Gulf Coast, Central Energy Corridor to Canada. The crude oil and condensate is transported via tank trucks and pipelines to third party pipelines as well as to the Cushing, Oklahoma interchange.

### 9.10.3 NATURAL GAS DISTRIBUTION SYSTEM

#### BLACK HILLS ENERGY



Black Hills Corporation serves 750,000 utility customers in Colorado, Iowa, Kansas, Montana, Nebraska, South Dakota, and Wyoming. Black Hills Energy, a division of Black Hills Corporation, serves 107,000 natural gas customers in 54 Kansas communities. The company's non-regulated businesses generate wholesale electricity, produce natural gas, oil and coal, and market energy. Black Hills operates in 21 counties in southwest (towns) and south central (transmission) Kansas.

#### ENTERPRISE PRODUCTS OPERATING, LLC

Enterprise Products transports natural gas, natural gas liquids, petrochemicals, and crude oil through 32,000 miles of onshore and offshore pipelines. The Mid-America Pipeline system operates approximately 2,068 miles of pipelines ranging in diameter from four (4) to 12 inches throughout 34 counties in the State of Kansas. Products include: iso-butane, naptha, normal butane, natural gasoline, propane, Y-grade (demethanized mix) ethane propane mix (E/P), natural gas, unleaded gasoline, and diesel fuel.

#### HAWKERBEECH GAS STORAGE

According to 2009 Department of Energy reporting, the former Stanlaker North Derby Underground Gas Storage reservoir has a working gas capacity of 50,785 Mcf, total field capacity of 1,050,000 million cubic feet (Mcf), and a maximum daily delivery of 750 Mcf through a transmission pipeline to the HawkerBeech plant on Webb Road in East Wichita.

#### KANSAS GAS SERVICE (KGS)

KGS is a division of ONEOK, Inc, provides clean, safe, and reliable natural gas to more than 647,000 residential, commercial and industrial customers across the state of Kansas. Natural gas is delivered to the company's distribution systems from transmission lines, some of which are owned by KGS, at operating pressures typically between 150 pounds per square inch (psig) and 1,000 psig. Natural gas is then delivered through distribution pipelines that generally operate at 60 psig or less. KGS maintains, operates, and monitors approximately 19,075 miles of transmission, distribution and service pipelines.

#### MID-CONTINENT MARKET CENTER, L.L.C. (MCMC)

MCMC is a 194-mile intrastate pipeline system primarily located in Kingman, Sedgwick and Butler counties in south central Kansas. MCMC offers both intrastate and NGPA 311 transportation services. Major sources of gas supply for MCMC are the ONEOK Field Services Company's Cheney plant, Pioneer Resources' Spivey

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

plant, Panhandle Eastern Pipeline Company and Southern Star Central Gas Pipeline, Inc. pipeline interconnects. Markets served include several Wichita, Kansas-area industrial customers and distribution customers. The pipeline operates between 500 and 600 psig. MCMC has two mainline compressor stations, Haysville and Colwich, with a combined total 8,000 horsepower. MCMC has three storage facilities: Brehm, Konold and Yaggy. Brehm Storage has 1,989 Bcf of working capacity, 1,230 horsepower of compression and the ability to deliver up to 35 MMcf per day and inject up to 20 MMcf per day. Konold Storage has 0.7 Bcf of working capacity, 720 horsepower of compression and the ability to deliver and inject up to 10 MMcf per day. Yaggy Storage is currently removed from service



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### ONEOK FIELD SERVICES COMPANY, LLC

ONEOK, Inc., an Oklahoma corporation, is a diversified energy company involved in natural gas processing, gathering, storage and transmission in the Mid-Continent areas of the United States. The company's gathering and processing segment gathers and processes natural gas, and fractionates natural gas liquids through its subsidiary, ONEOK Field Services Company.

Specifically, ONEOK Field Services Company has a processing capacity of approximately 2.0 Bcf/d with approximately 13,800 miles of gathering pipelines that supply the gas processing plants. The gas processing operation primarily includes the extraction of mixed natural gas liquids from natural gas, and their fractionation (separation) into component products (ethane, propane, iso-butane, normal butane and natural gasoline). The component products are used by and sold to diverse customer base of end users for petrochemical feedstock, residential uses, and blending into motor oils.

The gathering operation connects unaffiliated and affiliated producing wells to the processing plants. It consists of the gathering of natural gas through pipeline systems, including compression, treatment, and dehydration services. In Kansas, ONEOK Field Services operates approximately 6,000 miles of pipeline, 5,400 gas wells, 3 processing plants, and 215,000 horsepower of natural gas compression.

### ONEOK NGL PIPELINE, LLC

ONEOK NGL Pipeline, L.L.C., operates approximately 1,800 miles of pipelines through the state of Kansas that gather and transport products known as Natural Gas Liquids (NGL). These products, at any given time, can be a varied mixture of NGL, LPG (Liquid Petroleum Gas) or HVL (Highly Volatile Liquids). They are a mixture consisting of ethane, propane, butane, natural gasoline, ethane-propane mixture, and propylene. The Kansas pipeline system gathers raw NGL and transports the products to a fractionation and storage facility in Medford (Oklahoma), Hutchinson and Bushton (Kansas). Once the products have been fractionated, they are distributed to areas in Central Kansas and Gulf Coast markets. This system consists of pipelines ranging from 3 inches to 16 inches in diameter.

### QUEST PIPELINES (KPC), L.P.

Quest Pipelines (KPC) owns and operates a 1,120-mile interstate gas pipeline which transports natural gas from Oklahoma and Western Kansas to the metropolitan Wichita and Kansas City markets. Further, it is one of the only three pipeline system currently capable of delivering gas into the Kansas City metropolitan market. The KPC system includes three compressor stations with a total of 14,680 horsepower and has a capacity of approximately 160 Mmcfd/day. KPC has supply interconnections with the Transok, Panhandle Eastern and ANR pipeline systems, allowing distribution from the Anadarko and Arkoma basins, as well as the western Kansas and Oklahoma panhandle producing regions. KPC's two primary customers are Kansas Gas Service (KGS) and Missouri Gas Energy (MGE), both of which are served under long-term natural gas transportation contracts. KGS, a division of ONEOK, Inc. is the local distribution company in Kansas for Kansas City and Wichita as well as a number of other municipalities; while MGE, a division of Southern Union Company, is a natural gas distribution company that serves over a 500,000 customers in 155 western Missouri communities.

### SOUTHERN STAR CENTRAL GAS PIPELINE, INC

Headquartered in Owensboro, Kentucky, Southern Star is a natural gas transmission system spanning over 6,000 miles in the Midwest and Mid-Continent regions of the United States. Transmission lines cross 66 counties throughout Kansas into adjacent states.



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 9.11 GOVERNMENT FACILITIES SECTOR

This sector ensures security and freedom and administers key public functions. Threats to this sector include cyber, natural (related to cyber) and physical vulnerabilities. The following agencies are responsible for this sector:

Local: Public and Private Utilities, Petrochemical Companies

State: Kansas Division of Emergency Management/Kansas Highway Patrol, Kansas Fire Marshall

Federal: Department of Homeland Security

The Government Facilities Sector includes facilities owned or leased by all levels of government domestically or overseas. Many of these facilities are open to the public, such as courthouses, educational facilities, libraries, and archives. Other facilities not open to the public contain highly sensitive information, materials, processes, and equipment, such as military installations, embassies, and research facilities. These facilities are differentiated from other CIKR sectors because they are uniquely governmental.

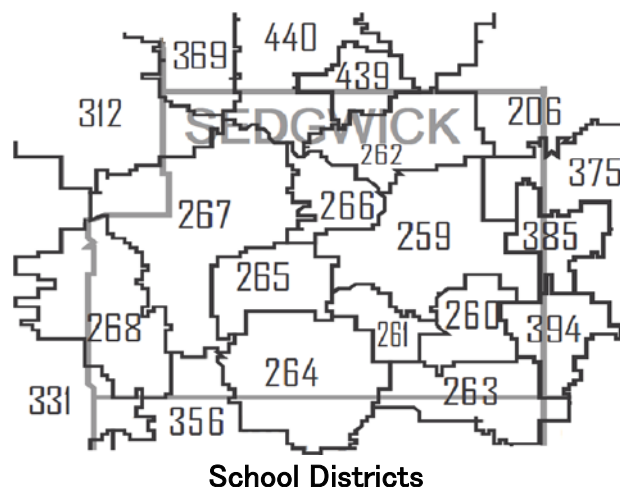
The Government Facilities Sector ensures the safety and security of governmental facilities owned or leased by all levels of government domestically or overseas. Many government facilities are open to the public for business activities, commercial transactions, or recreational activities. Other facilities are not open to the public because they contain highly sensitive information, materials, processes, and equipment.

The sector also includes the Education Facilities Subsector, which covers prekindergarten through 12th grade (preK-12) schools, institutions of higher education, and business and trade schools. This subsector includes both government-owned facilities and facilities owned by private-sector entities, so it faces some unique challenges.

In addition to physical structures, the sector considers cyber elements that contribute to the protection of sector assets, such as access control systems and closed-circuit television systems, and individuals who possess tactical, operational, or strategic knowledge or perform essential functions.

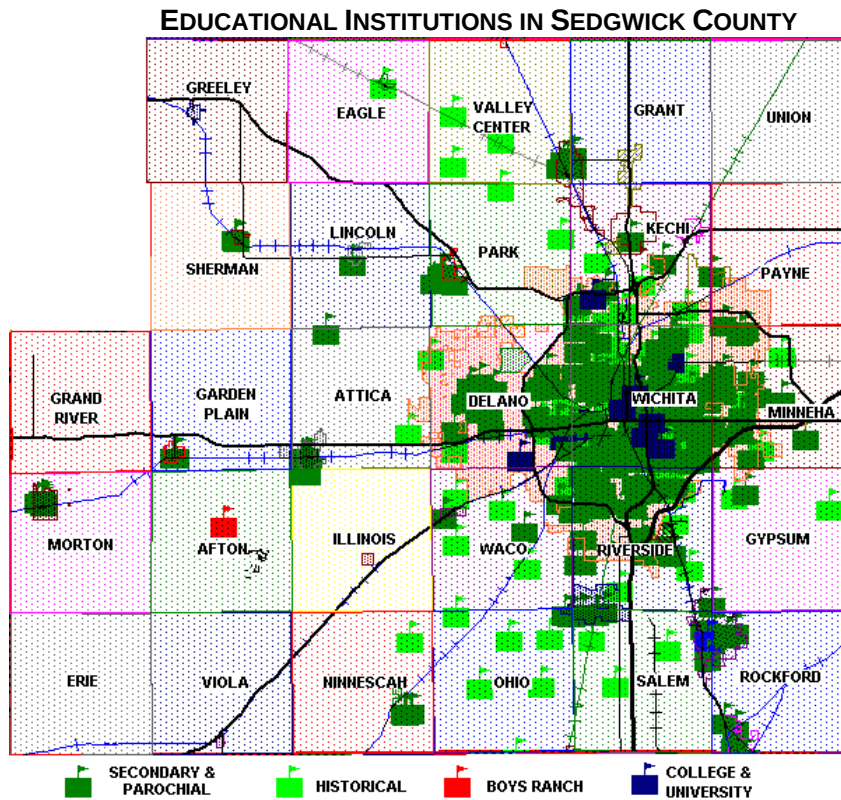
Government facilities face a range of natural and human-caused threats. These facilities are attractive targets for terrorist groups and criminals because they provide unique services, perform sensitive functions, and have significant symbolic value.

The Government Facilities Sector shares dependencies and interdependencies with all other CIKR sectors, including but not limited to the Communications, Energy, Information Technology, and Water. The Education Facilities Subsector shares dependencies and interdependencies with the following sectors: Agriculture and Food, Chemical, Commercial Facilities, Emergency Services, and Transportation Systems.



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

A total of 155 public and private schools (to include technical trade, colleges and universities) governed by the Kansas Board of Education were identified and are shown on the following page.



The following table shows a breakdown of school attendance for the school year 2013-2014:

| 2013-2014 ENROLLMENT                       |               |            |                     |            |                    |           |               |
|--------------------------------------------|---------------|------------|---------------------|------------|--------------------|-----------|---------------|
| PUBLIC SCHOOL DISTRICTS IN SEDGWICK COUNTY |               |            |                     |            |                    |           |               |
| USD                                        | K-12 Grades   | Special Ed | Special Ed 3 & 4 yr | Non-Graded | 4-Year Old At-Risk | Pre-K     | Totals        |
| 259                                        | 47,527        | 0          | 478                 | 739        | 2,005              | 55        | 50,804        |
| 260                                        | 6,886         | 0          | 87                  | 0          | 49                 | 42        | 7,064         |
| 261                                        | 4,980         | 0          | 91                  | 154        | 150                | 0         | 5,375         |
| 262                                        | 2,668         | 0          | 16                  | 50         | 32                 | 2         | 2,768         |
| 263                                        | 1,741         | 0          | 36                  | 38         | 31                 | 21        | 1,867         |
| 264                                        | 1,113         | 0          | 15                  | 58         | 8                  | 25        | 1,219         |
| 265                                        | 5,392         | 0          | 46                  | 6          | 60                 | 0         | 5,504         |
| 266                                        | 6,959         | 0          | 71                  | 3          | 36                 | 150       | 7,219         |
| 267                                        | 1,912         | 0          | 10                  | 0          | 0                  | 1         | 1,923         |
| 268                                        | 776           | 0          | 4                   | 0          | 22                 | 5         | 807           |
| <b>Totals</b>                              | <b>78,859</b> | <b>0</b>   | <b>775</b>          | <b>339</b> | <b>2,334</b>       | <b>70</b> | <b>82,377</b> |
| PRIVATE ACCREDITED SCHOOL DISTRICTS        |               |            |                     |            |                    |           |               |
| No. of Districts                           | K-12 Grades   | Special Ed | Special Ed 3 & 4 yr | Non-Graded | 4-Year Old At-Risk | Pre-K     | Totals        |
| <b>5</b>                                   | <b>10,114</b> | <b>0</b>   | <b>0</b>            | <b>0</b>   | <b>0</b>           | <b>60</b> | <b>10,174</b> |

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

Numbers of Public School Buildings

| School Year<br>2013-2014                 | USD<br>259 | USD<br>260 | USD<br>261 | USD<br>262 | USD<br>263 | USD<br>264 | USD<br>265 | USD<br>266 | USD<br>267 | USD<br>268 | Total |
|------------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------|
| <b>Public<br/>High<br/>Schools</b>       | 12         | 1          | 3          | 1          | 1          | 1          | 2          | 3          | 2          | 1          | 27    |
| <b>Public<br/>Middle<br/>Schools</b>     | 16         | 2          | 1          | 1          | 1          | 1          | 2          | 2          | 0          | 1          | 27    |
| <b>Public<br/>Elementary<br/>Schools</b> | 57         | 9          | 6          | 4          | 2          | 2          | 7          | 5          | 3          | 1          | 96    |
| <b>Total</b>                             | 85         | 12         | 10         | 6          | 4          | 4          | 11         | 10         | 5          | 3          | 150   |

High School 2  
Middle School 2  
Elementary School 7

### EDUCATIONAL INSTITUTION BREAKDOWN

#### Colleges and Universities

- Newman University: 2,000 (Average)
- Wichita State University: 15,049
- Friends University: 3,247

#### College and University Satellite Locations

- Southwestern College, 2040 S Rock Rd
- Southwestern College, 7011 W Central Avenue
- Southwestern College, McConnell AFB
- Cowley College – Aviation Tech Center, 7603 E Pawnee
- Cowley College Southside Education Center, 4501 E 47th S
- Baker University, 3450 N Rock Rd
- Butler County Community College
- Embry-Riddle Aeronautical University, 2801 S Rock Rd
- Tabor College, 7348 W 21<sup>st</sup> Street
- University of Phoenix, 3020 N Cypress Dr
- Vatterott College, 3639 N Comotara
- Webster University, McConnell AFB
- Webster University, 53474 Lawrence Court
- Word of Life Institute and Bible College, 3811 N Meridian

#### Industrial Technical and Trade Schools

- AGC Construction Training Center, 8201 E 34<sup>th</sup> N
- Carpenters Apprentice Training Center, 1225 W Carey Ln
- Center for Financial Training, 150 N Main Street
- Electrical Joint Apprenticeship and Training Cmte, 810 W 13<sup>th</sup> Street
- Job Corps MTC/Flint Hills, 402 E 2<sup>nd</sup> Street
- Joint Apprenticeship Committee Inc, 1330 E 1<sup>st</sup> Street
- KANSEL, 334 N Topeka, Suite 103
- Letizia's College Art of Dress Design, 1502 S Hillside
- Norris Training Systems, 400 N Woodlawn

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

There are three major universities within Sedgwick County: Wichita State University, Friends University, and Newman University.

WSU has an enrollment, as of 2010, of 14,806 students, of which approximately 4,500 are part-time students. Furthermore, according to the university's website, only eight percent of undergraduate students live on-campus. This suggests that most of the student body is commuting to class by personal vehicle or public transportation. Parking at Wichita State is primarily focused around the northern end of the campus. These spaces are also around the major sports facilities on campus, such as Koch Arena and Eck Stadium. Parking is restricted for commuters when the basketball or baseball team has a game. Currently, Koch Arena has a capacity of 10,506, which routinely sells out games. Eck Stadium has a capacity of 7,851.

Friends University is located between Kellogg and Maple Streets east of Meridian Avenue. The West Maple route serving the university on the northern edge of campus is one of the most travelled routes in the system, according to Wichita Transit. This is due to route being the only service to the west side of Wichita. Again, this bus runs on the hour. Friends has a markedly smaller enrollment than WSU, 2,800 students spread over multiple campuses across Kansas, and a higher proportion of undergraduate students live on-campus. Some of these students at other campuses and in Wichita are non-traditional continuing learners of whom Friends counts in the official total student enrollment. (Source: Friends University)

Newman University is located south of Kellogg and west of Southwest Blvd. The enrollment is 2,746 and all students with a junior status or younger are required to live on campus in student housing, however, an exact number of students living on campus is unknown.

A total of 155 public and private schools (to include technical trade, colleges, and universities) in 20 school districts governed by the Kansas Board of Education were identified in Sedgwick County. Of these, 54 schools or 36% of all schools were found to be within ½-half mile of a major roadway, pipeline, or railroad track right-of-way. Since the total attendance of children and staff for the county was shown to be 102,431, approximately 23,306 children are located within one-half mile of a major roadway, pipeline, or railroad track right-of-way.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### 9.12 HEALTHCARE AND PUBLIC HEALTH SECTOR

This sector mitigates the risk of disasters and attacks and also provides recovery assistance if an attack occurs. The sector consists of health departments, clinics, and hospitals. Threats to this sector include physical vulnerabilities. The following agencies are responsible for this sector:

Local: Public and Private Utilities, Petrochemical Companies

State: Kansas Division of Emergency Management/Kansas Highway Patrol, Kansas Fire Marshall

Federal: Department of Health and Human Services

The systems, networks, services, facilities, functions, and roles needed to prevent disease and disability, treat patients, foster public health, and respond to public health emergencies span all levels of government and the private sector, and touch every citizen of the United States.

Ensuring a resilient healthcare and public health system capable of withstanding disruption and poised to protect lives and health during emergencies is vital for people's safety and security.

The Healthcare and Public Health Sector provides a full array of goods and services, including acute hospital and ambulatory healthcare, public health, laboratories, blood banks, mass fatality management, insurers/payors, and medical supply manufacturing and distribution.

Private-sector as well as Federal, State, territorial, tribal, and local agencies provide healthcare and public health services, and participate in ongoing surveillance and detection of potential threats from bioterrorism and other manmade and natural threats.

The Healthcare and Public Health Sector shares dependencies and interdependencies with other CIKR sectors, including: Agriculture and Food, Chemical, Communications, Emergency Services, Energy, Information Technology, Postal and Shipping, Transportation Systems, and Water.

The following information was obtained from the Via Christi Health September 1, 2009 Assessment Report on the Wichita MSA Market.

#### Commercial Insurance Coverage

The top three commercial insurance companies for the Wichita MSA market include Blue Cross Blue Shield of Kansas (BCBS) with 55 percent of the enrollees, Preferred Health System (PHS) with 30-35 percent and Coventry Health Care of Kansas with 5-10 percent.

Insurance programs assisting with the medical fragile or low-income adults include the Kansas Health Insurance Association's high risk pool program, Medicaid, Kansas HealthWave 21, and MediKan. Statewide, the uninsured population represents nearly 15 percent of the under 65 year old population according to the U.S. Census. The MSA uninsured breakouts are Butler County at 11.7 percent, Harvey County at 12.4 percent, Sedgwick County at 10.9 percent and Sumner County at 12.0 percent.

#### Infrastructure – Information System

There are nine safety net clinics which offer low income residents medical homes. These include: Center for Health and Wellness, E.C. Tyree Medical and Dental Clinic, Guadalupe Clinic, Good Samaritan Clinic and Health Ministry, GraceMed, healthy Options for Kansas Communities in Plainview, Hunter Health Clinic, Via Christi Family Medicine Residency Program, and Wichita Family Practice Residency Program.

#### Infrastructure - Providers

According to the Dartmouth Atlas, the Wichita market has fewer physicians in all areas with the exception of Family Practice when compared to national averages. The national average for physicians per 100,000 residents is nearly 202, Wichita has 159.



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### Infrastructure – Hospitals & Others

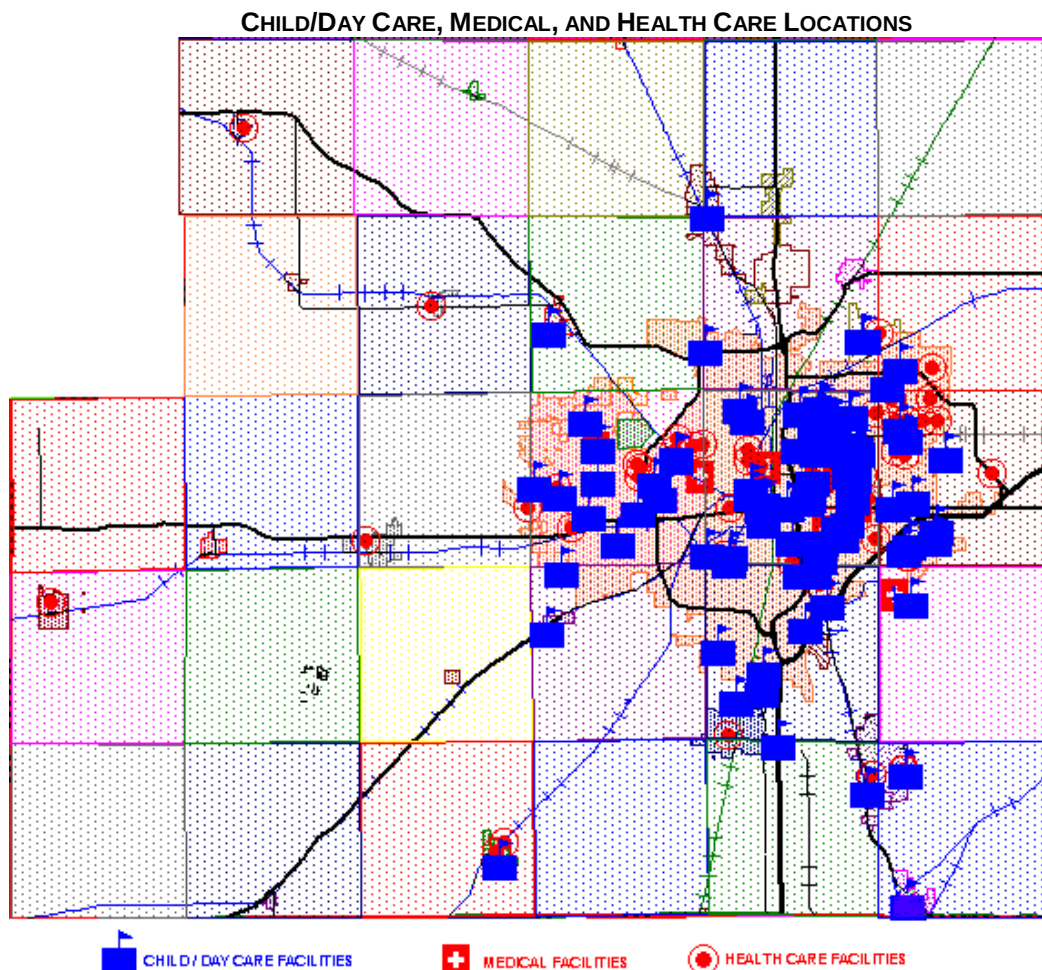
There are ten hospitals within the Wichita/Newton area alone.

There are three inpatient or residential addiction programs in the service area; however, outpatient addiction services for the uninsured are critically low.

COMCARE is the primary community health care provider for the Sedgwick County area for the uninsured. They have multiple locations serving an average of 4,500 people a month and approximately 1,000 of them are uninsured. COMCARE will see most everyone except those who are uncooperative and dangerous. Inpatient mental health services for children under the age of ten are non-existent in Wichita and the surrounding counties. There are four inpatient mental health facilities serving teens and adults.

### Dental Care

There are approximately 220 dentists in the Wichita area. Kansas has only one dentist for every 2,557 residents; the national average is 1:1,650. Dental care for the uninsured population is highly limited for adults.

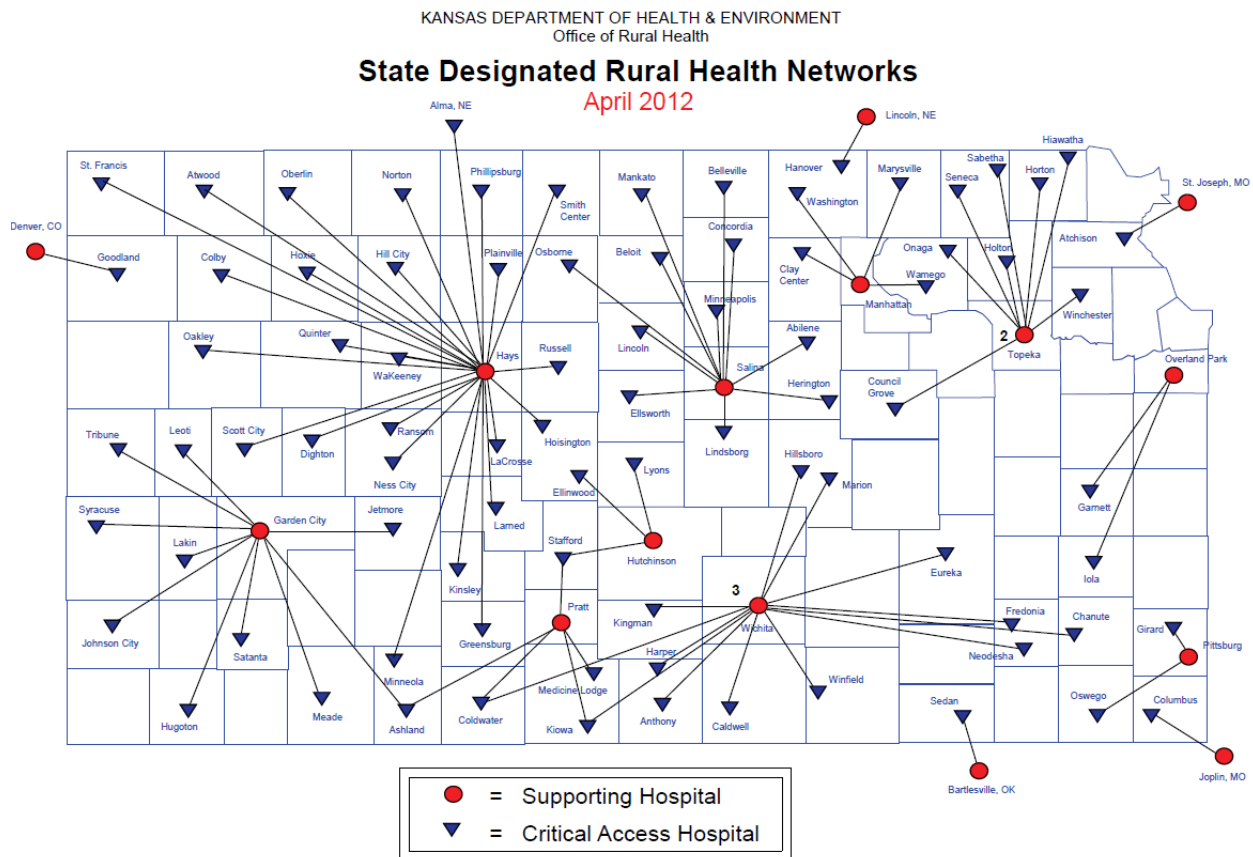


The map shown above shows the locations of child/day care facilities, medical facilities, and health care facilities classified as vulnerable sites. Health care facilities include assisted living, hospices, nursing facilities, adult day care, boarding care homes, and home plus providers. Breakouts of facilities are shown below:

# 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

## CAH's and Networks<sup>38</sup>

All Critical Access Hospitals are part of a rural health network. In applying for certification, a CAH must submit a plan to the Secretary of the Kansas Department of Health and Environment, and this plan must stipulate a Supporting Hospital and the rural network to which the CAH will belong. These plans describe agreements between the CAH and Supporting Hospital regarding patient referral and transfer, the provision of emergency and non-emergency transportation among members, and medical staff credentialing, risk management, quality assurance and peer review.



There are 83 CAHs in Kansas that participate in 19 rural health networks. These networks and their members are listed on the following page. Sedgwick County covers four of the networks and includes: Bluestem Rural Health Network (Wesley Medical Center); Wheat Plains Health Network (Via Christi Regional Medical Center); Ark Valley and Chisholm Trail Health Network (Via Christi Regional Medical Center); and, the Southern Plains Health Network (Via Christi Regional Medical Center).

<sup>38</sup> Kansas Rural Health Options Project, <http://www.krhop.net>

# 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

## LISTING OF HEALTH CARE NETWORKS:

### **Ark Valley and Chisholm Trail Health Network**

Supporting Hospital: South Central Kansas RMC, Arkansas City  
Supporting Hospital: Via Christi Regional Medical Center, Wichita

### **Bluestem Rural Health Network**

Supporting Hospital: Wesley Medical Center, Wichita  
CAH: Fredonia Regional Hospital, Fredonia  
CAH: Neosho Memorial RMC, Chanute  
CAH: St. Luke Hospital & Living Center, Marion

### **Cedar Valley Health Network**

Supporting Hospital: Saint Luke's South, Overland Park  
CAH: Anderson County Hospital, Garnett

### **Eastern Kansas Rural Health Network**

Supporting Hospital: Menorah Medical Center, Overland Park  
CAH: Allen County Hospital, Iola

### **Flint Hills Regional Health Network**

Supporting Hospital: Mercy Health Center of Manhattan  
CAH: Clay County Medical Center, Clay Center  
CAH: Community Memorial Healthcare, Marysville  
CAH: Wamego City Hospital, Wamego  
CAH: Washington County Hospital, Washington

### **Heartland Health Alliance CAH Collaborative Network**

Supporting Hospital: Bryant LGH Medical Center, Lincoln, NE  
CAH: Hanover Hospital, Hanover

### **Heartland Health Systems**

Supporting Hospital: Heartland Regional Medical Center, St. Joseph, MO  
CAH: Atchison Hospital, Atchison

### **Jane Phillips Health Care Network**

Supporting Hospital: Jane Phillips Medical Center, Bartlesville, OK  
CAH: Sedan City Hospital, Sedan

### **Northeast Kansas Healthcare Network**

Supporting Hospital: St. Francis Health Center, Topeka  
CAH: Hiawatha Community Hospital, Hiawatha  
CAH: Holton Community Hospital, Holton  
CAH: Nemaha Valley Community Hospital, Seneca

### **Northeast Kansas Rural Health Alliance**

Supporting Hospital: Stormont-Vail HealthCare, Topeka  
CAH: Community HealthCare System, Inc., Onaga  
CAH: Jefferson County Memorial Hospital, Winchester  
CAH: Morris County Hospital, Council Grove  
CAH: Northeast Kansas Center for Health & Wellness, Inc., Horton  
CAH: Sabetha Community Hospital, Inc., Sabetha

### **Northwest Kansas Health Alliance**

Supporting Hospital: Hays Medical Center, Hays  
CAH: Cheyenne County Hospital, St. Francis  
CAH: Citizens Medical Center, Colby  
CAH: Clara Barton Hospital, Hoisington  
CAH: Decatur Health Systems, Inc, Oberlin  
CAH: Edwards County Hospital, Kinsley  
CAH: Gove County Medical Center, Quinter  
CAH: Graham County Hospital, Hill City  
CAH: Grisell Memorial Hospital, Ransom  
CAH: Harlan County Health System, Alma, NE  
CAH: Kiowa County Memorial Hospital, Greensburg  
CAH: Lane County Hospital, Dighton  
CAH: Logan County Hospital, Oakley  
CAH: Minneola District Hospital, Minneola  
CAH: Ness County Dist. #2 Hospital, Ness City  
CAH: Norton County Hospital, Norton  
CAH: Pawnee Valley Community Hospital, Larned  
CAH: Phillips County Hospital, Phillipsburg  
CAH: Rawlins County Health Center, Atwood  
CAH: Rooks County Health Center, Plainville

CAH: Rush County Memorial Hospital, LaCrosse  
CAH: Russell Regional Hospital, Russell  
CAH: Scott County Hospital, Scott City  
CAH: Sheridan County Health Complex, Hoxie  
CAH: Smith County Memorial Hospital, Smith Center  
CAH: Trego Co.-Lemke Memorial Hospital, WaKeeney

### **Ozarks and Great Plains Health Alliance of SE Kansas**

Supporting Hospital: St. John's Regional Medical Center, Joplin, MO  
CAH: St. Johns Maude Norton Memorial Hospital, Columbus

### **Sherman St. Anthony Rural Health Network**

Supporting Hospital: St. Anthony Hospital Central, Denver, CO  
CAH: Goodland Regional Medical Center, Goodland

### **South Central Kansas Health Network**

Supporting Hospital: Hutchinson Hospital, Hutchinson  
CAH: Ellinwood District Hospital, Ellinwood  
CAH: Hospital District #1 of Rice County, Lyons  
CAH: Stafford County Hospital, Stafford

### **Southeast Kansas Health Alliance**

Supporting Hospital: Mt. Carmel Regional Medical Center, Pittsburg  
CAH: Hospital District #1 of Crawford County DBA/ Girard Medical Center, Girard  
CAH: Oswego Medical Center, Oswego

### **Southern Plains Health Network**

Supporting Hospital: Pratt Regional Medical Center, Pratt  
Supporting Hospital: Via Christi Regional Medical Center, Wichita  
CAH: Ashland Health Center, Ashland  
CAH: Comanche County Hospital, Coldwater  
CAH: Kiowa County Memorial Hospital, Kiowa  
CAH: Medicine Lodge Memorial Hospital, Medicine Lodge  
CAH: Stafford County Hospital, Stafford

### **Southwest Kansas Regional Health Network**

Supporting Hospital: St. Catherine Hospital, Garden City  
CAH: Ashland Health Center, Ashland  
CAH: Greeley County Health Services, Tribune  
CAH: Hamilton County Hospital, Syracuse  
CAH: Hodgeman County Health Center, Jetmore  
CAH: Kearny County Hospital, Lakin  
CAH: Meade District Hospital/Artesian Valley Health System, Meade  
CAH: Satanta District Hospital & LTCU, Satanta  
CAH: Stanton County Health Care Facility, Johnson  
CAH: Stevens County Hospital, Hugoton  
CAH: Wichita County Health Center, Leoti

### **Sunflower Health Network**

Supporting Hospital: Salina Regional Health Center, Salina  
CAH: Cloud County Health Center, Concordia  
CAH: Ellsworth County Medical Center, Ellsworth  
CAH: Herington Municipal Hospital, Herington  
CAH: Jewell County Hospital, Mankato  
CAH: Lincoln County Hospital, Lincoln  
CAH: Lindsborg Community Hospital, Lindsborg  
CAH: Memorial Health System, Abilene  
CAH: Mitchell County Hospital Health Systems, Beloit  
CAH: Osborne County Memorial Hospital, Osborne  
CAH: Ottawa County Health Center, Minneapolis  
CAH: Republic County Hospital, Belleville

### **Wheat Plains Health Network**

Supporting Hospital: Via Christi Regional Medical Center, Wichita  
CAH: Anthony Medical Center, Anthony  
CAH: Greenwood County Hospital, Eureka  
CAH: Harper Hospital Dist. #5, Harper  
CAH: Hillsboro Community Hospital, Hillsboro  
CAH: Ninnescan Valley Health System, Kingman  
CAH: Sumner County Dist #1 Hospital, Caldwell  
CAH: St. Luke Hospital & Living Center, Marion  
CAH: William Newton Hospital, Winfield  
CAH: Wilson County Hospital, Neodesha

**State Designated Rural Health Network** is an alliance of members consisting of one or more Critical Access Hospitals and at least one other hospital (usually known as a "Supporting Hospital") that has developed a comprehensive plan regarding patient referrals, the provision on emergency and nonemergency transfer among members, the development of a network-wide emergency medical services plan, and the development of a plan for sharing patient information and services between hospital members concerning medical staff credentialing, risk management, and quality assurance/improvement and peer review.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

Child/Day Care Facilities: As of August 2015, there were 890 KDHE licensed programs located within Sedgwick County with a capacity of 26,462 children. This number does not include information on all non-licensed or in-home day care facilities not readily available. Specifics about the types of facilities and locations are show below:

### *Sedgwick County (Rural and cities outside Wichita)*

- 31 Building Based School Age Programs had 20 to 500 children per location.
- 15 Child Care Centers had 14 to 99 children per location.
- 28 Group Day Care Homes had 12 children per location.
- 137 Licensed Day Care Homes had 10 children per location.
- 5 Preschools had 12 to 48 children per location.

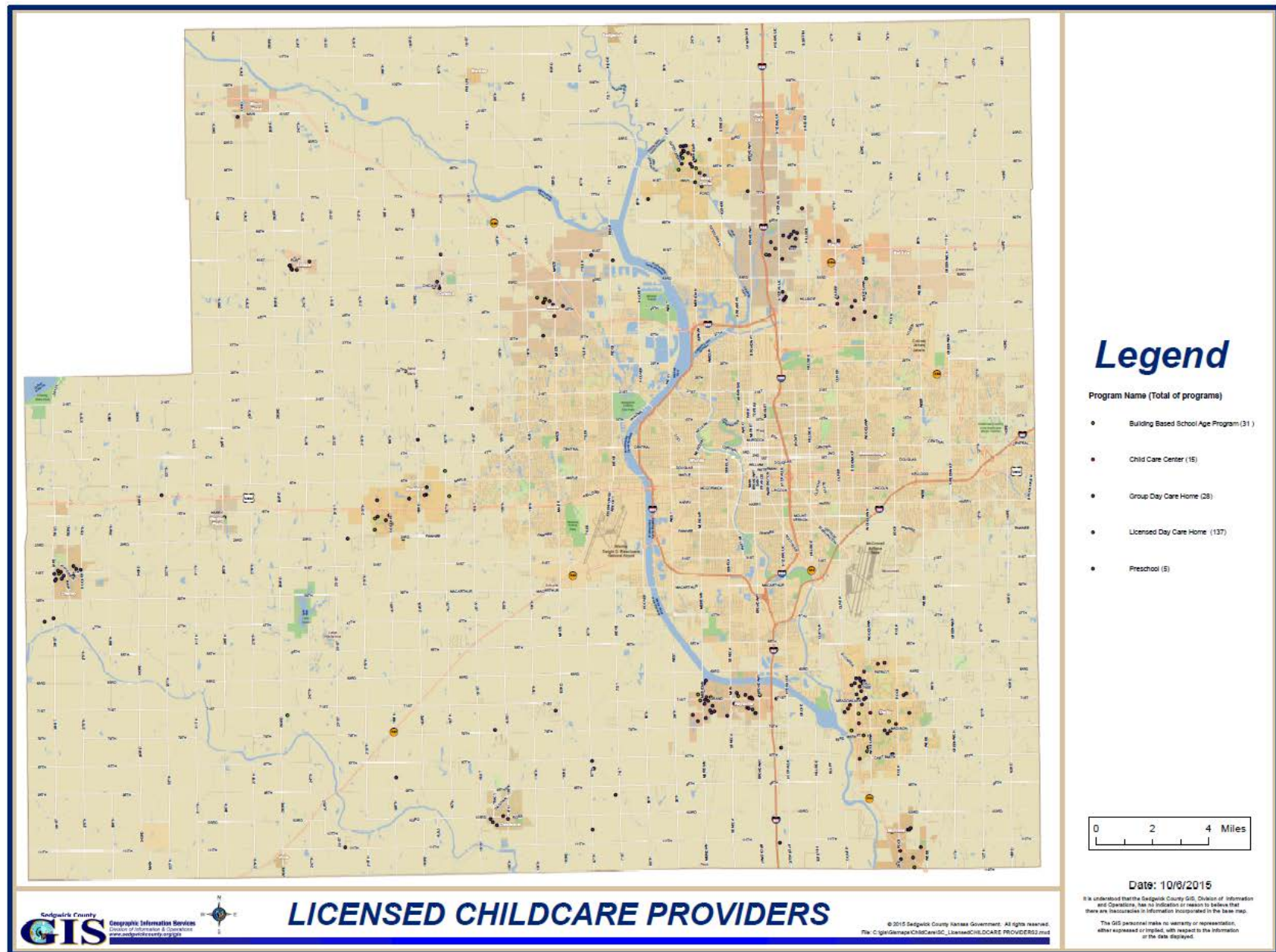
### *City of Wichita*

- 76 Building Based School Age Programs had 29 to 355 children per location.
- 89 Child Care Centers had 12 to 320 children per location.
- 5 Drop-In Programs had 60 to 275 children per location.
- 48 Group Day Care Homes had 9 to 12 children per location.
- 4 Head Start Child Care Centers had 30 to 108 children per location.
- 437 Licensed Day Care Homes had 6 to10 children per location.
- 15 Preschools had 12 to 112 children per location.

The following maps reflect the approximate locations of the facilities and their ½-mile highway and railroad proximity corridor to a potential hazardous materials release.

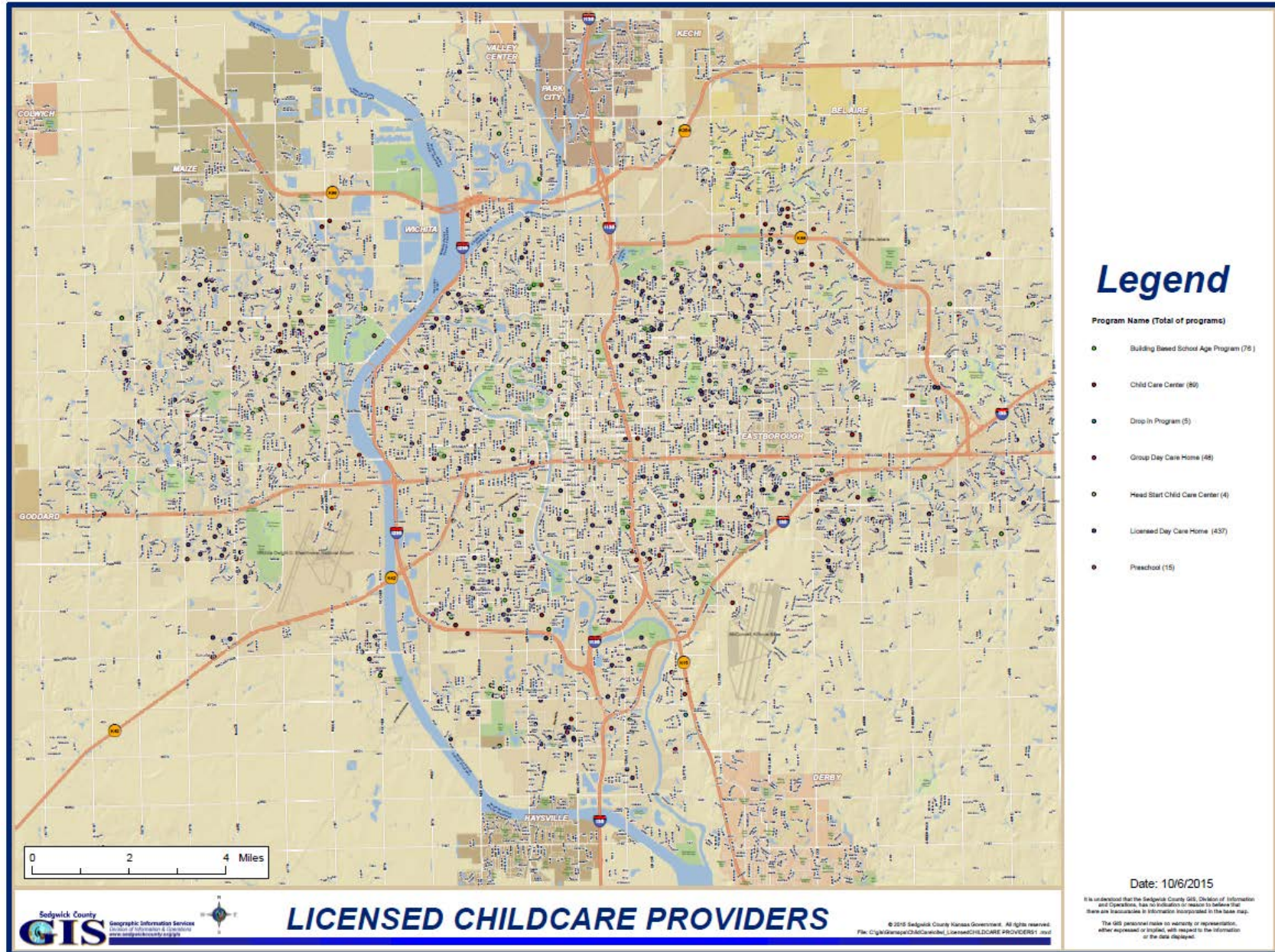


## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis



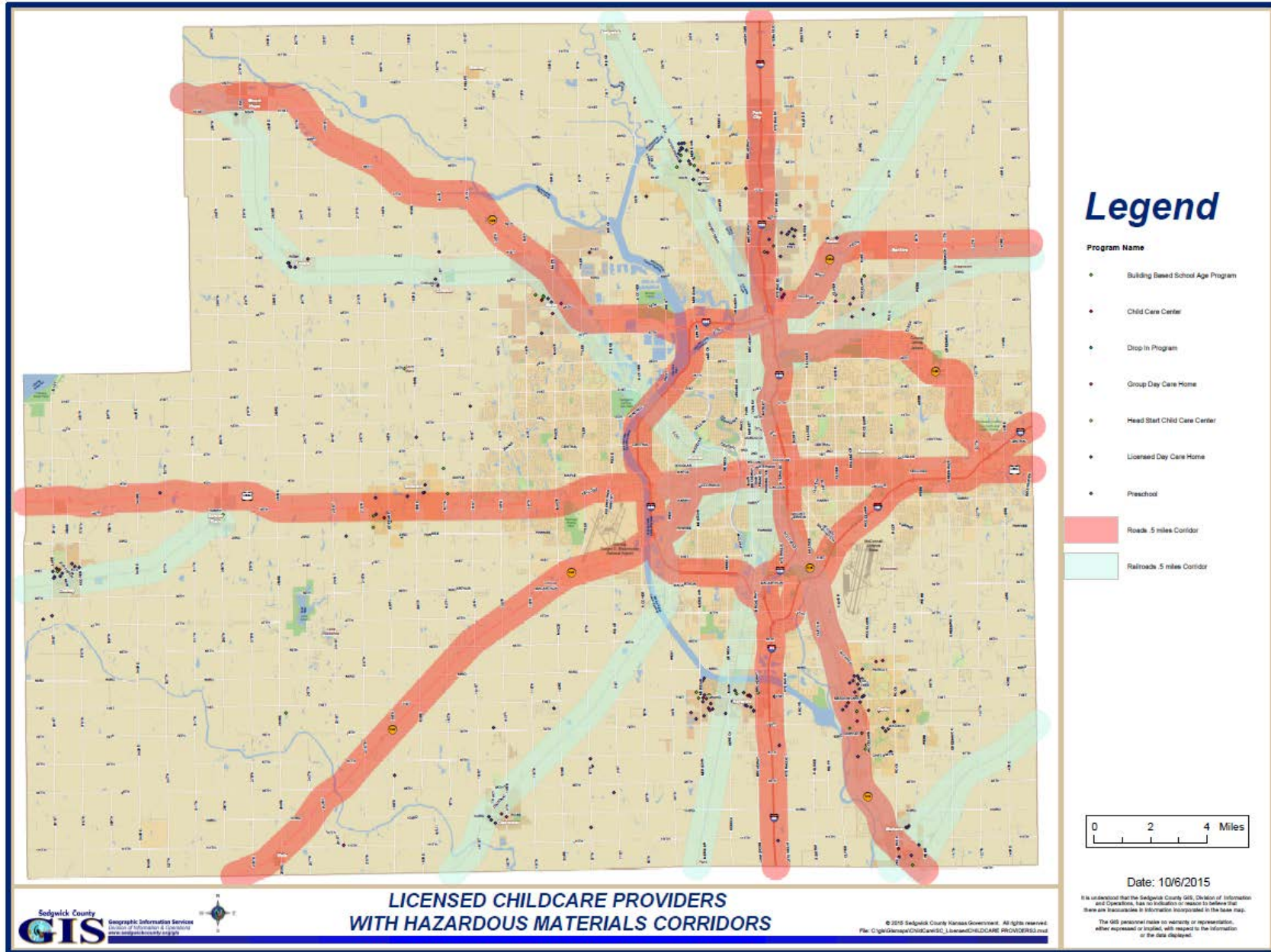


## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis



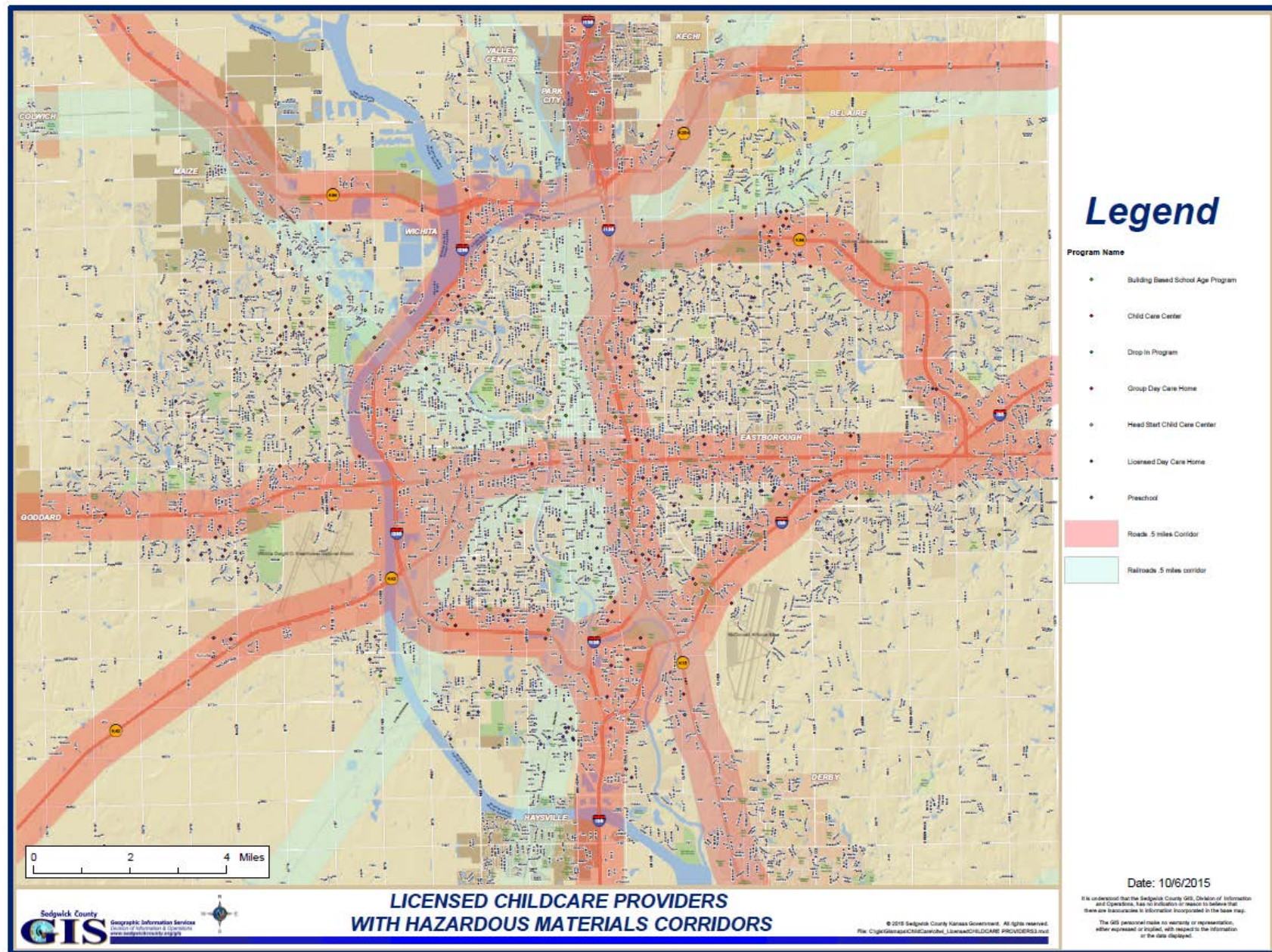


## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis





## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis



### Hospitals

Licensed hospitals in Sedgwick County includes the following:

- Kansas Heart Hospital
- Kansas Spine & Specialty Hospital, LLC
- Kansas Surgery & Recovery Center
- Select Specialty Hospital – Wichita
- Via Christi Behavioral Health Center
- Via Christi Hospital – St Teresa
- Via Christi Hospital – St Francis\* (*Level 1 Trauma Center*)
- Via Christi Hospital – St Joseph
- Via Christi Rehabilitation Hospital
- Wesley Medical Center\* (*Level 1 Trauma Center*)
- Wesley Rehabilitation Hospital
- Wichita-AMG Specialty Hospital

### Health Care Providers

Listing of licensed health care providers in Sedgwick County::

31 Assisted Living Facilities  
59 Home Health Agencies  
26 Home Plus Facilities  
109 Independent Living Housing Facilities  
10 End Stage Renal Disease Facilities  
3 Outpatient Physical Therapy Facilities

# 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

## Public Transportation Services

### **ABC Taxi**

Medicaid Provider  
Service Area: Sedgwick County

### **Always There Senior Care**

Service Area: Sedgwick County

### **American Cab**

Medicaid Provider  
Service Area: Sedgwick County

### **American Red Cross**

**(Medical) - Medical for ages 50 and over only**

FTA or KDOT Funded  
Service Area: Wichita, Haysville, Derby, Valley Center, Newton, Park City

### **American Red Cross**

**(Nutrition Sites - For ages 60 and over only)**

Wheelchair Accessible  
Service Area: Wichita, Haysville, Derby, Valley Center, Newton, Park City

### **Best Cab**

Service Area: Sedgwick County  
Service Hours: 24 hours a day, 7 days a week

### **Butler County Department on Aging**

Wheelchair Accessible, FTA or KDOT Funded  
Service Area: Butler County

### **Coach Transportation**

**Medicaid only**  
Medicaid Provider  
Service Area: Wichita

### **Comfort Care Transportation**

Wheelchair Accessible, Medicaid Provider  
Service Area: United States

### **Derby Dash**

Wheelchair Accessible, FTA or KDOT Funded  
Service Area: Derby

### **First Class Transportation**

**Medicaid Only**  
Medicaid Funded  
Service Area: Kansas

### **GED Specialized Transportation**

Wheelchair Accessible  
Service Area: Kansas

### **Gordon Transportation**

Medicaid Provider  
Service Area: Wichita

### **Harvey County Department on Aging**

Wheelchair Accessible, FTA or KDOT Funded  
Service Area: Harvey County

### **Heaven Sent Transportation**

Wheelchair Accessible  
Service Area: Wichita

### **Home Instead**

**In staff's personal vehicle**  
Service Area: Wichita & surrounding area  
Service Hours: 24 hours, 7 days a week

### **Homewatch Caregivers**

**In staff's personal vehicle**  
Service Area: Wichita & surrounding area  
Service Hours: 24 hours, 7 days a week

### **LOVE Inc.**

**Church-based - Volunteer's personal vehicles**

### **Anytime Anywhere Transportation**

Wheelchair Accessible, Medicaid Provider  
Service Area: Kansas

### **Midwest Express Transportation**

Medicaid Provider  
Service Area: Kansas

### **On Time Transportation**

**Medicaid Only**  
Wheelchair Accessible, Medicaid Provider  
Service Area: 50 mile radius of Wichita

### **Schowalter Villa**

Wheelchair Accessible, FTA or KDOT Funded  
Service Area: From Hesston to: Hesston, Newton, Halstead, Hutchinson, Wichita

### **Sedgwick County Transportation Brokerage**

Wheelchair Accessible, Medicaid Provider, FTA or KDOT Funded  
Service Area: Sedgwick County

### **SLR Transportation**

**Medicaid Only**  
Medicaid Provider  
Service Area: Wichita

### **Southeast Kansas Shuttle Service**

Service Area: Kansas

### **Sunny Dayz Transportation**

**Medicaid Only**  
Medicaid Provider  
Service Area: Sedgwick County

### **Sweet Cherry Transportation**

Medicaid Provider  
Service Area: Sedgwick County and surrounding counties



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### Public Transportation Services – Cont'd

**Thunder Enterprises****Formerly Friendly Shepherd**

Wheelchair Accessible, Medicaid Provider  
Service Area: 50 mile radius of Wichita

**Timber Lines Transportation****Cerebral Palsy Research Foundation**

Wheelchair Accessible, Medicaid Provider, FTA or KDOT  
Funded  
Service Area: Sedgwick County

**Wichita Transit Van Service**

Wheelchair Accessible, FTA or KDOT Funded  
Service Area: Wichita

**Wichita Transit Fixed Route Bus**

Wheelchair Accessible, FTA or KDOT Funded  
Service Area: Wichita

**Wisdom Travels**

Wheelchair Accessible  
Service Area: Wichita

### Community Clinics

The following primary care and medical home providers are available for uninsured, low-income, Medicaid, and Medicare clients.

**Center for Health and Wellness, Inc.**

2707 E 21st (67214)

**Guadalupe Clinic**

940 S St. Francis

**E.C. Tyree Health Clinic**

1525 N. Lorraine (67214)

**Guadalupe Holy Savior Satellite**

1406 N Erie (67214)

**GraceMed Health Main Clinic**

1122 N. Topeka (67214)

**Hunter Health Main Clinic**

2318 E Central (67214)

**GraceMed Good Samaritan Clinic**

3701 E 13<sup>th</sup> St, Bldg 400 (67208)

**Hunter Health-Brookside Satellite**

2760 S Roosevelt (67210)

**GraceMed Evergreen Children's Clinic**

2700 N Woodland (67204)

**Hunter Health – Diabetes Care Center**

238 N Waco (67202)

**GraceMed Healthy Children Clinic**

1233 S Emporia (67211)

**Hunter health – Interfaith Ministries**

841 N Broadway (67214)

**GraceMed Downing Children's Clinic**

2201 E. 25th N., at Gordon Park's Academy (67219)

### Limited Medical Service Clinics

The providers listed below serve specific populations, provide specialized services, or offer service during nontraditional hours. These services are provided for uninsured, low-income, Medicaid, and Medicare clients.

**Mother Mary Anne Clinic**

1152 S Clifton (67218)

**COMCARE – Crisis Intervention**

934 N Water (67203)

**Sedgwick County Health Department**

2716 W Central Avenue (67203)

**COMCARE – Adult Outpatient Services**

1919 N Amidon, Ste 130 (67203)

**Hunter Health – Wichita Child Guidance**

415 N Poplar (67214)

**COMCARE – Children's Services**

7701 E Kellogg, Ste 300 (67207)

**COMCARE – Intake and Assessment**

1919 N Amidon, Ste 100 (67203)

**COMCARE – Addiction Treatment Services**

940 n Waco (67203)

**COMCARE – Community Support Services**

1929 W 21<sup>st</sup> St N (67203)

**Sedgwick County Offender Assessment Program**

1720 E Morris, Ste 101 (67211)

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### Dental Clinics

The following providers are available for low income, Medicaid, Medicare, under- and un-insured clients.

**Center for Health and Wellness, Inc.**  
2707 E 21st (67214)

**GraceMed Downing Children's Clinic**  
2201 E. 25th N., at Gordon Park's Academy (67219)

**E.C. Tyree Dental Clinic**  
1525 N. Lorraine (67214)

**Hunter Health Clinic**  
2318 E Central (67214)

**GraceMed Dental Clinic**  
1122 N. Topeka (67214)

**Wichita State University Dental Hygiene Clinic**  
WSU Campus, 1845 Fairmount, 1st Floor of Ahlberg Hall  
(67260)

**GraceMed Evergreen Children's Clinic**  
2700 N Woodland (67204)

**Sedgwick County Health Department**  
1900 E 9th (67214)

**GraceMed Healthy Children Clinic**  
1233 S Emporia (67211)

### Pets and Animals

In accordance with Section 5-1, Article I of the Sedgwick County Code, the following words, terms and phrases, when used in this chapter, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

*Animal* means any vertebrate or invertebrate organism of the kingdom *Animalia*, such as, but not limited to, dogs, cats, cattle, horses and other equines, buffalos, hogs, goats, rabbits, sheep, chickens, ducks, geese, turkeys, pigeons and other fowl or wild animals, reptiles, fish, bees or birds that have been tamed, domesticated or captivated, except man.

*Inherently dangerous animal* means an inherently dangerous mammal and/or an inherently dangerous reptile.

*Inherently dangerous mammal* is any live member of the *canidae*, *felidae*, or *ursidae* families, including hybrids thereof, which, due to their inherent nature, may be considered dangerous to humans, and which include:

- (1) *Canidae*, including any member of the dog ( *canid* ) family not customarily domesticated by man, or any hybrids thereof, including wolf hybrids which are a cross between a wolf and a domestic dog, but not including domestic dogs (*Canis familiaris*).
- (2) *Felidae*, including any member of the cat family weighing over fifteen (15) pounds not customarily domesticated by man, or any hybrids thereof, but not including domestic cats ( *Felis catus* ) .
- (3) *Ursidae*, including any member of the bear family, or any hybrids thereof.

*Inherently dangerous reptile* is any live member of the class *reptilia* which is:

- (1) Venomous, including, but not necessarily limited to, all members of the following families: *Helodermidae*; *Viperidae*; *Crotalidae*; *Atractaspidae*; *Hydrophilidae*; and *Elapidae*.
- (2) A "rear fanged" snake of the family *Colubridae* that are known to be dangerous to humans, including, but not necessarily limited to, all members of the following families: *Dispholidus typus*; *Thebournis kirtlandii*; and *Rhabdophis spp.*
- (3) Of the family *Boidae* (boas and pythons); specifically the following species: *Python reticulatus*; *Eunectes sp.*; *Python sebae*; and *Python molurus*.
- (4) A member of the order *Crocodylia* (crocodiles, alligators and caiman).

*Livestock* means cattle, hogs, sheep, all creatures of the ratite family that are not indigenous to this state, including but not limited to ostriches, emus and rheas or domesticated deer. (KAR 47-1801)

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

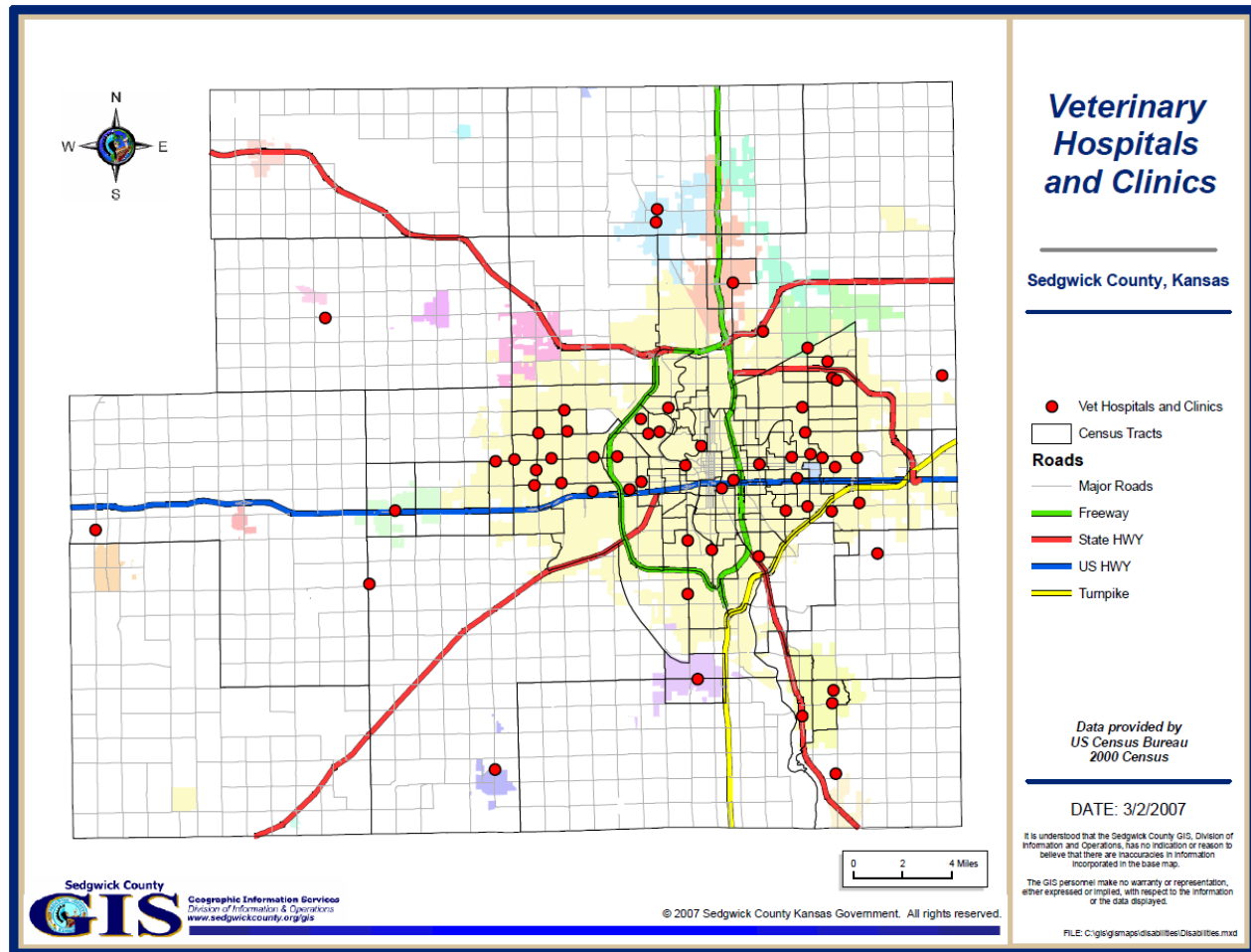
Studies by the American Veterinary Medical Association in 1992 show the following number of pets:

| Pet Type | Percentage of Households Owning a Pet | Number of Pets Per Household |
|----------|---------------------------------------|------------------------------|
| Dogs     | 36.5                                  | 1.52                         |
| Cats     | 30.9                                  | 1.95                         |
| Birds    | 5.7                                   | 2.16                         |
| Horses   | 2.0                                   | 2.54                         |

Below are calculations<sup>39</sup> for determining the number of companion animals in Sedgwick County with an estimated 192,651 households and a population of 508,803 (2014 estimated census). The calculation is households multiplied by percent of households owning and then multiplying the average number owned per household.

Dogs:  $192,651 \times 36.5\% = 70,317 \times 1.6 = 112,507$   
 Cats:  $192,651 \times 30.4\% = 58,566 \times 2.1 = 112,987$   
 Birds:  $192,651 \times 3.1\% = 5,972 \times 2.3 = 13,735$   
 Horses:  $192,651 \times 1.5\% = 2,890 \times 2.7 = 7,803$

**Estimated Pets in Sedgwick County: 247,032**



<sup>39</sup> American Veterinary Medical Foundation – U.S. Pet Ownership Statistics

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

| Veterinary Clinics                      | Address                    | City          | Remarks                                 |
|-----------------------------------------|----------------------------|---------------|-----------------------------------------|
| Aquarium in Old Town Inc                | 1001 E Douglas Ave         | Wichita       | Pet Store                               |
| Pet Mountain                            | 10035 E Funston Ct         | Eastborough   | Pet Store                               |
| McDonald Small Animal Clinic            | 1004 N Waco                | Wichita       | Hospital / Clinic                       |
| One Stop Pet Shop                       | 1018 W 31st St S           | Wichita       | Pet Store                               |
| Mulvane Animal Clinic                   | 10231 S Rock Rd            | Mulvane       | Hospital / Clinic                       |
| Companion Animal Hospital               | 10555 W Maple              | Wichita       | Hospital / Clinic                       |
| Blair Doon Veterinary Hospital          | 10804 E 31st S             | Wichita       | Hospital / Clinic                       |
| Wall Seed Company                       | 1085 S Washington St       | Wichita       | Pet Store                               |
| Sedgwick-Halstead Veterinary Clinic Inc | 110 E 5th St               | Sedgwick      | Hospital / Clinic                       |
| Zoom Groom                              | 1141 Maple St              | Wichita       | Pet Store                               |
| Gilpins Feed & Supply                   | 11808 E Kellogg Dr         | Eastborough   | Pet Food & Animal Feed Supplier         |
| Oakcrest Pet Hospital                   | 11832 W Central            | Wichita       | Hospital / Clinic                       |
| Valley Center Veterinary Clinic         | 122 W Main                 | Valley Center | Hospital / Clinic                       |
| Holmes Carriage Company                 | 12735 SW Meadowlark        | Valley Center | Pet & Livestock Transportation Supplies |
| Romms Grain Express                     | 13000 E 47th St            | Derby         | Pet Store                               |
| Loesch Mobile Veterinary Clinic         | 13110 W. Central           | Wichita       | Hospital / Clinic                       |
| Dogwatch of Wichita                     | 135 S Illinois St          | Wichita       | Pet Store                               |
| Indian Hills Animal Clinics             | 1448 N Maize Rd            | Wichita       | Hospital / Clinic                       |
| Pine Shadows Vet Service                | 15130 E 29th St N          | Wichita       | Hospital / Clinic                       |
| Animal Clinic at Webb Village           | 1520 S Webb Rd, Suite 180  | Wichita       | Hospital / Clinic                       |
| Exotic Pets                             | 1551 S 151st St W          | Goddard       | Pet Store                               |
| Kutter Pet Care Center                  | 1607 W Central             | Wichita       | Hospital / Clinic                       |
| Rainbow Valley Veterinary Clinic        | 1630 James St              | Derby         | Hospital / Clinic                       |
| Cove                                    | 1631 S Hillside St         | Wichita       | Pet Store                               |
| Tanglewood Veterinary Clinic            | 1634 E Madison Ave         | Derby         | Hospital / Clinic                       |
| General Pet Supply Midwest LLC          | 1635 S Sabin St            | Wichita       | Pet Store                               |
| Tails & Scales                          | 1718 N Nelson Dr           | Derby         | Pet Store                               |
| Chisholm Trail Animal Hospital PA       | 1726 E 61st Street N       | Wichita       | Hospital / Clinic                       |
| Prairie Avian Exotic Animal Clinic      | 1741 S Glendale St         | Wichita       | Hospital / Clinic                       |
| Hillside Feed & Seed Store              | 1805 S Hillside            | Wichita       | Pet Food & Animal Feed Supplier         |
| Wichita Mobile Vet Clinic               | 1838 N Kessler             | Wichita       | Hospital / Clinic                       |
| P&P Seed & Bait Company                 | 1901 E 21st St             | Wichita       | Pet Store                               |
| Valley Feed & Seed Inc                  | 1903 S Meridian            | Wichita       | Pet Food & Animal Feed Supplier         |
| Cheney Animal Clinic                    | 1961 S 391st St W          | Cheney        | Hospital / Clinic                       |
| Goddard Veterinary Clinic               | 19912 W Kellogg            | Goddard       | Hospital / Clinic                       |
| Precious Paws Dog & Cat Grooming        | 2021 W 21st St N           | Wichita       | Pet Store                               |
| Weldens Pet Supplies                    | 207 S Buckner St           | Derby         | Pet Store                               |
| Sweetbriar Veterinary Clinic            | 2070 W 21st                | Wichita       | Hospital / Clinic                       |
| Mitchell Veterinary Supply Inc          | 2136 N Mosley              | Wichita       | Equipment & Supplies                    |
| Weiden Pet Supplies                     | 225 S Circle Dr            | Wichita       | Pet Supplies                            |
| Pet Traditions Memorial Center          | 2260 N Ridge Rd, Suite 120 | Wichita       | Crematory / Funeral                     |
| Mona's Dog Grooming                     | 230 N Wood Ave             | Wichita       | Pet Store                               |
| Natural Classic                         | 2300 N Broadway            | Park City     | Pet Food & Animal Feed Supplier         |
| TreatCo Inc                             | 2300 N Broadway            | Park City     | Pet Store                               |
| El Paso Animal Clinic                   | 233 S Georgia Ave          | Derby         | Hospital / Clinic                       |
| Andale Animal Clinic ADL                | 24101 W. 53rd N            | Andale        | Hospital / Clinic                       |
| Kritter's Korner                        | 2417 S Hillside St         | Wichita       | Pet Store                               |
| College Hill Animal Hospital Inc        | 244 N Hillside             | Wichita       | Hospital / Clinic                       |
| Pet Haven Veterinary Clinic             | 2518 W 13th St N           | Wichita       | Hospital / Clinic                       |

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

| Veterinary Clinics                | Address                     | City       | Remarks                         |
|-----------------------------------|-----------------------------|------------|---------------------------------|
| Arapahoe Veterinary Clinic        | 2776 S Seneca               | Wichita    | Hospital / Clinic               |
| Gupton's Pets & Supplies Inc      | 2815 George Washington Blvd | Wichita    | Pet Store                       |
| Unique Clip                       | 300 S Greenwich Rd          | Wichita    | Pet Food & Animal Feed Supplier |
| DVM Resources                     | 3031 W Pawnee, Suite 400    | Wichita    | Equipment & Supplies            |
| Broadway Animal Clinic            | 3036 S Broadway             | Wichita    | Hospital / Clinic               |
| Luv My Pet                        | 3050 N Rock Rd              | Wichita    | Hospital / Clinic               |
| Petco Animal Supplies             | 3050 N Rock Rd              | Wichita    | Pet Store                       |
| Hutton Veterinary Clinic          | 3116 E 31st St S            | Wichita    | Hospital / Clinic               |
| Royal Pet Supplies                | 3123 N Forest Lakes Ct      | Wichita    | Pet Supplies                    |
| West Side Pet Center              | 3135 Maple St               | Wichita    | Pet Store                       |
| Bobby's Mobile Garden             | 3200 Southeast Blvd         | Oaklawn    | Pet Store                       |
| Indian Hills Animal Clinics       | 3223 W 13th St              | Wichita    | Hospital / Clinic               |
| Wichita Animal Shelter            | 3303 N Hillside             | Wichita    | Shelter                         |
| Equine Surgery & Medicine         | 3500 E 45th N               | Bel Aire   | Hospital / Clinic               |
| Banfield The Pet Hospital         | 3615 N Rock Rd              | Wichita    | Hospital / Clinic               |
| PetSmart                          | 3615 N Rock Rd              | Wichita    | Pet Food & Animal Feed Supplier |
| Caring Hearts Veterinary Clinic   | 3701 W Maple                | Wichita    | Hospital / Clinic               |
| Chirp N Squak Bird Supplies       | 3805 W 13th St              | Wichita    | Pet Store                       |
| Heartland Veterinary Services Inc | 3920 S 215th W              | Goddard    | Hospital / Clinic               |
| Skaer Veterinary Clinic           | 404 S Edgemoor, Bldg 100    | Wichita    | Hospital / Clinic               |
| Heartland Animal Hospital         | 4100 N Woodlawn             | Wichita    | Hospital / Clinic               |
| Adkins Mobile Veterinary Service  | 419 N Rutland St            | Wichita    | Hospital / Clinic               |
| Air Capital Veterinary Clinic     | 419 S Hydraulic, Suite 1    | Wichita    | Hospital / Clinic               |
| Clearwater Veterinary Clinic      | 420 N 4th                   | Clearwater | Hospital / Clinic               |
| Cottonwood Vet Clinic             | 421 N Webb Rd               | Wichita    | Hospital / Clinic               |
| Kansas Humane Society             | 4218 Southeast Blvd         | Wichita    | Shelter: 524-9196 / Crematory   |
| Bogue Animal Hospital West PA     | 429 N Maize Rd              | Wichita    | Hospital / Clinic               |
| Seneca Veterinary Clinic          | 435 N Seneca                | Wichita    | Hospital / Clinic               |
| Wingert Animal Hospital           | 4419 S Seneca               | Wichita    | Hospital / Clinic               |
| Pet Circus Grooming               | 517 Kopplin St              | Wichita    | Pet Store                       |
| Wingert Animal Hospital           | 521 E Grand                 | Haysville  | Hospital / Clinic               |
| Wichita Dog & Cat Hospital        | 5214 W Central              | Wichita    | Hospital / Clinic               |
| East Central Veterinary Hospital  | 5301 E Central              | Wichita    | Hospital / Clinic               |
| Banfield The Pet Hospital         | 533 S Tracy St              | Wichita    | Hospital / Clinic               |
| PetSmart                          | 533 S Tracy St              | Wichita    | Pet Food & Animal Feed Supplier |
| Bed & Bisquit Pet Center Ltd      | 5400 E Central              | Wichita    | Pet Food & Animal Feed Supplier |
| Fins & Feathers Pet Shop          | 601 N West St, #232         | Wichita    | Pet Store                       |
| Cimarron Animal Hospital          | 6011 E 21st Street          | Wichita    | Hospital / Clinic               |
| Village Animal Hospital           | 6121 E 13th St              | Wichita    | Hospital / Clinic               |
| Harry Pet Clinic                  | 6145 E Harry                | Wichita    | Hospital / Clinic               |
| Pro Zoological                    | 623 Baltimore               | Derby      | Pet Store                       |
| Cat Hospital of Wichita           | 6534 E Central              | Wichita    | Hospital / Clinic               |
| Helten Veterinary Clinic          | 6630 W Central              | Wichita    | Hospital / Clinic               |
| Luv My Pet                        | 6840 W Kellogg              | Wichita    | Hospital / Clinic               |
| Busy Birds                        | 7130 Maple St, #170         | Wichita    | Pet Store                       |
| Veterinary Hospital of Wichita    | 727 S Washington            | Wichita    | Hospital / Clinic               |
| Carol's Pet Grooming              | 7534 S Broadway St          | Haysville  | Pet Store                       |
| Solomon Veterinary Clinic         | 7810 E Funston              | Wichita    | Hospital / Clinic               |
| East Douglas Veterinary Clinic    | 8118 E Douglas, Suite 109   | Wichita    | Hospital / Clinic               |
| Uptown Paws                       | 8338 E 21st St              | Wichita    | Pet Food & Animal Feed Supplier |



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

| Veterinary Clinics                | Address                | City      | Remarks                                    |
|-----------------------------------|------------------------|-----------|--------------------------------------------|
| Northrock Hospital for Animals    | 8338 E 29th N          | Wichita   | Hospital / Clinic                          |
| All Creatures Veterinary Hospital | 8414 W 13th, Suite 170 | Wichita   | Hospital / Clinic                          |
| Charles' K-9 Boutique             | 846 S Edgemoor St      | Wichita   | Pet Store                                  |
| West Wichita Pet Clinic           | 8615 W 21st            | Wichita   | Hospital / Clinic                          |
| Herndon Veterinary Clinic         | 8820 W Maple           | Wichita   | Hospital / Clinic                          |
| Midwest Sales                     | 8830 S Hydraulic       | Haysville | Pet & Livestock Transportation<br>Supplies |
| Petco Animal Supplies             | 8840 W Kellogg         | Wichita   | Pet Store                                  |
| Pet Set Grooming                  | 905 S Seneca St        | Wichita   | Pet Store                                  |
| Noah's Ark Exotic Pets            | 920 E Grand Ave        | Haysville | Pet Store                                  |
| Best Friends Pet Clinic           | 9424 W Central         | Wichita   | Hospital / Clinic                          |
| Petcare                           | 9840 W Kellogg         | Wichita   | Pet Store                                  |

Pursuant to KAR 47-1803, *Disposition of injured or diseased animals*:

Any public health officer, officer or agent of a duly incorporated humane society, animal shelter or other appropriate facility, licensed veterinarian or police officer may take charge of any livestock or other domestic animal found injured or diseased upon public property. Such animal may be transported to a licensed veterinarian or a duly incorporated humane society, animal shelter or other appropriate facility for treatment, or, if such animal is injured or diseased beyond recovery or appears likely to injure any person or property, such animal may be killed in a humane manner by any such officer or agent.

Any public health officer, officer or agent of a duly incorporated humane society, animal shelter or other appropriate facility, licensed veterinarian or police officer may take charge of any livestock or other domestic animal found injured or diseased upon private property if such animal appears likely to injure any person or property. The disposition of such animal shall be as provided in subsection (a) of this section.

Unless any such animal's death appears to be imminent by reason of its disease or disability, or such animal is likely to injure any person or property, no such animal may be killed under the provisions of this section unless its owner cannot be located within twenty-four (24) hours.

### 9.13 INFORMATION TECHNOLOGY (IT) SECTOR

This sector provides communications and processes to meet the needs of businesses and government. Threats to this sector include physical vulnerabilities and also natural vulnerabilities for telecommunications. The following agencies are responsible for this sector:

Local: Public and Private Utilities, Petrochemical Companies

State: Kansas Division of Emergency Management/Kansas Highway Patrol, Kansas Fire Marshall

Federal: Department of Homeland Security

The Information Technology (IT) Sector is central to community security, economy, public health, and safety. Businesses, governments, academia, and private citizens are increasingly dependent upon IT Sector functions. These virtual and distributed functions produce and provide hardware, software, and IT systems and services, and—in collaboration with the Communications Sector—the Internet.

Many other critical infrastructure and key resources (CIKR) sectors rely on the IT Sector for products and services, including the reliable operation of networks and systems, and the movement and storage of critical data. The sector's complex and dynamic environment makes identifying threats and assessing vulnerabilities more difficult and requires that these tasks be dealt with in a collaborative and creative fashion.

Although the IT infrastructure has a certain level of inherent resilience, its interdependent and interconnected structure presents challenges as well as opportunities for coordinating public- and private-sector preparedness and protection activities.

The IT Sector provides an infrastructure upon which all other CIKR sectors rely, coordinates with other CIKR sectors, and works to ensure that any disruptions or manipulations of critical functions are brief, infrequent, manageable, geographically isolated, and minimally detrimental to the welfare of the United States. The Information Technology Sector shares dependencies and interdependencies with other CIKR sectors, including: Banking and Finance, Chemical, Communications, Emergency Services, Government Facilities, Healthcare and Public Health, Postal and Shipping, and Water.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

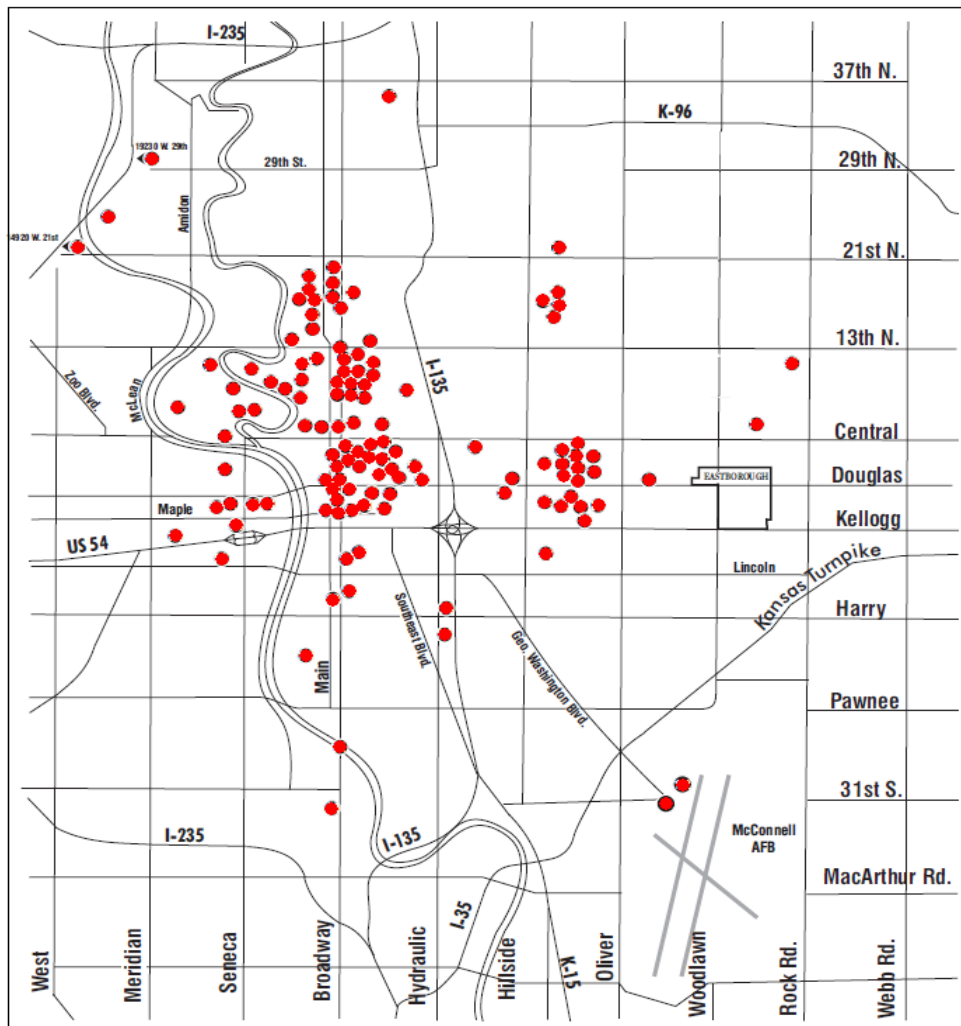
### 9.14 MONUMENTS AND ICONS SECTOR

The assets of the Monuments and Icons Sector are managed and safeguarded by the local and state historical societies. These facilities memorialize or represent significant aspects of a jurisdiction's heritage, tradition, or values, and serve as points of interest for visitors and educational activities. Many of these sites represent the foundation of the jurisdiction and as such must be protected from harm either by attack or natural disaster. The primary goal, however, is to preserve public accessibility to national critical assets to the maximum extent possible.

The sector faces the challenges of maintaining security at these sites and developing protective measures to deal with emerging threats without restricting access.

Unlike other assets that have numerous interdependencies, Monuments and Icons assets are basically stand-alone assets. The loss of or damage to an Monuments and Icons asset generally will not have a cascading effect on other assets within the Monuments and Icons Sector, or other sectors, such as Energy, Transportation, Food, and so on. Cross-sector coordination related to sector assets for which the primary protective responsibility resides in another sector is, however, essential.

MAP OF WICHITA HISTORIC SITES



The following pages reflect those historic sites that have been identified by the Kansas State Historical Society and the National Register of Historical Places.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### STATE & NATIONAL REGISTER OF HISTORICAL PLACES SEDGWICK COUNTY, KANSAS

| Site/Register Number                                                                                       | Address                                                           | Location                       | Significance                                                                            | Period of Significance                              | Owner                        | Historic Function                      | Current Function                       |
|------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|--------------------------------|-----------------------------------------------------------------------------------------|-----------------------------------------------------|------------------------------|----------------------------------------|----------------------------------------|
| <b>Adeline Apartment Building</b>                                                                          | 1403 N Emporia                                                    | Wichita                        | Architecture/<br>Engineering                                                            | 1900-1924                                           | Private                      | Domestic                               | Domestic                               |
| <b>Administration Building</b><br><i>Aka Building One</i><br>#90000908                                     | 3350 S George<br>Washington Blvd                                  | McConnell<br>Air Force<br>Base | Event,<br>Architecture/<br>Engineering                                                  | 1925-1949                                           | Federal                      | Transportation                         | Vacant/<br>Not In Use                  |
| <b>Allen, Henry J., House</b><br><i>Aka Kincade, Arthur W., House</i><br>#73000775                         | 255 N. Roosevelt St                                               | Wichita                        | Architecture/<br>Engineering                                                            | 1900-1924                                           | Private                      | Domestic                               | Domestic                               |
| <b>Allen's Market</b><br><i>Aka 173-5880-100000</i>                                                        | 2938 E Douglas Ave                                                | Wichita                        | Architecture/<br>Engineering                                                            | 1925-1949                                           | Private                      | Commerce                               | Commerce                               |
| <b>Arkansas Valley Lodge No. 21,<br/>Prince Hall Masons</b><br><i>Aka Black Masonic Lodge</i><br>#77000596 | 615 N. Main St                                                    | Wichita                        | Event/<br>Social History                                                                | 1900-1924                                           | Local<br>Government          | Social                                 | Vacant/<br>Not in Use                  |
| <b>Belmont Arches</b><br><i>Aka 173-5880-8157</i>                                                          | Located on Belmont<br>at the Central and<br>Douglas intersections | Wichita                        | Architecture/<br>Engineering,<br>Invention,<br>Community<br>Development and<br>Planning | 1925-1949,<br>1950-1974                             | Local<br>Government          | Recreation and<br>Culture              | Recreation and<br>Culture              |
| <b>Bitting Historic District</b><br>#04000776                                                              | 1100 and 1200 Blocks<br>of Bitting                                | Wichita                        | Event,<br>Architecture/<br>Engineering                                                  | 1875-1899,<br>1900-1924,<br>1925-1949               | Private, Local<br>Government | Domestic,<br>Transportation            | Domestic,<br>Transportation            |
| <b>Bond-Sullivan House</b><br><i>Aka 173-5880-5246</i>                                                     | 936 Back Bay Blvd                                                 | Wichita                        | Architecture/<br>Engineering                                                            | 1925-1949                                           | Private                      | Domestic                               | Domestic                               |
| <b>Bowers House</b><br><i>Aka 173-5880-5388</i><br>#04000973                                               | 1004 North Market                                                 | Wichita                        | Person,<br>Architecture/<br>Engineering                                                 | 1900-1924,<br>1925-1949                             | Private                      | Domestic                               | Work In<br>Progress                    |
| <b>Brown Building</b><br><i>(aka Broadway Plaza)</i>                                                       | 105 S Broadway St                                                 | Wichita                        | Architecture/<br>Engineering                                                            | 1925-1949                                           | Private                      | Commerce                               | Commerce                               |
| <b>Building Nine</b><br>#88001901                                                                          | 801 E. 37th St. North                                             | Wichita                        | Event/<br>Industry                                                                      | 1875-1899,<br>1900-1924,<br>1925-1949               | Private                      | Industry/<br>Processing/<br>Extraction | Industry/<br>Processing/<br>Extraction |
| <b>Buildings at 800 West Douglas Block</b><br><i>Aka 12573; 12574; 12575</i><br>#04001160                  | 809,811, and 815 W.<br>Douglas                                    | Wichita                        | Event/<br>Commerce                                                                      | 1875-1899,<br>1900-1924,<br>1925-1949,<br>1950-1974 | Private                      | Commerce/<br>Trade, Domestic           | Commerce/<br>Trade                     |

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

| STATE & NATIONAL REGISTER OF HISTORICAL PLACES<br>SEDGWICK COUNTY, KANSAS |                                                                    |          |                                                                                                 |                                                     |                              |                                                                             |                                                                           |
|---------------------------------------------------------------------------|--------------------------------------------------------------------|----------|-------------------------------------------------------------------------------------------------|-----------------------------------------------------|------------------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Site/Register Number                                                      | Address                                                            | Location | Significance                                                                                    | Period of Significance                              | Owner                        | Historic Function                                                           | Current Function                                                          |
| <b>Calvary Baptist Church</b><br>#88001905                                | 601 N. Water                                                       | Wichita  | Event,<br>Architecture/<br>Engineering                                                          | 1900-1924,<br>1925-1949                             | Local<br>Government          | Religion/<br>Religious<br>Structure                                         | Recreation And<br>Culture/<br>Museum                                      |
| <b>Campbell, B. H., House</b><br>#73000776                                | 1155 N. River Blvd                                                 | Wichita  | Architecture/<br>Engineering                                                                    | 1875-1899                                           | Private                      | Domestic                                                                    | Domestic                                                                  |
| <b>Carey House</b><br><i>Aka Eaton Hotel</i><br>#72000526                 | 525 E. Douglas Ave                                                 | Wichita  | Architecture/<br>Engineering                                                                    | 1875-1899                                           | Private                      | Domestic/<br>Hotel                                                          | Domestic/<br>Hotel                                                        |
| <b>Chapman-Noble House</b><br><i>Aka 173-5880-0069</i>                    | 1230 N Waco                                                        | Wichita  | Architecture/<br>Engineering                                                                    | 1875-1899                                           | Private                      | Domestic                                                                    | Domestic                                                                  |
| <b>Clapp, R.D.W. Residence</b><br><i>Aka 173-5880-0846</i>                | 320 N Belmont                                                      | Wichita  | Architecture/<br>Engineering                                                                    | 1900-1924,<br>1925-1949                             | Private                      | Domestic                                                                    | Domestic                                                                  |
| <b>Clapp, L. W., House</b><br><i>Aka Wellington Place</i><br>#82002668    | 1847 Wellington Place                                              | Wichita  | Person,<br>Architecture/<br>Engineering                                                         | 1875-1899                                           | Private                      | Domestic                                                                    | Vacant/<br>Not In Use                                                     |
| <b>College Hill Park Bathhouse</b>                                        | 304 S Circle Drive                                                 | Wichita  | Social History,<br>Architecture/<br>Engineering                                                 | 1925-1949                                           | Local<br>Government          | Recreation and<br>Culture                                                   | Recreation and<br>Culture                                                 |
| <b>Comley House</b><br><i>Aka 173-5880-0075</i>                           | 1137 N Broadway                                                    | Wichita  | Architecture/<br>Engineering                                                                    | 1875-1899,<br>1900-1924,<br>1925-1949,<br>1950-1974 | Local<br>Government          | Domestic                                                                    | Domestic                                                                  |
| <b>Dunbar Theater</b><br><i>Aka 173-5880-2470</i>                         | 1007 N. Cleveland                                                  | Wichita  | Social History,<br>Architecture/<br>Engineering,<br>Commerce,<br>Performing Arts,<br>Recreation | 1925-1949,<br>1950-1974                             | Private                      | Recreation and<br>Culture                                                   | Vacant/<br>Not In Use                                                     |
| <b>Eagle's Lodge #132</b>                                                 | 200-202 S. Emporia                                                 | Wichita  | Social History,<br>Architecture/<br>Engineering,<br>Commerce,                                   | 1900-1924,<br>1925-1949,<br>1950-1974               | Private                      | Social,<br>Funerary                                                         | Vacant/<br>Not In Use                                                     |
| <b>East Douglas Avenue<br/>Historic District</b><br>#04000777             | Roughly bounded by<br>Topeka, Rock Island,<br>1st, and English Sts | Wichita  | Architecture/<br>Engineering, Event                                                             | 1875-1899,<br>1900-1924,<br>1925-1949               | Private, Local<br>Government | Commerce/<br>Trade,<br>Domestic,<br>Recreation And<br>Culture,<br>Transport | Commerce/<br>Trade,<br>Recreation And<br>Culture,<br>Transport,<br>Museum |



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

| STATE & NATIONAL REGISTER OF HISTORICAL PLACES<br>SEDGWICK COUNTY, KANSAS                            |                                        |          |                                                                     |                                                     |                     |                                 |                            |
|------------------------------------------------------------------------------------------------------|----------------------------------------|----------|---------------------------------------------------------------------|-----------------------------------------------------|---------------------|---------------------------------|----------------------------|
| Site/Register Number                                                                                 | Address                                | Location | Significance                                                        | Period of Significance                              | Owner               | Historic Function               | Current Function           |
| <b>Ellis-Singleton Building</b><br><i>Aka Petroleum Building</i><br>173-5880-10004                   | 221 S Broadway                         | Wichita  | Architecture/<br>Engineering                                        | 1925-1949,<br>1950-1974                             | Private             | Commerce                        | Commerce                   |
| <b>Engine House No. 6</b><br><i>Aka 173-5880-2166</i><br>#94001623                                   | 1300 S. Broadway                       | Wichita  | Architecture/<br>Engineering, Event                                 | 1900-1924,<br>1925-1949                             | Local<br>Government | Government/<br>Fire Station     | Vacant/<br>Not In Use      |
| <b>Fairmount Congregational Church</b><br><i>Aka 173-5880-3389</i>                                   | 1650 N Fairmont                        | Wichita  | Architecture/<br>Engineering,<br>Communications                     | 1900-1924,<br>1925-1949,<br>1950-1974               | Private             | Religion                        | Religion                   |
| <b>Fairmount Cottage</b><br>#85001979                                                                | 1717 Fairmount Ave                     | Wichita  | Architecture/<br>Engineering                                        | 1875-1899                                           | Private             | Domestic                        | Domestic                   |
| <b>Farmer's and Banker's Historic District</b><br><i>Aka Elks Lodge and Commercial Club</i>          | NE Corner, 1st &<br>Market Sts         | Wichita  | Architecture/<br>Engineering                                        | 1900-1924,<br>1925-1949,<br>1950-1974               | Private             | Social,<br>Commerce/<br>Trade   | Commerce/<br>Trade         |
| <b>First Presbyterian Church</b><br>#72001615                                                        | 1717 Sim Park Dr                       | Wichita  |                                                                     |                                                     | Private             |                                 |                            |
| <b>Fresh Air Baby Camp</b><br><i>Aka Girl Scout Little House</i><br>173-5880-9040                    | 1229 W 11th St                         | Wichita  | Health/Medicine,<br>Social History,<br>Architecture/<br>Engineering | 1900-1924,<br>1925-1949,<br>1950-1974               | Local<br>Government | Health Care,<br>Social          | Vacant/<br>Not in Use      |
| <b>Gelbach House</b><br><i>Aka 173-5880-7352</i><br>#02000545                                        | 1721 Park Place                        | Wichita  | Event, Person                                                       | 1900-1924                                           | Private             | Domestic                        | Domestic                   |
| <b>Grace Methodist Episcopal Church</b><br><i>Aka Grace United Methodist Church</i><br>173-5880-8405 | 944 S Topeka                           | Wichita  | Architecture/<br>Engineering                                        | 1900-1924                                           | Private             | Religion                        | Religion                   |
| <b>Hayford Buildings</b><br>#82000420<br>173-5880-139                                                | 255 N Market and<br>115-127 E. 2nd Sts | Wichita  | Architecture/<br>Engineering                                        | 1900-1924,<br>1925-1949,<br>1950-1974,<br>1975-2000 | Private             | Commerce/<br>Trade,<br>Domestic | Commerce/<br>Trade         |
| <b>Hillside Cottage</b><br>#76000839 / 173-5880-087                                                  | 303 Circle Dr                          | Wichita  | Architecture/<br>Engineering                                        | 1875-1899                                           | Private             | Domestic                        | Domestic                   |
| <b>Holyoke Cottage</b><br><i>Aka Parker House</i><br>173-5880-7485                                   | 1704 N Holyoke                         | Wichita  | Architecture/<br>Engineering                                        | 1875-1899                                           | Private             | Domestic,<br>Education          | Other, Work in<br>Progress |
| <b>Hypatia House</b><br><i>Aka 173-5880-0064</i><br>#91001105                                        | 1215 N Broadway                        | Wichita  | Architecture/<br>Engineering                                        | 1900-1924                                           | Private             | Domestic,<br>Social             | Social,<br>Clubhouse       |

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### STATE & NATIONAL REGISTER OF HISTORICAL PLACES SEDGWICK COUNTY, KANSAS

| Site/Register Number                                                                            | Address                                    | Location | Significance                              | Period of Significance  | Owner            | Historic Function                      | Current Function              |
|-------------------------------------------------------------------------------------------------|--------------------------------------------|----------|-------------------------------------------|-------------------------|------------------|----------------------------------------|-------------------------------|
| <b>International Harvester Building</b><br>#02001702                                            | 355 N. Rock Island Ave/803-811 E. Third St | Wichita  | Architecture/<br>Engineering, Event       | 1900-1924,<br>1925-1949 | Private          | Commerce/<br>Trade                     | Domestic, Work<br>In Progress |
| <b>Jackman, C.M., House</b><br><i>Aka 173-5880-0548</i>                                         | 158 N Roosevelt                            | Wichita  | Architecture/<br>Engineering              | 1900-1924               | Private          | Domestic                               | Domestic                      |
| <b>Johnson Drug Store Building</b><br><i>Aka 173-5880-9994</i>                                  | 2329 E Central                             | Wichita  | Architecture/<br>Engineering              | 1925-1949               | Private          | Commerce                               | Commerce                      |
| <b>Keep Klean Building</b><br><i>Aka Wichita Towel Supply</i><br>173-5880-05209                 | 810 E Third                                | Wichita  | Architecture/<br>Engineering,<br>Industry | 1925-1949,<br>1950-1974 | Private          | Industry/<br>Processing/<br>Extraction | Work in Progress              |
| <b>Kelly, Edward M., House</b><br>#02000763                                                     | 1711 N. Market Street                      | Wichita  | Architecture/<br>Engineering,<br>Person   | 1900-1924,<br>1925-1949 | Private          | Domestic                               | Domestic                      |
| <b>Kress, S. H., Company Building</b><br><i>Aka Kress Building</i><br>#85001385                 | 224 E. Douglas                             | Wichita  | Architecture/<br>Engineering, Event       | 1925-1949               | Private          | Commerce/<br>Trade                     | Commerce/<br>Trade            |
| <b>Lassen Hotel</b><br><i>Aka Market Centre</i><br>173-5880-0016/<br>#84000108                  | Market Ave. and 1st Street                 | Wichita  | Architecture/<br>Engineering, Event       | 1900-1924               | Private          | Domestic,<br>Hotel                     | Work In Progress              |
| <b>Lewelling, Governor L.D., House</b><br>173-5880-1184/#05000547                               | 1245 N. Broadway                           | Wichita  | Person,<br>Architecture/<br>Engineering   | 1875-1899               | Private          | Domestic                               | Domestic                      |
| <b>Linwood Park Greenhouse and Maintenance Building</b>                                         | 1700 S. Hydraulic Street                   | Wichita  | Social History                            | 1925-1949               | Local Government | Agriculture/<br>Subsistence            | Agriculture/<br>Subsistence   |
| <b>Long, Chester I., House</b><br>173-5880-096/#78001289                                        | 3401 E 2nd St                              | Wichita  | Person                                    | 1875-1899               | Private          | Domestic                               | Domestic                      |
| <b>Mack, John, Bridge</b><br><i>Aka South Lawrence Street Bridge</i><br>173-5880-1383/#91002018 | S. Broadway across the Big Arkansas River  | Wichita  | Event,<br>Architecture/<br>Engineering    | 1925-1949               | Local Government | Transportation                         | Transportation                |
| <b>Market Street Cottage</b><br>173-5880-5243                                                   | 1144 N Market                              | Wichita  | Architecture/<br>Engineering              | 1875-1899               | Private          | Domestic                               | Domestic                      |
| <b>McCormick School</b><br>#78001288                                                            | 855 S. Martinson                           | Wichita  | Event,<br>Architecture/<br>Engineering    | 1875-1899               | Local Government | Education                              | Education                     |

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### STATE & NATIONAL REGISTER OF HISTORICAL PLACES SEDGWICK COUNTY, KANSAS

| Site/Register Number                                                                                           | Address                                              | Location | Significance                                           | Period of Significance                | Owner               | Historic Function                                             | Current Function                                 |
|----------------------------------------------------------------------------------------------------------------|------------------------------------------------------|----------|--------------------------------------------------------|---------------------------------------|---------------------|---------------------------------------------------------------|--------------------------------------------------|
| <b>Mentholatum Company Building</b><br>173-5880-8299                                                           | 1300 E Douglas                                       | Wichita  | Industry and Commerce,<br>Architecture/<br>Engineering | 1900-1924,<br>1925-1949               | Private             | Commerce/<br>Trade,<br>Industry/<br>Processing/<br>Extraction | Commerce/<br>Trade                               |
| <b>Mohr Barn</b><br>173-0000-0131                                                                              | 14920 W 21st Street<br>North                         | Wichita  | Agriculture                                            | 1900-1924,<br>1925-1949,<br>1950-1974 | Private             | Agriculture                                                   | Agriculture                                      |
| <b>Monroe--Mahan House</b><br>173-5880-0099/#96000583                                                          | 1357 S. Broadway                                     | Wichita  | Architecture/<br>Engineering                           | 1875-1899                             | Private             | Single Dwelling                                               | Single Dwelling                                  |
| <b>Mullen Court Apartments</b>                                                                                 | 1140-1150 N. Topeka<br>Avenue                        | Wichita  | Architecture/<br>Engineering                           | 1925-1949                             | Private             | Multiple<br>Dwelling                                          | Multiple<br>Dwelling                             |
| <b>Munger, Darius Sales, House</b><br>#82002669                                                                | Museum, Sim Park                                     | Wichita  | Event,<br>Architecture/<br>Engineering                 | 1850-1874                             | Local<br>Government | Domestic                                                      | Recreation And<br>Culture                        |
| <b>Nokomis and Navarre Apartment<br/>Buildings</b><br>#01000234                                                | 420-426 N. Topeka<br>Ave                             | Wichita  | Architecture/<br>Engineering                           | 1900-1924,<br>1925-1949               | Private             | Domestic                                                      | Domestic                                         |
| <b>North Riverside Park Comfort Station</b>                                                                    | 900 N Bitting Ave                                    | Wichita  | Architecture/<br>Engineering,<br>Social History        | 1925-1949                             | Local<br>Government | Recreation And<br>Culture                                     | Recreation And<br>Culture                        |
| <b>North Topeka Avenue-10th Street<br/>Historic District</b><br>#83000438/173-5880-0134 thru 173-<br>5880-0137 | 1165, 1103, 1109,<br>1113, and 1108 N.<br>Topeka Ave | Wichita  | Architecture/<br>Engineering                           | 1875-1899                             | Private             | Domestic                                                      | Domestic                                         |
| <b>Occidental Hotel</b><br><i>Aka Baltimore Hotel</i><br>#82002670/173-5880-052                                | 300 N. Main St                                       | Wichita  | Event,<br>Architecture/<br>Engineering                 | 1850-1874                             | Private             | Domestic                                                      | Commercial/<br>Trade                             |
| <b>Old Sedgwick County Courthouse</b><br>#71000327/173-5880-002                                                | 504 N. Main St                                       | Wichita  | Event,<br>Architecture/<br>Engineering                 | 1875-1899                             | Local<br>Government | Government                                                    | Government                                       |
| <b>Old Wheeler-Kelly-Hagny Building</b><br>#82002671/173-5880-0015                                             | 120 S. Market St                                     | Wichita  | Event,<br>Architecture/<br>Engineering                 | 1900-1924                             | Private             | Commerce/<br>Trade                                            | Commerce/<br>Trade                               |
| <b>Orpheum Theater and Office Building</b><br>#80001473/173-5880-039                                           | 200 N. Broadway St                                   | Wichita  | Event,<br>Architecture/<br>Engineering                 | 1900-1924                             | Private             | Commerce/<br>Trade,<br>Recreation And<br>Culture              | Commerce/<br>Trade,<br>Recreation And<br>Culture |

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

| STATE & NATIONAL REGISTER OF HISTORICAL PLACES<br>SEDGWICK COUNTY, KANSAS                                                                 |                                                                                    |          |                                         |                                 |                           |                        |                        |
|-------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|----------|-----------------------------------------|---------------------------------|---------------------------|------------------------|------------------------|
| Site/Register Number                                                                                                                      | Address                                                                            | Location | Significance                            | Period of Significance          | Owner                     | Historic Function      | Current Function       |
| <b>Park Place--Fairview Historic District</b><br>#04000778                                                                                | Roughly Park Place and Fairview Aves. bet. 13th and 17th Sts. and Wellington Place | Wichita  | Event, Architecture/Engineering         | 1875-1899, 1900-1924, 1925-1949 | Local Government, Private | Domestic               | Domestic               |
| <b>Riverside Cottage</b><br><i>Aka Fitch, Thomas, House</i><br>#88002824/173-5880-0114                                                    | 901 Spaulding Ave                                                                  | Wichita  | Person, Event, Architecture/Engineering | 1875-1899                       | Private                   | Domestic               | Domestic               |
| <b>Riverview Apartments</b><br>#02000765                                                                                                  | 404-408 Back Bay Blvd                                                              | Wichita  | Event, Architecture/Engineering         | 1925-1949                       | Private                   | Domestic               | Domestic               |
| <b>Roberts House</b><br>173-5880-0346                                                                                                     | 235 N Roosevelt                                                                    | Wichita  | Architecture/Engineering                | 1900-1924                       | Private                   | Domestic               | Domestic               |
| <b>Rock Island Depot</b><br>#73000777/173-5880-0162                                                                                       | 729 E. Douglas St                                                                  | Wichita  | Event, Architecture/Engineering         | 1875-1899                       | Private                   | Transportation         | Commerce/Trade         |
| <b>Scottish Rite Temple</b><br><i>Aka Y.M.C.A. Building</i><br>#72000527                                                                  | NW corner of 1st St. at Topeka                                                     | Wichita  | Architecture/Engineering                | 1875-1899, 1900-1924            | Private                   | Social                 | Social                 |
| <b>Sedgwick County Memorial Hall and Soldiers and Sailors Monument</b><br><i>Aka Soldiers and Sailors Civil War Monument</i><br>#98001359 | 510 N. Main                                                                        | Wichita  | Architecture/Engineering                | 1900-1924                       | Local Government          | Recreation And Culture | Recreation And Culture |
| <b>Sim Park Golf Course Tee Shelters</b>                                                                                                  | 2020 W Murdock St                                                                  | Wichita  | Social History                          | 1925-1949                       | Local Government          | Landscape              | Landscape              |
| <b>St. Mark Church</b><br>#91000463/173-0000-0001                                                                                         | 19230 W. 29th St., N                                                               | Colwich  | Architecture/Engineering, Event         | 1900-1924, 1925-1949            | Private                   | Religion               | Religion               |
| <b>Stackman Court Apartments</b><br><i>Aka Franklin Apartments;</i><br>#91001741/173-5880-0491                                            | 1207 Franklin Ave                                                                  | Wichita  | Architecture/Engineering, Person, Event | 1925-1949                       | Private                   | Domestic               | Domestic               |
| <b>Stearman Aircraft Company Hangar</b><br>#82005257                                                                                      | McConnell Air Force Base                                                           | Wichita  |                                         |                                 | Federal                   |                        |                        |
| <b>Sternberg, William, House</b><br>#89000387                                                                                             | 1065 N. Waco                                                                       | Wichita  | Event, Architecture/Engineering         | 1875-1899                       | Private                   | Domestic               | Domestic               |
| <b>Stoner Apartment Building</b>                                                                                                          | 938-940 N Market                                                                   | Wichita  | Architecture/Engineering                | 1900-1924                       | Private                   | Domestic               | Domestic               |

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

| STATE & NATIONAL REGISTER OF HISTORICAL PLACES<br>SEDGWICK COUNTY, KANSAS                                                                          |                                                                               |          |                                         |                                                     |                  |                                                            |                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|----------|-----------------------------------------|-----------------------------------------------------|------------------|------------------------------------------------------------|------------------------------------------------------------|
| Site/Register Number                                                                                                                               | Address                                                                       | Location | Significance                            | Period of Significance                              | Owner            | Historic Function                                          | Current Function                                           |
| <b>Topeka--Emporia Historic District</b><br>#04000779                                                                                              | Roughly N. Topeka and Emporia Aves.<br>bet. 10th and 13th Sts                 | Wichita  | Event,<br>Architecture/<br>Engineering  | 1875-1899,<br>1900-1924,<br>1925-1949               | Private          | Domestic                                                   | Domestic                                                   |
| <b>US Post Office and Federal Building—Wichita</b><br><i>Aka Wichita United States Post Office and Federal Building</i><br>#89000792/173-5880-0035 | 401 N. Market                                                                 | Wichita  | Event,<br>Architecture/<br>Engineering  | 1925-1949                                           | Federal          | Government                                                 | Government                                                 |
| <b>University Hall, Friends University</b><br><i>Aka Garfield University</i><br>#71000328/173-5880-001                                             | 2100 University Ave.                                                          | Wichita  | Event,<br>Architecture/<br>Engineering  | 1875-1899                                           | Private          | College                                                    | College                                                    |
| <b>Virginia Apartment Building</b><br>#01000233                                                                                                    | 401-405 E. Third St                                                           | Wichita  | Architecture/<br>Engineering            | 1900-1924                                           | Private          | Domestic                                                   | Domestic                                                   |
| <b>Wall, Judge T. B., House</b><br>#83000439/173-5880-0098                                                                                         | 622 N. St. Francis Ave                                                        | Wichita  | Person,<br>Architecture/<br>Engineering | 1875-1899,<br>1900-1924                             | Private          | Domestic                                                   | Vacant/<br>Not In Use                                      |
| <b>Wichita City Carnegie Library Building</b><br><i>Aka Wichita Omnisphere and Science Center</i><br>#87000971/173-5880-0004                       | 220 S. Main                                                                   | Wichita  | Event,<br>Architecture/<br>Engineering  | 1900-1924                                           | Local Government | Education                                                  | Recreation And Culture                                     |
| <b>Wichita City Hall</b><br>#71000329                                                                                                              | 204 S. Main St                                                                | Wichita  | Event,<br>Architecture/<br>Engineering  | 1875-1899                                           | Local Government | Courthouse                                                 | Courthouse                                                 |
| <b>Wichita Historic Warehouse and Jobbers District</b><br><i>Aka Old Town</i><br>#03001172                                                         | Bounded by the elevated RR tracks,<br>Douglas and Washington Aves. and 2nd St | Wichita  | Event                                   | 1875-1899,<br>1900-1924,<br>1925-1949,<br>1950-1974 | Private          | Commerce/<br>Trade, Industry/<br>Processing/<br>Extraction | Commerce/<br>Trade, Industry/<br>Processing/<br>Extraction |
| <b>Wichita Wholesale Grocery Company</b><br>#83000440/173-5880-0180                                                                                | 619 E. William St                                                             | Wichita  | Event,<br>Architecture/<br>Engineering  | 1875-1899                                           | Private          | Commerce/<br>Trade                                         | Commerce/<br>Trade                                         |



### 9.15 Nuclear Reactors, Materials, and Waste Sector (or Nuclear Sector)

The Nuclear Reactors, Materials, and Waste Sector (or Nuclear Sector) owns, oversees, and operates commercial nuclear power reactors that provide power to millions of homes and businesses across the country. The sector also includes:

- Non-power nuclear reactors used for research, training, and radioisotope production.
- Nuclear and radiological materials used in medical, industrial, and academic settings.
- Nuclear fuel-cycle facilities.
- The transportation, storage, and disposal of nuclear and radioactive materials and waste.

The Nuclear Sector is composed of the following primary subsectors: Nuclear Facilities, Nuclear Materials, and Nuclear Waste. Let's look at each of these subsectors.

- Nuclear Facilities Subsector: includes power plants that use nuclear fission to produce electricity. This subsector also includes non-power reactors that are used for research and in education or medical applications. And finally, the subsector includes the deactivated facilities that have not been fully decontaminated and decommissioned for release back to public use. The only nuclear power plant in Kansas is Wolf Creek in Coffey County and serves the majority of the eastern portion of Kansas to include part of Kingman County.
- Nuclear Materials Subsector: ranges from nuclear fuel cycle facilities that produce fuel for use in nuclear power plants to companies that transport nuclear materials for use and for waste disposal. The subsector also includes radioactive material users such as medical, research, irradiation, and industrial facilities, and private-sector facilities that import, fabricate, or remanufacture radioactive materials.
- Nuclear Waste Subsector: encompasses a wide range of radioactive waste handling and storage facilities. These facilities handle low-level radioactive wastes such as contaminated clothing and medical equipment, as well as large quantities of naturally occurring radioactive materials. The Nuclear Waste Subsector also includes facilities that store spent reactor fuel assemblies in both wet and dry environments.

While the loss of the electricity generated by a single nuclear power plant may have only a minor impact on the State's overall electrical capacity, a terrorist attack on the Wolf Creek nuclear power plant or University of Kansas (Manhattan) research reactor would be a significant security event. For this reason, Nuclear Sector facilities are among the best defended and most physically hardened of all critical infrastructures. These facilities are designed to withstand such extreme events as hurricanes, tornadoes, and earthquakes.

The sector shares dependencies and interdependencies with other CIKR sectors, including: Chemical, Communications, Emergency Services, Energy, Government Facilities, Healthcare and Public Health, Information Technology, and Transportation Systems.

#### WOLF CREEK GENERATING STATION



Wolf Creek Nuclear Operating Corporation operates the Wolf Creek Generating Station, Kansas' first nuclear power generating station, for three utility owners in Kansas and Missouri. Commissioned on September 3, 1985, the plant generates about 1,200 megawatt electrical, which is enough energy for approximately 800,000 homes. Wolf Creek Generating Station is located in Coffey County, Kansas, just northeast of Burlington. We are about 55 miles south of Topeka, 90 miles southwest of Kansas City and 120 miles northeast of Wichita. Wolf Creek, dammed to create Coffey County Lake, provides cooling water for the reactor.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

Wolf Creek Nuclear Operating Corporation is a subsidiary of three owners:

Kansas City Power & Light, a Great Plains Energy Company (47 percent)  
Westar Energy Company (47 percent)  
Kansas Electric Power Cooperative (6 percent).

### NUCLEAR RELEASE CONSIDERATION

On March 11, 2011, a 9.0 earthquake shook the island of Japan causing severe damage to the Fukushima Daiichi nuclear reactor commissioned in 1971. According to the Kansas Division of Emergency Management, the hydrogen gas released from the Fukushima nuclear reactor in Japan contained Cesium, Iodine, Strontium, and some noble gases. If a similar situation occurred at Wolf Creek generating station from the Humboldt Fault, the impact would be minimal. Planning for Wolf Creek, which is tested every two years for such an event, has three evacuation/shelter-in-place zones of one, five, and ten miles. The types of responses would be based on the level of radiation released and half-lives of those isotopes. Unlike the Chernobyl and Fukushima reactors, today's reactors are stronger and better able to contain reactions through special venting systems.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### 9.16 POSTAL AND SHIPPING SECTOR

This sector delivers private and commercial letters, packages, and bulk assets. The U.S. Postal Service and other carriers provide the services of this sector. Threats to this sector include physical vulnerabilities. The following agencies are responsible for this sector:

Local: Public and Private Utilities, Petrochemical Companies

State: Kansas Division of Emergency Management/Kansas Highway Patrol, Kansas Fire Marshall

Federal: Department of Homeland Security

The Postal and Shipping Sector's collection, transportation, and distribution assets include complex intermodal networks linking millions of potential delivery points across the country and the globe. Given the sector's vast networks of facilities, transportation assets, and cyber systems, achieving 100 percent security is not economically or technologically feasible. However, the sector envisions a resilient infrastructure in which threats can be quickly detected, consequences localized, and operational disruptions minimized. A key component of this vision is the United States Postal Inspection Service, one of the country's oldest Federal law enforcement agencies, which fights criminals who attack our Nation's postal system and misuse it to threaten the American public.

The Postal and Shipping Sector's collection, transportation, and distribution assets include complex intermodal networks linking millions of potential delivery points across the country and the globe.

The sector processes and distributes more than 170 billion pieces of mail domestically each year. However, the size and diversity of the Postal and Shipping Sector challenges efforts to protect its many different systems and assets.

The Postal and Shipping Sector shares dependencies and interdependencies with other CIKR sectors, including: Banking and Finance, Commercial Facilities, Communications, Critical Manufacturing, Energy, Healthcare and Public Health, Information Technology, and Transportation Systems.

U.S. Postal Service

#### *Wichita Stations and Outlets*

- General Maintenance Facility – 7117 W Harry Street
- Downtown Station – 330 W 2<sup>nd</sup> Street N
- North Wichita Station – 2325 N Arkansas Avenue
- Chisholm Station – 2510 S Elizabeth Avenue
- Wichita State University Station – 1845 Fairmount Street
- Dillons Georgetown Station – 1607 S Georgetown
- Dillons Wichita West 13<sup>th</sup> Street Station – 3932 W 13<sup>th</sup> Street N
- Dillons Wichita West 13<sup>th</sup> Street Station – 8828 W 13<sup>th</sup> Street N
- Munger Station – 1314 N Oliver Avenue
- Dillons Wichita South Seneca Station – 3211 S Seneca Street
- River City Station – 3241 S Hydraulic Street
- Dillons Wichita East 13<sup>th</sup> Street Station – 6297 E 13<sup>th</sup> Street N
- Dillons Wichita Central Avenue Station – 7707 E Central Avenue
- Dillons Wichita Broadway Street Station – 4747 S Broadway Street
- Dillons Wichita North Rock Road Station – 2244 N Rock Road
- Corporate Hills Station – 9350 E Corporate Hills Drive
- Dillons Wichita Woodlawn Station – 3707 N Woodlawn Boulevard
- Delano Station – 626 S Tyler Road
- Dillons Wichita Harry Street Station – 9450 E Harry Street
- Dillons Wichita West Central Avenue Station – 10515 W Central Avenue
- Dillons Wichita West 21<sup>st</sup> Street Station – 10222 W 21<sup>st</sup> Street N

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### *Wichita Stations and Outlets- Cont'd*

- Dillons Wichita Maple Street Station – 13415 W Maple Street

### *Other Communities*

- Park City Leekers #166 Station – 6223 N Broadway Street
- Kechi Station – 307 E Kechi Road
- Haysville Station – 224 W Grand Avenue
- Maize Station – 115 E Albert Street
- Dillons Derby Greenway Station – 200 W Greenway Street
- Derby Station – 201 W Greenway Street
- Valley Center Station – 205 E Main Street
- Dillons Derby North Rock Station – 1624 N Rock Road
- Colwich Station – 417 W Wichita Avenue
- Goddard Station – 328 N Main Street
- Clearwater Station – 640 N 4<sup>th</sup> Street
- Mulvane Station – 410 E Main Street
- Peck Station – 328 W 7<sup>th</sup> Street
- Sedgwick Station – 415 N Commercial Avenue
- Bentley Station – 140 S Wichita Street
- Andale Station – 318 N Main Street
- Garden Plain Station – 412 N Main Street
- Mount Hope Station – 125 W Main Street
- Viola Station – 205 S Main Street
- Cheney Station – 215 N Main Street

### Federal Express (FedEx)

#### *Wichita Stations and Outlets*

- FedEx Office Print & Ship center – 240 S West Street, Suite 10a
- FedEx Express Ship Center – 1530 S Hoover Road
- OfficeMax – 6930 W Kellogg Drive
- The Packaging Store – 2110 N Maize Road, Suite 500
- OfficeMax – 2414 N Maize Road
- FedEx Office Print & Ship Center – 2441 N Maize Road, Suite 2507
- The Packaging Store – 6249 E 21<sup>st</sup> Street N, Suite 120
- Custom Pack & Ship – 513 S Woodlawn Boulevard
- Postnet – 13303 W Maple Street, Suite 139
- FedEx Office Print & Ship Center – 7701 E Kellogg Drive
- OfficeMax – 8147 E Kellogg Drive
- OfficeMax – 3535 N Rock Road
- FedEx Office Print & Ship Center – 3605 N Rock Road
- Postnet – 2350 N Greenwich Road, Suite 100

### United Parcel Service

#### *Wichita Stations and Outlets*

- Box Central Inc – 2920 W Central Avenue
- The UPS Store – 8918 W 21<sup>st</sup> Street, N, Suite 200
- UPS Customer Center – 3003 S West Street
- Office Depot/Copy Center – 613 S Dugan Road
- The Mail Room – 2020 W 21<sup>st</sup> Street N

### *Wichita Stations and Outlets – Cont'd*

- The UPS Store – 2250 N Rock Road, Suite 118
- The UPS Store – 6505 E Central Avenue
- Office Depot/Copy Center – 3035 N Rock Road
- Box Central Inc – 5405 E Central Avenue
- The Packaging Store – 6249 E 21<sup>st</sup> Street N, Suite 120
- One Stop Mail Stop – 513 S Woodlawn Avenue
- Postnet – 13303 W Maple Street, Suite 139
- Postnet – 2350 N Greenwich Road, Suite 100

### *Other Communities*

- The UPS Store (Derby) – 620 N Rock Road



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### 9.17 TRANSPORTATION SYSTEMS SECTOR

This sector enables movement of people and assets that are vital to our economy, mobility, and security with the use of aviation, ships, rail, pipelines, highways, trucks, buses, and mass transit. Threats to this sector include physical vulnerabilities. The following agencies are responsible for this sector:

Local: Public and Private Utilities, Petrochemical Companies

State: Kansas Division of Emergency Management/Kansas Highway Patrol, Kansas Fire Marshall

Federal: Department of Homeland Security

The Transportation Systems Sector is a vast, open network of interdependent systems that delivers food, water, medicines, fuel, and other commodities, making it a highly attractive target for terrorists.

What is unique about the Transportation Systems Sector is its part in the global transportation network. The Transportation Systems Sector relies on global partners to share critical information that can lead to more informed decisions by identifying and understanding threats, vulnerabilities, and consequences using global threat information and assessments.

The sector's goals are to prevent and deter acts of terrorism using transportation means or against elements of the transportation system, to enhance resilience of the transportation system, and to improve the cost-effective use of resources for transportation security.

The sector is organized into the following six subsectors or "modes":

- **Aviation Mode:** includes aircraft, air traffic control systems, and air cargo, as well as commercial, civil, and joint-use military airports, airfields, heliports, and seaplane bases.
- **Maritime Mode:** includes various maritime operations within the Maritime Transportation System (MTS) networks and have components that include vessels as well as approximately 95,000 miles of coastline, port facilities, waterways, and related infrastructure.
- **Mass Transit and Passenger Rail Mode:** comprised of multiple-occupancy vehicles designed to transport customers on local and regional routes, while the Highway Infrastructure and Motor Carriers mode encompasses more than 4 million miles of roadways and supporting infrastructure.
- **Freight Rail Mode:** includes hundreds of railroads, thousands of miles of track, and more than 1 million cars and locomotives.
- **Pipeline Security Mode:** focuses on the infrastructure that carries natural gas, hazardous liquids, and various chemicals.

The Transportation Systems Sector shares dependencies and interdependencies with all the other CIKR sectors, including: Agriculture and Food, Banking and Finance, Chemical, Commercial Facilities, Communications, Critical Manufacturing, Defense Industrial Base, Emergency Services, Energy, Government Facilities, Information Technology, and Postal and Shipping. In addition to cross-sector interdependencies, the Transportation Systems Sector must pay particular attention to interdependencies among the transportation modes.

#### 9.17.1 SAFETY

KDOT maintains the Kansas Accident Records System (KARS) of crash data for the state. KARS contains information on the number of crashes, contributing causes (road conditions, weather, animals, etc.), location, and severity (fatality, injury, or property damage only). In the region, there were 53,573 crashes resulting in 23,820 injuries and 237 fatalities from 2004- 2008. Over two thirds of the crashes in the region were property damage only crashes; whereas, injury crashes accounted for over 31% of the crashes in the region. Fatal crashes accounted for less than 1% of the crashes in the region.

Based on 2004- 2008 KARS data, the region experienced 217 fatal crashes that resulted in a total of 237 deaths. The number of fatal crashes peaked in 2006 with 58 crashes involving a fatality. Fatal crashes have declined in the two years following 2006. The 28 fatal crashes in 2008 represent a 50% decrease since

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

2006. While rural crashes account for 14% of the region's total crashes, one out of every three (33%) fatal crashes occurs in the rural areas. Nine of the top ten circumstances leading to regional crashes are related to driver behavior and driver related issues contributing to 90% of the crashes.

### 9.17.2 SECURITY

Some of the most critical transportation infrastructure in the region includes:

- Major highways
- Major bridges
- Railroad lines
- Pipelines
- Transit facilities
- Aviation facilities, including McConnell Air Force Base

The Wichita Traffic Management Center (TMC) is vital to the implementation of the Intelligent Transportation System (ITS) architecture. The TMC monitors roads with cameras, coordinates operations with other agencies and emergency services, and provides information to the public and local media. During an emergency, the TMC assists with alerting the public, media, and coordinating response efforts. Wichita Transit is in the process of deploying an Automatic Vehicle Locator (AVL) system. AVL systems calculate the real-time location of any vehicle equipped with a Global Positioning System (GPS) receiver. When combined with other ITS technologies, AVL can deliver many benefits such as real-time bus location and accurate prediction of arrival times.

### 9.17.3 OPERATIONS AND MAINTENANCE

Operations and maintenance covers a wide range of activities that are intended to keep transportation infrastructure, such as roads, paths, and buses, in good repair and functioning properly. Some of these activities include:

- Street sweeping
- Snow and ice removal
- Pavement and lane markings
- Traffic sign and signal repair
- Pothole and pavement patching
- Bridge inspections and repair
- Rail crossing inspections and repair
- Pavement resurfacing
- Vehicle maintenance

#### *System Management*

System management goes beyond operations and maintenance and seeks to optimize the performance of existing infrastructure. System management involves a wide range of techniques to maximize the ability of the existing transportation facilities to meet user demands. Some of these techniques include:

- Traffic incident management
- Travel information services
- Roadway weather information
- Automatic vehicle location
- Traffic signal coordination
- Work zone management
- Electronic payment/toll collection
- Emergency response and homeland security
- Freight management

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

- Transportation demand management
- Transit fleet management and dispatch
- Congestion management

### 9.17.4 HIGHWAYS

#### *Historical Overview*

On August 11, 1871, the county voted \$200,000 in bonds to aid in the construction of a railroad. The railroad ran from Newton to Wichita and was completed on May 16, 1872. On June 8, 1872, the first shipment on the railroad was made and consisted of 18 cars of cattle. The Kansas Midland Railroad was built in 1887 and later sold to the St. Louis and San Francisco Railroad Company.<sup>40</sup>

In the spring of 1885, as Wichita experienced a growth boom and in an effort to have workers in Wichita commute back and forth to Valley Center, a means of transportation was needed. A transit company was organized to build and manage an interurban between Wichita and Valley Center. The Wichita terminal of the road was on Douglas Avenue, followed the street car track to Thirteenth Street, then came up Arkansas Avenue, the west one-half mile to the Santa Fe track, then following it to one mile south of Valley Center where it angled over to Meridian, then over to the station which was the former Carrothers' Grocery Store in Valley Center. The motor cars, as they were called, contained a section for the engine and the coal bin. Coal or wood was used to furnish the steam. The remainder was filled with seats for the passengers. On busy days, a trailer would be fastened to the car to take care of surplus passengers.<sup>41</sup>

Types of transportation people use to get to work, and how many people use each type:

**Means of Transportation to Work**

|         | Private Vehicle | Walked | Public Transit | Bicycle | Other Means |
|---------|-----------------|--------|----------------|---------|-------------|
| Trips   | 211,287         | 3,083  | 1,467          | 352     | 1,187       |
| Percent | 97.2%           | 1.4%   | 0.7%           | 0.2%    | 0.5%        |

#### WAMPO Region's Eight Elements:

- Roadway provides an overview of the existing roadway network, regional roadway needs, existing plans, and recommendations to improve the network.
- Bicycle and Pedestrian provides an overview of the existing bicycle and pedestrian facilities, existing plans, trends and needs of the region, and recommendations to improve the walkability and bikeability of the region.
- Public Transportation provides an overview of the existing public transportation system, plans for the system, highlights regional needs, and recommends improvements to promote use of the system.
- Freight provides an overview of transportation modes used to move freight in the region, freight trends and needs, freight related plans, and recommendations to improve the freight transportation network.
- Aviation provides a brief summary of the existing regional facilities, historical and projected airport activity, plans and planned facilities, regional needs, and recommendations.
- Safety provides an overview of the regional safety issues and recommendations for improving safety.
- Security highlights transportation related security activities in the region, potential roles for WAMPO, and strategies to enhance WAMPO's focus on interrelated security and transportation issues.
- Operations, Maintenance, and System Management discusses agencies' roles, system management, and operations and maintenance.

<sup>40</sup> Valley Center: Its Founding & Major Events, Frank Hutchings, Valley Center, 1976

<sup>41</sup> The Founding of Valley Center, Genevieve May Rapp, Pgs 67-74, Wichita, 1931

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### Roadways

There are approximately 5,000 miles of roadway in the region. Currently, vehicles travel almost 13 million miles and spend nearly 370,000 hours per day on the roadway network. By 2035, it is anticipated that vehicles will travel approximately 17 million miles and 480,000 hours per day.

Functional classification is divided into three systems; arterial, collector, and local.

#### Arterial

The primary purpose of the arterial system is to move people and goods. Within the arterial system there are two sub-classifications, the principal arterial system and the minor arterial system. The principal arterial system is a road network designated for the most traffic, the longest trips, and the highest speeds. The minor arterial system connects with the principal arterial system and provides service for shorter trips with less mobility but more access.

#### Collector System

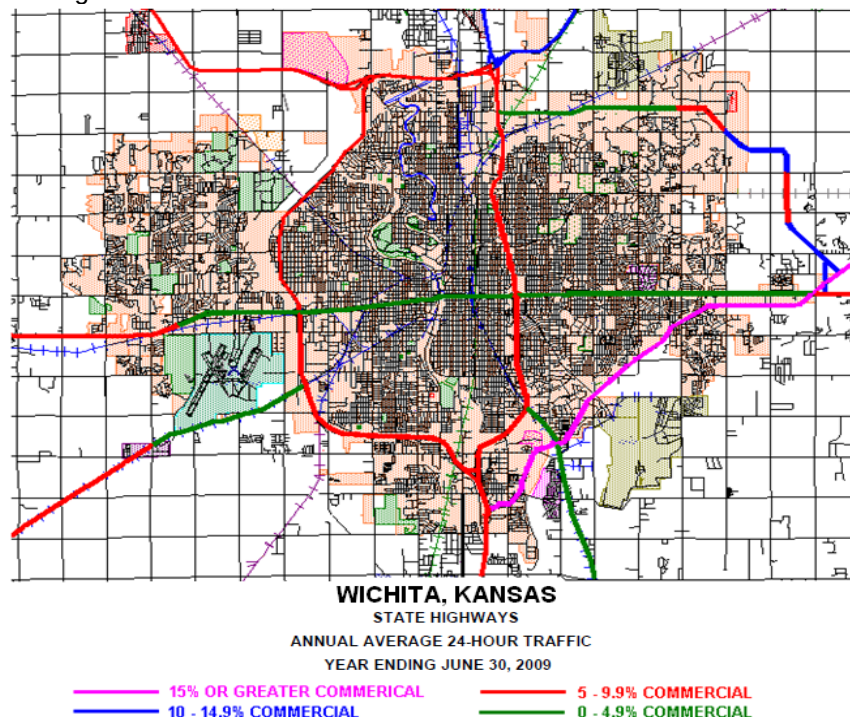
Moves traffic between different areas, such as residential neighborhoods, commercial developments, and industrial areas. The collector system is intended to provide both mobility and access. The collector system includes three types of roadways; urban collectors, rural major collectors, and rural minor collectors.

#### Local System

The local system includes all roadways not on the arterial system or the collector system. The purpose of the local system is to provide access to adjoining land uses and funnel traffic to the arterial and collector systems.

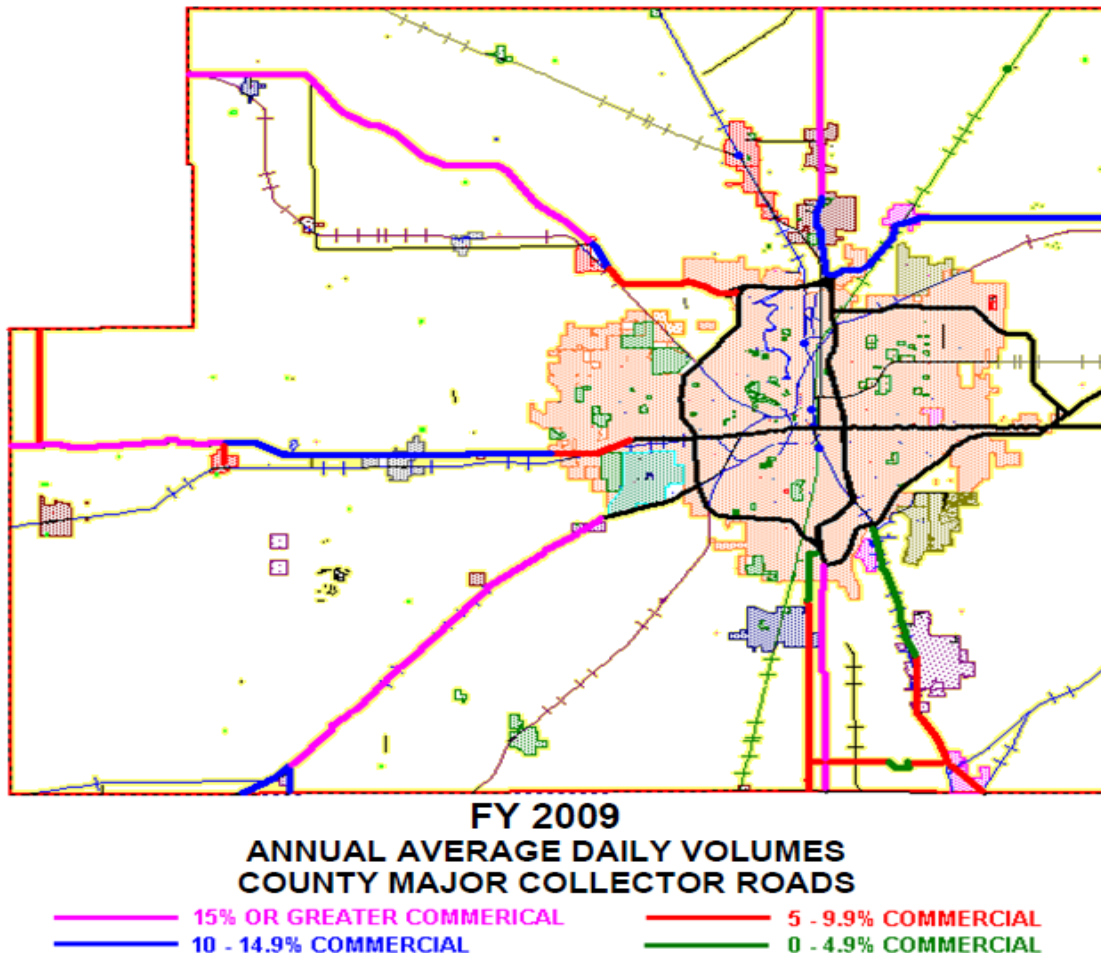
#### 9.17.4.1 TRAFFIC DATA

According to information developed in the KDOT Traffic Flow Map that reported traffic counts for year ending June 30, 2009, the following maps (Wichita metropolitan area and Sedgwick County) show the traffic density of commercial versus regular traffic.



### 9.17.4.2 CONGESTION

Traffic congestion occurs when the demand to use a road exceeds the roadway's capacity. Congestion typically results in reduced travel speeds and increased travel time. The majority of congestion occurs in the AM (6-10 AM) and PM (4-8 PM) peak hours when people are commuting to and from work. Many of the areas that are currently seeing recurring congestion are crossings over the Wichita-Valley Center Flood Control Project (Big Ditch) and portions of US-54/400 (Kellogg) west of I-135.



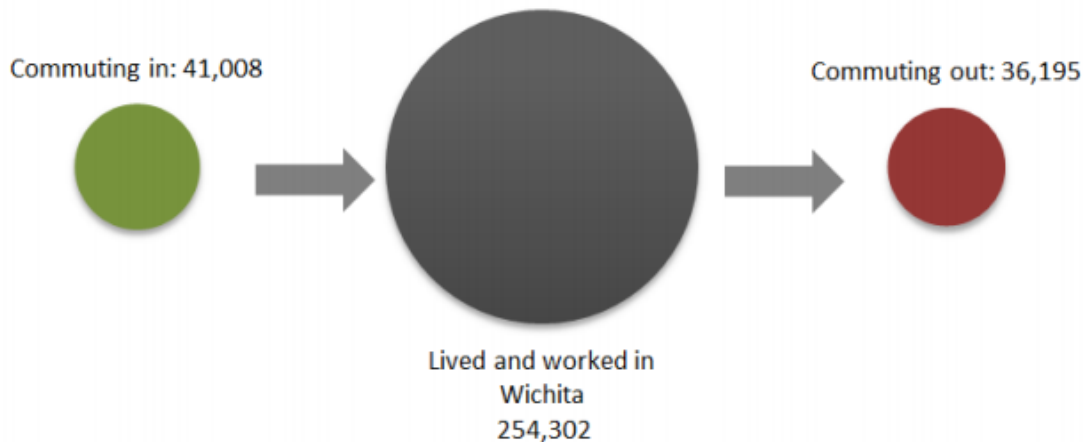
Traffic densities in Wichita and Sedgwick County shows interstates are typically less than 10% commercial traffic, while most state highways carry 15% or greater commercial traffic. Information developed from industries and motor carriers shows hazardous materials routes are primarily state and federal highways. Hazardous materials transportation in communities is typically restricted from industrial facility to major highway.

### 9.17.4.3 COMMUTER TRAVEL PATTERNS

The Wichita metropolitan area consists of four counties; Butler, Harvey, Sedgwick and Sumner. There was a net import of workers to the area, with 2 percent more workers working in the area than living in the area. The daytime population increased by only 4,813, a small adjustment relative to the population. There was a moderate to low level of commuting compared to other urban areas in the state.<sup>42</sup>

<sup>42</sup> WSU W. Frank Barton School of Business – 2012 Commuting Patterns in Kansas





**Wichita Metropolitan Statistical Area**

| Daytime Population                         |         |
|--------------------------------------------|---------|
| Total resident population                  | 609,383 |
| Total workers working in area              | 295,310 |
| Workers who lived and worked in same area  | 254,302 |
| Workers commuting in:                      | 41,008  |
| Total workers living in area               | 290,497 |
| Workers who lived and worked in same area  | 254,302 |
| Workers commuting out:                     | 36,195  |
| Total daytime population                   | 614,196 |
| Daytime population change due to commuting | 4,813   |
| Worker retention                           | 87.5%   |
| Employment residence ratio                 | 1.02    |

Source: U.S. Census Bureau, 2006-2010 American Community Survey

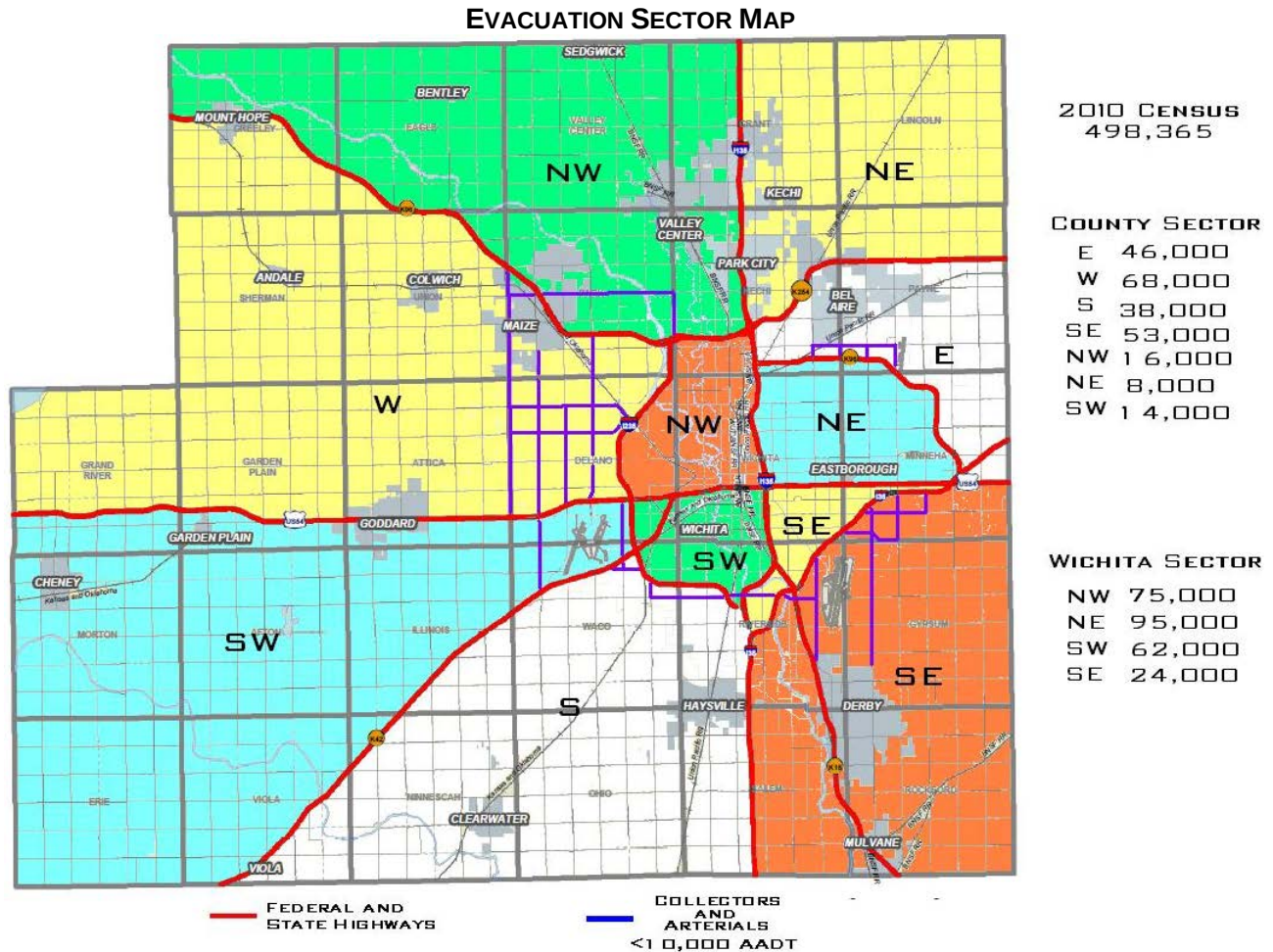
Wichita had a net import of workers in all industries with the exception of agriculture, information and the armed forces, each of which export a small number of workers. Manufacturing was by far the industry that draws the most significant number of workers to the area. In Wichita, low income workers tend to travel out of the area to work, while moderate and high income workers tend to live outside the area and travel in for work.

#### 9.17.4.4 EVACUATION PLANNING

There is a probable or more likely scenario only a portion of an area would be evacuated and an unlikely catastrophic event where a large section would be evacuated. The following map shows the general population distribution by section based on 2010 census data (approximately 499,000) and does not necessarily reflect the concentration of people in that area depending on the time of day since population movement is dynamic and can change often due to working conditions, events, etc.

The primary thoroughfares are the interstates, turnpike and state highways, with some heavier concentrated movement of vehicles in southeastern Wichita based on KDOT's annual average daily traffic count information. Principal movement will be based on the easiest accessibility to these major thoroughfares which typically would follow the pre-designated snow routes which are section roads in the county and city.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis



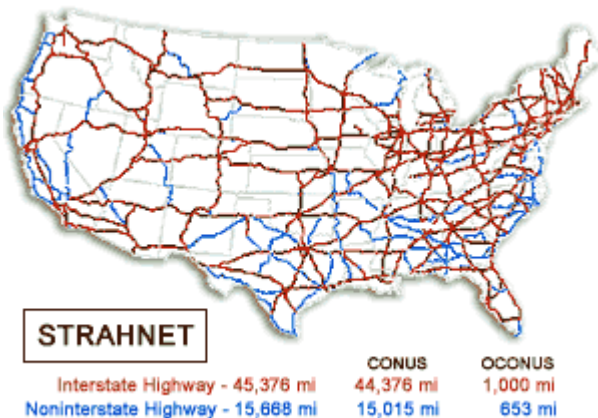
In the case of evacuation, the following information is derived from "Lessons From Katrina", Sep 20, 2005, Victoria Transport Policy:

- Maximum single lane capacity under normal conditions: 2,000 vehicles per hour
- Maximum single lane capacity caused by congestion, weather, towing vehicles, accidents, and mechanical problems: 1,000 vehicles per hour
- Estimated number of occupants per vehicle: 2.5
- Estimated number of evacuees per hour per lane: 2,500
- Bussing estimation of 600 busses per hour per lane with average capacity of 25 or approximately 15,000 passengers per hour

It is estimated that the time to evacuate a given area can range from 1 to 5 hours for normal traffic conditions. If the Governor of Kansas authorizes the use of contraflow (one-direction) travel, this time can be reduced by approximately 40 percent. It should be noted that an orderly evacuation of an area will be dependent on the time needed by individuals preparing to leave their locations in addition to the travel time which could add 15 to 30 minutes. The use of contraflow is strongly cautioned since this allows for only one-direction of travel and emergency vehicles may be hindered in responding to injury accidents that would occur. Usages of the interstate shoulders are likely to be used by individuals evacuating thus increasing the safety concerns of an orderly evacuation. It should be noted that cities outside of Sedgwick County will have increased traffic proceeding through their area, and restricting the use of the contraflow concept would help alleviate safety concerns and congestions for those cities.

### 9.17.4.5

### STRATEGIC HIGHWAY CORRIDOR NETWORK (STRAHNET)



The U.S. Strategic Highway Corridor Network (STRAHNET) system consists of 61,000 miles of public highways, designated by the Federal Highway Administration in partnership with the Department of Defense's MTMC, which link more than 200 military installations and ports.

The STRAHNET is important to the United States' strategic defense policy and which provide defense access, continuity and emergency capabilities for defense purposes to include movement of personnel, materials, and equipment in both peace time and war time. The network is comprised of major strategic network connectors and intermodal connectors.

Major Strategic Highway Network Connectors are highways providing access between major military installations and highways that are part of the Strategic Highway Network. Intermodal Connectors are highways providing access between major intermodal facilities and the other four subsystems making up the National Highway System. Although there are no non-interstate STRAHNET roads in Kansas, I-35, I-135 and I-235 are designated interstate STRAHNET roads in the south-central Kansas area. Mid-Continent Airport is a designated intermodal connector for the south-central Kansas area. The Department of Energy utilizes the STRAHNET on a routine basis with traceable shipments by the State of Kansas Division of Emergency Management via the U.S. Transportation Command (USTRANSCOM) global position satellite-tracking program.



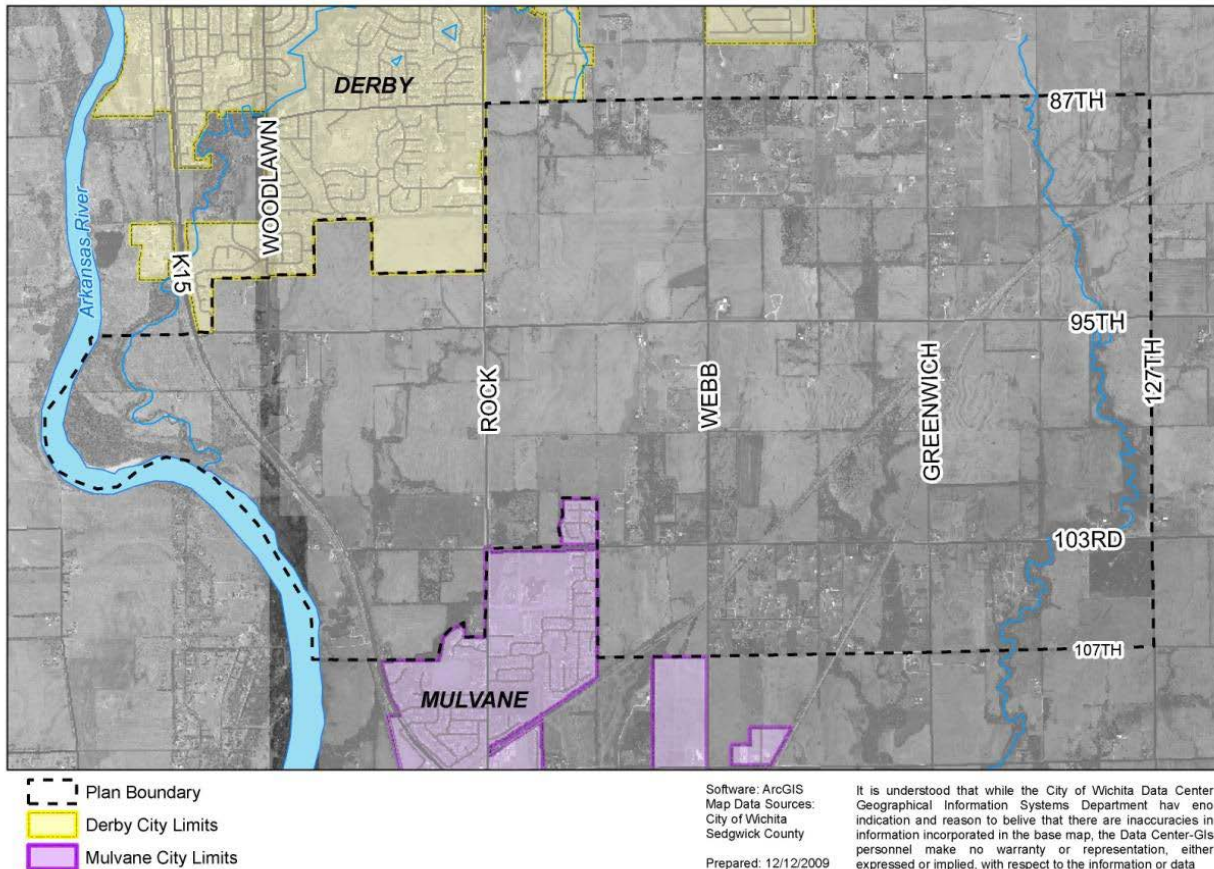
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

9.17.4.6

### DERBY-MULVANE JOINT AREA PLAN

The Derby-Mulvane Joint Area Plan is a plan for the area located between the City of Derby and City of Mulvane, bounded by the Derby City limits and 87th Street to the north; 127th Street to the east; a half mile south of 103rd Street and the Mulvane City limits; and the Arkansas River to the west.

#### Derby-Mulvane Joint Area Plan - Plan Boundary



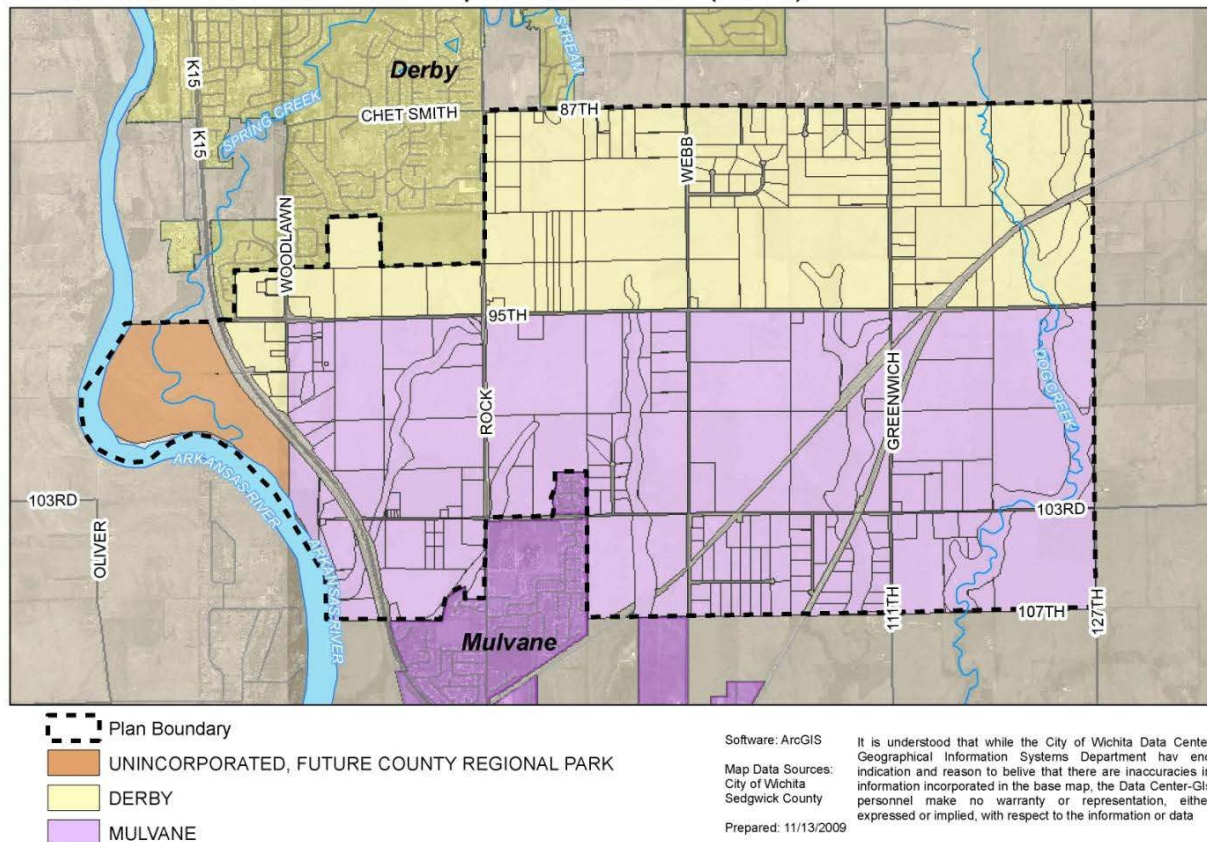
#### Existing Conditions Analysis Summary

Multiple streams and their tributaries travel through the plan area, generally flowing in a southerly direction. The topography in the area is varied, with relatively well defined stream corridors. However, flooding is a concern. Approximately 15 percent of the plan area lands are within the F.E.M.A. identified 100 year floodplain. The plan area, including the Arkansas River, may provide habitat for four different threatened animal species. A majority of lands in the plan area are also well suited for agricultural activity. Most are in agricultural use, with clusters of unincorporated large-lot residential properties scattered throughout the plan area. The residential users are primarily located near edges of Derby and Mulvane, in the north and south portions of the plan area. The eastern half of the area is not well suited for septic systems. The plan area is served by paramedic, medical transport, fire, and law enforcement services. Less than half of the plan area is within a storm siren coverage area. Water, electric, and gas services are also available. Two school districts serve the area. No public libraries or public parks are located within the area, but are available within Derby or Mulvane. Recent regional transportation studies have identified the need for an additional roadway bridge over the Arkansas River, a segment of a four-lane access controlled divided roadway loop, and a bike path within the plan area. By 2030, four roadway bridges will require upgrades or replacement. The plan area has one of the highest train traffic volumes in Sedgwick County. Three separate railroad corridors travel through the plan area, with a combined average daily traffic total of more than 90 trains per day. The cities of Derby and Mulvane are greatly able to influence the future development of the area through the use of the Extraterritorial





Derby-Mulvane Joint Area Plan -  
Recommended Future Municipal Boundaries (2015)



#### 9.17.4.7 SOUTH AREA TRANSPORTATION STUDY (SATS)

Communities in the southern portion of the Wichita Area Metropolitan Planning Organization (WAMPO) planning region are interested in the potential to improve mobility and access to and within this region. According to the WAMPO 2030 Long Range Transportation Plan (LRTP), key issues formulated by citizens of the Wichita area included providing good roadway connections between cities, from cities to the highway system, and reducing congestion on the existing roadway system.

The South Area Transportation Study (SATS) sought to address these concerns by assessing the future mobility needs of the southern portion of the WAMPO planning region. This was accomplished by evaluating various transportation improvements from a broad perspective to determine which strategy best addresses the specific transportation needs of the southern Wichita Metropolitan Area. The SATS focuses on linkages between north and south parts of the Wichita Metropolitan Area and linkages between the cities in the South Area and in and out of Sedgwick County.

The Study Area for the SATS consists of a significant portion of the southern half of the WAMPO planning region. The approximate study boundaries are:

- On the north, US 54/400 from Andover in the east to Goddard in the west;
- On the west, a line running south from the west of Goddard, approximately South 263rd Street West, to the Ninnescah River and following the river to the Sedgwick County/Sumner County line;
- On the south, along the Sedgwick County/Sumner County line, including all of Mulvane; and,
- On the east, along SW Meadowlark Road in Butler County.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

The SATS is a cooperative effort involving WAMPO and the local units of government in the southeast and southwest quadrants of the WAMPO planning area including the cities of Andover, Clearwater, Derby, Goddard, Haysville, Mulvane, and Wichita along with Sedgwick County, Butler County, the Kansas Department of Transportation, the Federal Highway Administration, and the Kansas Turnpike Authority.

### *Study Area Cities*

**Andover:** The City of Andover, Kansas has a population of 6,698 persons according to the 2000 census. The major transportation routes through Andover are I-35, US-54/400, Central Avenue, Andover Road, Harry Street, and 21st Street North. Key commercial areas are located near the intersection of Andover Road and Central Avenue and along US-54/400. The Comprehensive Development Plan for the Andover Area calls for major commercial development to remain in these areas. As well as, new commercial development at the Decker/Kiser plat at 21st Street North and Andover Road. This development is north of the SATS Area.

**Clearwater:** The City of Clearwater, Kansas has a population of 2,178 persons according to the 2000 census. The 2030 population projection for Clearwater is 3,514 persons. The major transportation route through the city is 103rd Street South, with a small retail commercial district located along it.

**Derby:** The City of Derby, Kansas has a population of 17,807 persons according to the 2000 census. It is projected that in 2030 the population of Derby will be 32,045 persons. The major transportation routes through the city are K-15, Rock Road, 63rd Street South, and 71st Street South. A key industrial area is located along K-15 while key commercial areas are located along both K-15 and Rock Road. The City of Derby Comprehensive Plan calls for more than 7,000 new acres of zoned land by 2030 with much of the focus on the K-15 business corridor.

**Goddard:** The City of Goddard, Kansas has a population of 2,037 persons according to the 2000 census. It is projected that in 2030 the population of the city will be 5,274 persons. The major transportation route through Goddard is US-54/400. US-54/400 has small pockets of industry and a commercial strip. Goddard's long term economic development goals include enhancement of the central business district through streetscapes and encouraging redevelopment through incentives. Their comprehensive plan indicates that about 1,200 new acres of zoned land will be needed by 2022, including about 740 acres of residential and about 260 acres of industrial lands.

**Haysville:** The City of Haysville, Kansas has a population of 8,502 persons according the 2000 census. The 2030 population projection for the city is 16,412 persons. The major transportation routes through Haysville are I-35, I-135, Broadway Avenue, Seneca Street, 71st Street South, and 79th Street South. Many commercial areas in Haysville are in an on-going redevelopment process as a result of the May 1999 tornado. Broadway Avenue and Seneca/Main Street are major locations of redevelopment. The future land use plan for the city identifies the area between Broadway and I-135 as a major regional commercial area.

**Mulvane:** The City of Mulvane, Kansas has a population of 4,154 persons according to the 2000 census. The 2030 population projection for the city is 6,533 persons. The major transportation routes through Mulvane are K-15, K-53, and Rock Road. Key commercial areas include those near the intersection of K-15 and Rock Road and the downtown central business district along K-53. According to the Comprehensive Development Plan for the Mulvane Area, by 2012, 181 acres of new residential property will be needed. It also identifies the Central Business District (CBD) and 2nd Street as areas of continued commercial development. In addition, the intersection of Rock Road and 111th Street South has been approved for future commercial development.

**Wichita:** The City of Wichita has a population of 344,284 persons according to the 2000 census. It is projected that in 2030 the population of the city will be 412,460 persons. In the near future, the City of Wichita's predominately east-west growth pattern is expected to continue. Western Wichita is projected to experience a population increase of approximately 31,000 people between 2005 and 2030. In eastern Wichita, the population is expected to increase by 20,000 persons.<sup>7</sup> Major transportation routes through Wichita include I-35, I-135/US-81, US-54/400, and K-96. Key employment nodes include downtown Wichita; industrial areas north of downtown along I-135 and K-96; and industrial and commercial areas in eastern Wichita along Greenwich Road. US-54/400, although limited access along much of its length through Wichita, has significant commercial activity along it.

# 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

*Note: 2030 population projects used for the SATS comes from the Wichita-Sedgwick County Metropolitan Area Planning Department's "2007 Development Trends Report," 2007*

## 2030 Traffic Projections

The higher volume local roadways in 2030 are forecast to include:

- Rock Road between Kellogg Avenue and 63rd Street South (23,400 to 24,400 vpd)
- Hillside Street near Kellogg Avenue (14,500 vpd)
- Seneca Street between I-235 and 63rd Street South (19,700 vpd)
- Meridian Avenue near Kellogg Avenue (13,400 vpd)
- West Street near Kellogg Avenue (24,200 vpd)
- 47th Street South between I-35 and K-15 (31,000 vpd)
- 63rd Street South between I-35 and K-15 (20,900 vpd)
- 71st Street South between K-15 and Rock Road (21,400 vpd)
- 83rd Street South Crossing of Arkansas River (21,400 vpd)

Interstate and state highways carry much higher volumes of traffic through the SATS Area than the local roads. The following are the forecast 2030 volumes of the key highways in the SATS Area.

- I-35 – 22,600 to 36,200 vpd depending on location
- I-135 – 45,100 to 77,900 vpd depending on location
- I-235 – 53,800 to 57,100 vpd depending on location
- K-15 – 25,800 to 55,000 vpd depending on location
- K-42 – 8,900 to 41,000 vpd depending on location

### 9.17.4.8 NATIONAL HIGHWAY SYSTEM (NHS)

Roadways included on the NHS are important to the nation's economy, defense, and mobility. The NHS is a 161,000 mile network of roads throughout the U.S., including the Interstate Highway System and other roadways that are deemed important to the nation as a whole by Congress. The following roadways within the WAMPO region are on the NHS:

- I-135
- I-35
- I-235
- US-54/400 (Kellogg)
- K-254
- K-96
- K-15
- Mid-Continent Drive
- Air Cargo Road

South Area Transportation Study (SATS): Completed in 2008, addressed mobility and access concerns in the southern portion of the region.

### 9.17.4.9 CONDITION OF TRANSPORTATION

#### Highways

Information obtained from the Kansas Department of Transportation (KDOT) 2002 Pavement Management Information System (PMIS) shows District 5 has a total of 2,029 miles of surveyed Kansas's highways. Performance level assessments of the highways were broken down to those roads not requiring corrective action, those requiring at least routine maintenance, and those requiring rehabilitation action beyond routine

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

maintenance.

### Bridges

A bridge condition report generated by the KDOT Office of Chief Counsel was reviewed to determine the condition of each of the 3,744 bridges in each of the six counties in south-central Kansas. Information contained in the report shows the sufficiency ratings and locations of the bridges. The sufficiency ratings are a method of evaluating factors that are indicative of bridge sufficiency to remain in service. The result of this method is a percentage in which 100% would represent an entirely sufficient bridge and zero percent would represent an entirely insufficient or deficient bridge.

In order to better define bridge conditions for each of the counties, the sufficiency ratings were divided into quarters. The following ratings are defined in this study as follows:

|                 |               |
|-----------------|---------------|
| Sufficient      | 75.1% to 100% |
| Semi-Sufficient | 50.1 to 75%   |
| Semi-Deficient  | 25.1% to 50%  |
| Deficient       | 0% to 25%     |

A total of 1,267 bridges are rated in Sedgwick County by the KDOT of which nine are classified deficient, 64 are classified as semi-deficient, 187 are classified as semi-sufficient, and 936 are classified as sufficient. Those bridges considered as deficient are identified at the locations and rated conditions on the next page.

### DEFICIENT BRIDGES IN SEDGWICK COUNTY

| Structure Number | Sufficiency Rating | Features Intersected         | Facility Carried              | Location                                  |
|------------------|--------------------|------------------------------|-------------------------------|-------------------------------------------|
| 999908100871571  | 5.3                | Cowskin Creek                | US-81 Hwy                     | 3.08 mi N Sumner Co Line                  |
| 530400870RIOP10  | 18.7               | Rock Island Railroad         | South Broadway                | Broadway at 34 <sup>th</sup> Street South |
| 000870819005884  | 18.8               | Gooseberry Creek             | Local Road                    | 4.0E 0.4S Sedgwick                        |
| 000870825606320  | 19.9               | Tributary Big Arkansas River | Local Road                    | 1.4W 2.0N of Derby                        |
| 000870781006341  | 21.9               | Tributary to Ninnescah River | Local Road                    | 1.0W 6.1S of Garden Plain                 |
| 000870789006403  | 22.4               | Tributary to Ninnescah River | Local Road                    | 1.0E 2.7N of Viola                        |
| 430400876500050  | 23.8               | East Fork Chisholm Creek     | 21 <sup>st</sup> Street North | 21 <sup>st</sup> St N WB at New York      |
| 000870805005987  | 24.3               | Big Arkansas River           | Local Road                    | 1.0W 3.3N of Maize                        |
| 000870805005988  | 24.3               | Big Arkansas River           | Local Road                    | 1.0W 3.2N of Maize                        |

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### 9.17.5 BICYCLE AND PEDESTRIAN

#### *Existing Facilities*

*Sidewalks* – Provides a separate, relatively safe route on which to walk or bike. Safe Routes to School (SRTS) program has encouraged greater interest in developing sidewalks to connect neighborhoods and schools.

*Multi-use Paths* – There are approximately 107 miles of multi-use paths in the region. Existing multiuse paths, such as the Arkansas River, Sedgwick County Zoo Park, and Derby paths are each more than 10 miles long and provide recreation and transportation connections.

*Rails-to-Trails* – These are abandoned rail lines that are converted for pathway use. A regional example is the Prairie Sunset Trail, which connects Goddard to Garden Plain.

Public transportation provides passenger transportation services for the general public and is provided by many different agencies. These include:

- Wichita Transit
- Taxicab companies
- Non-profit organizations
- Private institutions
- Government agencies

### 9.17.6 MOTOR CARRIERS

As reported by the Department of Transportation, statistics for the State of Kansas shows accidents involving motor carriers mostly occur on weekdays in rural areas on non-divided highways and during the day (6:00 AM to 6:00 PM) by licensed drivers in non-placarded box semi-tractor/trailers on dry pavement. Approximately 40% of motor carrier accidents are Kansas based companies and primarily involve gases and flammable liquid commodity loads.

#### *Safety and Fitness Electronic Records (SAFER) System*

The SAFER system is a component of the Intelligent Transportation System (ITS) that is being designed to increase roadway safety, reduce motorist delays and air pollution, and improve the overall productivity of commercial vehicle operations (CVO) through the use of advanced technology. The current focus is on creating transparent borders for interstate commercial vehicles and improving the safety of commercial vehicle operations. Access is provided to Carrier Snapshots, a concise electronic record of a carrier's identification, size, commodity information, and safety record, including the safety rating (if any), a roadside out-of-service inspection summary, and crash information.

Developed by the Johns Hopkins University Applied Physics Laboratory and maintained by the Volpe National Transportation Systems Center, under contract to the Federal Motor Carrier Safety Administration (FMCSA), SAFER uses carrier information from existing government motor carrier safety databases. Presently, it consists of interstate carrier data and several states' intrastate data. Operational data such as inspections and crashes are generally only presented for interstate carriers, but plans are to include them for the intrastate carriers at a later time.

The SAFER system is now being expanded to include the capability to provide carrier, vehicle, and driver safety and credential information to fixed and mobile roadside inspection stations. This information will allow the roadside inspector to select vehicles and/or drivers for inspection based on the number of prior carrier inspections, as well as carrier, vehicle, and driver safety and credential historical information. The following table contains information regarding 44 motor carriers known to transport chemicals or other hazardous materials within south-central Kansas. As noted on the table, all of the carriers were reported to have satisfactory safety ratings with 15 carriers reported to be out of service more than the national average.



# 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

| Motor Carrier Legal Name                 | USDOT No | City         | State | Power Units | Drivers | MCS-150 Mileage (Yr) | Ops Class        | Carrier Ops              | Type Cargo            | Total Inspections | Hazard Inspection Type | Out of Service % | Fatal Injury/Tot | Crashes | Safety Rating |              |
|------------------------------------------|----------|--------------|-------|-------------|---------|----------------------|------------------|--------------------------|-----------------------|-------------------|------------------------|------------------|------------------|---------|---------------|--------------|
| Air Products & Chemicals Inc             | 101263   | Allentown    | PA    | 962         | 1,525   | 63,442,726 (2001)    | Private          | Interstate               | Liquids/Gases         | 1,447             | 1,272                  | 8                | 0.6              | 3       | 17            | 15           |
| Albert Hogobom                           | 381783   | El Dorado    | KS    | 24          | 21      | 300,000 (2001)       | For Hire/Private | Interstate               | Chemicals             | 7                 | 1                      | 0                | 0                | 0       | 0             | None         |
| Barton Southwest Inc                     | 2516     | Des Moines   | IA    | 68          | 61      | 2,320,000 (2001)     | For Hire/Private | Interstate               | Chemicals             | 162               | 136                    | 4                | 2.9              | 0       | 1             | 2            |
| Brentita Southwest Inc                   | 82753    | Longview     | TX    | 100         | 94      | Not Reported         | Private          | Interstate               | Chemicals             | 161               | 128                    | 15               | 11.7             | 0       | 2             | Satisfactory |
| Bridgman Oil Co Inc                      | 549684   | Hutchinson   | KS    | 6           | 307     | 7,679,796 (2000)     | Private          | Interstate               | Gen Freight           | 3                 | 3                      | 0                | 0                | 0       | 0             | None         |
| Clean Harbors Environmental Services Inc | 180743   | Braniffire   | MA    | 342         | 307     | 7,679,796 (2000)     | For Hire         | Interstate               | Liquids/Gases         | 548               | 350                    | 16               | 4.6              | 0       | 3             | 3            |
| Conway Central Express                   | 75722    | Chicago      | IL    | 376         | NA      | Not Reported         | Private          | Interstate               | Log, Lumber           | 5                 | 1                      | 1                | 100              | 0       | 0             | 1            |
| Custom Compounds Inc                     | 921677   | Arnold       | MO    | NA          | NA      | Not Reported         | Not Reported     | Interstate               | None Listed           | 54                | 0                      | 0                | 0                | 0       | 0             | None         |
| D & A Trucking Inc                       | 360402   | Hawen        | KS    | 6           | 7       | 11,420 (2000)        | For Hire         | Interstate               | Commodities Dry Bulk  | 54                | 0                      | 0                | 0                | 0       | 0             | None         |
| Diversified Transportation Inc           | 360402   | Reed City    | MI    | NA          | NA      | Not Reported         | For Hire/US Mail | Interstate               | Commodities Dry Bulk  | 27                | 14                     | 0                | 0                | 0       | 0             | Satisfactory |
| Energy Air Freight Corp                  | 299332   | Anthony      | KS    | 27          | 1,556   | 3,161,000 (1999)     | For Hire/US Mail | Interstate               | Haz Waste             | 454               | 12                     | 1                | 8.3              | 0       | 5             | 6            |
| Farmers Oil Company Inc                  | 299332   | Anthony      | KS    | 27          | 32      | 3,272,000 (1999)     | For Hire/Private | Interstate/Intrastate HM | Liquids/Gases         | 115               | 69                     | 1                | 1.4              | 0       | 0             | 1            |
| Familand Industries Inc                  | 89238    | Kansas City  | MO    | 224         | 302     | 25,760,000 (2000)    | For Hire/Private | Interstate/Intrastate HM | Commodities Dry Bulk  | 542               | 348                    | 2                | 0.6              | 0       | 4             | Satisfactory |
| FedEx Freight East Inc                   | 220039   | Harrison     | AR    | 121,805     | 9,629   | 493,142,166 (2001)   | For Hire         | Interstate               | Liquids/Gases         | 2,999             | 1,133                  | 91               | 8                | 9       | 108           | 124          |
| Groundline Transport Inc                 | 472007   | End          | OK    | 983         | 900     | Not Reported         | For Hire         | Interstate               | Chemicals             | 2,487             | 1,723                  | 38               | 2.2              | 6       | 34            | 24           |
| Hamilton Trucking Company Inc            | 263253   | Wichita      | KS    | 19          | 49      | Not Reported         | Private          | Interstate               | Batteries             | 106               | 9                      | 0                | 0                | 0       | 0             | 2            |
| Hampel Oil Distributors Inc              | 259584   | Buffalo      | NY    | 98          | 100     | 10,113,975 (2001)    | Private          | Interstate               | Refrigerated Foods    | 80                | 49                     | 6                | 12.2             | 0       | 0             | 1            |
| HAZMAT Environmental Group Inc           | 314460   | Indianapolis | IN    | 210         | 190     | Not Reported         | For Hire         | Interstate               | Liquids/Gases         | 495               | 402                    | 5                | 1.2              | 0       | 0             | 1            |
| Heritage Transport LLC                   | 126303   | Wichita      | KS    | 11          | 7       | Not Reported         | Private          | Interstate               | Chemicals             | 340               | 224                    | 15               | 6.7              | 0       | 1             | 2            |
| Lampton Welding Supply Co Inc            | 126303   | Wichita      | KS    | 11          | 7       | Not Reported         | Private          | Interstate               | Non-Bulk Liquid       | 51                | 41                     | 9                | 22               | 0       | 0             | 0            |
| Midwest Transportation Inc               | 654330   | El Dorado    | AR    | 10          | 1       | 36,000 (2000)        | For Hire/Private | Interstate               | Liquids/Gases         | 236               | 139                    | 5                | 3.6              | 0       | 1             | 2            |
| Nighthawk Transport Inc                  | 956303   | Brentville   | KS    | 36          | 23      | 860,000 (1999)       | Private          | Interstate               | Machinery             | 2                 | 2                      | 0                | 0                | 0       | 0             | 0            |
| Prepare Central LLC                      | 236877   | Salina       | KS    | 36          | 23      | 860,000 (1999)       | Private          | Interstate               | Chemicals             | 2                 | 2                      | 0                | 0                | 0       | 0             | 0            |
| Quick Transfer Inc                       | 463951   | Wichita      | KS    | 123         | 133     | 1,276,000 (2000)     | For Hire         | Interstate               | Liquids/Gases         | 45                | 4                      | 0                | 0                | 0       | 0             | 0            |
| R A Christopher Inc                      | 382526   | Wichita      | KS    | 125         | 167     | Not Reported         | For Hire         | Interstate               | Intermodal Containers | 45                | 4                      | 0                | 0                | 0       | 0             | 0            |
| Reef Chemical Co Inc                     | 363626   | Odesa        | TX    | 108         | 81      | 4,069,000 (2001)     | Private          | Interstate               | Chemicals             | 93                | 17                     | 2                | 11.8             | 1       | 3             | 1            |
| Roush Trucking Inc                       | 838455   | Stafford     | KS    | 5           | 4       | Not Reported         | Private          | Interstate               | Grain, Feed, Hay      | 45                | 40                     | 9                | 22.5             | 0       | 0             | 4            |
| Safety Kleen Systems Inc                 | 151268   | Columbia     | SC    | 2,613       | 1,930   | 24,125,660 (2001)    | Private          | Interstate               | Chemicals             | 18                | 5                      | 0                | 0                | 0       | 0             | None         |
| Savannah National Carriers Inc           | 664906   | Topeka       | KS    | 27          | 33      | 3,770,048 (2001)     | For Hire         | Interstate               | Intermodal Containers | 1,486             | 643                    | 23               | 3.6              | 2       | 13            | Satisfactory |
| Schneider Transport Inc                  | 264164   | Green Bay    | WI    | 11,946      | 13,717  | 1,365,045,760 (2001) | For Hire         | Interstate               | Liquids/Gases         | 228               | 117                    | 9                | 7.7              | 0       | 1             | Satisfactory |
| Semirelle Transportation & Gaehring Inc  | 609725   | Okemah       | OK    | 43          | 37      | Not Reported         | Private          | Interstate               | Chemicals             | 26                | 152                    | 140              | 7.6              | 31      | 385           | 475          |
| Sequoyia Trucking & Transportation LLC   | 511228   | Midwest      | UT    | 49          | 57      | Not Reported         | Private          | Interstate               | Oilfield Equip        | 119               | 88                     | 4                | 4.5              | 0       | 2             | 1            |
| SLT Express Inc                          | 513264   | Murray       | UT    | 49          | 57      | Not Reported         | Private          | Interstate               | Liquids/Gases         | 34                | 14                     | 1                | 7.1              | 0       | 0             | 2            |
| Stucky & Sons Inc                        | 141868   | Calgary      | AB    | 917         | 1,246   | 86,389,159 (2001)    | For Hire         | Interstate               | Commodities Dry Bulk  | 331               | 156                    | 10               | 6.4              | 0       | 0             | Satisfactory |
| Timac Transportation Services Inc        | 288333   | Kirkland     | WA    | 686         | 733     | 16,250,000 (2001)    | For Hire         | Interstate               | Commodities Dry Bulk  | 16                | 2                      | 0                | 0                | 0       | 0             | 0            |
| Universal Lubricants Inc                 | 603031   | Wichita      | KS    | 28          | 30      | Not Reported         | Private          | Interstate               | Liquids/Gases         | 490               | 254                    | 3                | 1.2              | 0       | 1             | Satisfactory |
| USF Dugan Inc                            | 53004    | Wichita      | KS    | 1,128       | 1,336   | 70,640,000 (2001)    | Private          | Interstate               | Chemicals             | 1,237             | 967                    | 51               | 5.3              | 0       | 3             | 6            |
| USher Transport Inc                      | 105257   | Louisville   | KY    | 230         | 200     | 13,870,698 (2001)    | For Hire         | Interstate               | Commodities Dry Bulk  | 57                | 4                      | 1                | 25               | 0       | 1             | Satisfactory |
| Vulcan Materials Co                      | 146511   | Wichita      | KS    | 119         | 131     | 5,200,000 (2000)     | Private          | Interstate               | Chemicals             | 1,112             | 338                    | 39               | 11.5             | 2       | 40            | Satisfactory |
| W & W Transports Inc                     | 46126    | Weatherford  | OK    | 18          | 19      | 1,310,000 (2000)     | Private          | Interstate               | Liquids/Gases         | 632               | 595                    | 5                | 1                | 0       | 7             | 4            |
| Waste Management of Oklahoma Inc         | 263203   | Okemah       | OK    | 175         | 165     | 3,684,000 (2001)     | For Hire         | Interstate               | Intermodal Containers | 158               | 127                    | 0                | 0                | 0       | 2             | Satisfactory |
| Wichita Southeast Kansas Transit Inc     | 630269   | Parsons      | KS    | 327         | 410     | Not Reported         | Applying F       | Interstate/Intrastate HM | Liquids/Gases         | 38                | 30                     | 0                | 0                | 0       | 1             | Satisfactory |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 36                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Gabage/Refuse         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    | KS    | 42          | 45      | 3,490,000 (2000)     | For Hire         | Interstate               | Non-Haz Waste         | 37                | 0                      | 0                | 0                | 0       | 0             | 0            |
| Willing Transport Inc                    | 241138   | McPherson    |       |             |         |                      |                  |                          |                       |                   |                        |                  |                  |         |               |              |

Information based on content of FMCSA Management Information Systems

<http://www.safetysys.org>

Notes:  
Inspections and crashes reported for 24 months prior to November 17, 2002  
National Average Inspections (2001): HazMat - 6%

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

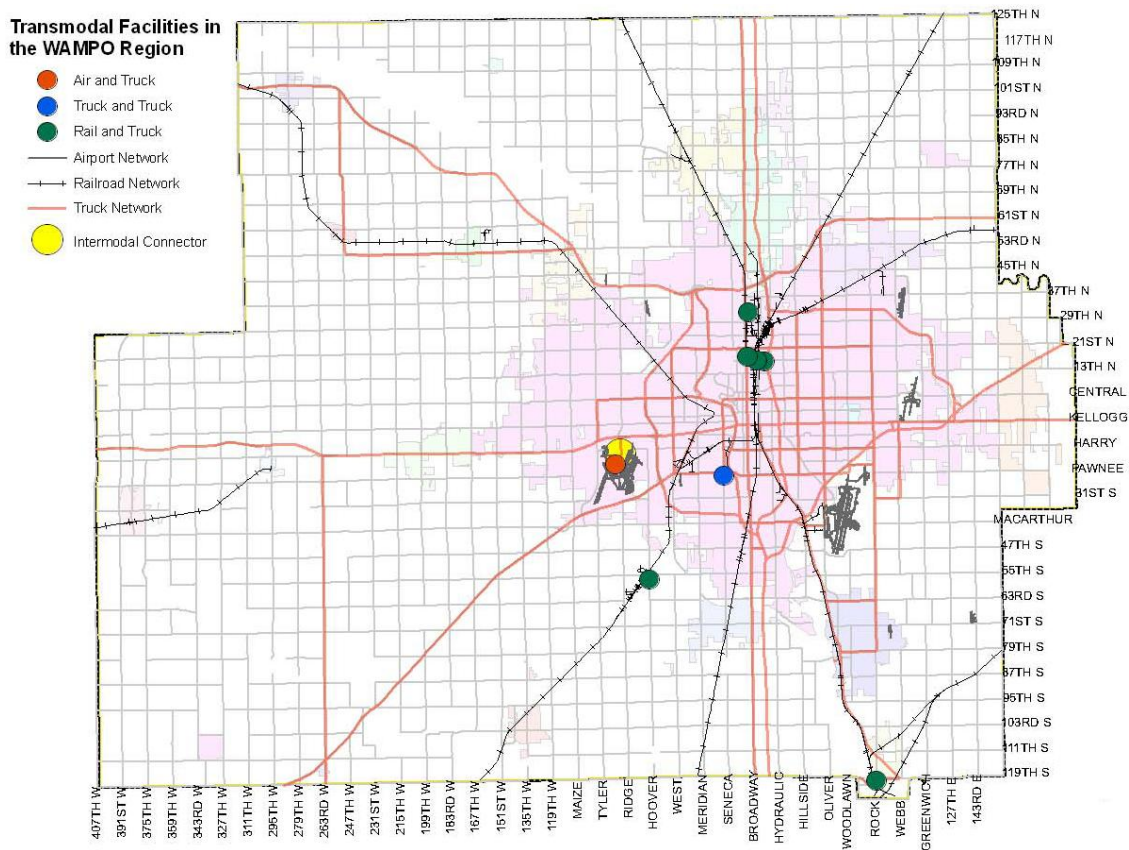
### 9.17.7 AVIATION

#### 9.17.7.1 INTERMODAL FACILITIES

Mid-Continent Airport serves as a major intermodal facility in the region. An intermodal facility provides for the transfer of freight from one mode to another (e.g., air to truck and vice versa). Mid-Continent Airport is connected to the regional roadway network, allowing freight to flow into and out of the airport via truck. This connection, provided on Mid-Continent Drive and Air Cargo Road, is the only intermodal connector in the region. Mid-Continent airport serves as an intermodal facility to transfer freight from air to truck and truck to air. The United States Postal Service (USPS) operates an intermodal facility to transfer mail and freight from trucks coming from other regions to trucks that deliver to postal distribution centers in the WAMPO region.

As stated earlier, the WAMPO region is an active location for the transfer of agricultural goods from rural Kansas to the national rail system. There are six truck-to-rail and rail-to-truck intermodal facilities operating in the WAMPO region. Institutional issues for the operation of the Wichita Terminal, as well as being land - locked, cause periodic delays in transferring goods from the short line railroads to the BNSF and UPRR railroads.

All intermodal facilities are located inside or within one mile of the corporate limits of the City of Wichita. As such they can have an influence on traffic within and around the facility. Rail relocations, as identified previously, allow for moving rail to areas outside of the City core and can provide room for intermodal facilities to expand. Maintaining the existing street and highway system may help in mitigating the effects of traffic in and around existing intermodal facilities.



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

The region is also home to eight private intermodal facilities that transfer freight from one mode of transportation to another.

- Emery Forwarding – Air & Truck
- USPS Remote, Inc. – Truck & Truck
- Mulvane Cooperative – Rail & Truck
- Cereal Food Processors, Inc. – Rail & Truck
- Garvey Elevators, Inc. – Rail & Truck
- Heiman Elevator, Inc. – Rail & Truck
- Garvey Public Warehouse – Rail & Truck
- CTS Bulk Terminal – Rail & Truck

The WAMPO region is served by one commercial and one regional airport. Wichita Mid-Continent Airport, the largest airport in Kansas, serves as the primary airport for passenger service and goods movement. Colonel James Jabara Airport serves as a general aviation reliever, providing an option for smaller aircraft such as private jets. There are also privately owned airports in the region which include the Hawker Beechcraft Factory, Cessna Aircraft Field, Maize Airport, Riverside Airport, Westport Airport, and Westport Auxiliary Airport. In addition, there are other privately owned airfields within the region.

### 9.17.7.2 KASP AIRPORT ROLE DESIGNATION

The Kansas Airport System Plan (KASP) puts airports into five categories based on the role they serve: commercial service, regional, business, community, and basic.

- **Commercial service** airports accommodate scheduled major/national or regional/commercial air carrier service.
- **Regional** airports accommodate regional economic activities, connect the state and national economies, and serve all types of general aviation aircraft.
- **Business** airports accommodate local business activities and general aviation users.
- **Community** airports serve a supplemental role in local economies, primarily serving business, recreational, and personal flying.
- **Basic** airports serve a limited role in the local economy, primarily serving recreational and personal flying.

The 2008 KASP identifies eight airports in the WAMPO region:

- Hawker Beechcraft Factory – Regional
- Cessna Aircraft Field – Business
- Colonel James Jabara Airport – Regional
- Maize Airport – Basic
- Riverside Airport – Business
- Wichita Mid-Continent Airport – Commercial Service
- Westport Airport – Community
- Westport Auxiliary – Basic

### 9.17.7.3 AVIATION FACILITIES

#### 9.17.7.3.1 DWIGHT D. EISENHOWER NATIONAL AIRPORT

Dwight D. Eisenhower National Airport (ICT) is a commercial service airport that serves as the primary hub for air travel in the WAMPO region. The airport is located approximately five miles southwest of the central business district in Wichita and is bordered on the north by US-54/400 (Kellogg) and on the south by K-42. It is owned by the Wichita Airport Authority and operated by the City of Wichita Department of Airports. The

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

Wichita City Council, which also serves as the Wichita Airport Authority Board, makes final decisions regarding the airport.

Wichita Dwight D. Eisenhower National Airport is the only airport in the WAMPO region that is equipped to handle large-scale commercial freight movements, and operates and maintains runways that can handle wide-body aircraft. As such, the airport accounts for the majority of air cargo tonnage shipped into and out of Kansas. It is anticipated that the airport will enplane and deplane approximately 78,000 tons of freight in 2023, up 200% from the 25,000 tons of freight enplaned and deplaned in 2010.

### *DWIGHT D. EISENHOWER NATIONAL AIRPORT STATISTICS*

#### **AIRCRAFT SPECIFICATIONS**

Normal Air Traffic Aircraft Types: A320 (Passenger)/MD-80 (Passenger), B757/A300 (Cargo)  
Smallest Aircraft Type Serviced: Cessna 208 Caravan and Fairchild Metro  
Helicopter Services: (1) Kansas Highway Patrol, (2) Wichita Police, (2) EagleMed  
Airport Operations  
Air Carrier Daily Departures per Day: 39  
Air Cargo (Tons) Flown In per Day: 40  
Air Cargo (Tons) Flown Out per Day: 31  
Mail (Tons) Flown Out per Day: 2

#### **AIRCRAFT TYPES/FUEL CAPACITIES**

##### Civilian

Boeing 757: 11,489 Gallons/78,585 Lb (Cargo)  
Airbus A300: 18,000 Gallons/123,120 Lb (Cargo)  
Airbus A320: 6,400 Gallons/43,775 Lb (Passenger)  
MD-80: 5,840 Gallons/39,500 Lb (Passenger)  
Cessna 208: 332 Gallons/1,990 Lb  
Fairchild metro: 643 Gallons/39,500 Lb (Cargo)

##### **Military**

KC-135R: 35,803 Gallons/241,200 Lb  
T-38: 598 Gallons/4,029 Lb  
T-2: Not Available  
T6: 165 Gallons/1,112 Lb

##### Largest Aircraft Capability:

Boeing 747-300: 53,864 Gallons/364,300 Lb  
Boeing 747-400: 93,864 Gallons/634,850 Lb  
Antonov An-1234: 92,128 Gallons/621,864 Lb

Dwight D. Eisenhower National Airport currently operates an air cargo terminal that is used by the cargo carriers to sort air freight. All cargo carriers operate from an air cargo apron located east of Runway 1L/19R. It encompasses approximately 65,000 square yards for aircraft movement and parking. Due to its central U.S. location, Dwight D. Eisenhower National Airport accommodates a considerable number of passenger and cargo medical and mechanical emergency "diverts" for aircraft not regularly scheduled to arrive/depart.

The apron is also used to store ground servicing equipment along the eastern portion of the apron. Two additional cargo buildings are exclusively (private) operated on the Airport, also located on the east portion of the air cargo apron. The airport also owns and maintains a fleet of 13 snow removal vehicles and equipment to maintain the aprons, taxiways and runways in winter weather conditions.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

Dwight D. Eisenhower National Airport has Aircraft Rescue and Firefighting Facility (ARFF) that houses equipment to respond to incidents at the airport. Equipment currently includes:

- A rapid response vehicle (Safety 1);
- Two primary vehicles (Safety 4 and Safety 5); and
- A backup vehicle (Safety 2).

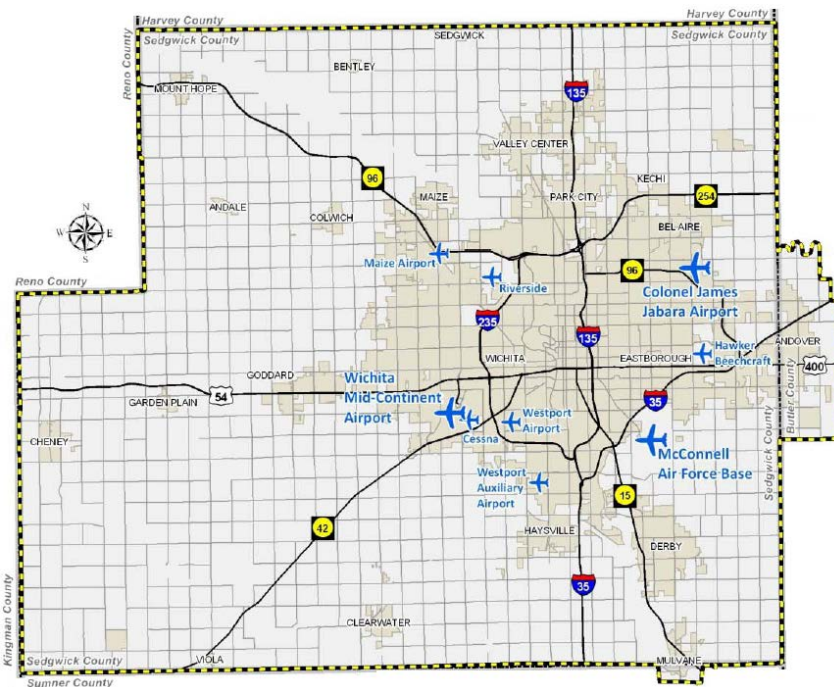
Truck access is through Airport Cargo Drive, connected to the WAMPO Truck Network through a system interchange with US - 54/400. However, the airport does not have access to the railroad network

### SERVICES

Dwight D. Eisenhower National Airport provides two types of service; general aviation (non-scheduled flights) and scheduled air transport (regularly scheduled passenger and freight flights).

General aviation is served by specialized companies providing aircraft-related accessories, service, rental, storage, and flight training. Two general aviation manufacturers are located on the airport with access to the public aeronautical facilities.

As for scheduled air transport, the airport currently services seven major airlines with 10 scheduled passenger service airlines with 10 non-stop destinations, and 3 cargo service airlines. The passenger airline companies operate on a hub and spoke network and provide service on a variety of mainline and regional jet aircraft to their respective hubs.



Over the past 11 years (1999 to 2009), the number of passengers that boarded commercial aircraft, or enplanements, at Dwight D. Eisenhower National Airport increased by more than 180,000. Despite the general increase in enplanements, the number of takeoffs and landings, or operations, over the same 11 year timeframe has decreased.

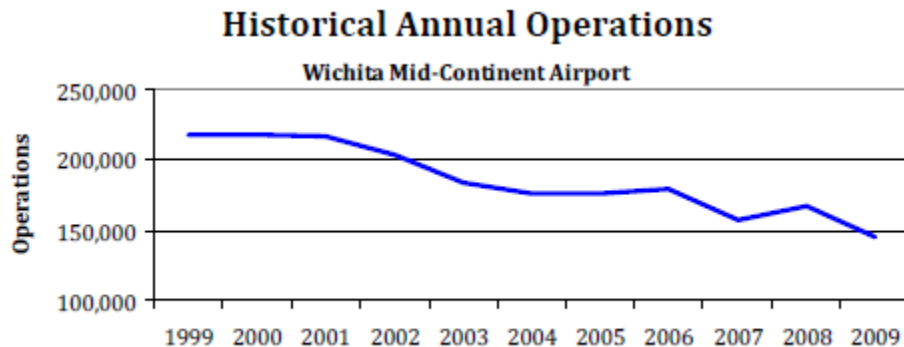
### PASSENGER ACCESS

The airport bus stop is located by the luggage sign in front of the terminal; two stops on the route are by request only through a telephone system. To access the Central Business District, passengers must transfer by



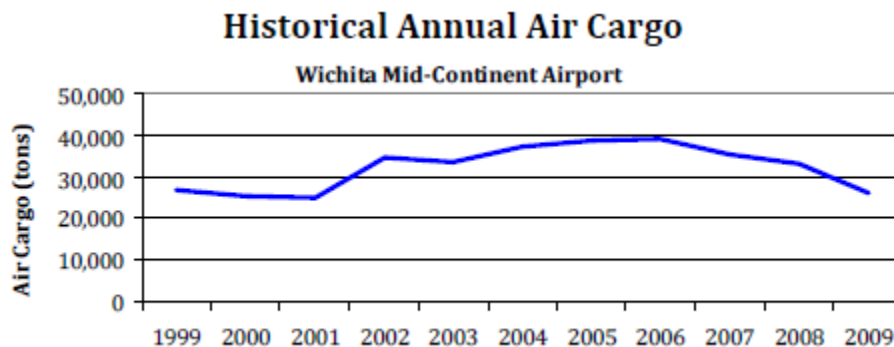
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

connecting to the West Maple Route (annual average of 14,000 riders), which has one-hour headway during off-peak hours and half hour headway during peak hours. The Park & Ride lot has 753 stalls available, with 24 ADA accessible stalls. Courtesy shuttles are ADA accessible and run between the lot and the terminal approximately every 10 minutes, 24 hours per day.



Source: Wichita Airport Authority Activity Report 1999 to 2009.

Post September 11, 2001, the airport saw an increase in air cargo movement. This increase peaked in 2006 (approximately 40,000 tons), but has since declined. By the end of 2010, the air cargo tonnage nearly equaled the 2001 level (approximately 25,000 tons).



Source: Wichita Airport Authority Activity Report 1999 to 2009.

### FORECAST AIRPORT ACTIVITY

Forecasts of passenger enplanements drive the planning for capacity increases for commercial airports. Aircraft operation projections typically identify the capacity-related needs, such as runways and terminals. Through the MTP 2035 development process, WAMPO developed forecasts for airport activity at Dwight D. Eisenhower National Airport.

All of the airport activities are expected to increase through 2035, but at different rates. The compound annual growth rates used to derive the 2010 to 2035 airport activity forecasts are as follows:

- 1.06 % for commercial enplanements (2008 KASP)
- 2.98 % for commercial operations (2008 KASP)
- 2.80 % for commercial air cargo (FAA Aerospace)
- 0.84% for general airport based aircraft and operations (2008 KASP)

By 2035, close to 230,000 more enplanements are expected at Dwight D. Eisenhower National Airport. Airport operations are expected to nearly double over the next 25 years. Air cargo is also expected to nearly double over the next 25 years.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

The Wichita Airport Authority is replacing the existing terminal with a new terminal and concourse building west of the existing terminal. The terminal concourse will include 12 gates, all equipped to accommodate both commercial transport sized aircraft and regional jets. It will provide a facility that is designed for modern airline operational and security practices. The new terminal is designed to handle two million passengers annually. The design permits future expansions to support growth up to 2.4 million annual passengers. The new terminal is anticipated to be open in the spring of 2013.

### 9.17.7.3.2 COLONEL JAMES JABARA AIRPORT

Colonel James Jabara (AAO) Airport, owned by the Wichita Airport Authority and operated by the City of Wichita Department of Airports, is a general aviation reliever airport for the WAMPO region. It is located nine miles northeast of the central business district in Wichita with easy access to K-96.

#### *SERVICES*

AAO provides general aviation services (non-scheduled flights). AAO does not serve any scheduled commercial passenger or cargo airlines. AAO serves as a general aviation “reliever” airport to ICT for the use of corporate, air ambulance, and training operations. Midwest Corporate Aviation is the single full-service fixed-base operator. As of 2010, Jabara Airport became the new location for the National Center for Aviation Training (NCAT). NCAT is a world class training facility that provides students the opportunity to receive hands-on, real world training in the areas of general aviation manufacturing, aircraft, and power plant mechanics.

#### *FORECAST AIRPORT ACTIVITY*

WAMPO forecasts airport activity at Jabara Airport is anticipated to increase over the next 25 years. Annual based aircraft is anticipated to grow by 23%, adding 25 aircraft. Annual operations are anticipated to also grow by 23%, adding 9,500 operations.

### 9.17.8 RAILROAD

#### *Background*

In 1873, the first train entered Sedgwick County and Wichita on rails after two years of contract approval on September 9, 1871 by the Wichita and Southwestern Railway Company (organized in 1871) from Newton before becoming the Santa Fe Company.

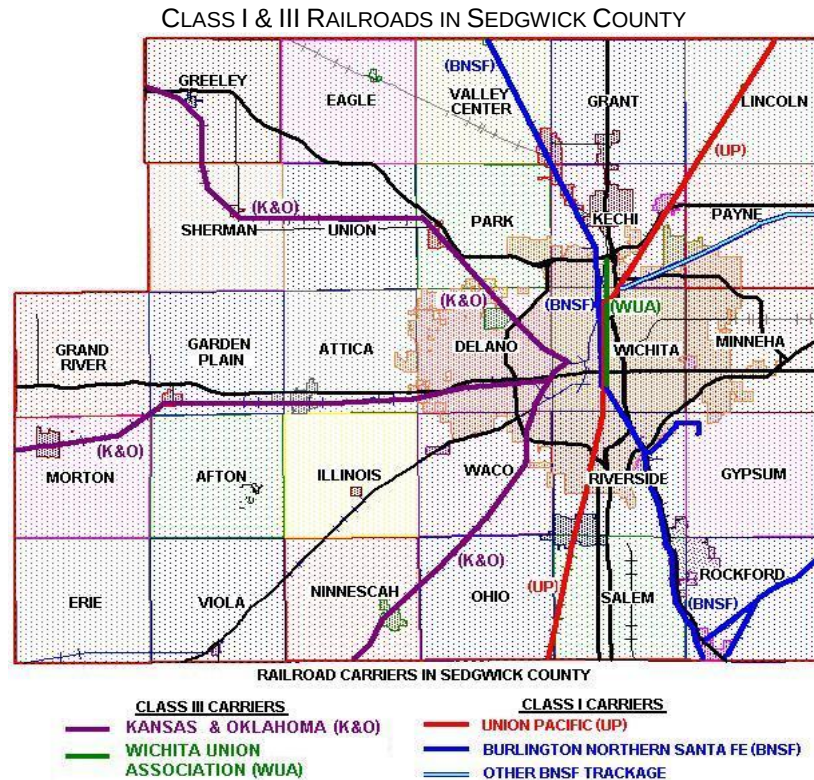
The St. Louis, Wichita & Western became the St. Louis & San Francisco (Frisco) in early 1880. Later on, the Kansas Midland was acquired by the Frisco. In 1883, the Missouri Pacific entered the county from the east as the St. Louis, Fort Scott & Wichita railway (later known as the Fort Scott, Wichita & Western). Additional railroads consolidated into the Missouri Pacific included the Wichita, Anthony & Salt Plains Railway, and the line to the northwest part of the county known as the Wichita & Colorado. The Wichita & Western Railway, owned jointly by the Santa Fe and Frisco, ran directly west to Kingman from Wichita. Additionally, the Rock Island and the Chicago, Kansas & Nebraska served Wichita. The Santa Fe south of Wichita was built in October 1878 under the name Cowley, Sumner and Ft. Smith railway. In 1904, the Orient Railway started hauling freight into Wichita.

Passenger rail service in 1910 constituted two thousand passengers are handled in and out of Wichita every day by the eighteen passenger trains operated into and through Wichita. That means that this road brings in and takes out something like 750,000 people per year.

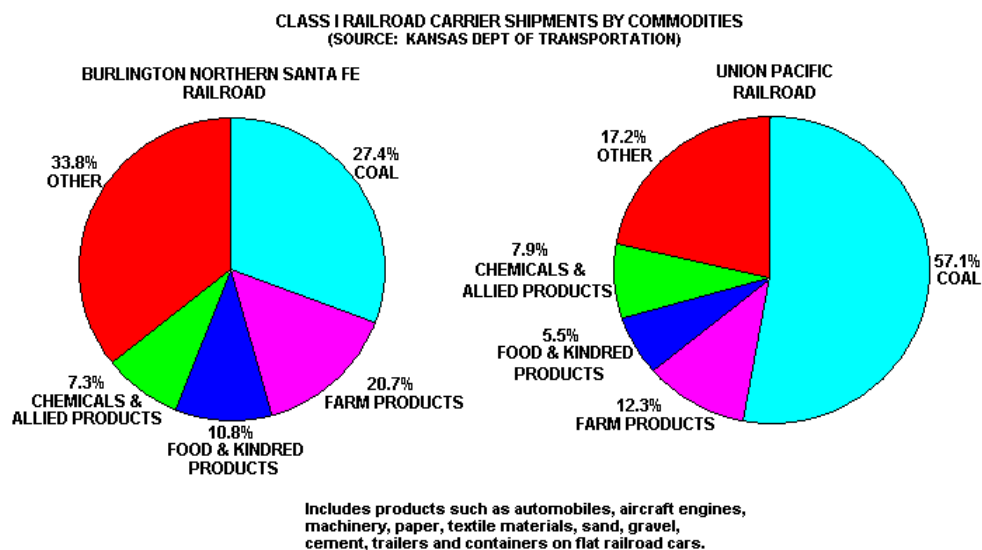
For instance the in and out tonnage handled by the Santa Fe for the first seven months of 1910 totaled 408,000,000 pounds of freight. The total for the twelve months of 1909 was 536,000,000 pounds. The increase of tonnage for the first seven months of 1910 over the same period of last year was 62,000,000 pounds.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

The Kansas rail system consists of 21 railroads of which five are identified in the South-Central Kansas region. Sedgwick County is serviced by three railroads; BNSF Railway (BNSF), Union Pacific (UP), and the Kansas and Oklahoma (K&O) which operate on approximately 175 miles of rail in the region. The Wichita Terminal Association (WTA) operates a switching yard in north central Wichita. The WTA is owned jointly by the BNSF and UP railroads and serves over a dozen industries in the region. The facility is also used to switch rail cars between the main tracks of the K&O, BNSF, and UP rail lines. The WTA switched over 37,000 rail cars in 2008.



The K&O and WTA railroads lease track from the two primary Class I rail carriers: Burlington Northern Santa Fe, Kansas and Union Pacific. The following shipping information is for the two Class I carriers in Kansas:



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### 9.17.8.1

#### CLASS I RAILROAD CARRIER OVERVIEW

##### BNSF

Burlington Northern Santa Fe Corporation, (the Company) including its majority-owned subsidiaries, is engaged primarily in transportation services through its principal subsidiary. The BNSF Railway Company (BNSF), which operates one of the largest railroad networks in North America with approximately 32,000 route miles covering 28 states and two Canadian provinces. This network covers the western two-thirds of the United States, stretching from all major Pacific Northwest and California ports to destinations in the Midwest, Southeast and Southwest, and from the Gulf of Mexico to Canada. In Kansas, BNSF operates on 1,237 route miles of track and 443 miles of trackage rights for a total of 1,680 miles. BNSF is headquartered in Fort Worth, Texas. Its Kansas Division is headquartered in Kansas City, Kansas. BNSF transports a range of products and commodities including coal, agricultural products, perishable products, automobiles, intermodal containers and trailers containing consumer goods and other products, petroleum, plastics and chemical products, building and construction products.

##### Union Pacific

Union Pacific Railroad is an operating subsidiary of Union Pacific Corporation (UP) headquartered in Omaha, Nebraska. Operating in the western two-thirds of the United States, it is the largest railroad in North America with 32,400 miles of track. The UP system serves 23 states, linking every major West Coast and Gulf Coast port. It also serves four major gateways to the east: Chicago, St. Louis, Memphis, and New Orleans. UP is the primary rail connection between the U.S. and Mexico. It also interchanges traffic with the Canadian rail system. In Kansas, the Union Pacific owns 2,248 miles of track. UP has one of the most diversified commodity shipping mixes in the industry. Commodities hauled include chemicals, coal, food and food products, forest products, grain and grain products, intermodal, metals and minerals, and automobiles and automotive parts.

### 9.17.8.2

#### CLASS III RAILROAD CARRIER OVERVIEW

##### Kansas & Oklahoma

The Kansas and Oklahoma Railroad (KO) is a subsidiary of Watco Companies, Inc. (Watco), a Pittsburg, KS based company. As of November, 2006, Watco owns and operates 16 railroads nationwide, including the KO, South Kansas and Oklahoma Railroad (SKOL) and Kaw River Railroad (KAW) in Kansas. More than 1,200 people are employed by Watco and its subsidiaries nationwide. Watco purchased the KO June 29, 2001, making it one of the largest short-lines in the industry. The KO operates 877 track miles in three directions, originating from Wichita and extending to the Colorado state line. More than 55,000 carloads of agricultural and industrial products such as corn, wheat, fertilizers, lumber, cement, sand, and rock are transported annually on the KO. The KO serves customers such as OxyChem, Wichita; DeBruce Grain, Wichita; Cargill Corporation, Salina; and Collingwood Grain, Leoti.

##### Wichita Terminal Association

The Wichita Terminal Association Railroad Inc. (WTA) was formed in 1889, this two miles is to service the stockyards in Wichita, Kansas. The railroad is owned by a partnership between the BNSF Railway (BNSF) and Union Pacific (UP). The BNSF Railway handles the maintenance and dispatching on the line. The railroad is primarily a switching concern, which handles grain and grain-related products including wheat for flourmills. Often shipments of grain involve subsequent moves as related to the processing of flour products. Some scrap steel is also moved. The Wichita Union Terminal comprises only about two miles of track owned jointly by the BNSF and UP railroads. Wichita Union Terminal has no employees or rolling stock of its own. It is merely a bridge line shared by the carriers. The Wichita Union Terminal should not be confused with the Wichita Terminal Association (a partnership consisting of the BNSF and UP). The latter provides maintenance for the Wichita Union Terminal and also switching service on about 27 miles of track. It serves about two dozen shippers in the area formerly occupied by the stockyards. The tracks over which the Wichita Terminal Association crews operate have no physical connection with the Wichita Union Terminal's tracks.

### 9.17.8.3 TONS TRANSPORTED

Freight tonnage transported by Class I Railroads in Kansas totaled approximately 377.41 million tons in 2005, an increase of just over four and a quarter percent from the 2004 tonnage. Freight tons include originating, terminating and through traffic. The total 2005 rail tonnage would require almost 23 million trucks to move the equivalent car loadings of bulk commodities over Kansas highways. The Union Pacific continues to be the dominant rail service provider in the state hauling more than 211 million tons, or approximately 56 percent, of the total rail tonnage for 2005.

### 9.17.8.4 COMMODITIES MOVED

Coal remains the principal commodity hauled by Class I railroads with approximately 194.7 million tons or 52 percent of the total rail tonnage of 2005. Other principal commodity groups moved include farm products at more than 39 million tons (10 percent), food and kindred products at more than 32.4 million tons (9 percent), chemicals and allied products at more than 25.2 million tons (7 percent), and all other commodities at over 86.1 million tons (23 percent). Tonnage totals in 2005 had an increase of 15,383,425 tons hauled from 2004. There was an increase of five percent in the coal category. Food and kindred products had an increase of 8 percent. The miscellaneous category, which includes automobiles, aircraft engines, machinery, paper, textile materials, sand, and gravel, showed an increase of 3 percent.

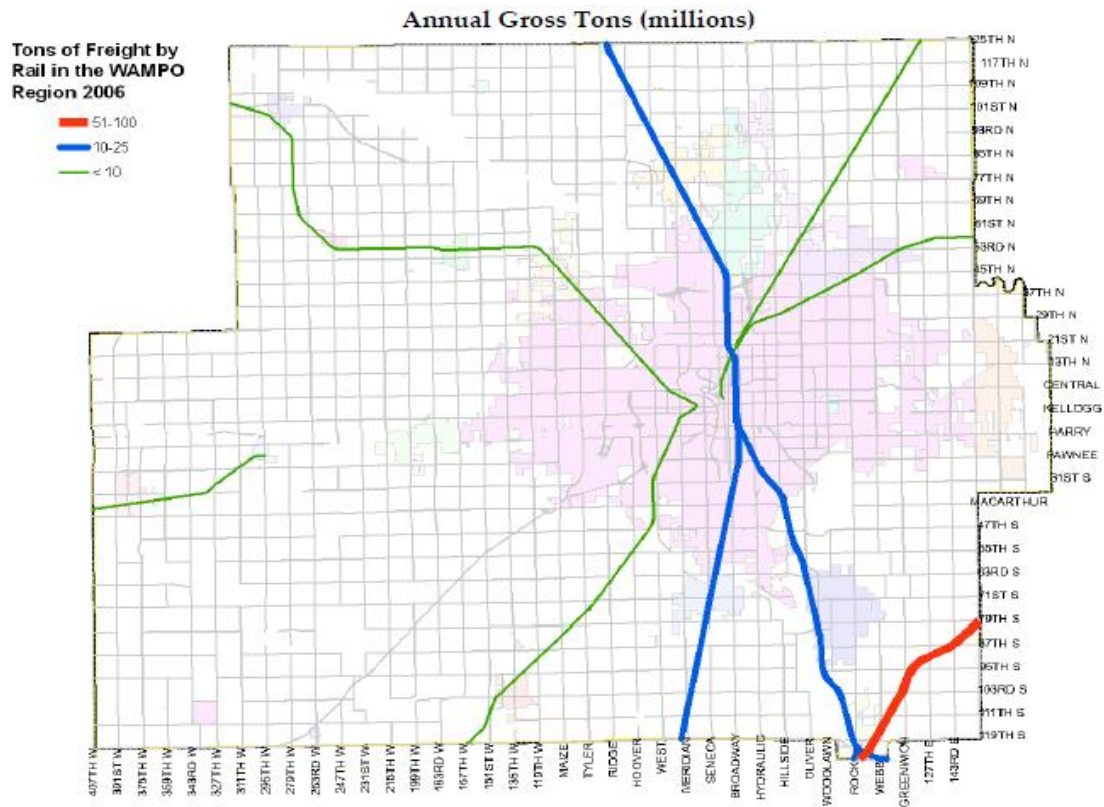
### 9.17.8.5 COMPOSITION OF TRAFFIC

The BNSF Railway's primary commodities originated in Kansas during 2005 were farm products 20.7 percent; miscellaneous mixed shipments (62.5 percent); food and kindred products (10.1 percent); coal (less than one percent); and chemical and allied products (6.7 percent). In 2005, the Union Pacific's primary originated commodities were farm products (3.9 percent); miscellaneous mixed shipments (43.3 percent); food and kindred products (6.4 percent); coal (45.1 percent); and chemical and allied products (1.3 percent).

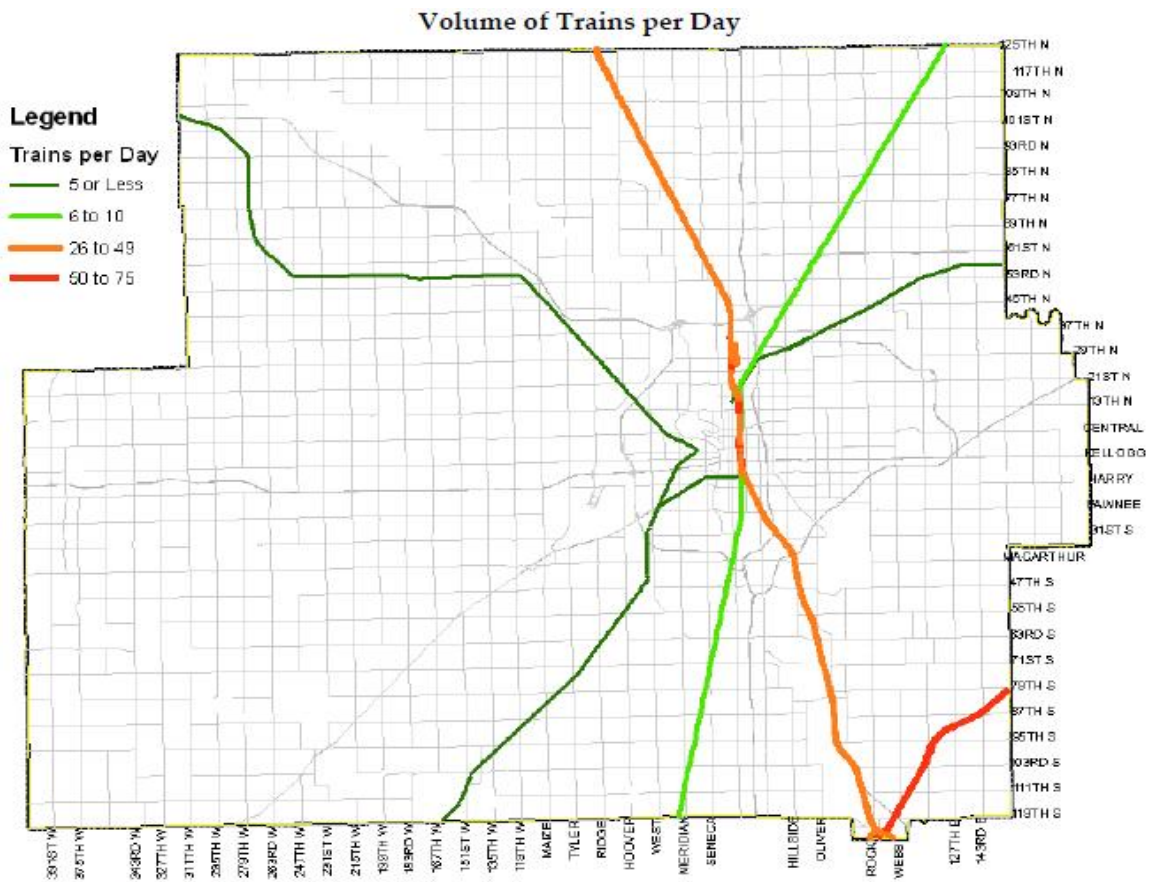
The following map shows the annual number of gross tons transported through the WAMPO region (2006 data):



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis



The following map shows the average number of trains passing through the WAMPO region:



source: Kansas DOT

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

The following chart shows the hazard ranking, location, railroad, and crossing conditions.

### Top 50 WAMPO Identified Hazard Index Locations

| Rank | Crossing Number | Hazard Index | Crossing Street       | Railroad                               | Adjacent Land Use | Crossing Condition | Crossing Consolidation | Grade Separation | Geometric Issues | Signal Upgrades |
|------|-----------------|--------------|-----------------------|----------------------------------------|-------------------|--------------------|------------------------|------------------|------------------|-----------------|
| 1    | 009286B         | 78037        | Pawnee Street         | BNSF Railway                           | Commercial        |                    |                        | ✓                |                  |                 |
| 2    | 009295A         | 68742        | 47Th Street           | BNSF Railway                           | Commercial        |                    |                        |                  |                  |                 |
| 3    | 009268D         | 56612        | 13 Street             | BNSF Railway                           | Industrial        |                    |                        |                  |                  |                 |
| 4    | 009272T         | 51072        | Murdock Street        | BNSF Railway                           | Industrial        |                    |                        |                  |                  |                 |
| 5    | 009273A         | 50810        | Central Street        | Wichita Union Terminal Railway Company | Industrial        |                    |                        |                  |                  |                 |
| 6    | 009293L         | 49943        | Macarthur Road        | BNSF Railway                           | Commercial        |                    |                        |                  |                  |                 |
| 7    | 009263U         | 49066        | 21 Street             | BNSF Railway                           | Commercial        |                    |                        |                  |                  |                 |
| 8    | 009290R         | 48906        | Private Entrance 31st | BNSF Railway                           | Industrial        |                    |                        |                  |                  | ✓               |
| 9    | 009283F         | 45338        | Harry Street          | BNSF Railway                           | Commercial        |                    |                        |                  |                  |                 |
| 10   | 009388U         | 41439        | 63Rd Street           | BNSF Railway                           | Commercial        |                    |                        |                  |                  |                 |
| 11   | 670158K         | 38304        | Meridian Street       | BNSF Railway                           | Commercial        |                    |                        |                  | ✓                |                 |
| 12   | 009377G         | 37688        | K-15 Highway          | BNSF Railway                           | Industrial        |                    |                        |                  | ✓                | ✓               |
| 13   | 009382D         | 35183        | K-15 Highway          | BNSF Railway                           | Open Space        |                    |                        |                  | ✓                | ✓               |
| 14   | 009280K         | 31814        | Lincoln Avenue        | BNSF Railway                           | Industrial        |                    |                        | ✓                | ✓                |                 |
| 15   | 009259E         | 29427        | 29 Street             | BNSF Railway                           | Commercial        |                    |                        |                  |                  |                 |
| 16   | 009252G         | 28815        | 53 Street             | BNSF Railway                           | Commercial        |                    |                        |                  | ✓                |                 |
| 17   | 009284M         | 27010        | Mt. Vernon Street     | BNSF Railway                           | Residential       |                    |                        |                  | ✓                |                 |
| 18   | 009285U         | 26847        | Hydraulic Street      | BNSF Railway                           | Residential       |                    |                        | ✓                | ✓                |                 |
| 19   | 445091N         | 26786        | 21St Street           | Union Pacific Railroad Company         | Industrial        |                    |                        | ✓                | ✓                |                 |
| 20   | 009248S         | 25696        | 77 Street             | BNSF Railway                           | Commercial        | ✓                  | ✓                      | ✓                | ✓                |                 |
| 21   | 009257R         | 24411        | 37 Street             | BNSF Railway                           | Commercial        |                    |                        |                  |                  |                 |
| 22   | 009282Y         | 21972        | Washington Street     | BNSF Railway                           | Commercial        |                    |                        |                  | ✓                |                 |
| 23   | 009393R         | 19832        | Market Street         | BNSF Railway                           | Commercial        |                    |                        |                  |                  |                 |
| 24   | 009287H         | 18745        | Wassall Road          | BNSF Railway                           | Industrial        |                    |                        | ✓                |                  |                 |
| 25   | 009368H         | 18460        | Seneca Street         | Kansas & Oklahoma Railroad Company     | Commercial        |                    |                        |                  |                  | ✓               |
| 26   | 009266P         | 17628        | 17 Street             | BNSF Railway                           | Industrial        |                    |                        |                  | ✓                |                 |
| 27   | 595029R         | 16878        | 21St Street           | Union Pacific Railroad Company         | Industrial        |                    |                        | ✓                |                  |                 |
| 28   | 595037H         | 16690        | 9Th Street            | Union Pacific Railroad Company         | Industrial        |                    |                        |                  |                  |                 |
| 29   | 595060C         | 16075        | Pawnee Street         | Union Pacific Railroad Company         | Commercial        |                    |                        | ✓                |                  |                 |
| 30   | 595034M         | 15343        | 13Th N Street         | Union Pacific Railroad Company         | Industrial        |                    |                        |                  |                  |                 |
| 31   | 009406P         | 14865        | K-53 Highway          | BNSF Railway                           | Industrial        |                    |                        | ✓                | ✓                |                 |
| 32   | 009315J         | 13545        | 17 Street             | Wichita Terminal Association           | Industrial        | ✓                  |                        |                  |                  | ✓               |
| 33   | 595035U         | 13250        | 11Th N Street         | Union Pacific Railroad Company         | Industrial        |                    |                        |                  |                  |                 |
| 34   | 445161B         | 12857        | Douglas Street        | Kansas & Oklahoma Railroad Company     | Commercial        |                    |                        |                  | ✓                | ✓               |
| 35   | 595038P         | 12577        | Murdoch Street        | Union Pacific Railroad Company         | Industrial        |                    |                        |                  |                  |                 |
| 36   | 009636R         | 11518        | 95Th E Street         | BNSF Railway                           | Open Space        |                    |                        |                  | ✓                |                 |
| 37   | 009246D         | 11400        | Main Street           | BNSF Railway                           | Commercial        | ✓                  |                        |                  | ✓                |                 |
| 38   | 445179I         | 10851        | 29Th Street           | Kansas & Oklahoma Railroad Company     | Industrial        |                    |                        |                  |                  | ✓               |
| 39   | 595063X         | 9981         | Macarthur Road        | Union Pacific Railroad Company         | Commercial        |                    |                        |                  |                  |                 |
| 40   | 595065L         | 9677         | 47Th Street           | Union Pacific Railroad Company         | Industrial        |                    |                        |                  | ✓                |                 |
| 41   | 009231N         | 9576         | 1 Street              | BNSF Railway                           | Residential       |                    |                        |                  |                  |                 |
| 42   | 445187D         | 8984         | Meridian Street       | Kansas & Oklahoma Railroad Company     | Residential       |                    | ✓                      |                  | ✓                | ✓               |
| 43   | 445167S         | 8935         | Maple Street          | Kansas & Oklahoma Railroad Company     | Institutional     |                    |                        |                  | ✓                | ✓               |
| 44   | 009251A         | 8311         | 61 Street             | BNSF Railway                           | Residential       | ✓                  | ✓                      | ✓                | ✓                |                 |
| 45   | 009390V         | 8113         | 71St Street           | BNSF Railway                           | Commercial        | ✓                  |                        |                  |                  |                 |
| 46   | 009628Y         | 8008         | 190Thll Street        | BNSF Railway                           | Open Space        |                    |                        | ✓                | ✓                |                 |
| 47   | 009385Y         | 7934         | 55Th Street           | BNSF Railway                           | Open Space        | ✓                  |                        |                  | ✓                |                 |
| 48   | 595053S         | 7304         | Harry Street          | Union Pacific Railroad Company         | Commercial        |                    |                        |                  |                  |                 |
| 49   | 009294T         | 7110         | Clifton Avenue        | BNSF Railway                           | Residential       |                    |                        |                  |                  |                 |
| 50   | 445210V         | 6402         | Maize Road            | Kansas & Oklahoma Railroad Company     | Residential       | ✓                  | ✓                      | ✓                | ✓                |                 |

source: WAMPO Railroad Crossing Study

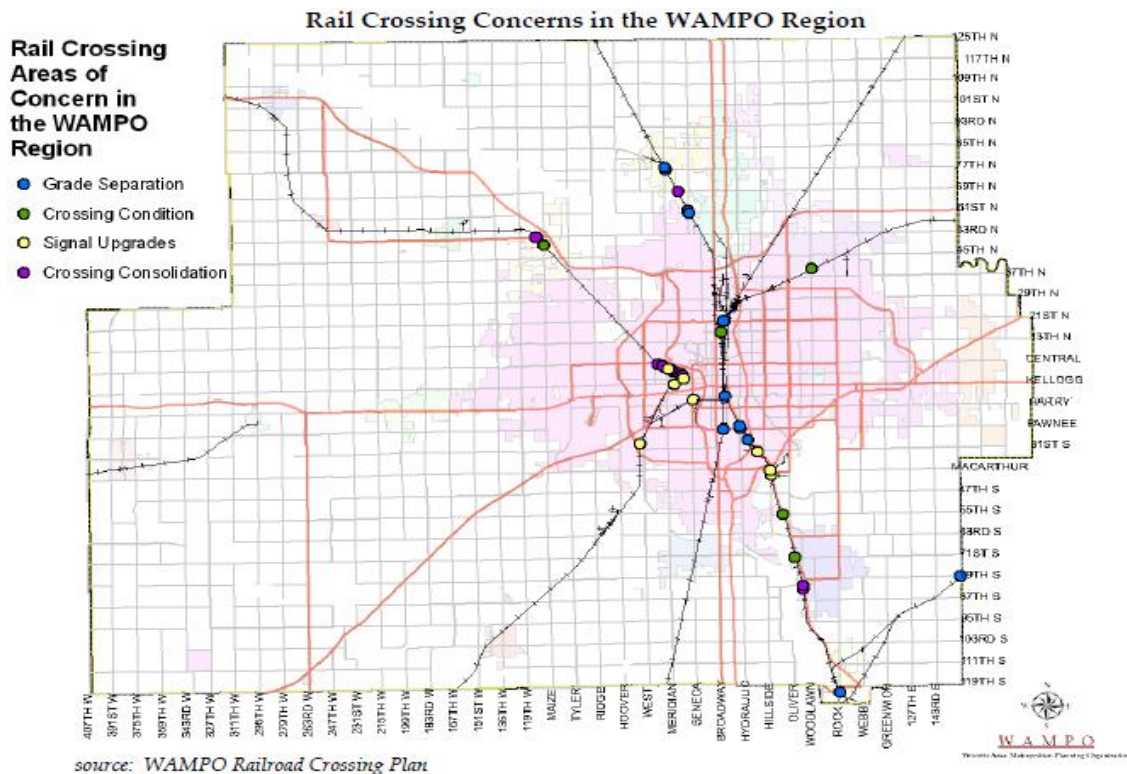
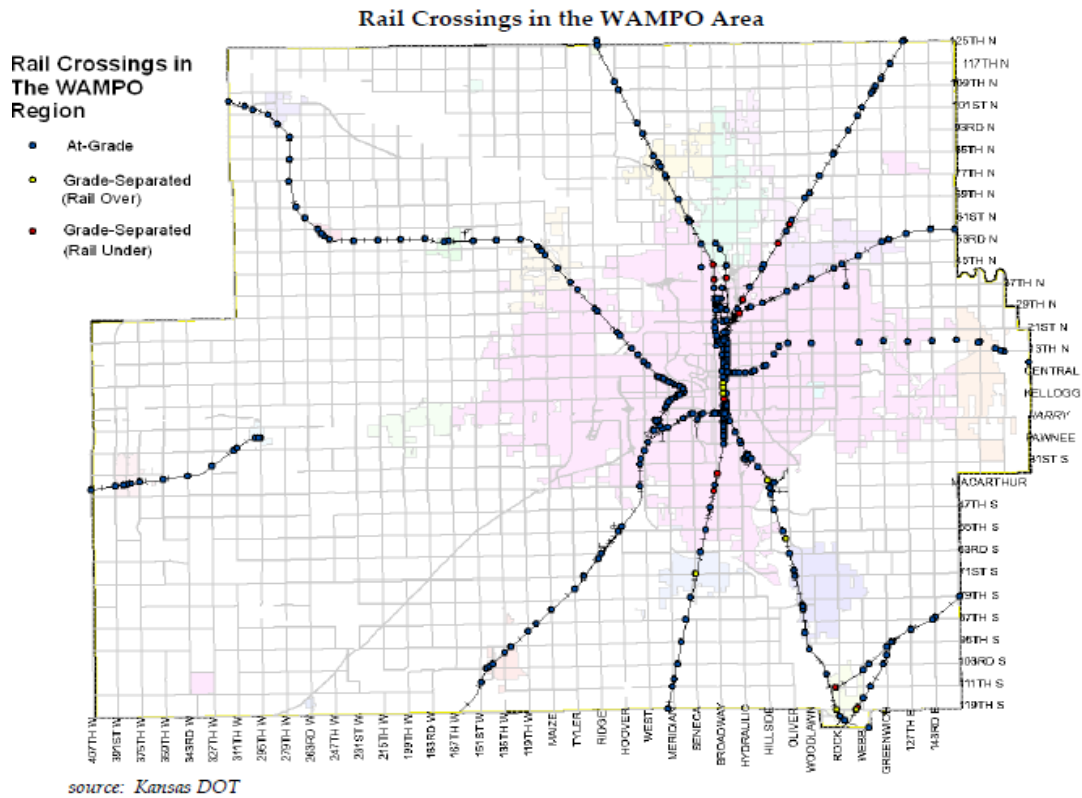


## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 9.17.8.6

### RAILROAD CROSSINGS

Of the 376 rail crossings in the WAMPO region (shown below), approximately 360 are at grade and approximately 16 are grade - separated.



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

9.17.8.7

### HAZARDOUS MATERIALS TRANSPORTATION

Hazardous materials reports for Sedgwick County covering a one-year period (2005) were provided by the railroads with breakdown of class types and average carloads (includes loaded, residue, and inter-modal) and are presented below. Carloads per day are based on a 360-day year.

**2005 Railroad Commodity Data**

| CLASS | CLASS DESCRIPTION<br>(U.S. Dept of Transportation) | BNSF         | UNION<br>PACIFIC | CUMULATIVE<br>TOTAL | CARLOADS<br>PER DAY |
|-------|----------------------------------------------------|--------------|------------------|---------------------|---------------------|
| 2.1   | Flammable Gas                                      | 1,850        | 249              | 2,099               | 5.8                 |
| 2.2   | Non-Flammable Gas                                  | 488          | 99               | 587                 | 1.6                 |
| 2.3   | Poison Gas                                         | 1,008        | 2,097            | 3,105               | 8.5                 |
| 3     | Flammable                                          | 2,315        | 843              | 3,158               | 8.6                 |
| 4.1   | Flammable Solid                                    | 159          | 0                | 159                 | 0.4                 |
| 4.2   | Spontaneously Combustible                          | 0            | 10               | 10                  | 0.03                |
| 4.3   | Dangerous When Wet                                 | 8            | 111              | 119                 | 0.3                 |
| 5.1   | Oxidizer                                           | 60           | 59               | 119                 | 0.3                 |
| 6.1   | Poison                                             | 1,375        | 428              | 1,803               | 4.9                 |
| 8     | Corrosive                                          | 9,554        | 2,136            | 11,690              | 32.0                |
| 9     | Miscellaneous                                      | 2,282        | 2,716            | 4,998               | 13.7                |
| ML    | Hazardous Waste Material                           | See Class 9* | 5                | 5*                  | 0.01                |
| CL    | Non-Hazardous Waste                                | 197          | 59               | 256                 | 0.7                 |

**2009 Railroad Commodity Data**

| CLASS | CLASS DESCRIPTION<br>(U.S. Dept of Transportation) | BNSF   | UNION<br>PACIFIC | CUMULATIVE<br>TOTAL | CARLOADS<br>PER DAY |
|-------|----------------------------------------------------|--------|------------------|---------------------|---------------------|
| 2.1   | Flammable Gas                                      | 3,915  | 165              | 4,080               | 11.3                |
| 2.2   | Non-Flammable Gas                                  | 5,768  | 3,328            | 9,096               | 25.3                |
| 2.3   | Poison Gas                                         | 803    | 392              | 1,195               | 3.3                 |
| 3     | Flammable                                          | 16,988 | 32,381           | 49,369              | 137.1               |
| 4.1   | Flammable Solid                                    | 3      | 0                | 3                   | 0.01                |
| 4.2   | Spontaneously Combustible                          | 2      | 0                | 2                   | 0.01                |
| 4.3   | Dangerous When Wet                                 | 12     | 156              | 168                 | 0.5                 |
| 5.1   | Oxidizer                                           | 177    | 15               | 192                 | 0.5                 |
| 6.1   | Poison                                             | 1,626  | 470              | 2,096               | 5.8                 |
| 8     | Corrosive                                          | 11,807 | 2,034            | 13,841              | 38.5                |
| 9     | Miscellaneous                                      | 3,735  | 664              | 4,399               | 12.2                |
| ML    | Hazardous Waste Material                           | 16,278 | 3                | 16,281              | 45.2                |
| CL    | Non-Hazardous Waste                                | 870    | 33               | 903                 | 2.5                 |

As noted in the comparison in the tables above, there have been dramatic increases in railroad movement of hazardous materials from almost 77 cars per day in 2005 to over 282 cars per day in 2009.

Hazardous material shipments are broken into three categories:

- 1/3 are loaded and placarded per DOT requirements
- 1/3 have residue from previous chemicals in railcars (may contain 3% to 7% product)
- 1/3 are intermodal railcars (trailers, equipment, tanks loaded on flat cars)

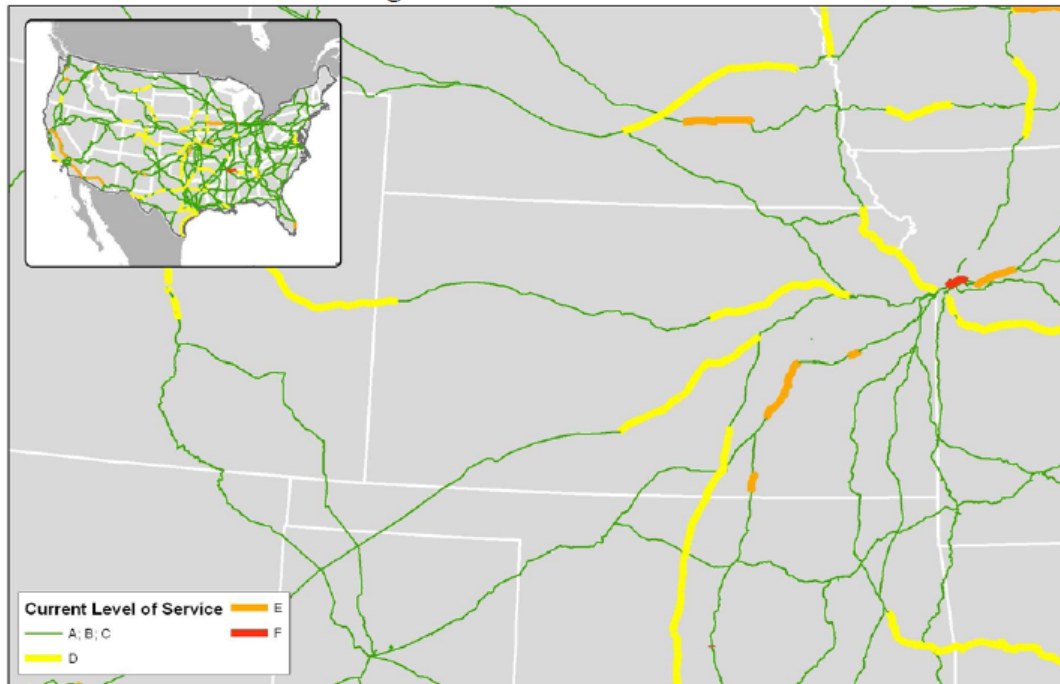
There are seven general types of tank cars in use by railroads: general service, pressure, chlorine, hydrochloric acid, cryogenics, and intermodal. Safety features include: Liquid lines on railcars are designed in line with the long axis of the train, safety relief valves designed to function at 75% of the tank car's maximum operating pressure, and safety relief vents (acid cars only) designed to function at 100% of tank car's maximum operating pressure.



9.17.8.8

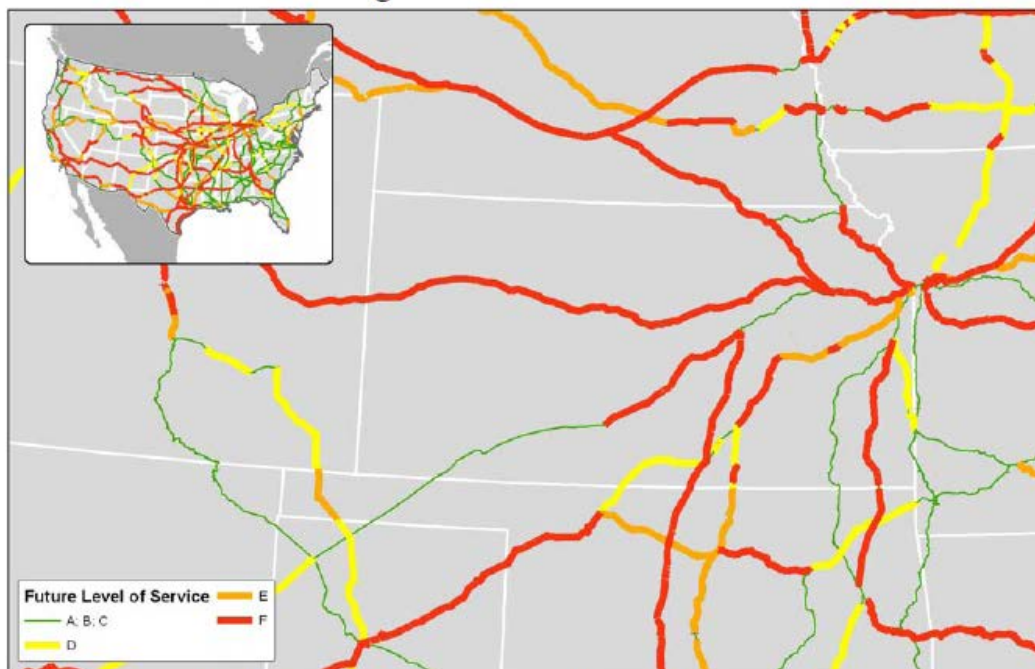
FREIGHT RAIL LEVEL OF SERVICE

**Kansas Freight Rail Level of Service 2005**



Source: National Rail Freight Infrastructure Capacity and Investment Study prepared for the Association of American Railroads by Cambridge Systematics, Inc.

**Future Freight Rail Level of Service 2035**



Source: National Rail Freight Infrastructure Capacity and Investment Study prepared for the Association of American Railroads by Cambridge Systematics, Inc.



### 9.17.8.9

#### RAILROAD SAFETY INITIATIVE – TIME SENSITIVE CAR TRACKING

A UP team in the St. Louis' National Customer Service Center (NCSC) tracks hazardous material commodities, which are deemed "time-sensitive" shipments, due to their chemical nature. These products must reach their destination within a given time period or they may start a chemical reaction and possibly cause a release.

To safeguard against a release occurring, UP was the first railroad to monitor every time-sensitive shipment on a daily basis. If a car appears to be delayed enroute, a series of calls are initiated by management to ensure arrival of the product within the designated time period. Since beginning this process, there have been no car releases of time sensitive products. They also provide a list of time-sensitive cars going to each carrier for their advanced planning.

### 9.17.8.10

#### TRAFFIC DENSITIES AND CONCERNS

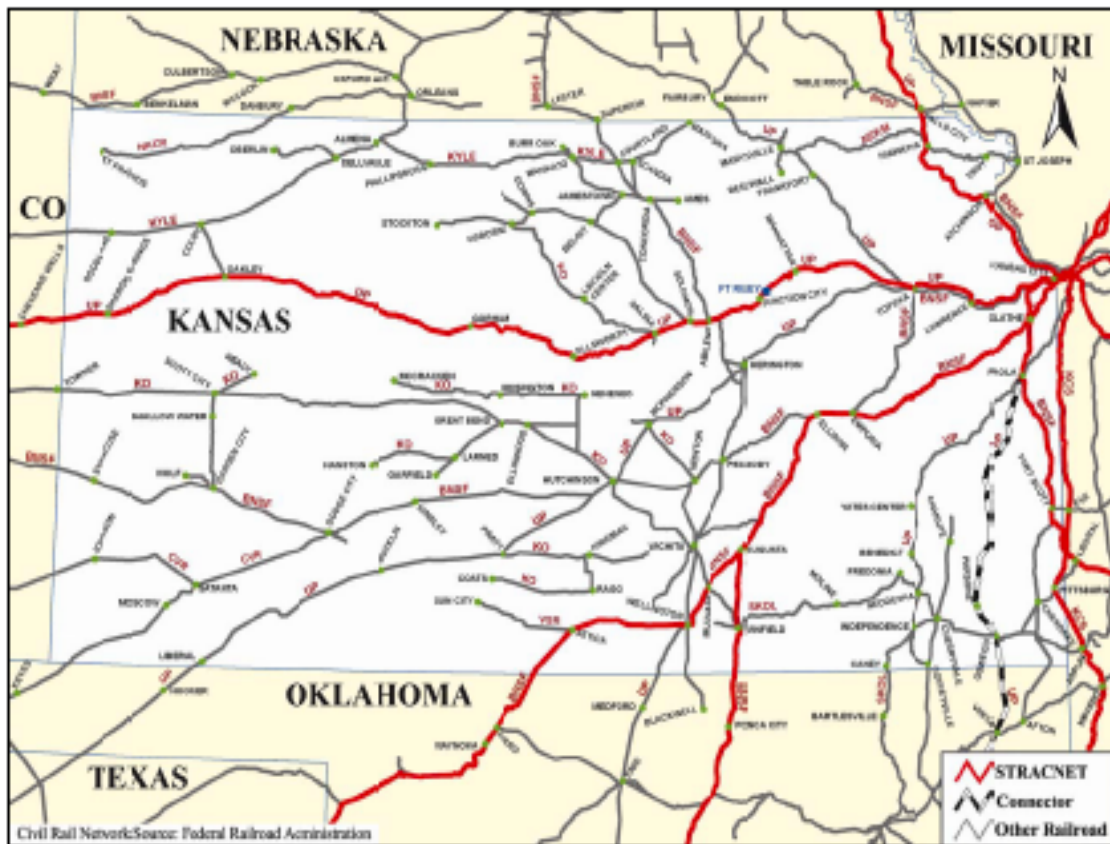
According to the Association of American Railroads, North American railroads operate over 173,000 miles of track and earn \$42 billion in annual revenues.<sup>1</sup> Historically, cities emerged and flourished with the inception of the railroad industry in which goods could be shipped greater distances for less cost than by steamboat or conventional roadways. Railroads remain the backbone of Kansas as one of the principal rail centers in the Midwest; Kansas is served by 4,936 miles of railroad trackage, much of it operated by the BNSF Railway (BNSF) and by the Union Pacific Railroad (UPRR).<sup>2</sup> As a result of the increasing number of trains operating throughout Kansas, improving safety and reducing congestion at highway - railroad grade crossings are priorities for many communities. Nationwide, a collision occurs between a train and vehicle or a train and a pedestrian approximately every 2 hours.<sup>3</sup> Likewise, the number of vehicle miles traveled is increasing at a faster rate than train miles traveled.

### 9.17.8.11

#### STRATEGIC RAIL CORRIDOR NETWORK (STRACNET)

The U.S. Strategic Rail Corridor Network (STRACNET) consists of 38,800 miles of rail lines, identified as railroad corridors that are vital to national defense and provides service to 193 defense installations whose mission requires rail service. The STRACNET was identified and designated through a partnership between the Military Traffic Management Command of the Department of Defense and the Federal Railroad Administration. In the event of a large-scale military mobilization, it is very important that the network be fully responsive to national defense needs and priorities. According to information provided by the Department of Defense's Military Traffic Management Command (MTMC), several Union Pacific and BNSF rail lines are designated as part of the STRACNET. The designated STRACNET route in south-central Kansas includes the cities of El Dorado, Augusta, Winfield, Wellington, and Attica.

KANSAS STRACNET MAP

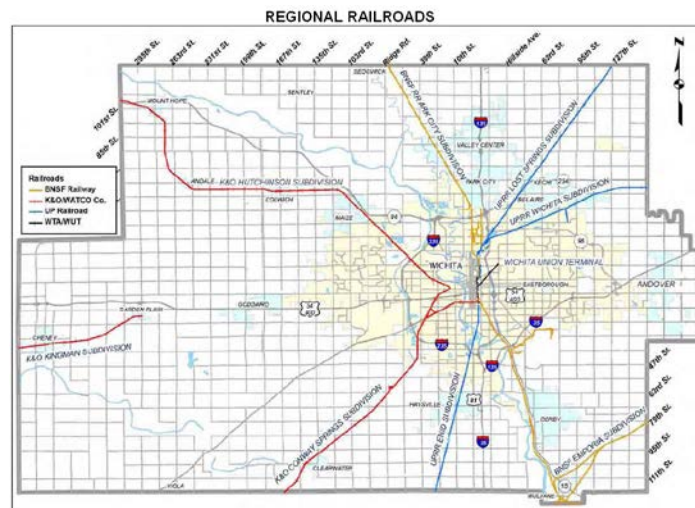


Source: U.S. Military Surface Deployment and Distribution Command

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### Regional

Centered on the railroad industry in the 1850's as a transportation center, Wichita became the largest city in Kansas and has the 2nd largest metropolitan area population (344,300). WAMPO serves a planning area of 1,036 square miles with a total population of 460,000.<sup>5</sup> The region has approximately 4,560 miles of roadway, 175 miles of Class I and shortline railroad trackage and 297 highway - railroad grade crossings. According to the WAMPO Travel Demand Model, the total number of Vehicle Miles Traveled (VMT) in the region in 2002 was 12,709,826.



The WAMPO region is home to two Class I railroads, the BNSF and the UPRR; and one shortline railroad, the Kansas & Oklahoma Railroad (K&O) operated by WATCO Companies. The BNSF operates over 100 trains per day through the WAMPO region; the UPRR operates 10 trains per day. The K&O operates 2 trains per week through Garden Plain and Cheney, and one to two trains per day through the Hutchinson and Conway Springs Subdivisions. The BNSF and the UPRR are part owners of the Wichita Terminal Association/Wichita Union Terminal (WTA/WUT) in north Wichita and by agreement train movements are controlled by the BNSF through the Central Corridor. This joint agreement allows for coordinated railroad operations through Wichita's core.

### Railroad Crossing Overview

Railroad crossings are classified as being either at - grade or grade separated. An at - grade crossing is one in which the roadway and railroad tracks are at the same elevation; a grade separated crossing is one in which the highway and railroad tracks are at different elevations, such as a bridge structure carrying the railroad over a highway or vice versa. Crossings can also be classified as either public or private. Public highway - railroad grade crossings are on streets and highways under the jurisdiction of and maintained by a public authority. Private highway-railroad grade crossings are located on a privately - owned road and are intended for use by the owner. These private roads are not intended for public use and are therefore not maintained by a public or state highway authority.

### Railroad Crossing Inventory

According to KDOT's 1995 Long Range Transportation Plan (KL RTP), the state of Kansas has 6,376 public highway - railroad grade crossings, of which 1,684 have flashing light systems and 1,126 have automatic gates.<sup>6</sup> The remaining 4,692 crossings have passive signage which may include crossbucks, advance warning signs, and pavement markings. There are also several crossings that are signed with stop signs. In the WAMPO region, almost 40% of existing crossings are considered passive, marked only by crossbucks. The



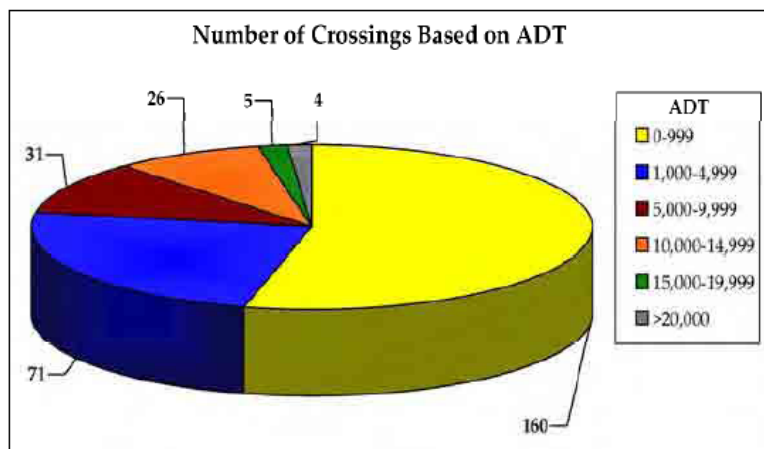
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

remaining 60% are active crossings; 18% are marked with flashing lights and 42% are equipped with flashing lights and gates.

According to the Federal Railroad Administration (FRA), 57 collisions resulting in 15 fatalities occurred at grade crossings in the state of Kansas during 2006; a total of 21 fatalities occurred in 2006 as a result of trespassing on railroad property. The number of fatalities in 2006 increased from 2005, when there were 63 collisions resulting in seven fatalities; nine additional fatalities were a result of trespassing on railroad property.<sup>7</sup> In Sedgwick County, there were eight collisions resulting in one fatality in 2006; there were ten collisions resulting in one fatality in 2005.<sup>8</sup>

### Average Traffic Counts

Average Daily Traffic (ADT) is a measure used to determine how many vehicles travel on a given road in one day. Over one - half (54%) of the highway - railroad grade crossings in the WAMPO region have an ADT of less than 1,000 vehicles.



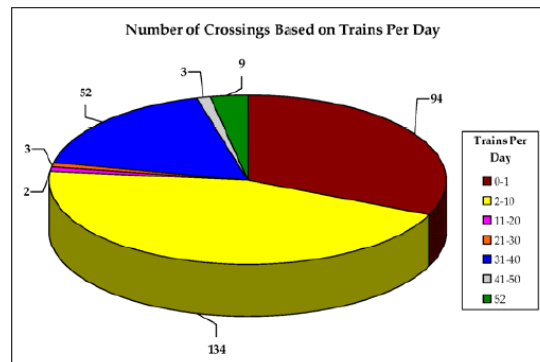
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

Crossings experiencing the most vehicles per day include:

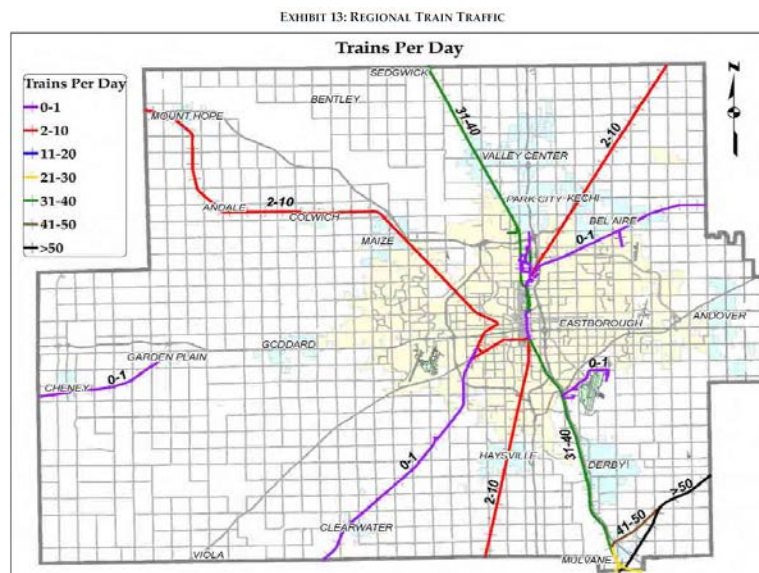
- K - 15 Highway in Wichita, on the BNSF
- Pawnee Avenue in Wichita, on the BNSF and UPRR
- 47th Street in Wichita, on the BNSF and UPRR
- Meridian Ave. in Wichita, on the BNSF and K&O
- West Street in Wichita, on the K&O
- Seneca Street in Wichita, on the K&O
- 13th Street in Wichita, on the Central Corridor

According to the WAMPO Travel Demand Model, total Vehicle Miles Traveled (VMT) in 2002 was 12,709,826; VMT is projected to increase to 18,404,132 in 2030. Additionally, the average vehicular travel time in 2002 was calculated at 16.89 minutes; this is projected to increase to approximately 19.67 minutes by 2030. Travel time on routes which intersect grade crossings is expected to be higher as train lengths and train traffic increase over the same time period.

The majority of crossings (77%) experience 0 - 10 trains per day. These crossings are located on the UPRR and K&O. 4% of all crossings in the WAMPO region experience the highest volumes of daily train traffic (41 - 52 trains per day). These crossings are located on the BNSF Emporia Subdivision.



The BNSF operates the highest number of trains per day; the BNSF Emporia subdivision operates up to 52 trains each day. The K&O operates less than one to two trains per day through the region, while the UPRR operates up to ten trains per day.



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

| TOP 50 HAZARD INDEX CROSSINGS LIST |                   |          |          |        |            |                |               |              |
|------------------------------------|-------------------|----------|----------|--------|------------|----------------|---------------|--------------|
| DOT #                              | Street            | Railroad | Surface  | ADT    | Trains/Day | Warning Device | Hazard Weight | Hazard Index |
| 009286B                            | Pawnee Avenue     | BNSF     | C&R      | 20,536 | 38         | FL/G           | 0.1           | 78037        |
| 009295A                            | 47th Street       | BNSF     | C&R      | 18,090 | 38         | FL/G           | 0.1           | 68742        |
| 009268D                            | 13th Street       | BNSF     | C&R      | 14,898 | 38         | FL/G           | 0.1           | 56612        |
| 009272T                            | Murdock Street    | BNSF     | C&R      | 13,440 | 38         | FL/G           | 0.1           | 51072        |
| 009273A                            | Central Street    | WTA/WUT  | Concrete | 13,371 | 38         | FL/G           | 0.1           | 50810        |
| 009293L                            | Macarthur Road    | BNSF     | Rubber   | 13,143 | 38         | FL/G           | 0.1           | 49943        |
| 009263U                            | 21st Street       | BNSF     | C&R      | 12,912 | 38         | FL/G           | 0.1           | 49066        |
| 009290R                            | 31st Street       | BNSF     | C&R      | 1,287  | 38         | Xbucks         | 1.0           | 48906        |
| 009283F                            | Harry Street      | BNSF     | C&R      | 11,931 | 38         | FL/G           | 0.1           | 45338        |
| 009388U                            | 63rd Street       | BNSF     | C&R      | 10,905 | 38         | FL/G           | 0.1           | 41439        |
| 009377G                            | K-15 Highway      | BNSF     | Rubber   | 31,407 | 2          | FL             | 0.6           | 37688        |
| 009382D                            | K-15 Highway      | BNSF     | Rubber   | 29,319 | 2          | FL             | 0.6           | 35183        |
| 009280K                            | Lincoln Avenue    | BNSF     | C&R      | 8,372  | 38         | FL/G           | 0.1           | 31814        |
| 009259E                            | 29th Street       | BNSF     | C&R      | 7,744  | 38         | FL/G           | 0.1           | 29427        |
| 009252G                            | 53rd Street       | BNSF     | C&R      | 7,583  | 38         | FL/G           | 0.1           | 28815        |
| 009284M                            | Mt. Vernon Street | BNSF     | C&R      | 7,108  | 38         | FL/G           | 0.1           | 27010        |
| 009285U                            | Hydraulic Avenue  | BNSF     | C&R      | 7,065  | 38         | FL/G           | 0.1           | 26847        |
| 445091N                            | 21st Street       | UPRR     | C&R      | 13,393 | 20         | FL/G           | 0.1           | 26786        |
| 009248S                            | 77th Street       | BNSF     | C&R      | 6,762  | 38         | FL/G           | 0.1           | 25696        |
| 009257R                            | 37th Street       | BNSF     | Rubber   | 6,424  | 38         | FL/G           | 0.1           | 24411        |
| 009282Y                            | Washington Street | BNSF     | C&R      | 5,782  | 38         | FL/G           | 0.1           | 21972        |
| 009393R                            | Market Street     | BNSF     | C&R      | 5,219  | 38         | FL/G           | 0.1           | 19832        |
| 009287H                            | Wassall Road      | BNSF     | C&R      | 4,933  | 38         | FL/G           | 0.1           | 18745        |
| 009368H                            | Seneca Street     | K&O      | Rubber   | 15,383 | 2          | FL             | 0.6           | 18460        |
| 009266P                            | 17th Street       | BNSF     | C&R      | 4,639  | 38         | FL/G           | 0.1           | 17628        |
| 595029R                            | 21st Street       | UPRR     | Concrete | 12,983 | 13         | FL/G           | 0.1           | 16878        |
| 595060C                            | Pawnee Avenue     | UPRR     | C&R      | 22,964 | 7          | FL/G           | 0.1           | 16075        |
| 595034M                            | 13th Street North | UPRR     | Concrete | 15,343 | 10         | FL/G           | 0.1           | 15343        |
| 009406P                            | K-53 Highway      | BNSF     | C&R      | 5,126  | 29         | FL/G           | 0.1           | 14865        |
| 009315J                            | 17th Street       | WTA/WUT  | Asphalt  | 4,515  | 3          | Xbucks         | 1.0           | 13545        |
| 445161B                            | Douglas Street    | K&O      | C&R      | 10,714 | 2          | FL             | 0.6           | 12857        |
| 595038P                            | Murdock Street    | UPRR     | Concrete | 12,577 | 10         | FL/G           | 0.1           | 12577        |
| 009636R                            | 95th Street East  | BNSF     | C&R      | 2,215  | 52         | FL/G           | 0.1           | 11518        |
| 009246D                            | Main Street       | BNSF     | C&R      | 3,000  | 38         | FL/G           | 0.1           | 11400        |
| 445179I                            | 29th Street       | K&O      | Concrete | 10,851 | 1          | Xbucks         | 1.0           | 10851        |
| 595063X                            | Macarthur Road    | UPRR     | C&R      | 14,259 | 7          | FL/G           | 0.1           | 9981         |
| 595065L                            | 47th Street       | UPRR     | C&R      | 13,824 | 7          | FL/G           | 0.1           | 9677         |
| 009231N                            | 1st Street        | BNSF     | Concrete | 2,520  | 38         | FL/G           | 0.1           | 9576         |
| 445187D                            | Meridian Avenue   | K&O      | C&R      | 7,487  | 2          | FL             | 0.6           | 8984         |
| 445167S                            | Maple Street      | K&O      | Rubber   | 7,446  | 2          | FL             | 0.6           | 8935         |
| 009251A                            | 61st Street       | BNSF     | C&R      | 2,187  | 38         | FL/G           | 0.1           | 8311         |
| 009390V                            | 71st Street       | BNSF     | Timber   | 2,135  | 38         | FL/G           | 0.1           | 8113         |
| 009628Y                            | 190th Street      | BNSF     | C&R      | 1,540  | 52         | FL/G           | 0.1           | 8008         |
| 009385Y                            | 55th Street       | BNSF     | Timber   | 348    | 38         | FL             | 0.6           | 7934         |
| 595053S                            | Harry Street      | UPRR     | Concrete | 10,435 | 7          | FL/G           | 0.1           | 7305         |
| 009294T                            | Clifton Avenue    | BNSF     | C&R      | 1,871  | 38         | FL/G           | 0.1           | 7110         |
| 445210V                            | Maize Road        | K&O      | Asphalt  | 5,335  | 2          | FL             | 0.6           | 6402         |
| 009247K                            | Meridian Avenue   | BNSF     | C&R      | 1,680  | 38         | FL/G           | 0.1           | 6384         |
| 009243H                            | 5th Street        | BNSF     | C&R      | 1,648  | 38         | FL/G           | 0.1           | 6262         |
| 439344F                            | Woodlawn Blvd     | UPRR     | C&R      | 10,299 | 1          | FL             | 0.6           | 6179         |

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### TRANSIT

#### Wichita Transit

The Wichita Transit route network serves primary persons with mobility limitations, the impoverished and the elderly with transportation to lead productive lives and meet everyday needs. Wichita Transit operates both fixed route and paratransit services which are dispatched from the Transit Operations Center (777 E Watermen). The transit system currently operates 53 buses (all ADA compliant) on 18 fixed routes and

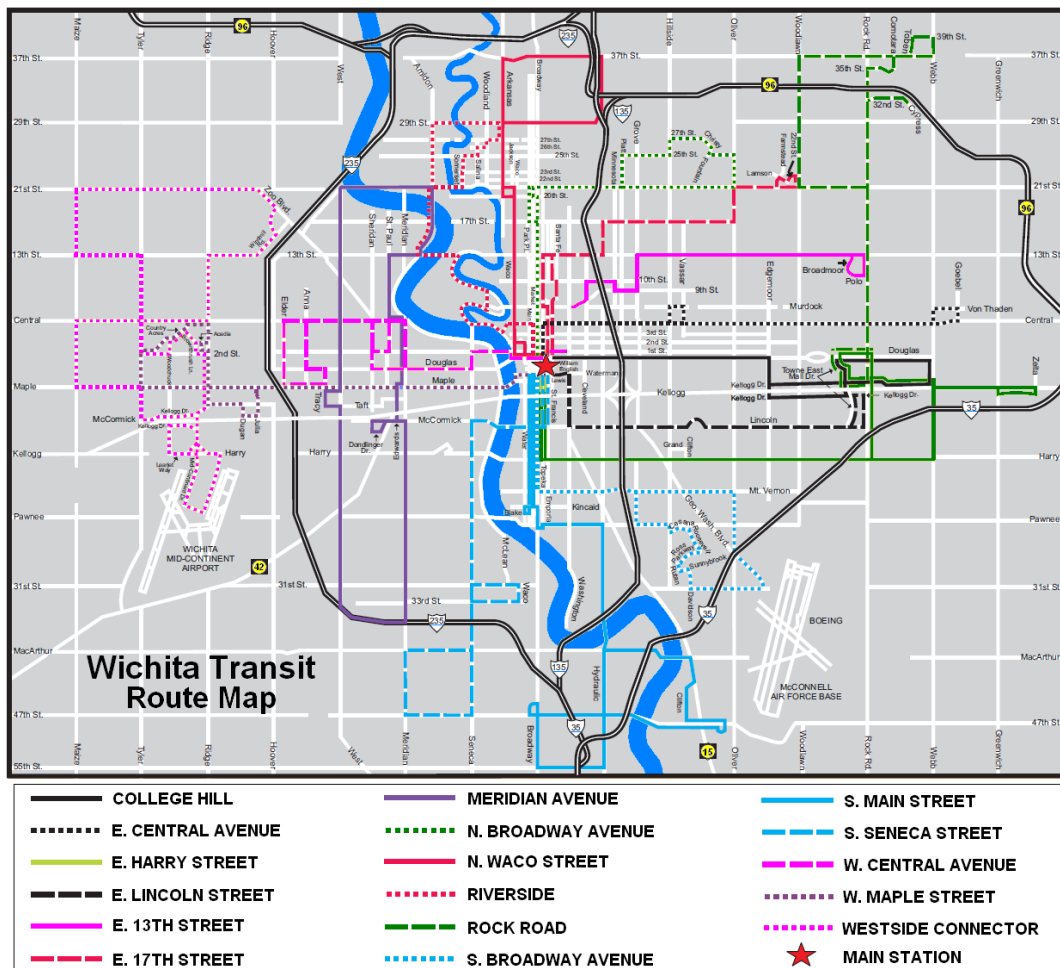
Wichita Rolling Stock

| Qty       | Description                           | Retirement |
|-----------|---------------------------------------|------------|
| 25        | Gillig Phantom 35 Foot, 37 Seat Bus   | 2014       |
| 9         | Gillig Low Floor 35 Foot, 32 Seat Bus | 2014       |
| 2         | Gillig Phantom 35 Foot, 37 Seat Bus   | 2017       |
| 4         | Gillig Phantom 40 Foot, 43 Seat Bus   | 2018       |
| 2         | 2001 Chance AH28 Streetcar, 27 Seat   | 2011       |
| 5         | Chance Opus29, 27 Seat Bus            | 2011       |
| 4         | Optima Opus29, 27 Seat Bus            | 2015       |
| 2         | Optima AH28 Streetcar, 27 Seat        | 2014       |
| <b>53</b> | <b>Total Buses</b>                    |            |

Source: Wichita Transit

It is estimated that 69% of riders had an annual income of less than \$20,000 and 98% of riders brought home less than \$50,000 per year. Additionally, 67% of those surveyed said that they rode the bus five days a week. Most riders used the bus to go to work (31%) or conduct personal business (29%).

25 wheelchair lift vans on 25 demand-response paratransit routes, including rides purchased under contract from 6 social services agencies. Additionally, four rubber tired trolleys are used for the trolley system. Annually, Wichita Transit currently carries 2.4 million passengers on fixed route bus service, and over 350,000 disabled passengers on paratransit vans. Ridership increased 15 percent over last year due to increased gas prices. Wichita Transit operates a radial bus network where most routes are designed to provide service to and from the Downtown Transit Center (214 S Topeka).



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

The Transit Center has 24 parking bays for buses and/or vans. Vehicles are parked inside the Transit Operations Center for vehicle maintenance, which is designed for diesel buses. Vans are currently maintained at the City's Central Maintenance Facility; however, a Regional Van Maintenance Facility is currently under construction. Of the buses on the radial routes, all are scheduled to arrive simultaneously at the transit center so that transfers between routes may be accommodated. There are also subarea circulator routes which do not directly connect to the transit center. These routes circulate in designated areas and connect with other routes that provide service to and from the Downtown Transit Center. There are plans to replace the radial route system to a grid network allowing for movement of people in a shorter time. The Q-Line is a wheelchair accessible trolley service connecting restaurants, hotels, and entertainment venues in downtown Wichita.

Paratransit services differ from transit services in that the routes and schedules vary based on demand. Typical paratransit services offered include deviated fixed route (e.g., off of a regular route), curb-to-curb, door-to-door, and ambulance services. Paratransit services are provided by Wichita Transit and 17 private, non-profit, and social service agencies in the region. Wichita Transit currently operates 26 wheelchair lift-equipped vans providing service to the general public on 17 demand response paratransit routes. Wichita Transit has also contracted with six other CTD #12 agencies to provide paratransit services. These other agencies have their own vehicles and routes in addition to those previously mentioned. Over 320,000 passengers annually are carried by the combined Wichita Transit paratransit services. Approximately 75% of these paratransit customers are carried by the contracted carriers.

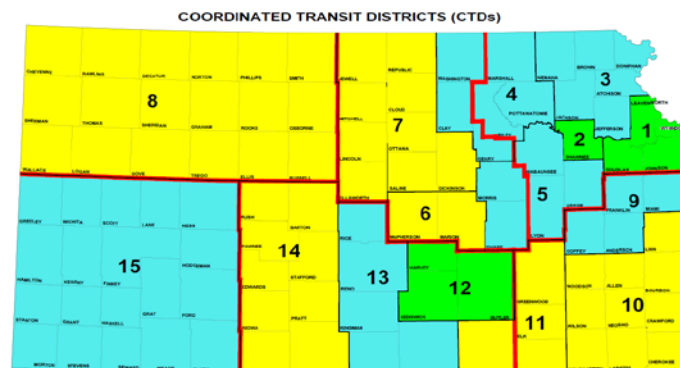
Future transportation includes changing to a grid network of north/south and east/west transit routes. Routes extend from 119th Street to Greenwood road and from 37th Street north to 55th Street south. They are spaced every half mile (or within an 8 minute walk) in the denser older portions of the city. In lower density area or where there are natural barriers, the routes are spaced approximately every one mile. Corridor routes would operate on major and local streets, whereas communities may link into the City of Wichita system in the following ways: By providing their own service or contracting with Wichita Transit to link into the grid, or Connect with Commuter express services that link to Downtown Wichita. Commuter Expresses Services are designed for workers. They would operate Monday through Friday during the peak periods, every 30 minutes. Connections could be made at Park and Ride lots.

### *Derby Dash*

The City of Derby operates a demand response service called the Derby Dash. The Derby Dash was initiated in April 2007 and curb-to-curb paratransit service is available to all residents of Derby. The service area includes the City of Derby and serves more than 22,000 residents.

### *Coordinated Transit District #12 (CTD) Organizations*

Kansas is divided into 15 Coordinated Transit Districts (CTDs), each of which is responsible for coordinating transit service within their area. The CTDs are composed of organizations that have a vested interest in paratransit services. Most of these organizations receive transit funds from the Kansas Department of Transportation (KDOT) and the Federal Transit Administration (FTA) to provide paratransit services.





## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

The Paratransit Council, Inc., formed in 1984, is a network of transportation providers comprised of human service agencies in Sedgwick, Harvey and Butler Counties. This organization shares information regarding service needs and trends, coordinates services and training, and advocates for local, state and federal support of public transportation. The Paratransit Council Inc. is an advisory body to CTD #12, authorized under K.S.A. 75-5051 to manage state and federal passenger transportation funds. The administrative agency for CTD #12 is Sedgwick County Department on Aging (SCDOA).

The CTD #12 is composed of 18 service providers in Butler, Harvey, and Sedgwick Counties. This includes Wichita Transit, social service agencies, non-profits, and private institutions that provide a variety of paratransit services. The following CTD #12 members provide specialized transportation services for their clients.

- American Red Cross
- Buhler Sunshine Home, Inc.
- Butler County Department on Aging
- Catholic Charities Adult Day Services
- Cerebral Palsy Research Foundation of Kansas, Inc.
- Futures Unlimited, Inc.
- Harper County Department of Aging
- Heartspring
- Kansas Elks Training Center for the Handicapped, I
- Leisure Time Center
- Mennonite Bethesda Society, Inc dba Bethesda Home
- Mosaic (Martin Luther Homes of KS)
- Rainbows United, Inc.
- Sedgwick County Department on Aging
- Starkey, Inc.
- The ARC of Sedgwick County
- Training and Evaluation Center of Hutchinson
- Wichita Transit (Specialized Services)

The services are all designed to meet the individual needs of each organization. Generally, CTD #12 providers serve the elderly, the physically or mentally challenged, and the economically disadvantaged. Most CTD #12 member organizations operate fewer than ten vehicles. However, four member organizations operate between ten and 25 vehicles and one member organization operates over 70 vehicles. The 2010 Coordinated Public Transit – Human Services Plan focuses on transportation services for elderly populations, people with disabilities, and low - income individuals.

### *Intercity Bus Transportation*

Greyhound bus service connects Wichita to Kansas City and Oklahoma City. There are four departures daily from the Wichita Greyhound bus station located in downtown Wichita. Intercity bus service has recently been instituted on two new routes; Wichita/Salina and Wichita/Pueblo, Colorado.

### *Taxicab Transportation*

Taxicab service in Wichita is provided by ABC Taxi, American Cab, and Best Cab. These companies provide a variety of services including regular taxi trips, parcel delivery, and long distance shuttle service to cities such as Kansas City and Lawrence. Services are available 24 hours a day from some companies.

### *Medicaid Transportation*

Medical Transportation Management (MTM) can transport qualified Medicaid beneficiaries for no cost medical transportation with at least 48 hour advance notification.

### *Volunteer Transportation*

Sedgwick County Transportation's RSVP Volunteer Transportation Program sponsors volunteer transportation that is coordinated through four senior centers and is available to residents of the towns listed below only. Services are provided by RSVP volunteers in their own vehicles.

- Mount Hope Senior Center
- Garden Plain Senior Center
- Bentley Senior Center
- Clearwater Senior Center

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### *Charters and Tour Bus Transportation*

- Village Tours (25 motor coaches ranging in size from 29 to 56 passengers)
- Prestige Bus Charters (17 motor coaches ranging in size from 43 to 56 passengers)
- Kincaid Coach (62 motor coaches located at 6 Midwest terminals including Wichita)
- Overland Charters (56 passenger motor coaches)
- Party Express Bus (6 vehicles ranging from 15-passenger van to 45-passenger bus)
- River City Trolley and Charters

### *Passenger Rail Studies*

Several reports have been published regarding restoration of the intercity passenger rail service that once connected Wichita to Kansas City, Oklahoma City, Fort Worth, and other cities. Amtrak conducted a study for KDOT which examined the costs and logistics associated with the potential expansion of passenger rail service in Kansas. The study, Feasibility Report of Proposed Amtrak Service, was completed in March 2010. It identified and investigated four possible intercity passenger rail scenarios.

- Night time extension of the Heartland Flyer between Oklahoma City and Newton
- Night time extension of Heartland Flyer between Oklahoma City and Kansas City
- Day service between Fort Worth and Kansas City
- Day service between Oklahoma City and Kansas City

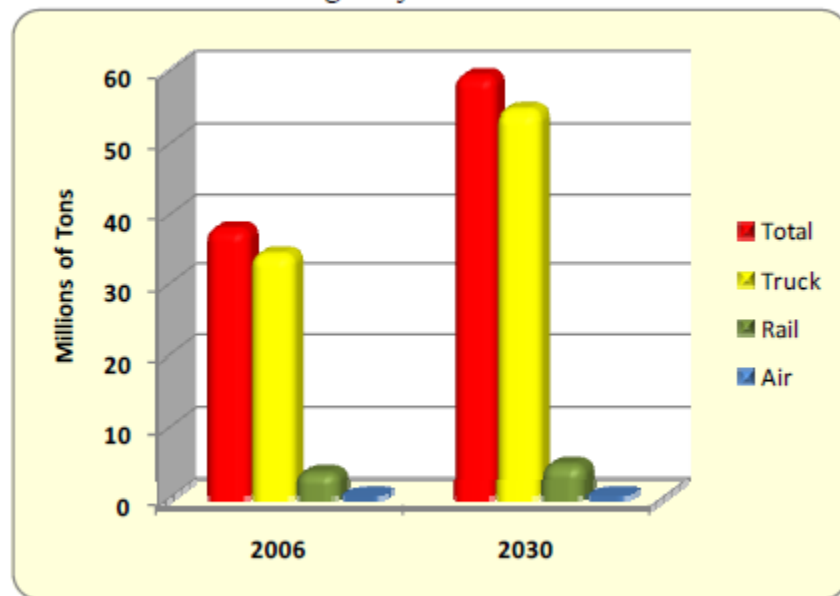
KDOT and the Oklahoma Department of Transportation will build on these results by providing matching funds for a Service Development Plan. This plan will choose one of the scenarios identified in the feasibility study and develop a business and operations plan for expanded passenger rail service in Kansas. Publication of a Kansas state rail plan, a long-range plan covering freight, short line, and passenger rail activities, is anticipated in 2010. The University of Kansas, School of Business and the Northern Flyer Alliance, Inc. have also produced reports that analyze the economic benefit potential of new passenger rail service connections to Wichita: Economic Benefit Study of Renewed Passenger Rail Service between Kansas City and Oklahoma City, December, 2009, and Final Return on Investment Review, December 2009.

### *Freight*

Freight movement is an important component of the national, regional, and local economies. The term “freight” is used generically throughout this plan to mean the commercial transport of goods. Goods need to be shipped from their point of origin to their final destination. The term “goods” used in the plan refers to all items, except services, that can be moved commercially. Freight movement can be by truck, rail, air, water, or pipeline; but usually freight movement is accomplished by a combination of modes. Freight arriving from other countries in container ships at major U.S. maritime ports, or goods manufactured in the U.S., are transferred to rail, trucks, or pipelines and shipped to other distribution centers for additional modal transfers. These goods eventually arrive at shopping malls, grocery stores, car dealers, department stores, other manufacturing centers, or directly to homes.

According to 2006 TRANSEARCH® Insight data used in the WAMPO Freight Plan, approximately 38 million tons of freight was shipped into, out of, and within the WAMPO region in 2006. That amount is projected to increase by 57% by the year 2030 to 59.3 million tons (figure 5). The value of these shipments totaled \$68.8 billion in 2006 and is expected to increase 89.6% to \$130.4 billion by 2030 which is nearly a 90% increase.

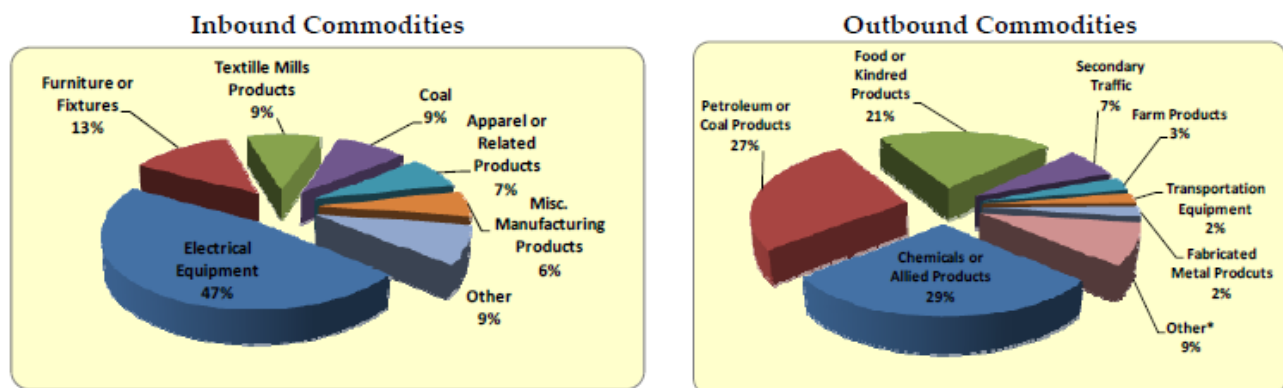
**Total Freight by Mode 2006 and 2030**



source: 2006 TRANSEARCH® Insight, Cambridge Systematics, Inc.

Commodities vary in type, ranging from basic building materials for major appliances and homes to fresh fish and other foods. The top ten commodities shipped out of and into the WAMPO region in 2006 are identified below.

**Top Ten Inbound and Outbound Commodities by Ton: WAMPO Region 2006**



source: 2006 TRANSEARCH® Insight, Cambridge Systematics, Inc.

Nonmetallic minerals (33%) and food (12%) are the most common freight items shipped into the WAMPO region, while petroleum/coal (27%) and chemical/allied products (29%) are the most common items shipped out. Petroleum/coal products remain the largest commodity shipped within the WAMPO region, increasing 1.25% from 2006 to 2030.

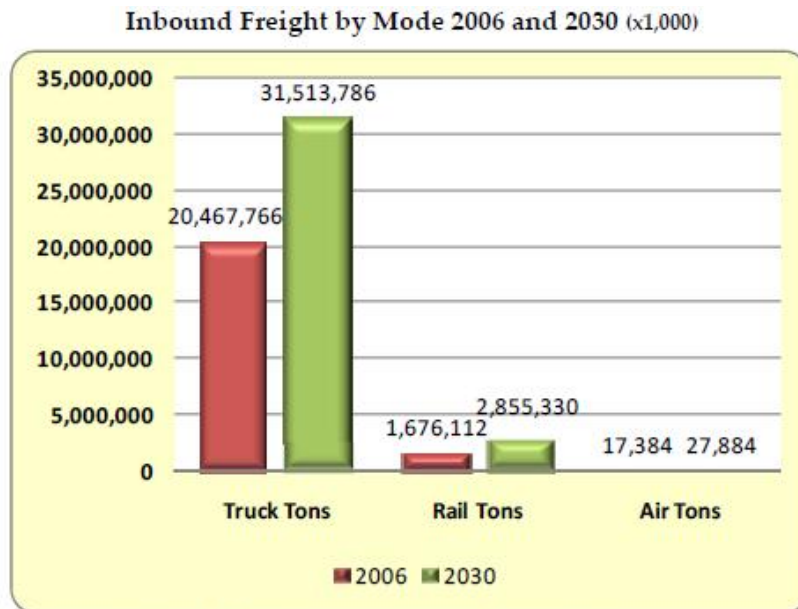
### Inbound Commodities

In 2006, over 20 million tons of various goods were shipped into the WAMPO region by truck. In comparison, 1.6 million tons of freight was shipped by rail and only 17 thousand tons by air (figure 7). Freight movement by truck is anticipated to increase approximately 35% from 20.5 million tons to 31.5 million tons between 2006 and 2030. Rail and air freight tonnage is also projected to increase by 41% and 36%, respectively. Although overall tonnage shipped into the WAMPO region is anticipated to increase between 2006 and 2030, the relative percentage of goods by truck, rail, and air flowing into the WAMPO region remains the same.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

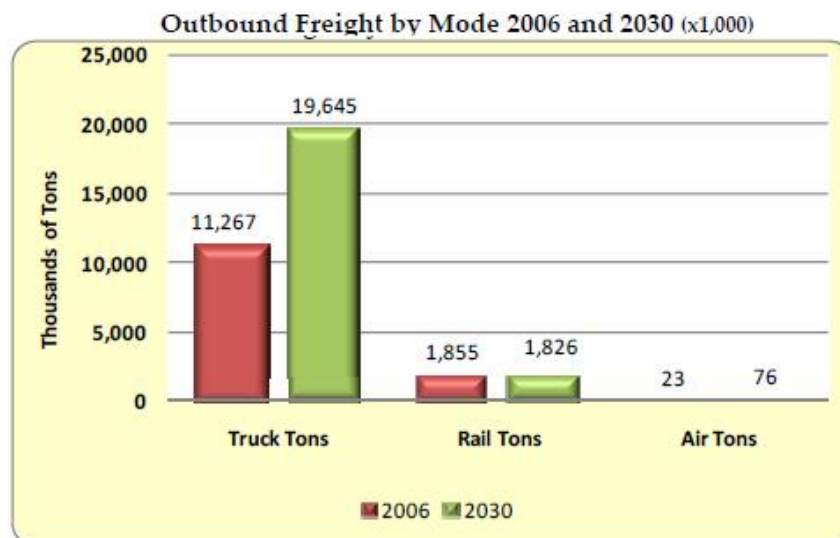
### Outbound Commodities

Over 11 million tons of freight was shipped from the WAMPO region to points outside the region by truck in 2006. Rail and air freight collectively represent approximately 1.9 million tons. Freight shipped from the region by truck is estimated to increase slightly over 74% between 2006 and 2030 to 19.6 million tons. Air freight from the region is projected to only increase slightly by 75.6%. Freight moved by rail remains somewhat steady at 1.8 million tons. Figure 8 represents the tons of commodities that originated in and were shipped to points outside of the WAMPO region.



source: 2006 TRANSEARCH® Insight, Cambridge Systematics, Inc.

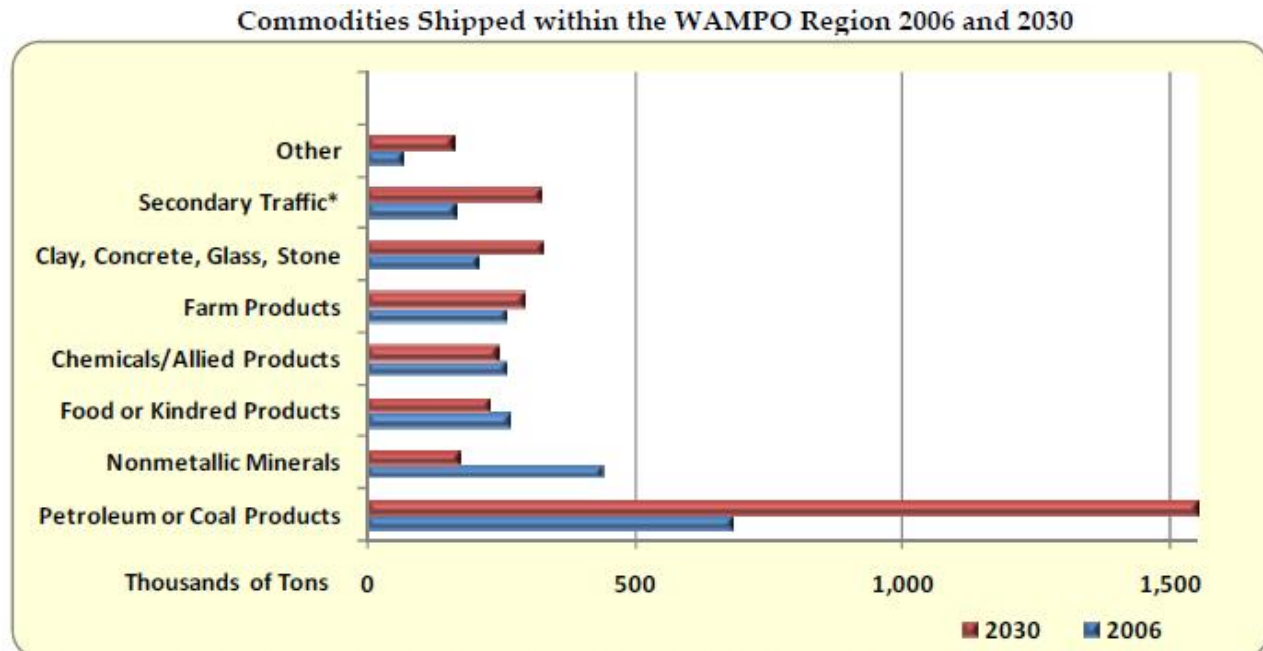
The trucking industry, by far, was the largest carrier of freight in the region. It accounted for almost 91% (34 million tons) of the freight moved in the region in 2006. Freight movement by rail accounted for slightly more than 9% (3.5 million tons) of the total. Freight movement by air represents less than 1% (40,000 tons) of the freight moved in the region. Even with this volume of freight into, out of, and within the region, most of the freight being transported is just passing through. It is estimated that over 60 million tons of freight per year is currently shipped through the region, primarily on I-35 and the Class I railroads.



source: 2006 TRANSEARCH® Insight, Cambridge Systematics, Inc.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

By 2030 (information was only available through 2030), approximately 59 million tons of freight is projected to be shipped into, out of, and within the WAMPO region. This is over a 50% increase in freight movement from 2006 to 2030. Of that total, 53.5 million tons of freight will be carried by truck, five million tons by rail, and 104,000 tons by air. The amount of freight moved through the region by 2030 is also expected to increase greatly.



\* Secondary traffic is defined as freight movement associated with a distribution center or warehouse serving as an intermediate reship facility.

source: 2006 TRANSEARCH® Insight, Cambridge Systematics, Inc.

### Freight by Truck, Rail, and Air

Overall, freight movement into, out of, and within the WAMPO region is dominated by trucks. In 2006, trucks represented 91% of all freight movement in the WAMPO region. Rail came in a very distant second at 9%, while air freight movement represented less than 1% of all freight movement in the WAMPO region. This trend is predicted to change little in 2030. Rail is anticipated to lose 1% of the freight it moves to trucks, resulting in 92% of all freight being moved by truck and 8% by rail in 2030. Air freight movement is projected to remain less than 1% of all freight movement in the WAMPO region in 2030.

### Through Freight Movement

Most evidence suggests that the through movement of freight accounts for the majority of freight affecting transportation systems in the region. The 2006 Transearch data used to demonstrate commodity flow covers only county - to - county freight movement and freight movement through the WAMPO region is not identified in the data. The WAMPO region is served by two National Highway System (NHS) High Priority Corridors: US - 50/400 and I - 35. US50/400 is designated as the High Plains Corridor which is a major east west freight corridor. I - 35/Kansas Turnpike is part of the I - 35 Corridor and is a major North American Free Trade Agreement (NAFTA) trade route for freight movement between Canada, Mexico, and the United States.



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 9.18 Water Sector

This sector provides drinking water and wastewater treatment through approximately 170,000 public water systems. These systems depend on reservoirs, dams, wells, treatment facilities, pumping stations, and transmission lines. Threats to this sector include physical vulnerabilities. The following agencies are responsible for this sector:

Local: Public and Private Utilities, Petrochemical Companies

State: Kansas Division of Emergency Management/Kansas Highway Patrol, Kansas Fire Marshall

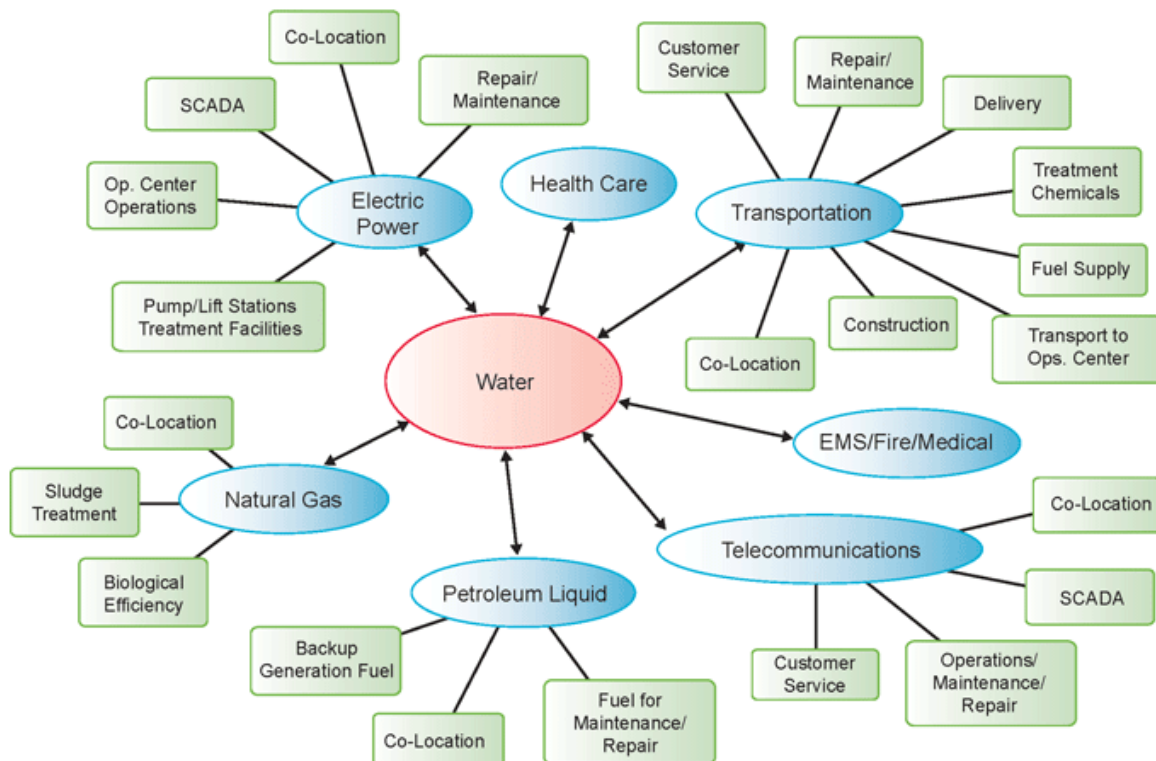
Federal: U.S. Environmental Protection Agency

Safe drinking water and properly treated wastewater are critical to modern life. The former is a prerequisite for all human activity—physical, economic, and cultural. Wastewater treatment is important for preventing disease and protecting the environment. Therefore, from the standpoints of public health and economic impact, it is critical that we protect the Nation's drinking water and wastewater infrastructures, collectively known as the Water Sector.

The Water Sector is a partnership of public and private drinking water and wastewater utilities; national and State associations; State, local, and tribal governments; research foundations; and Federal agencies that together have been ensuring the protection and resilience of water services for decades. Water Sector partners collaborate to be better prepared to prevent, detect, respond to, and recover from terrorist attacks and other intentional acts, natural disasters, and other hazards (i.e., the “all-hazards” approach).

The Water Sector has interdependencies with all critical infrastructures. Further analysis of dependencies and interdependencies across all 18 CIKR sectors is needed to identify the true scope of cascading effects resulting from a manmade attack or a naturally occurring event.

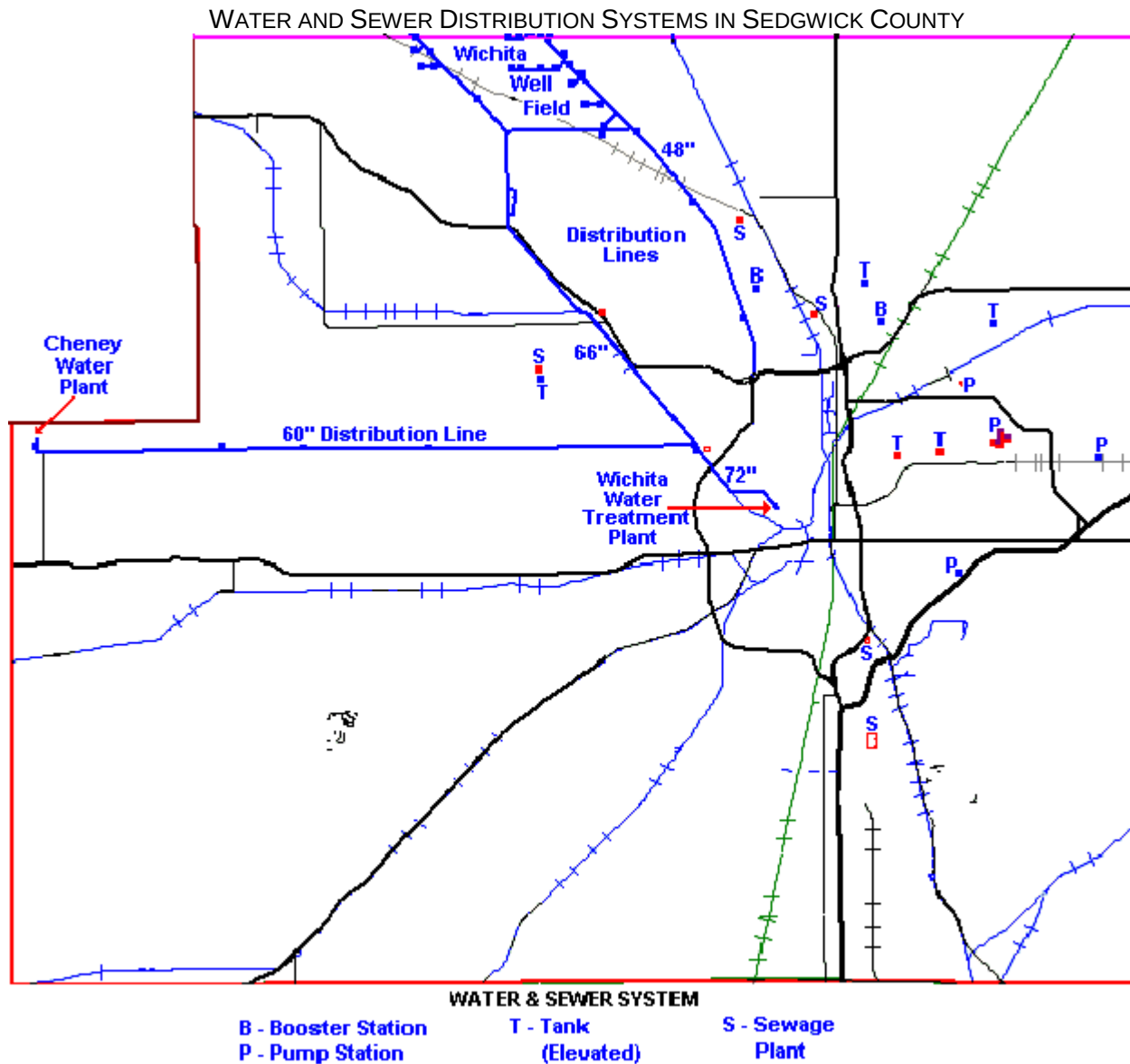
### Water Sector Interdependencies With Other CIKR Sectors



### 9.18.1 WATER DISTRIBUTION SYSTEM (URBAN)

#### City of Wichita

The following map shows the locations of water service to the City of Wichita from distribution lines originating from the Cheney reservoir pump station and the Wichita (Equus Beds) Well Field.



The well field is comprised of 55 wells of which half or 26 wells are located in Harvey County. A smaller local well field of 20 wells is located near the Wichita Water Treatment Plant and Sims Park. Cheney Reservoir provides approximately 80% of the water for Wichita while the Wichita well field provides between 10 to 15%. The Cheney pump station produces about 30 million gallons of water per day (MGD) to Wichita with a firm capacity of 80 MGD. In the advent of power failure at the Cheney pump station, the Wichita well field pumps can deliver 72 MGD and the local well field can provide 30 MGD. Average daily flow produced for the City of Wichita and wholesale customers (other cities) was 60.8 MGD in 2000.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### *Chisholm Creek Utility Authority (CCUA)*

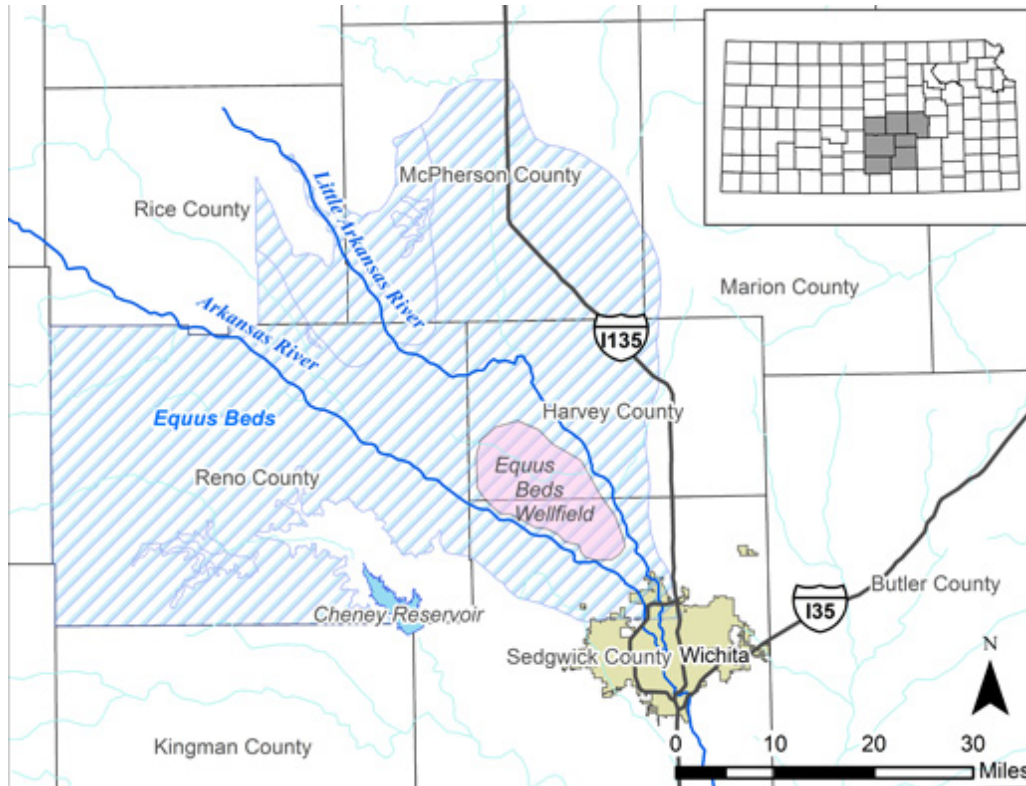
The Chisholm Creek Utility Authority draws raw water from three separate groundwater well fields: the City of Park City's, located north and south of 61<sup>st</sup> Street North and west of Broadway; the City of Bel Aire's, located east of Arkansas Street and south of 47<sup>th</sup> Street North; and the Ripley field, located west of Arkansas Street on the east and west sides of the Arkansas River near the dead-end of Seneca Street north of 37<sup>th</sup> Street North at the old KGE Ripley power generation plant. The current members of the Chisholm Creek Utility Authority are the cities of Park City and Bel Aire. Although they are current CCUA wholesale customers, they also have contracts to purchase water from the City of Wichita. There is a 3.5 MGD lime-softening water treatment plant located at 5551 North Broadway in Park City.

### *Public Wholesale Water Supply (PWWS) District #17*

PWWS #17 serves the cities of Halstead, Newton, North Newton, and Sedgwick. Water is derived from four wells located in Harvey County and is treated at the water plant west of Newton.

#### 9.18.2 EQUUS BEDS AQUIFER STORAGE AND RECOVERY (ASR) PROJECT<sup>43</sup>

The ASR project involves pumping water out of the Little Arkansas River following periods of heavy rainfall, treating it to drinking-water quality and injecting it into the Equus Beds aquifer, a major source of Wichita's water. The water is stored in the aquifer – an underground layer of sand and gravel that can hold water – until it is needed. Ultimately, the project will be capable of producing up to 100 million gallons of water a day from the Little Arkansas River, using 60 recharge wells and three recharge basins to put the water back into the aquifer. The Equus Beds aquifer covers portions of Sedgwick, Harvey, McPherson and Reno counties with an area of approximately 900,000 acres. The ASR project encompasses approximately 165 square miles and extends northwest of the City of Wichita across parts of Harvey and Sedgwick counties, mostly between Bentley and Halstead.



<sup>43</sup> Equus Beds Aquifer Storage and recovery Project Fact Sheet, City of Wichita

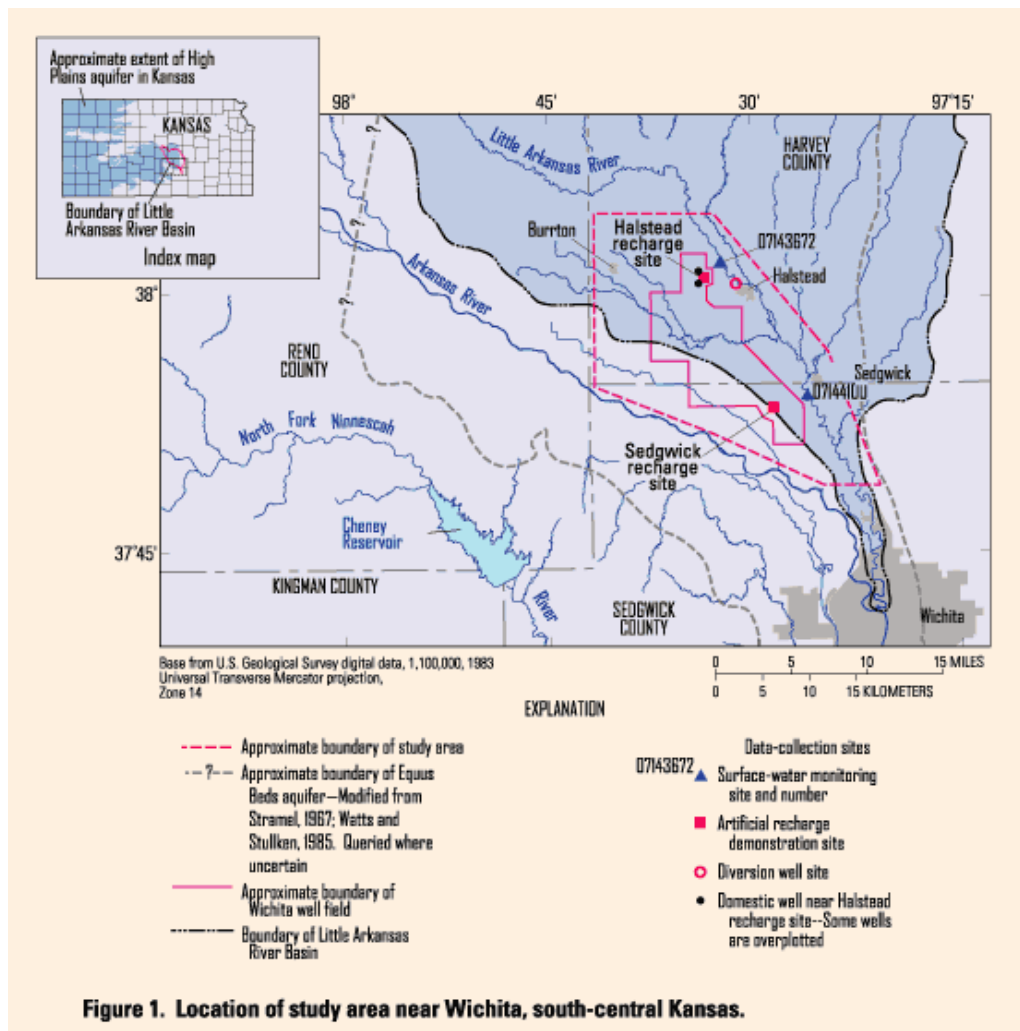
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

The ASR project is broken down into four phases. Phase I was completed in September 2006, and it has the capacity to divert and recharge up to 10 million gallons a day of river water into the aquifer. It includes an extensive monitoring program to help assure that the project is safe and complies with all of the operating conditions placed on the project. Phase II, which consists of 30 million gallons a day of production, is now in the design phase and should be completed by 2012. Phases III and IV will include further expansion of treatment and water storage capacity.

The ASR project, coupled with greater use of Cheney Reservoir – the city's existing surface water supply – will help Wichita provide water for more than 600,000 users by the year 2050. The project will add up to 65 billion gallons of water to the aquifer as well as create a hydraulic barrier to slow down or stop the intrusion of saltwater into the groundwater supply.

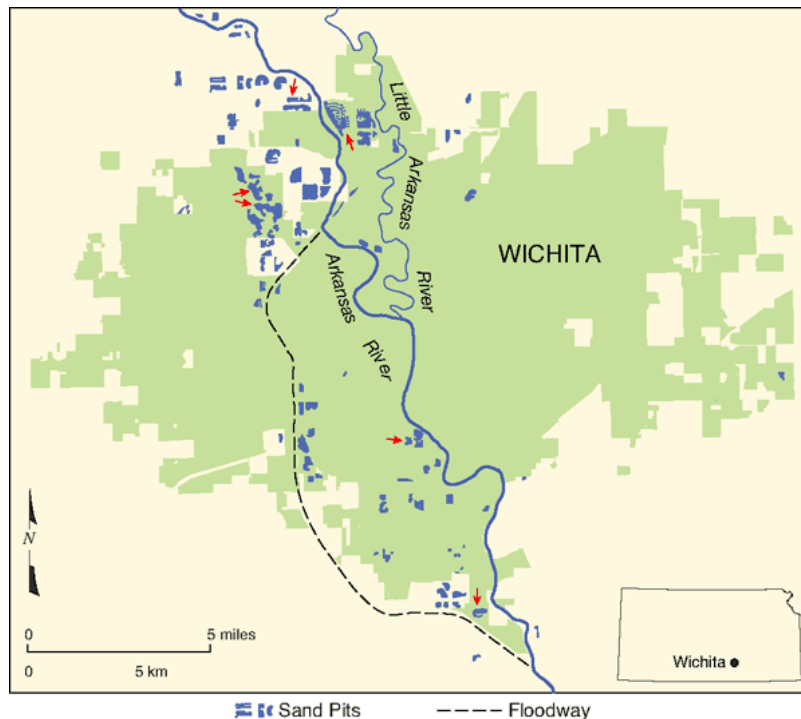
Since the City of Wichita will only be able to capture river water during times when the Little Arkansas River is flowing at a high level, it is estimated that it will take up to 10 years to recharge the aquifer to the levels required to meet the city's 2050 needs.

All water users in the region will benefit from a fully charged aquifer, and higher groundwater levels will also reduce energy costs for irrigators to pump water to the surface. Current consumers of the Equus Beds aquifer are irrigators, municipalities (Wichita, Halstead, Hutchinson, Maize, McPherson, Newton, Park City, Valley Center and others) and industries that include Westar Energy, Kansas Gas Service, National Cooperative Refinery Association (NCRA), Morton Salt, Cargill Salt, Sonoco paperboard mill and Koch Hydrocarbon natural gas processing operation.



Many sand and gravel pits have been excavated for construction materials in and around Wichita in south-central Kansas. The water table in the alluvial aquifer in the area is so shallow that the sand pits permanently fill with water. A concern is that the water-filled sand pits provide an opening to the aquifer, such that stormwater runoff and any contaminants it contains could directly enter the ground water. After sand and gravel operations end, residential developments often are built around the pits that contribute to the runoff.<sup>44</sup>

Distribution of sand and gravel pits in the Wichita area are shown on the following page.. Most of the pits were mined for construction aggregate, although a few are borrow pits for highway fill. Red arrows indicate the locations of the six sand pits studied.



### 9.18.3 WATER DISTRIBUTION SYSTEM (RURAL)

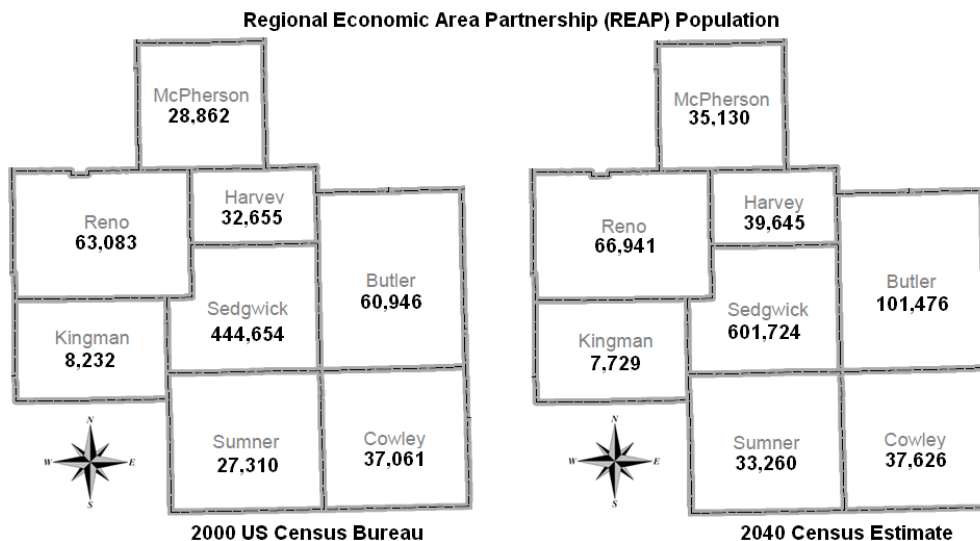
According to a Regional Economic Area Partnership (REAP) 2009 Municipal Utility Growth Issues Special Committee Report, rural water districts (RWD) were created to provide domestic water service to residents of sparsely populated, rural areas. Rural water districts meet a critical need: ensuring that rural residents have access to clean water for domestic purposes. Urban growth coupled with expansions initiated by rural water districts that include service to urban density developments has caused service area conflicts between districts and municipalities. These types of conflicts are on the rise in South-Central Kansas as city boundaries expand and come in contact with a greater number of RWDs.

Currently there are fifty-two RWDs in the REAP region, which includes nine counties: Butler, Cowley, Harper, Harvey, Kingman, McPherson, Reno, Sedgwick, and Sumner. Forty-eight of the region's 97 cities have city boundaries within three miles of a RWD. Some of the communities adjacent to RWDs are among the fastest growing in the region, including Andover, Derby, Goddard and Wichita. These four communities are within Butler and Sedgwick counties, which experienced a 6% and 5.1% population growth respectively between 2000 and 2007.

<sup>44</sup> Stormwater Runoff into Sand Pits--Effects on Ground-water Quality, Kansas Geologic Survey



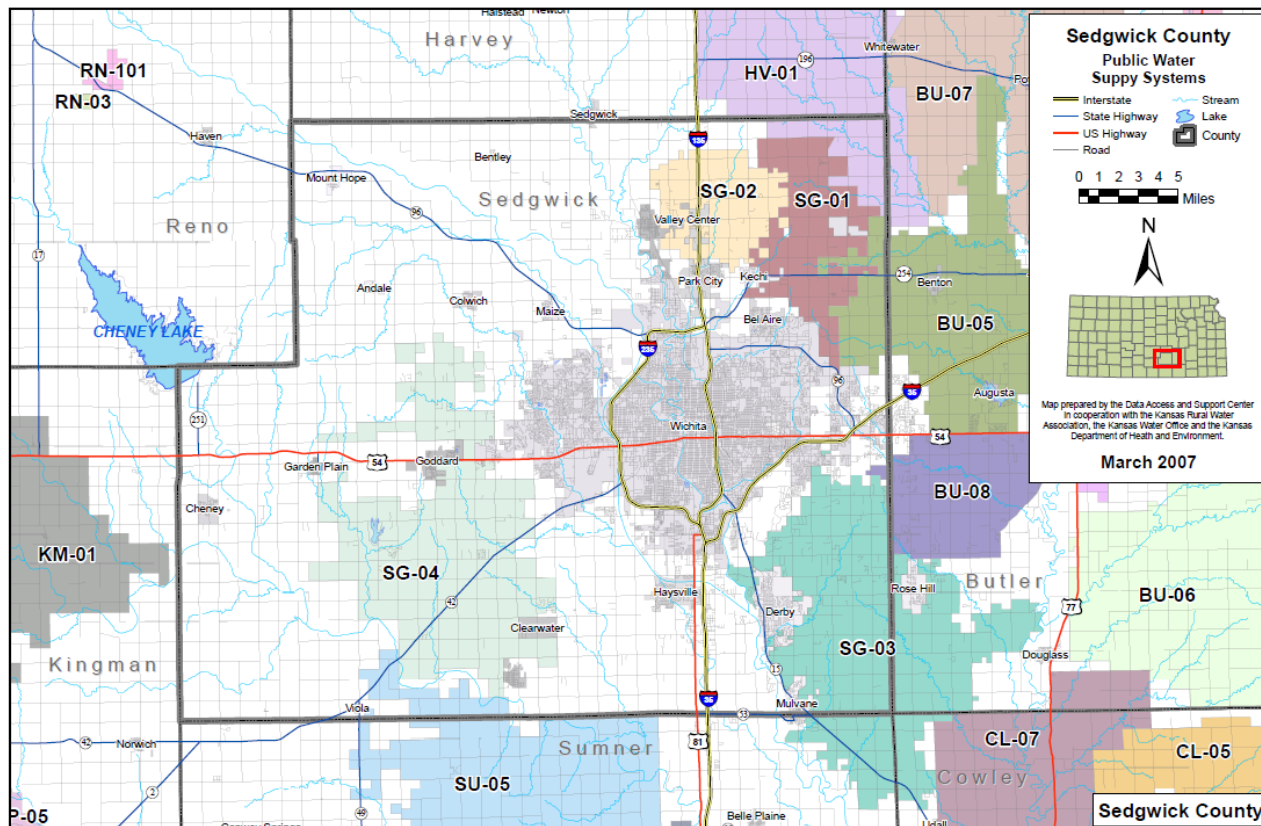
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis



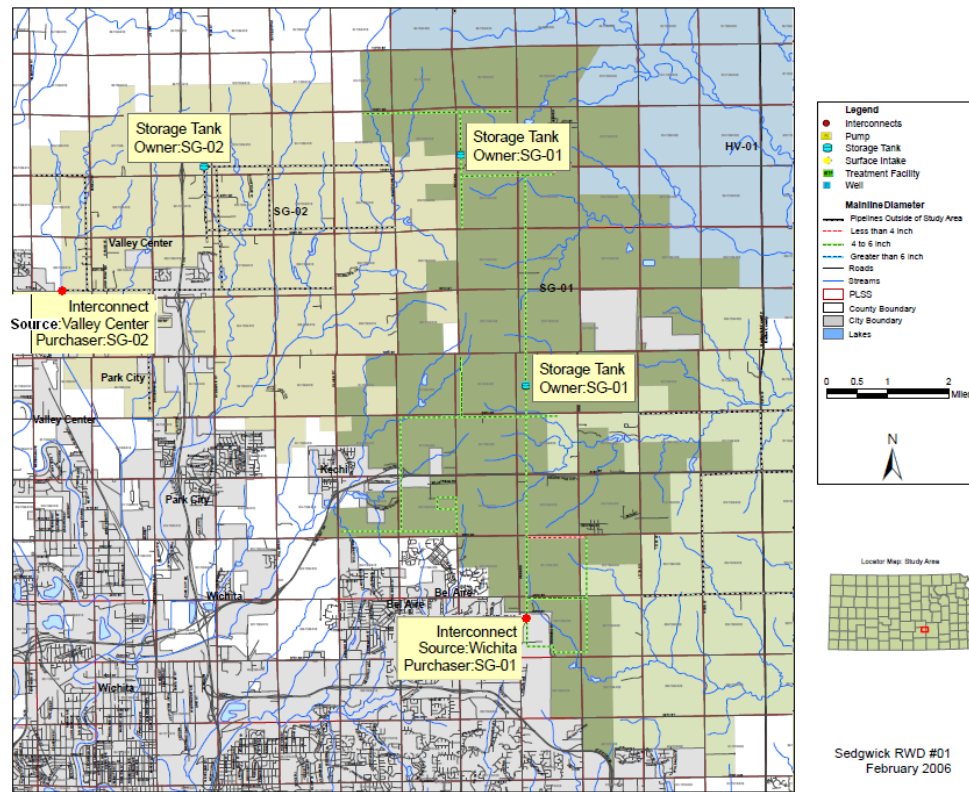
According to the Kansas Water Office, water supply demand for Sedgwick County is anticipated to exceed 92 million gallons per day by 2040.

The following maps show rural areas of Sedgwick County are serviced by eight rural water districts: Sedgwick County Rural Water District 1 through 4, Sumner Rural Water District 5, Butler County Rural Water District 5 and 8, and Harvey County Rural Water District 1. Each of these districts is an independent system serving customers via water wells.

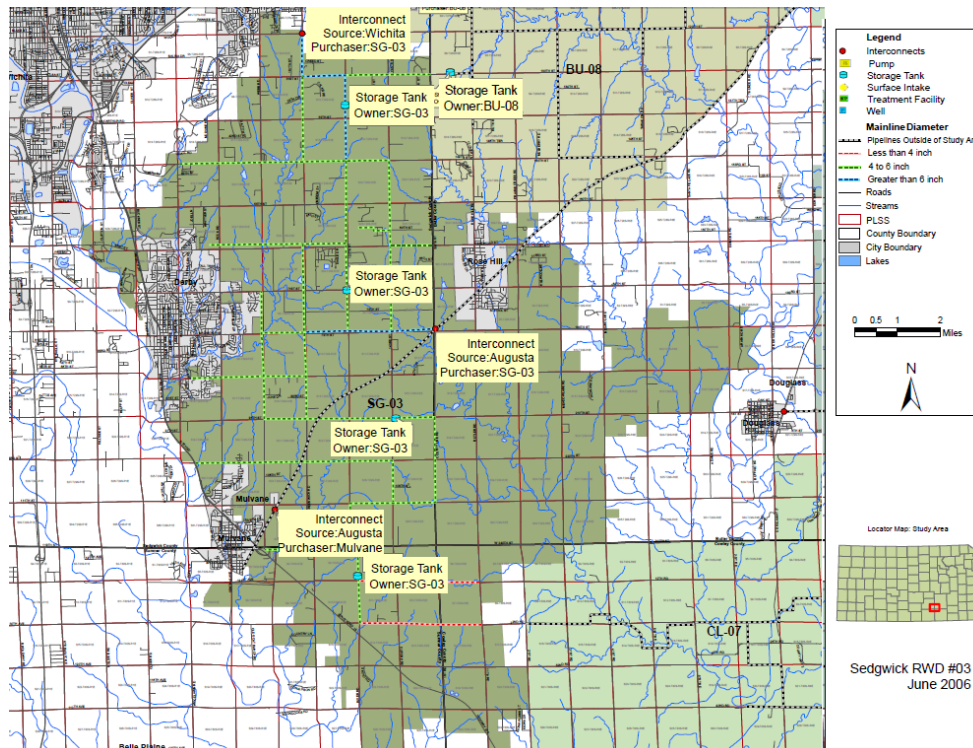
### RURAL WATER DISTRICTS IN SEDGWICK COUNTY



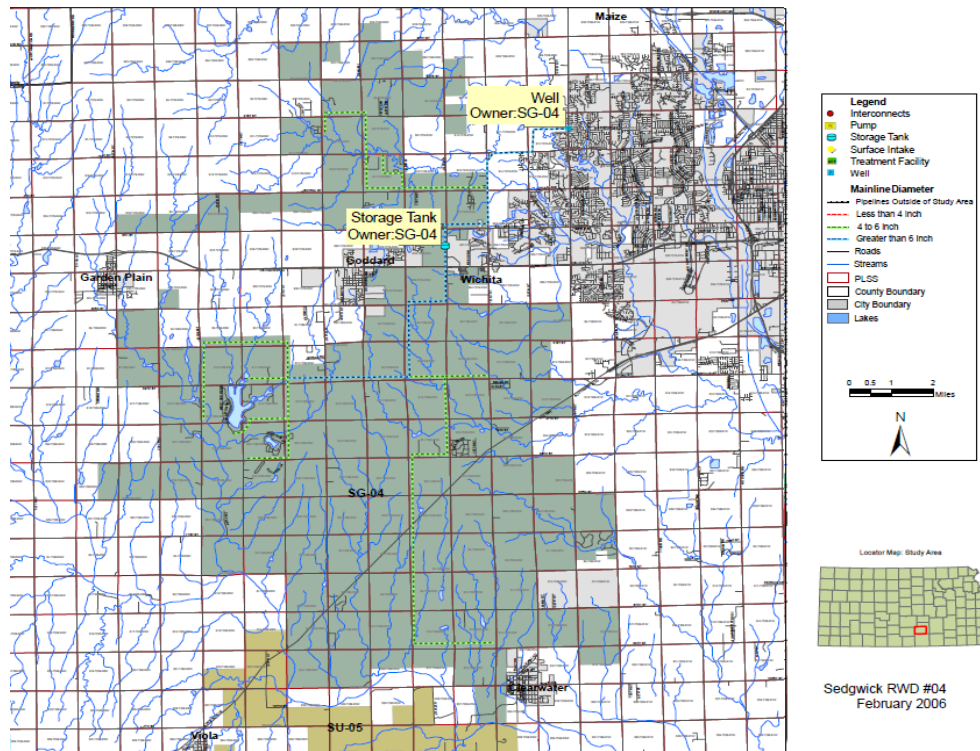
## SEDGWICK COUNTY RURAL WATER DISTRICTS #1 & #2



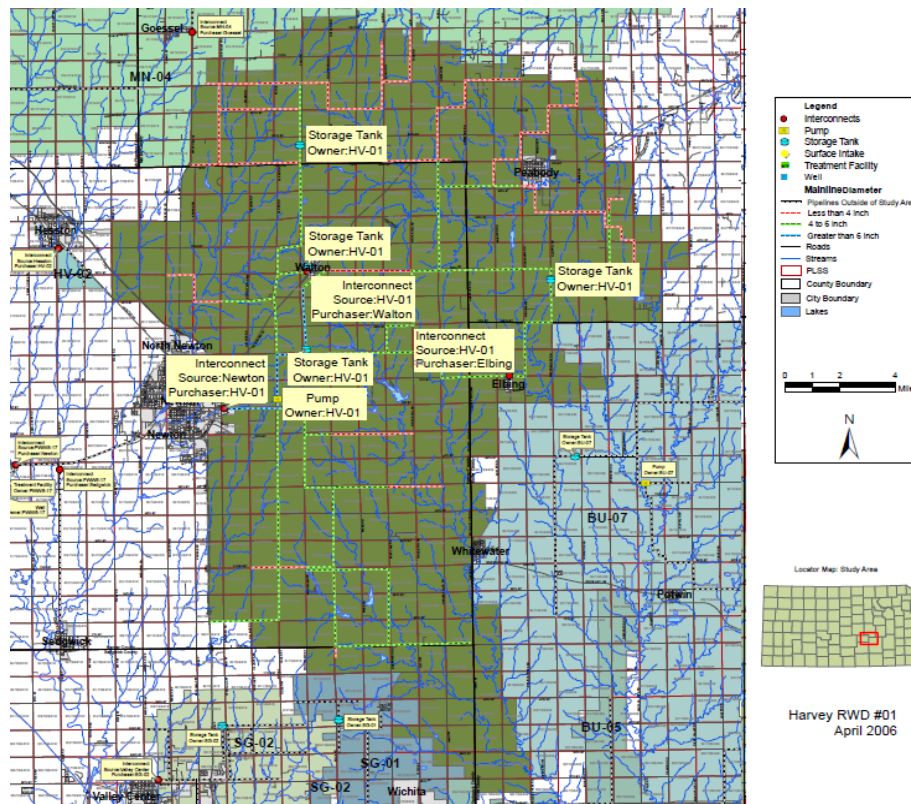
## SEDGWICK COUNTY RURAL WATER DISTRICT #3



## SEDGWICK COUNTY RURAL WATER DISTRICT #4

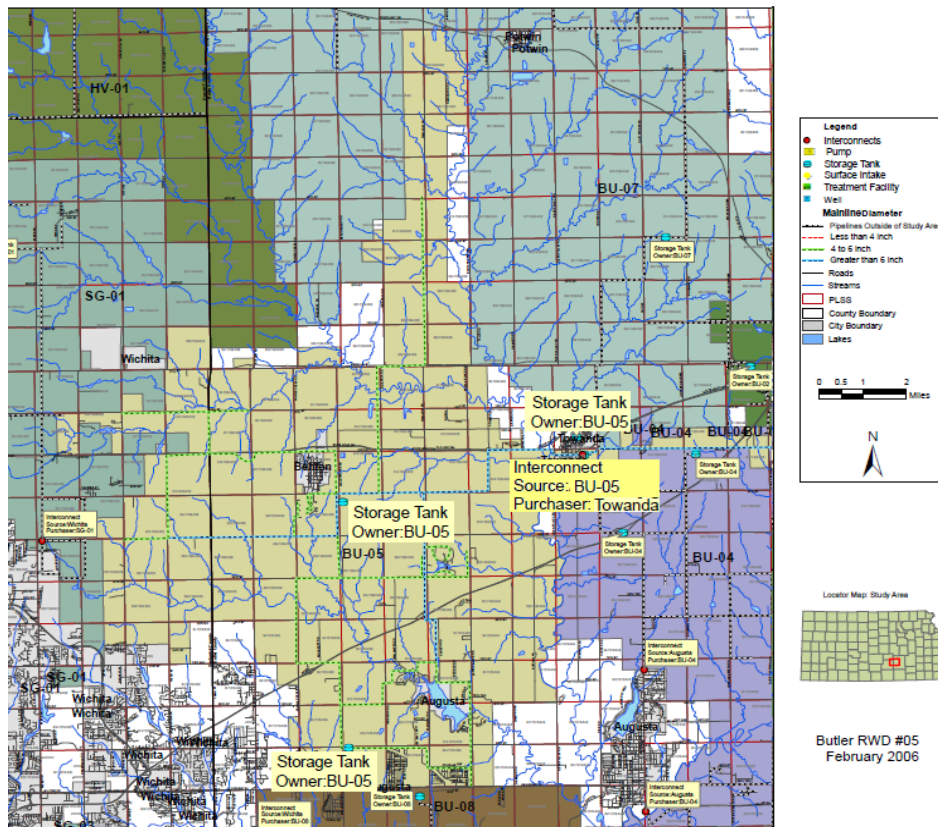


## HARVEY COUNTY RURAL WATER DISTRICT #1

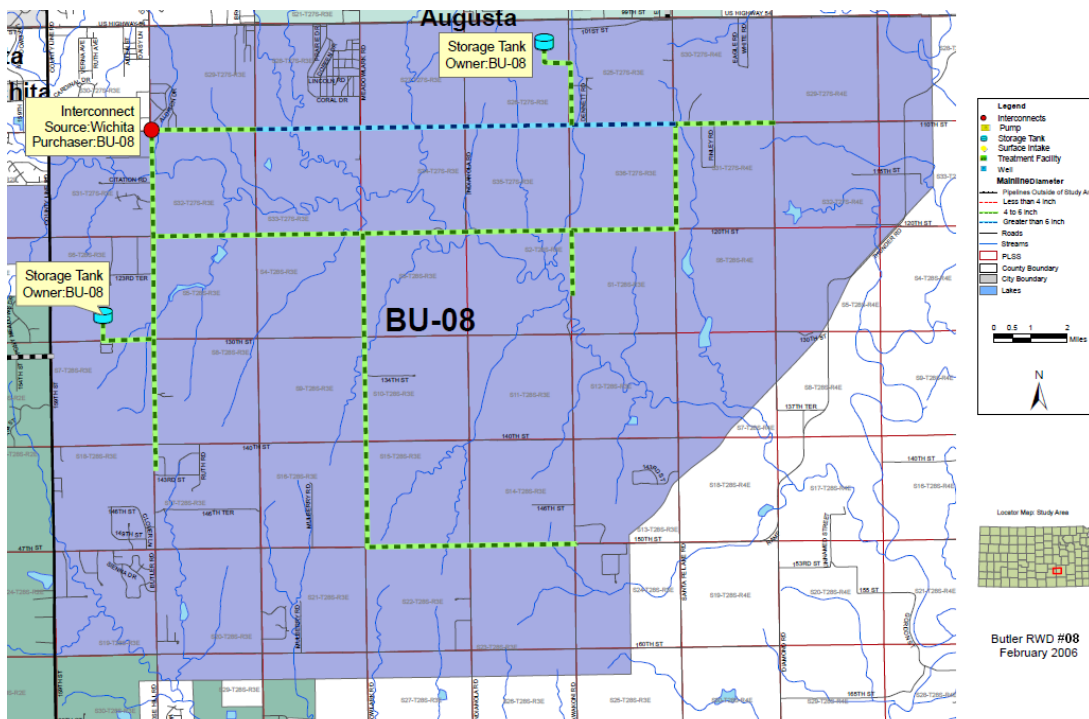




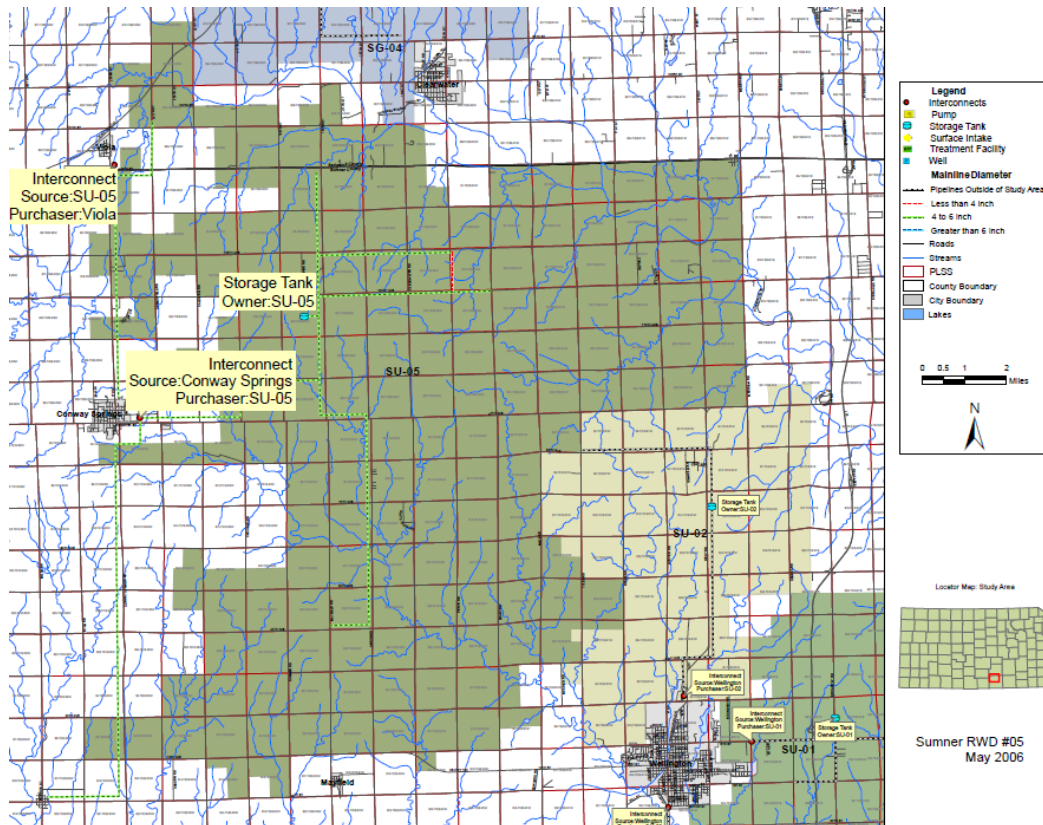
## BUTLER COUNTY RURAL WATER DISTRICT #5



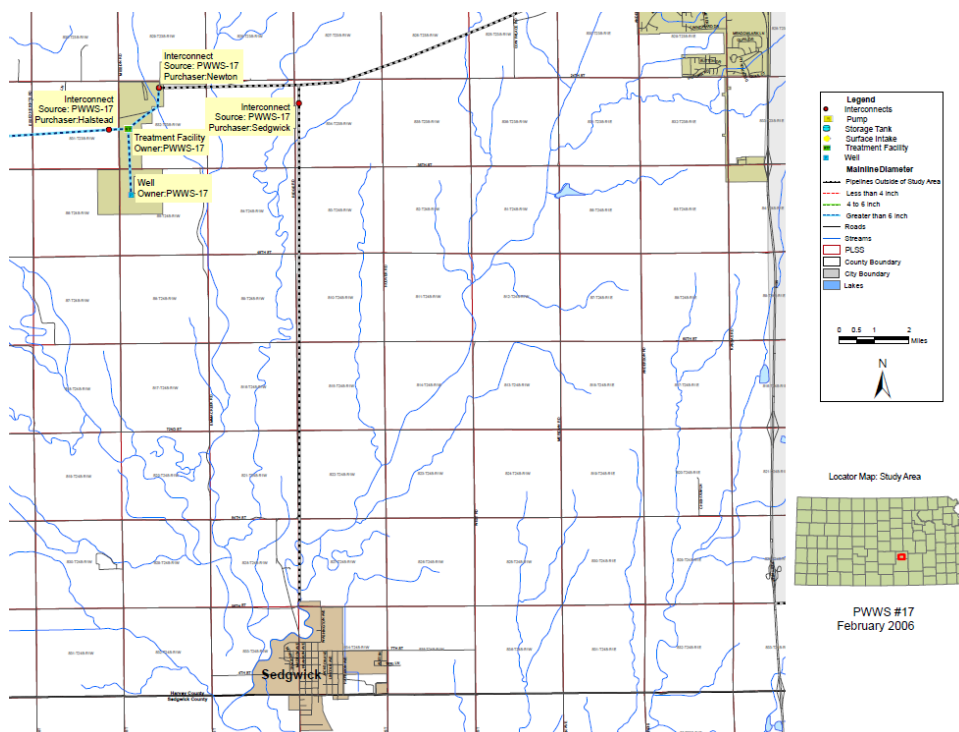
## BUTLER COUNTY RURAL WATER DISTRICT #8



## SUMNER COUNTY RURAL WATER DISTRICT #5



## PUBLIC WHOLESALE WATER SUPPLY DISTRICT #17



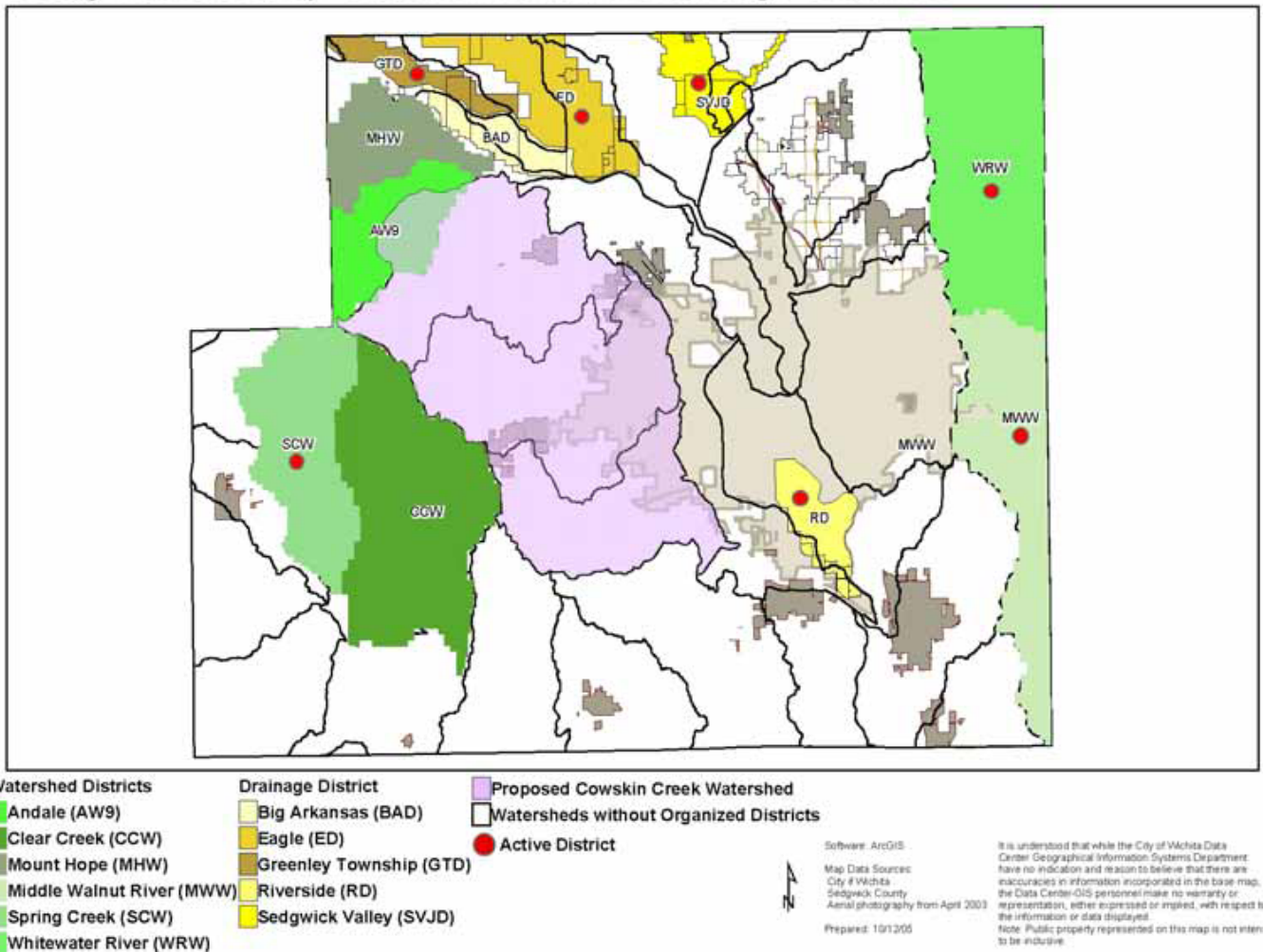


## 2010–2040 HAZARDS ANALYSIS PLAN

### 9.18.4 WATERSHEDS AND DISTRICTS

The Floodplain Management Task Force was formed in January 2005 with a charge to evaluate current policy and practice of regulating development within floodplains and to make recommendations of any needed change in policy and practice to the Sedgwick County Board of Commissioners and Wichita City Council. In developing recommendations, the Task Force incorporated concerns regarding development within floodplains and the reduction of present and future flood hazards. Business, environmental, and neighborhood interests were taken into account.

### Sedgwick County Watershed and Drainage Districts



#### Watershed Districts within Sedgwick County

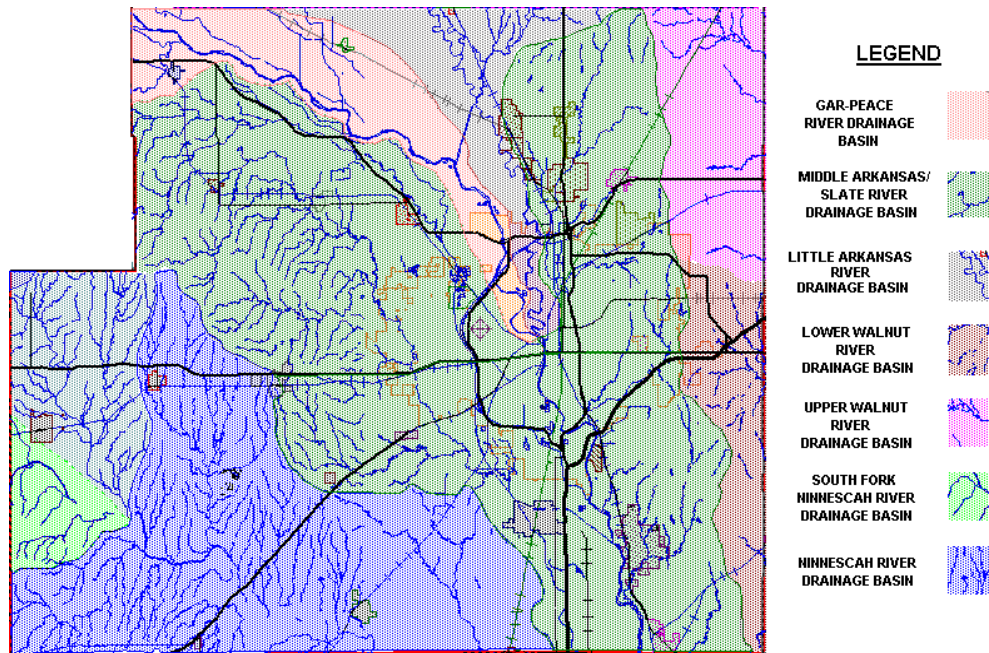
- Andale Watershed #9
- \*Spring Creek Watershed #16
- \*Whitewater River Watershed - Butler County
- Clear Creek Watershed #30
- Mount Hope Watershed #54
- \*Middle Walnut River Watershed - Butler County -  
levy every other year
- Proposed Cowskin Creek Watershed District

(\*Indicates an active district)

#### Drainage Districts within Sedgwick County

- Big Arkansas Drainage District
- \*Eagle Drainage District
- \*Greenley Township Drainage District
- \*Riverside Drainage District
- Sedgwick-Sumner Drainage District
- \*Sedgwick Valley Drainage District

## 2010–2040 HAZARDS ANALYSIS PLAN



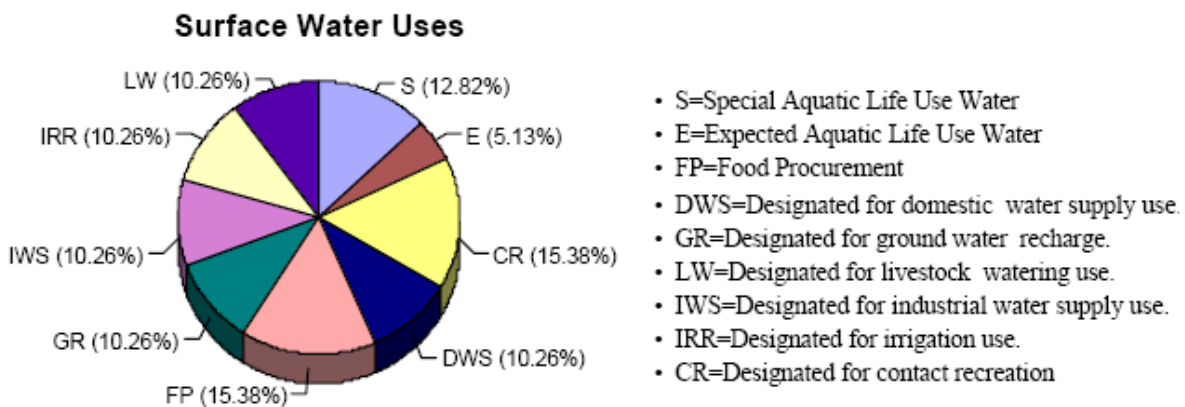
Sedgwick County has eight watersheds that are areas of land that catches rain and snow and drains or seeps into a marsh, stream, river, lake or groundwater. The watersheds include: Gar-Peace, Little Arkansas, Middle Arkansas, North Fork Ninnescah, South Fork Ninnescah, Ninnescah, and the Upper Walnut River. Most flooding concerns in the county come from run-off into the Middle Arkansas/Slate River Drainage Basin area. The following information for each watersheds is derived from the Kansas Department of Health and Environment (KDHE) and reflects only those watersheds that have been evaluated so far.

### 9.18.4.1 GAR PEACE

The HUC8 11030010 watershed is ranked 19th in priority for watershed restoration throughout the state. According to the Unified Watershed Assessment, approximately 56% of the stream miles within this watershed are impaired. The Arkansas River, Gar Creek, Peace Creek and Salt Creek are among the larger streams and creeks within this watershed.

#### Designated Uses

There are 75 public water supplies within the watershed, many of which draw water from the Arkansas River and local streams. According to the Kansas Surface Water Register, the most common designated uses for streams and rivers in this watershed include: aquatic life use, food procurement, contact recreation, domestic water supply, industrial water supply, irrigation use, livestock, and groundwater recharge.



## 2010–2040 HAZARDS ANALYSIS PLAN

**Feedlots:** In Kansas, confined animal feeding operations (CAFOs) with greater than 300 animal units must register with KDHE. There are approximately 85 registered CAFOs located within the watershed.

**Wastewater Treatment Facilities:** There are approximately six municipal and industrial wastewater treatment facilities within the watershed.

**Urban/Suburban Runoff:** Many urban landscapes are covered by paved surfaces including roads, driveways, parking lots, and sidewalks. These surfaces are impermeable and tend to divert water into storm drains at high velocities. This increased flow velocity from urban areas can cause severe stream bank erosion in receiving water bodies. Additionally, urban and suburban runoff may carry other pollutants like petroleum hydrocarbons and heavy metals. Currently, the watershed is only about 2% urban.

**Groundwater:** Major groundwater aquifers underlying this watershed include the High Plains aquifer, portions of the Dakota aquifer, and alluvial aquifers of the Arkansas River and its tributaries.

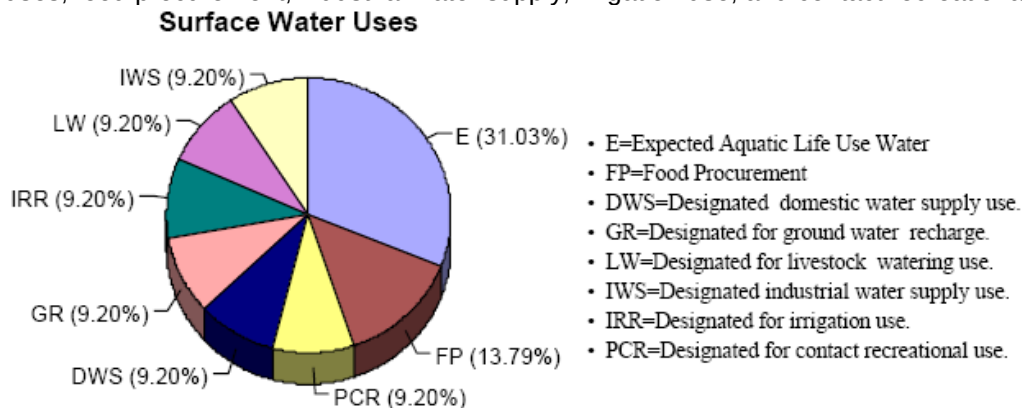
**Wells:** There are approximately 2,353 groundwater wells located within the watershed. Water from these wells is used for domestic use, lawn and garden, oil field supply, irrigation, monitoring wells, industrial supply, air conditioning, dewatering, public water supply, injection, and feedlots.

### 9.18.4.2 LITTLE ARKANSAS

The HUC8 11030012 watershed is ranked 14th in priority for watershed restoration throughout the state. According to the Unified Watershed Assessment, approximately 67% of the total miles of water in this watershed do not meet their designated uses. The Little Arkansas River, Emma Creek, and Sand Creek are a few of the larger streams and rivers in this watershed.

#### Designated Uses

This watershed is mostly a drainage basin for the Little Arkansas River; however, smaller streams and creeks are also abundant throughout the area. There are approximately 205 public water supplies within the watershed, many of which draw water from the Little Arkansas River and its alluvium. According to the Kansas Surface Water Register, the most common designated uses for streams and rivers in this watershed include: aquatic life uses, food procurement, industrial water supply, irrigation use, and contact recreational use.



**Feedlots:** In Kansas, confined animal feeding operations (CAFOs) with greater than 300 animal units must register with KDHE. There are approximately 237 registered CAFOs located within HUC8 11030012.

**Wastewater Treatment Facilities:** There are approximately 23 municipal and industrial wastewater treatment facilities within the watershed.

**Urban/Suburban Runoff:** Many urban landscapes are covered by paved surfaces including roads, driveways, parking lots, and sidewalks. These surfaces are impermeable and tend to divert water into storm drains at high velocities. This increased flow velocity from urban areas can cause severe stream bank erosion in receiving



## 2010–2040 HAZARDS ANALYSIS PLAN

water bodies. Additionally, urban and suburban runoff may carry other pollutants like petroleum hydrocarbons and heavy metals. Currently, the watershed is only about 3% urban.

HUC8 11030012 is the home to many city and county lakes along with one wetland area. Some of these include Newton City Park Lake, Inman Lake, and Harvey County West Park Lake. These lakes offer fishing, camping, and trails for hiking, boating, and swimming. The wetland area, called the McPherson Wetland Area, is located in the northern portion of the watershed.

**Groundwater:** Major groundwater aquifers underlying this watershed include the High Plains and Dakota Aquifers along with alluvial aquifers of the Little Arkansas River and its tributaries.

**Wells:** There are approximately 7,406 groundwater wells located within the watershed. Water from these wells is used for domestic use, lawn and garden, groundwater monitoring, and irrigation purposes.

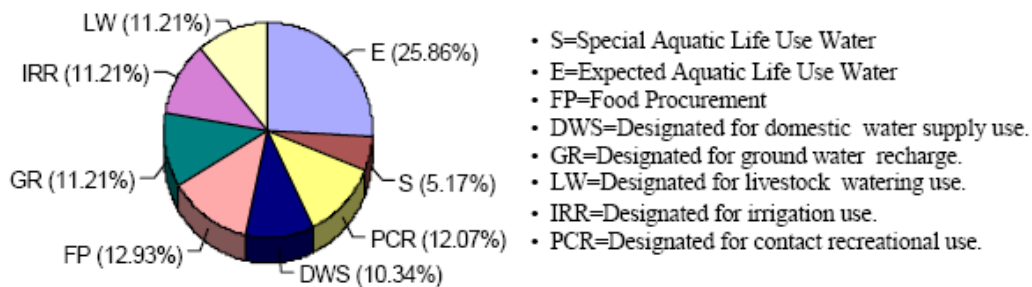
### 9.18.4.3 MIDDLE ARKANSAS SLATE

The HUC8 11030013 watershed is ranked 6th in priority for watershed restoration throughout the state. According to the Unified Watershed Assessment, 43.4% of the total miles of water in this watershed do not meet their designated uses. The Arkansas River, Chisholm Creek, Spring Creek, and Cowskin Creek are among the larger streams and rivers.

#### Designated Uses

This watershed is mostly a drainage basin for the Arkansas River, however, several smaller streams, creeks, and rivers are also present throughout the area. There are 83 public water supplies within the watershed, many of which draw water from the Arkansas River and its alluvium. According to the Kansas Surface Water Register, the most common designated use for streams and rivers in this watershed include: aquatic life uses, food procurement; recreation, and groundwater recharge.

#### Huc 11030013 Surface Water Uses



**Feedlots:** In Kansas, confined animal feeding operations (CAFOs) with greater than 300 animal units must register with KDHE. There are approximately 92 registered CAFOs located within HUC8 11030013

**Wastewater Treatment Facilities:** There are approximately 20 municipal and industrial wastewater treatment facilities within the watershed.

**Urban/Suburban Runoff:** Many urban landscapes are covered by paved surfaces including roads, driveways, parking lots, and sidewalks. These surfaces are impermeable and tend to divert water into storm drains at high velocities. This increased flow velocity from urban areas can cause severe stream bank erosion in receiving water bodies. Additionally, urban and suburban runoff may carry other pollutants like petroleum hydrocarbons and heavy metals. Currently, the watershed is about 11.5% urban.

#### **Lakes & Wetlands**

HUC8 11030013 is the home to several smaller city and county lakes, as well as two wetland areas. Many of the lakes are used for recreational purposes such as camping and fishing but for the most part they are used for food procurement. The wetland areas, otherwise known as the Pracht Wetland and the Slate Creek

## 2010–2040 HAZARDS ANALYSIS PLAN

Wetland, occupy many aquatic species and filter runoff. Some of the smaller lakes in the watershed include Moss Lake, Watson Park Lake, Emery Park Lake, and Horseshoe Lake.

**Groundwater:** Major groundwater aquifers underlying this watershed include portions of the High Plains and alluvial aquifers of the Arkansas River and its tributaries.

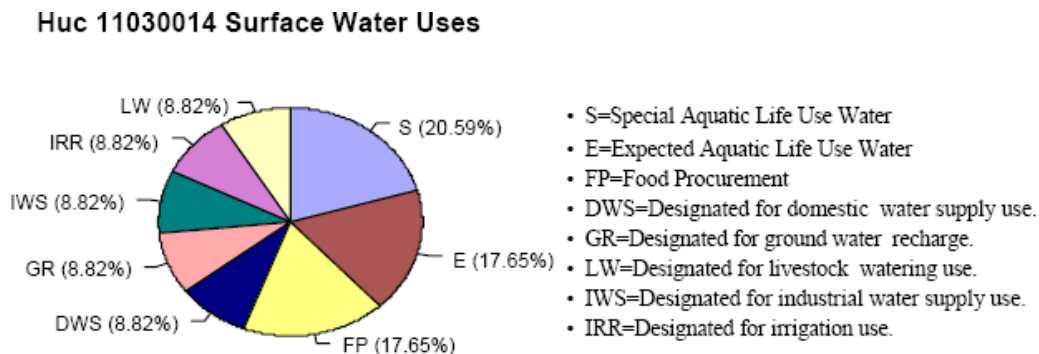
**Wells:** There are approximately 8,191 groundwater wells located within the watershed. Water from these wells is used for domestic use, monitoring, and lawn and garden.

### 9.18.4.4 NORTH FORK NINNESCAH

The HUC8 11030014 watershed is ranked 7th in priority for watershed restoration throughout the state. According to the Unified Watershed Assessment, all of the streams and rivers miles sampled in this watershed meet their designated uses. The Ninnescah River, Red Rock Creek, and Dooleyville Creek are among the larger streams and rivers and most drain into the Cheney Reservoir.

#### Designated Uses

There are 55 public water supplies within the watershed, few of which draw water from the local rivers. According to the Kansas Surface Water Register, the most common designated uses for streams and rivers in this watershed include: special aquatic life use, expected aquatic life use, and food procurement.



**Lakes & Wetlands:** Huc 8 11030014 is the home to Cheney Reservoir and several smaller city and county lakes. Cheney Reservoir is used for public water supply, recreational purposes, and flood control downstream. According to the Surface Water Register, Cheney Reservoir is designated for expected aquatic life use, food procurement, domestic and industrial water supply, and contact recreational purposes.

**Feedlots:** In Kansas, confined animal feeding operations (CAFOs) with greater than 300 animal units must register with KDHE. There are approximately 70 registered CAFOs located within HUC 8 11030014

**Wastewater Treatment Facilities:** There are approximately 14 municipal and industrial wastewater treatment facilities within the watershed.

**Groundwater:** Major groundwater aquifers underlying this watershed include portions of the High Plains and Dakota aquifers, and alluvial aquifers of the Ninnescah River and its tributaries.

**Wells:** There are approximately 2,312 groundwater wells located within the watershed. Water from these wells is used for domestic use, irrigation, feedlots, and industrial uses.

### 9.18.4.5 SOUTH FORK NINNESCAH

The HUC8 11030015 watershed is ranked 15th in priority for watershed restoration throughout the state. According to the Unified Watershed Assessment, approximately 21% of the total miles of water in this watershed do not meet their designated uses. The South Fork Ninnescah River, Coon Creek, and Painter Creek are a few of the larger streams and rivers in this watershed.

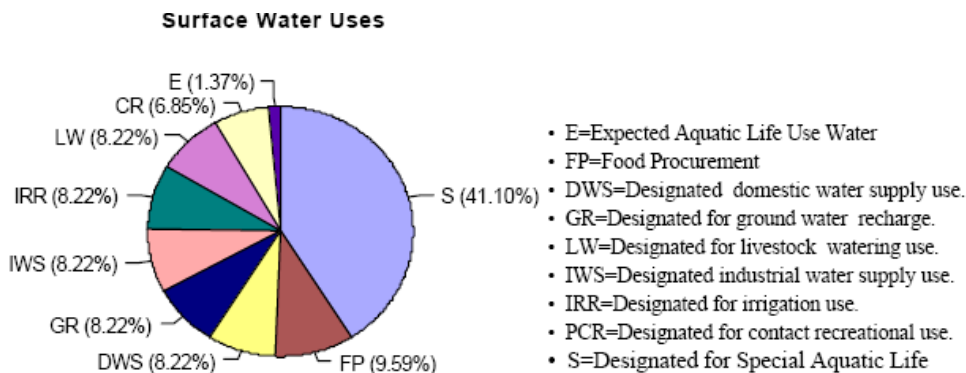


## 2010–2040 HAZARDS ANALYSIS PLAN

### Designated Uses

This watershed is mostly a drainage basin for the South Fork Ninnescah River; however, smaller streams and creeks are also abundant throughout the area. There are approximately 67 public water supplies within the watershed, many of which draw water from the South Fork Ninnescah and its alluvium.

According to the Kansas Surface Water Register, the most common designated uses for streams and rivers in this watershed include: aquatic life uses, food procurement, domestic water use, groundwater recharge and industrial water supply.



**Feedlots:** In Kansas, confined animal feeding operations (CAFOs) with greater than 300 animal units must register with KDHE. There are approximately 41 registered CAFOs located within HUC8 11030015

**Wastewater Treatment Facilities:** There are approximately 10 municipal and industrial wastewater treatment facilities within the watershed.

**Urban/Suburban Runoff:** Many urban landscapes are covered by paved surfaces including roads, driveways, parking lots, and sidewalks. These surfaces are impermeable and tend to divert water into storm drains at high velocities. This increased flow velocity from urban areas can cause severe stream bank erosion in receiving water bodies. Additionally, urban and suburban runoff may carry other pollutants like petroleum hydrocarbons and heavy metals. Currently, the watershed is only about 1% urban.

**Lakes & Wetlands:** HUC8 11030015 is the home to many city and county lakes along with three wetland areas. Some of these include the Pratt County Lake, the Kingman County State Fishing Lake, and the Lemon Park Lake. These lakes offer fishing, camping, and trails for hiking, boating, and swimming. The wetland areas are called the Kingman State Fishing Lake Wetland, the Texas Lake Wetland Area, and the Kingman Wetland Area and are all located in the northern portion of the watershed. According to the Surface Water Register, the majority of the lakes/wetland areas in this watershed is designated for expected aquatic life use, food procurement, and contact recreational use.

**Groundwater:** Major groundwater aquifers underlying this watershed include the High Plains and Dakota Aquifers along with alluvial aquifers of the South Fork Ninnescah River and its tributaries. See attachment 4 for a map of groundwater aquifers.

**Wells:** There are approximately 2,556 groundwater wells located within the watershed. Water from these wells is used for oil field supply, domestic use, irrigation, groundwater monitoring, lawn and garden, industrial supply, public water supply, air conditioning, and feedlots.

# 2010-2040 HAZARDS ANALYSIS PLAN

## SEDGWICK COUNTY STATISTICAL DATA CHART

|                                               | Township |        |        |       |       |              |             |       |         |        |          |        |         |         |        |           |       |       |       |           |          |       |         |       |               |       |       |         |
|-----------------------------------------------|----------|--------|--------|-------|-------|--------------|-------------|-------|---------|--------|----------|--------|---------|---------|--------|-----------|-------|-------|-------|-----------|----------|-------|---------|-------|---------------|-------|-------|---------|
| Hazard Concern                                | Afton    | Attica | Delano | Eagle | Erie  | Garden Plain | Grand River | Grant | Greeley | Gypsum | Illinois | Kechi  | Lincoln | Minneha | Morton | Ninnescah | Ohio  | Park  | Payne | Riverside | Rockford | Salem | Sherman | Union | Valley Center | Viola | Waco  | Wichita |
| Demographics                                  |          |        |        |       |       |              |             |       |         |        |          |        |         |         |        |           |       |       |       |           |          |       |         |       |               |       |       |         |
| Population (2000)                             | 1290     | 6996   | 79381  | 1437  | 106   | 1780         | 607         | 3710  | 1924    | 5822   | 1620     | 59896  | 473     | 46398   | 4163   | 5091      | 1146  | 12882 | 1119  | 70289     | 40174    | 8411  | 2128    | 385   | 5179          | 758   | 20595 | 113613  |
| Total Area (Square Miles)                     | 36       | 36     | 36     | 36    | 36    | 36           | 36          | 36    | 36      | 36     | 36       | 36     | 36      | 36      | 36     | 36        | 36    | 36    | 36    | 36        | 36       | 36    | 36      | 36    | 36            | 36    | 36    | 36      |
| Population Density                            | 35.8     | 194.3  | 2205   | 39.9  | 2.9   | 49.4         | 16.9        | 103.1 | 53.4    | 161.7  | 45       | 1663.7 | 13.1    | 1288.8  | 115.6  | 141.4     | 31.8  | 357.8 | 31.1  | 1952.5    | 1115.9   | 233.6 | 59.1    | 94    | 143.9         | 21.1  | 572.1 | 3155.9  |
| Average Household Income (1999)*              | 21454    | 14871  | 11797  | 11716 | 12205 | 12218        | 13619       | 15178 | 10542   | 12482  | 12797    | 12735  | 12248   | 27996   | 14404  | 12167     | 12767 | 16658 | 18409 | 11556     | 16059    | 12912 | 11168   | 11656 | 12800         | 10983 | 14608 | 14516   |
| Number of Households                          | 404      | 2273   | 30672  | 513   | 37    | 577          | 194         | 1342  | 698     | 1687   | 549      | 22878  | 172     | 18549   | 1514   | 1786      | 393   | 4847  | 319   | 27510     | 14041    | 3030  | 659     | 1012  | 1803          | 257   | 5806  | 45899   |
| Risk Areas                                    |          |        |        |       |       |              |             |       |         |        |          |        |         |         |        |           |       |       |       |           |          |       |         |       |               |       |       |         |
| Number of RMP Sites                           | 0        | 0      | 0      | 0     | 2     | 1            | 0           | 0     | 2       | 0      | 0        | 2      | 1       | 0       | 0      | 1         | 0     | 1     | 0     | 1         | 0        | 0     | 1       | 2     | 0             | 0     | 0     | 6       |
| Number of Tier II Reporting Sites             | 0        | 2      | 35     | 0     | 1     | 4            | 1           | 4     | 3       | 3      | 1        | 25     | 1       | 9       | 5      | 5         | 9     | 4     | 10    | 18        | 3        | 11    | 4       | 5     | 5             | 0     | 18    | 64      |
| HM Railroad Lines (Miles)                     | 0        | 6.06   | 14.03  | 0     | 5.68  | 6.06         | 0.15        | 0.16  | 5.14    | 1.58   | 5.45     | 19.43  | 7.03    | 0       | 6.25   | 7.42      | 4.64  | 4.73  | 6.52  | 16.56     | 13.15    | 8.57  | 5.28    | 6.81  | 6.91          | 7.6   | 12.76 | 25.24   |
| HM Vehicular Routes (Miles)                   | 8.01     | 0      | 12.97  | 3.24  | 0     | 6.13         | 5.99        | 6.01  | 7.01    | 0      | 5.45     | 18.47  | 0       | 17.98   | 0      | 2.68      | 0     | 8.71  | 8.24  | 14.64     | 0        | 8.02  | 0       | 2.84  | 0             | 6.29  | 8.22  | 12.88   |
| Vulnerable Areas                              |          |        |        |       |       |              |             |       |         |        |          |        |         |         |        |           |       |       |       |           |          |       |         |       |               |       |       |         |
| Number of Child/Day Care Centers              | 0        | 0      | 12     | 0     | 0     | 0            | 0           | 1     | 0       | 1      | 0        | 2      | 0       | 9       | 0      | 1         | 0     | 1     | 2     | 10        | 2        | 1     | 0       | 0     | 0             | 0     | 0     | 38      |
| Number of Education Facilities                | 0        | 6      | 18     | 0     | 0     | 2            | 0           | 2     | 0       | 1      | 2        | 4      | 0       | 13      | 3      | 0         | 0     | 5     | 2     | 30        | 0        | 0     | 1       | 1     | 1             | 0     | 3     | 58      |
| Number of Health Care Facilities              | 0        | 2      | 9      | 0     | 0     | 0            | 0           | 0     | 1       | 0      | 0        | 0      | 0       | 12      | 1      | 2         | 0     | 0     | 2     | 2         | 1        | 1     | 0       | 1     | 0             | 0     | 0     | 15      |
| Area in Cheney Dam Inundation Zone (Sq Miles) | 2.85     | 0      | 0      | 0     | 4.65  | 0            | 8.4         | 0     | 0       | 0      | 0        | 0      | 0       | 0       | 18.15  | 14.25     | 8.15  | 0     | 0     | 0         | 0        | 0     | 0       | 0     | 0             | 22.55 | 0     | 0       |
| Number of Warning Sirens                      | 1        | 6      | 17     | 1     | 0     | 2            | 0           | 0     | 1       | 5      | 1        | 11     | 1       | 12      | 3      | 2         | 2     | 3     | 4     | 15        | 14       | 9     | 1       | 3     | 2             | 1     | 7     | 24      |
| Number of Fire Departments                    | 0        | 0      | 5      | 1     | 0     | 1            | 0           | 1     | 1       | 0      | 0        | 2      | 0       | 4       | 1      | 1         | 0     | 0     | 1     | 1         | 0        | 0     | 1       | 2     | 0             | 0     | 1     | 8       |
| Number of Hospitals                           | 0        | 0      | 2      | 0     | 0     | 0            | 0           | 0     | 0       | 1      | 0        | 0      | 0       | 0       | 0      | 0         | 0     | 0     | 0     | 0         | 0        | 0     | 0       | 0     | 0             | 0     | 0     | 4       |



## **SECTION 5**

### **RISK ASSESSMENT**

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 10 HAZARD EVENT DETERMINATIONS

The following categories presented in this section are weighted for determining the potential impact of hazards in Sedgwick County:

- *Potential* – Based on historical hazard events and weighting the worst of these events with resulting cascading effects
- *Catastrophic* – An event that has not historically occurred but has the probability of occurring based on the worst case conditions with resulting cascading effects

#### 10.1 HAZARD SEVERITY RATING

The following section describes and rates each hazard that poses a threat to Sedgwick County. Ratings are categorized based on history, vulnerability, maximum threat, and probability. The following chart shows the score and final ratings for all hazards in Sedgwick County. Those receiving a rating of one hundred points and greater should receive priority in a descending order. The historical information presented is a detailed comparison for hazard severity ratings.

#### Hazard Identification and Event Analysis

| Risk Factor | Consequence of Occurrence |                           |                                 |                               |                                                      |                                      |
|-------------|---------------------------|---------------------------|---------------------------------|-------------------------------|------------------------------------------------------|--------------------------------------|
|             | Area Impacted             | Probability of Occurrence | Health and Safety               | Property                      | Environment                                          | Economic                             |
| <b>0</b>    | No developed area         | Unknown or rare           | No impact                       | No damage                     | No damage                                            | No economic impact                   |
| <b>1</b>    | Less than 25%             | Every 500 years or less   | Minor injuries and/or illness   | Few damaged                   | Minor damage                                         | Low direct and/or low indirect costs |
| <b>2</b>    | Less than 50%             | Every 100 years or less   | Major illnesses and/or injuries | Few destroyed and/or damaged  | Resources damaged with short term recovery practical | High direct and low indirect costs   |
| <b>3</b>    | Less than 75%             | Every 25 years or less    | Few fatalities                  | Many damaged and/or destroyed | Resources damaged with long term recovery feasible   | Low direct and high indirect costs   |
| <b>4</b>    | Over 75%                  | Once a year or more       | Numerous fatalities             | Mostly destroyed              | Resources destroyed beyond recovery                  | High direct and indirect costs       |

#### NOTES:

Few fatalities = Less than 5 deaths per event

Numerous Fatalities = 5 deaths or greater per event



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### Direct vs. Indirect Costs

| Direct Costs*                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Indirect Costs*                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• The cost of repair and replacement of damaged and destroyed buildings</li> <li>• The costs of damage to building contents</li> <li>• The value of lost or damaged inventory</li> <li>• Relocation expenses</li> <li>• Lost productivity, service or sales</li> <li>• Lost wages (employees), lost rental income (to building owners)</li> <li>• Lost tax revenues and reduced tax base (for local governments)</li> </ul> | <ul style="list-style-type: none"> <li>• Disrupted or delayed sustainable economic growth (i.e., funds intended for economic development are redirected for disaster recovery)</li> <li>• Reduced tourism, leisure, and business travel</li> <li>• Environmental degradation</li> <li>• Cultural and socioeconomic effects (i.e., movement of population)</li> <li>• Reduced real estate sales and depressed property values</li> <li>• Long-term health issues</li> </ul> |
| *FEMA Course E464: Disaster-Resistant Jobs: Strategies for Community, Emergency, and Economic Risk Management                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

### 10.2 MITIGATION PLAN METHODOLOGY

Based on the experience of the representatives of the participating agencies, the hazards identified in the 2009 Sedgwick County Multi-Jurisdiction Mitigation Plan have been revisited, reevaluated, reorganized, and reprioritized to reflect the hazards environment in Sedgwick County at the time of the 2010 Risk Assessment and Hazard Vulnerability Analysis Plan update. Twenty-two hazards have been identified as threatening and pose a sufficient level of human, economic, and/or environmental risk to the communities of the state that they warrant incorporation into this plan.

Listed alphabetically, 2014 mitigation hazards include:

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

The following natural hazards identified by FEMA are not included in this analysis because they do not threaten Kansas: avalanche, coastal erosion, and coastal storm.. Thunderstorms are not identified because the damaging results of them are addressed in the following hazard profiles: lightning, windstorm, hailstorm, and flood.

In 2014, Sedgwick County used the methodology from the MitigationPlan.com planning tool to prioritize the 22 hazards. This prioritization was based on a calculated priority risk index (CPRI) that considered four elements of risk: probability, magnitude/severity, warning time, and duration. The table on the next page defines the levels for each element of risk.

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

$$(\text{Probability} \times .45) + (\text{Magnitude/Severity} \times .30) + (\text{Warning Time} \times .15) + (\text{Duration} \times .10) = \text{CPRI}$$

Based on their CPRI, the hazards were separated into three categories of planning significance:

- High (3.0-4.0)
- Moderate (2.0-2.95)
- Low (1.1-1.95)

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

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

**Calculated Priority Risk Index (CPRI) Element Definitions**

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

Source: MitigationPlan.com

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

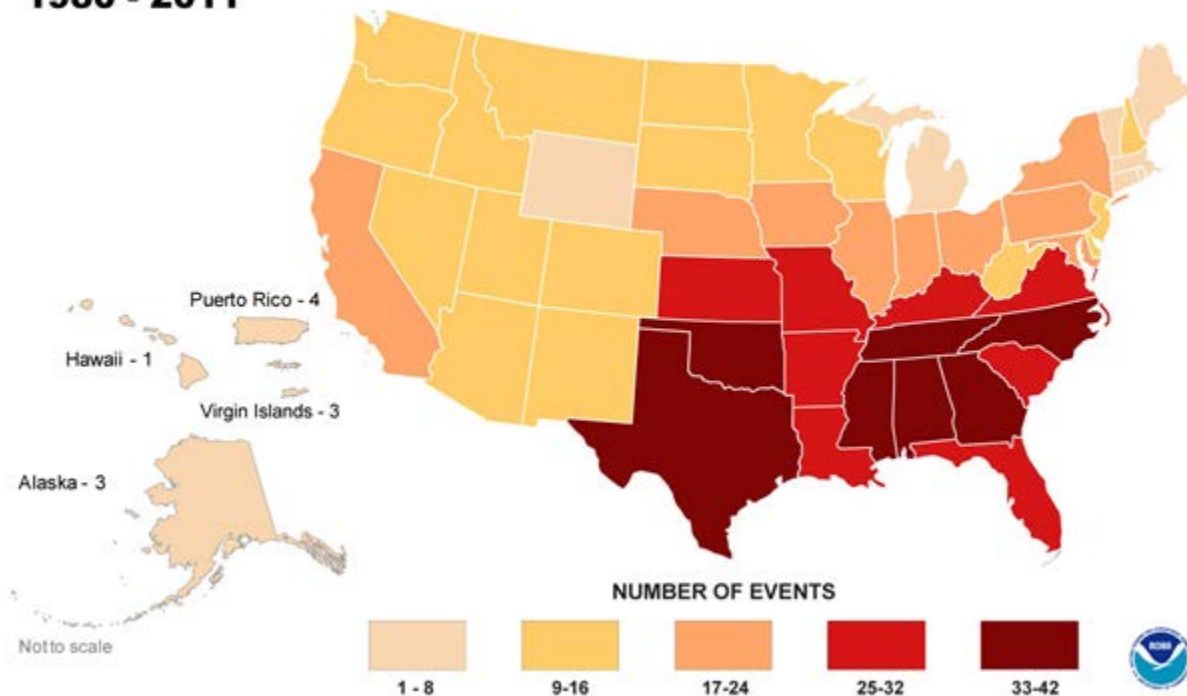
\*\* According to the severity associated with past events or the probable worst case scenario possible in the state.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 11 HAZARD VULNERABILITY VS RISK ASSESSMENT

Natural disasters account for the largest financial losses in the United States, primarily from severe storms, tropical cyclones, drought, flooding, wildfire, winter storms, and freezing. NOAA's National Climatic Data Center (NCDC) shows a summary of these "billion dollar" disaster events from 1980 to 2011 on the map below with corresponding chart:

### Billion Dollar Weather/Climate Disasters 1980 - 2011



Please note that the map reflects a summation of billion dollar events for each state affected (i.e., it does not mean that each state shown suffered at least \$1 billion in losses for each event).

| Disaster Type    | Number of Events | Percent Frequency | CPI-Adjusted Damages<br>(Billions of Dollars) | Percent Damage |
|------------------|------------------|-------------------|-----------------------------------------------|----------------|
| Severe Storm     | 43               | 32.3%             | 94.6                                          | 10.8%          |
| Tropical Cyclone | 31               | 23.3%             | 417.9                                         | 47.5%          |
| Drought          | 16               | 12%               | 210.1                                         | 23.9%          |
| Flooding         | 16               | 12%               | 85.1                                          | 9.7%           |
| Wildfire         | 11               | 8.3%              | 22.2                                          | 2.5%           |
| Winter Storm     | 10               | 7.5%              | 29.3                                          | 3.3%           |
| Freeze           | 6                | 4.5%              | 20.5                                          | 2.3%           |

This table reflects the total number of Billion dollar events to affect the U.S. since 1980, including percent frequency and percent damage, by disaster type.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 11.1 FLOODS

*Definition:* Any high flow, overflow, or inundation by water that causes or threatens damage (*National Weather Service*).

#### BACKGROUND

History of recorded flooding in Sedgwick County (Appendix A) begins in 1877 with the first significant flood. Since then, there have been 16 notable flood events, two of which were presidential declared disasters. Typically, surface water historically prone to flooding are the Arkansas River, Little Arkansas River, Ninnescah River, Jester Creek, Big Slough Creek, Little Slough Creek, Chisholm Creek, East Branch Chisholm Creek, Cowskin Creek, Calfskin Creek, Dry Creek, Gypsum Creek, Wildcat Creek, Clearwater Creek, Spring Creek, Indianola Creek, Jocelyn Creek, Mud Creek, Sand Creek, and Gooseberry Creek.

In 1938, the most severe of the three floods, both the Little Arkansas and Jester Creek flooded, forcing many families on the west side of town to evacuate their homes. Poorly insulated houses leaked water into the basements and lower floors, causing people to move the upper stories of their houses. The flood was particularly harmful to the farmers because it washed out their crops and killed their livestock. The following years, in '44 and '51, the occurrences were basically the same. Houses flooded, farms were washed out and businesses were set back.<sup>45</sup>

#### INSURANCE AND REPETITIVE LOSS

In Kansas as of August 31, 2015, there were 11,604 flood insurance policies having a combined written premium price of \$9,392,378 providing \$2,029,764,000 in coverage. In Sedgwick County, a total of 1,752 policies (15.1% of Kansas) are in force and is shown in the table below followed by claims.

**NATIONAL FLOOD INSURANCE PROGRAM (NFIP) POLICIES AS OF AUGUST 31, 2015**

| Jurisdiction                   | Policies In-Force | Insurance In-Force   | Written Premium In-Force |
|--------------------------------|-------------------|----------------------|--------------------------|
| State of Kansas                | 11,604            | 2,029,764,400        | 9,392,378                |
| Sedgwick County (Rural)        | 317               | \$52,399,700         | 301,508                  |
| City of Bel Aire               | 17                | \$3,457,800          | 17,610                   |
| City of Bentley                | 1                 | \$70,000             | 241                      |
| City of Cheney                 | 2                 | \$710,000            | 1,436                    |
| City of Clearwater             | 6                 | \$784,800            | 5,478                    |
| City of Colwich                | 8                 | 1,288,800            | 4,447                    |
| City of Derby                  | 95                | \$18,984,900         | 55,660                   |
| City of Garden Plain           | 3                 | \$308,200            | 2,693                    |
| City of Goddard                | 6                 | \$1,469,500          | 4,211                    |
| City of Haysville              | 21                | \$3,587,700          | 11,740                   |
| City of Maize                  | 6                 | \$1,597,000          | 3,451                    |
| City of Mulvane                | 63                | \$7,168,700          | 45,822                   |
| City of Park City              | 25                | \$2,860,300          | 19,954                   |
| City of Valley Center          | 27                | \$5,497,900          | 18,007                   |
| City of Wichita                | 1,155             | \$224,846,500        | 1,044,982                |
| <b>Sedgwick County (Total)</b> | <b>1,752</b>      | <b>\$325,031,800</b> | <b>1,537,240</b>         |

Source: FEMA Policy & Claim Statistics for Flood Insurance

<sup>45</sup> Valley Center: Its Founding & Major Events, Frank Hutchings, Valley Center, 1976

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### NATIONAL FLOOD INSURANCE PROGRAM (NFIP) CLAIMS FROM JAN 1, 1978 TO OCT 31, 2015

| Jurisdiction                   | Total Loss <sup>1</sup> | Closed Loss <sup>2</sup> | Open Loss <sup>3</sup> | CWOP Loss <sup>4</sup> | Total Payments         |
|--------------------------------|-------------------------|--------------------------|------------------------|------------------------|------------------------|
| State of Kansas                | 6,847                   | 5,210                    | 19                     | 1,618                  | \$86,894,130.05        |
| Sedgwick County (Rural)        | 177                     | 129                      | 0                      | 48                     | \$2,189,591.18         |
| City of Bel Aire               | 2                       | 1                        | 0                      | 1                      | \$2,331.97             |
| City of Clearwater             | 3                       | 3                        | 0                      | 0                      | \$51,301.92            |
| City of Colwich                | 5                       | 4                        | 1                      | 0                      | \$71,748.81            |
| City of Derby                  | 44                      | 22                       | 1                      | 21                     | \$125,345.21           |
| City of Haysville              | 5                       | 2                        | 0                      | 3                      | \$10,406.22            |
| City of Maize                  | 1                       | 1                        | 0                      | 0                      | \$16,922.76            |
| City of Mulvane                | 51                      | 35                       | 0                      | 16                     | \$483,382.32           |
| City of Valley Center          | 5                       | 4                        | 0                      | 1                      | \$132,722.45           |
| City of Wichita                | 533                     | 338                      | 2                      | 193                    | \$7,640,129.78         |
| <b>Sedgwick County (Total)</b> | <b>826</b>              | <b>539</b>               | <b>4</b>               | <b>283</b>             | <b>\$10,723,882.62</b> |

Source: FEMA Policy & Claim Statistics for Flood Insurance

<sup>1</sup> Total losses - All losses submitted regardless of the status.

<sup>2</sup> Closed losses - Losses that have been paid.

<sup>3</sup> Open losses - Losses that have not been paid in full.

<sup>4</sup> CWOP losses - Losses that have been closed without payment.

Nationally only 10% of people have flood insurance that need it. The table above is not portraying all properties that flood; it is only showing claim information from property owners that actually have flood insurance. For instance, the City of Wichita has a variety of reports and basin studies that identify numerous structures that flood, which are not reflected in the claims information displayed in the table above.

### HISTORICAL FLOOD EVENTS

The following events reflect the extent and magnitude of flooding in Sedgwick County.



The floods of 1944 and 1945 resulted from unusually heavy amounts of rainfall over the Little Arkansas River and Chisholm Creek watersheds. These floods are the maximum on record along the Little Arkansas River below Valley Center and along the lower reaches of the Chisholm Creek.

Geologic evidence indicates that floods of greater intensity have occurred on these streams.

The flood of 1942 is the largest known along the reach of Cowskin Creek below the Big Slough-Cowskin Floodway, as well as the Dry Creek. The maximum known flood on Cowskin Creek above the floodway occurred on October 2, 1955. The flood of July 1951, which was augmented by overflow from the Arkansas River, is the maximum known on Big Slough and Little Slough. The flood of October 2, 1955, on Big Slough and Little Slough is the maximum flood that occurred after training levees were constructed along the Arkansas River in 1953. That flood inundated nearly the same area as the 1951 flood. The flood of October 2, 1955, is the maximum known flood in the upper reaches of West Branch Chisholm Creek and West Fork West Branch Chisholm Creek. Floods of July 29, 1960, and August 24, 1960, were the maximum known floods in the Chisholm Creek and Spring Creek basins.

The October 1, 1973 flood peak was the largest on record and closely approximates the 100-year flood frequency. Floods on the Little Arkansas River exceed channel capacity on the average of once a year. The largest mitigation project that was constructed to provide protection to the City of Wichita is the U.S. Army Corps of Engineer (USACE) Wichita and Valley Center Local Protection Project (completed 1959). The project



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

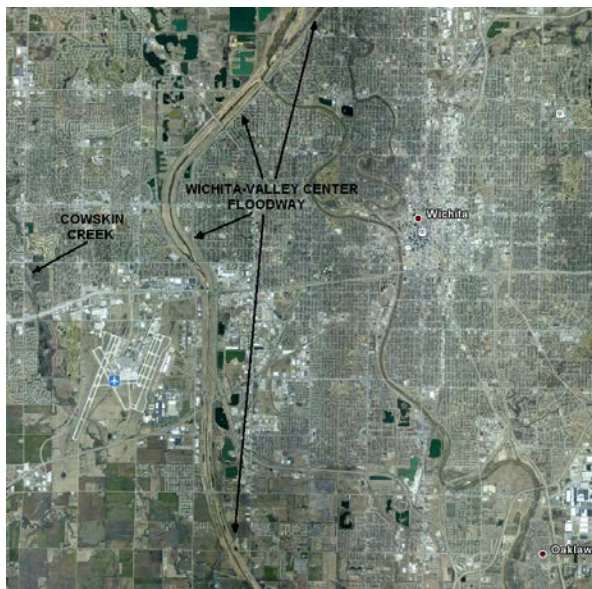
---

consists of non-regulatory control structures and levees and is designed to intercept the excess flow of Chisholm Creek, the Little Arkansas River, and the Arkansas River. A maximum flow of 25,000 cubic feet per second of storm water flows through Wichita in the natural river channels; the excess is directed around the city through the floodway (*Refer to Section 9.7.5*). There have been no major floods in Wichita from the Arkansas or Little Arkansas Rivers since its completion.

The following photos show the terrain before and after the Wichita and Valley Center Local Protection Project. The Ackerman Island west channel was filled in around 1934 where Lawrence Dumont stadium is now located to form the new west bank of the Arkansas River.



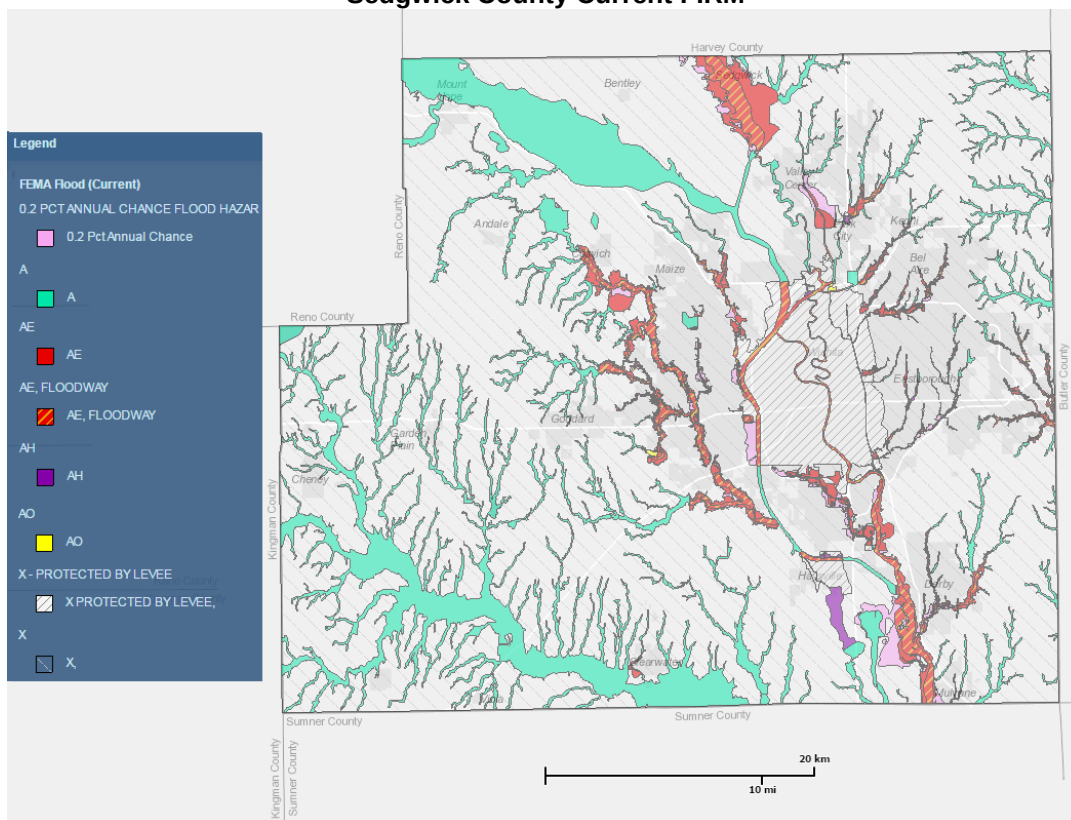
1938 Wichita Aerial View



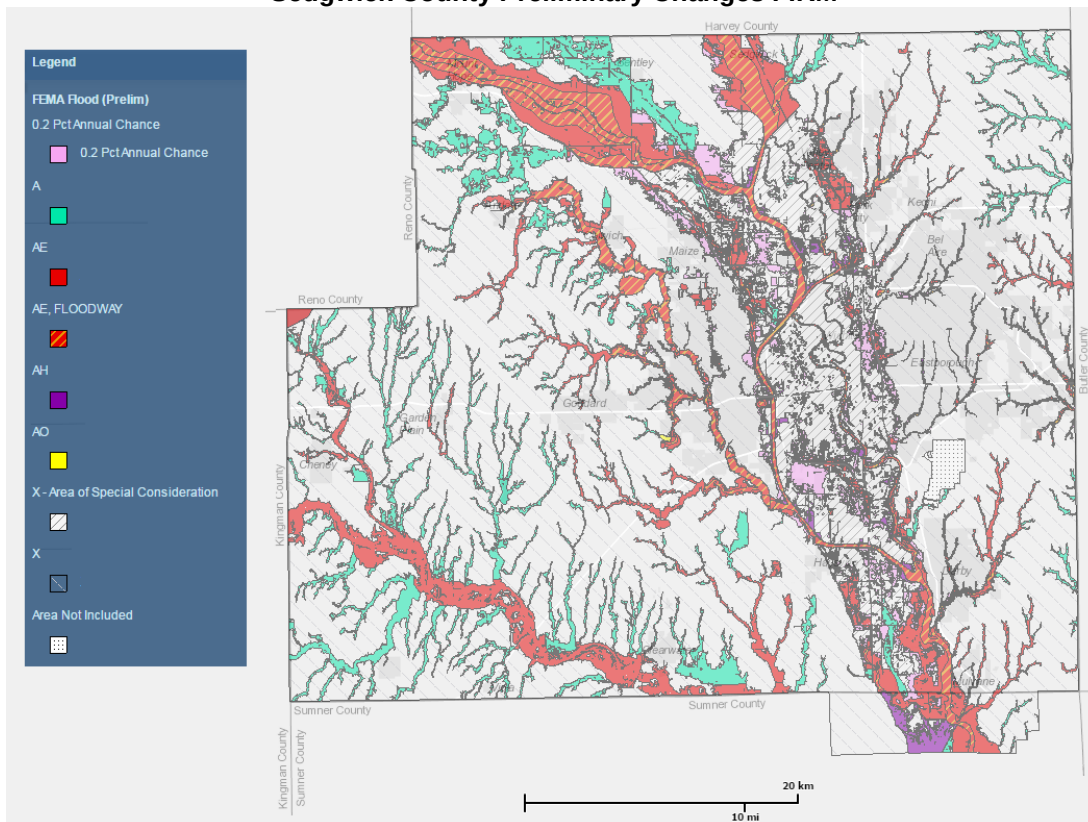
2007 Wichita Aerial View

The following maps show the current February 2, 2007 FEMA Flood Insurance Rate Map (FIRM) and the proposed FEMA FIRM for Sedgwick County and each community.

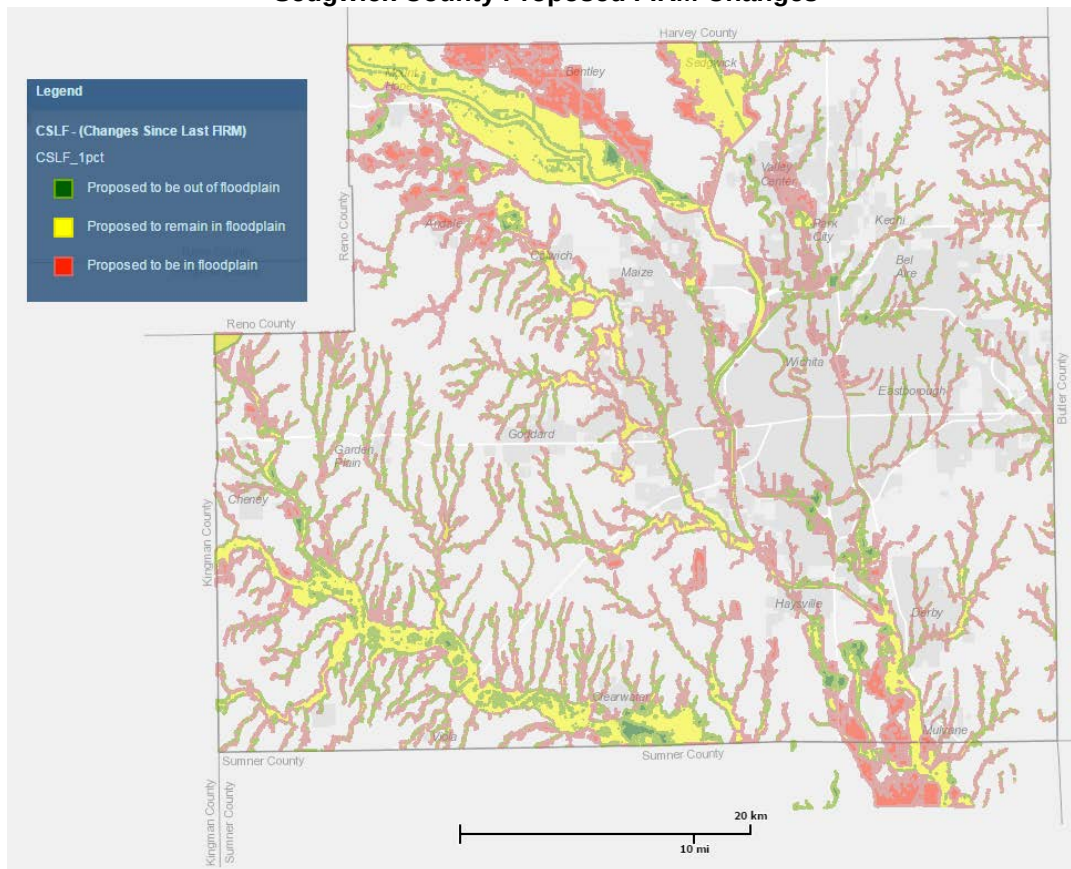
## Sedgwick County Current FIRM



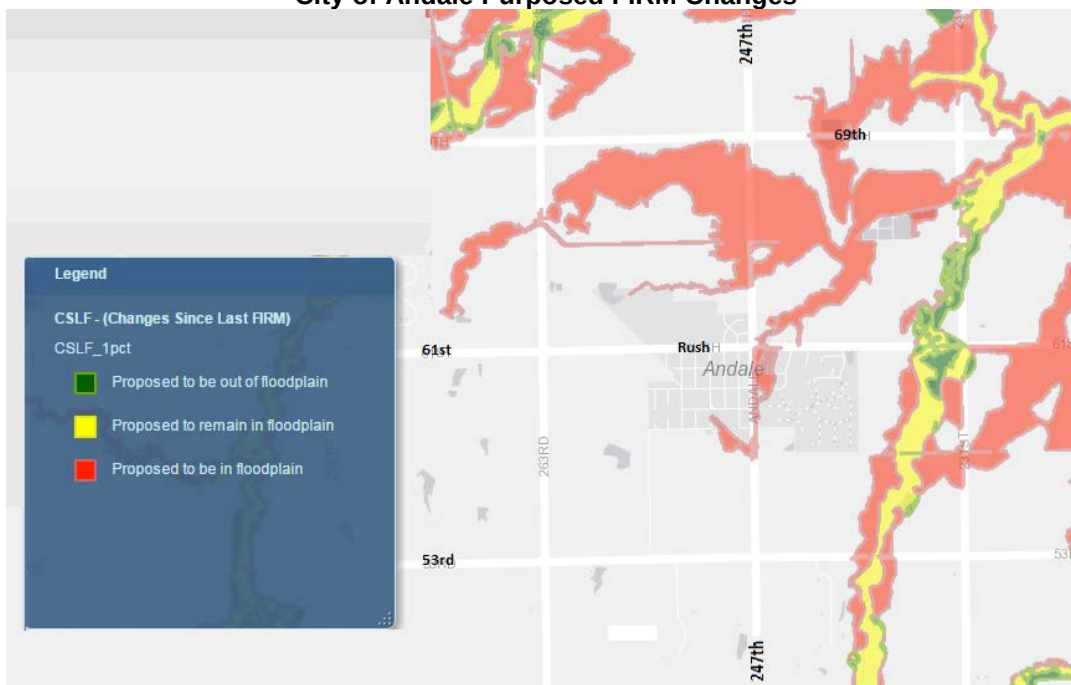
## Sedgwick County Preliminary Changes FIRM



## Sedgwick County Proposed FIRM Changes

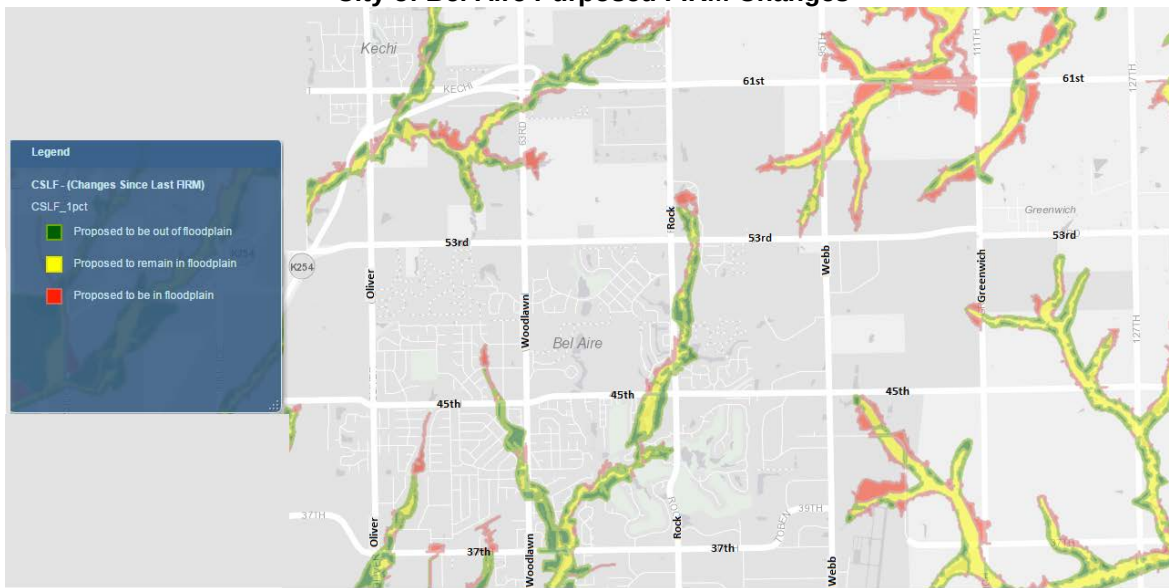


## City of Andale Purposed FIRM Changes

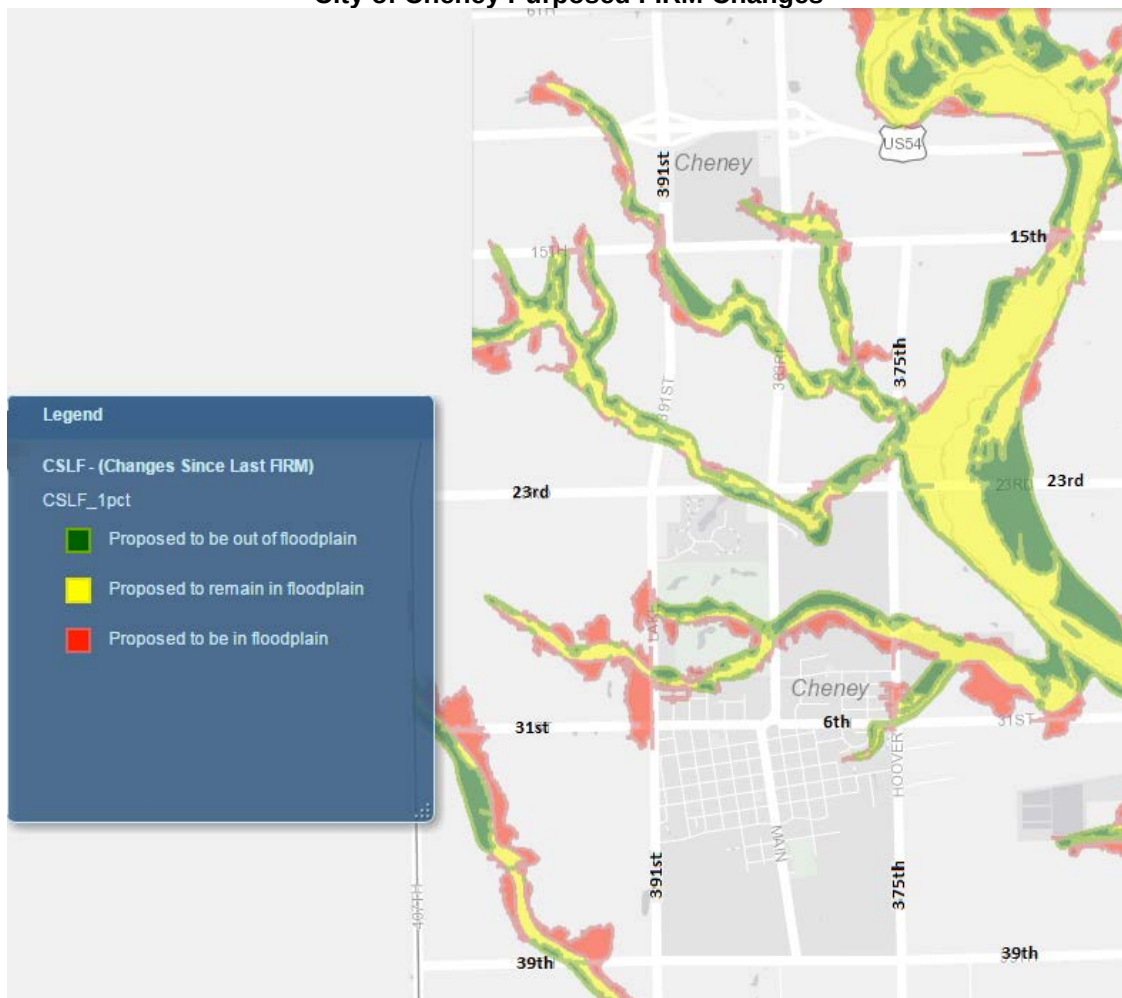




City of Bel Aire Purposed FIRM Changes



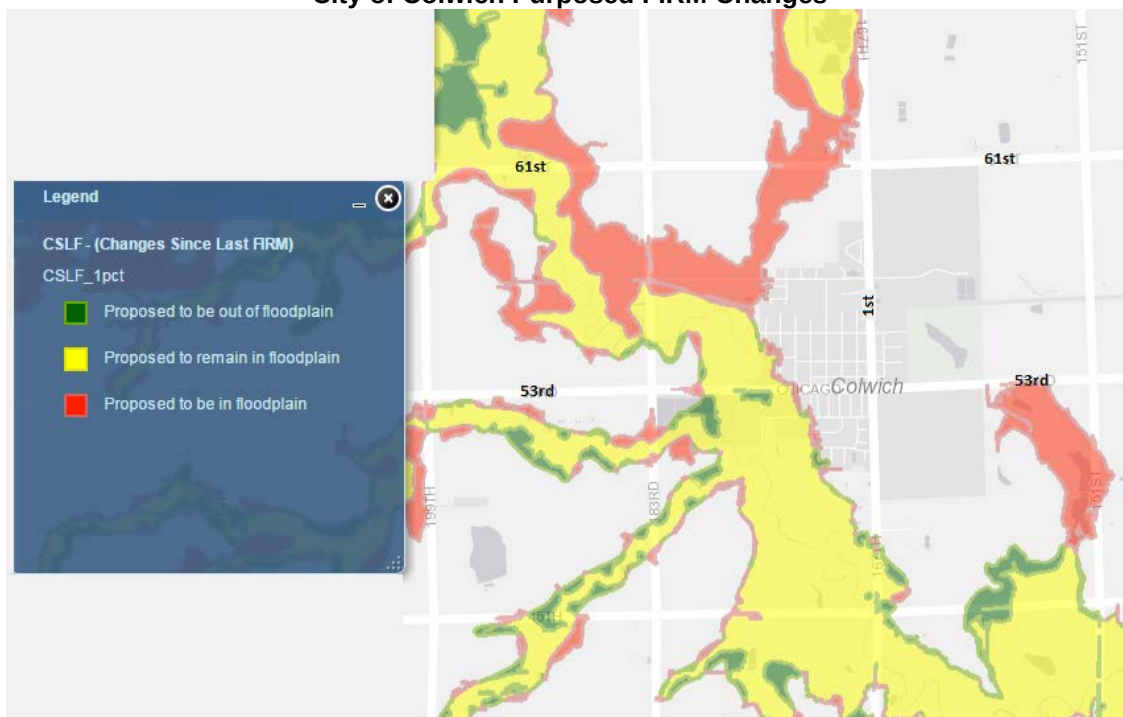
City of Cheney Purposed FIRM Changes



City of Clearwater Purposed FIRM Changes

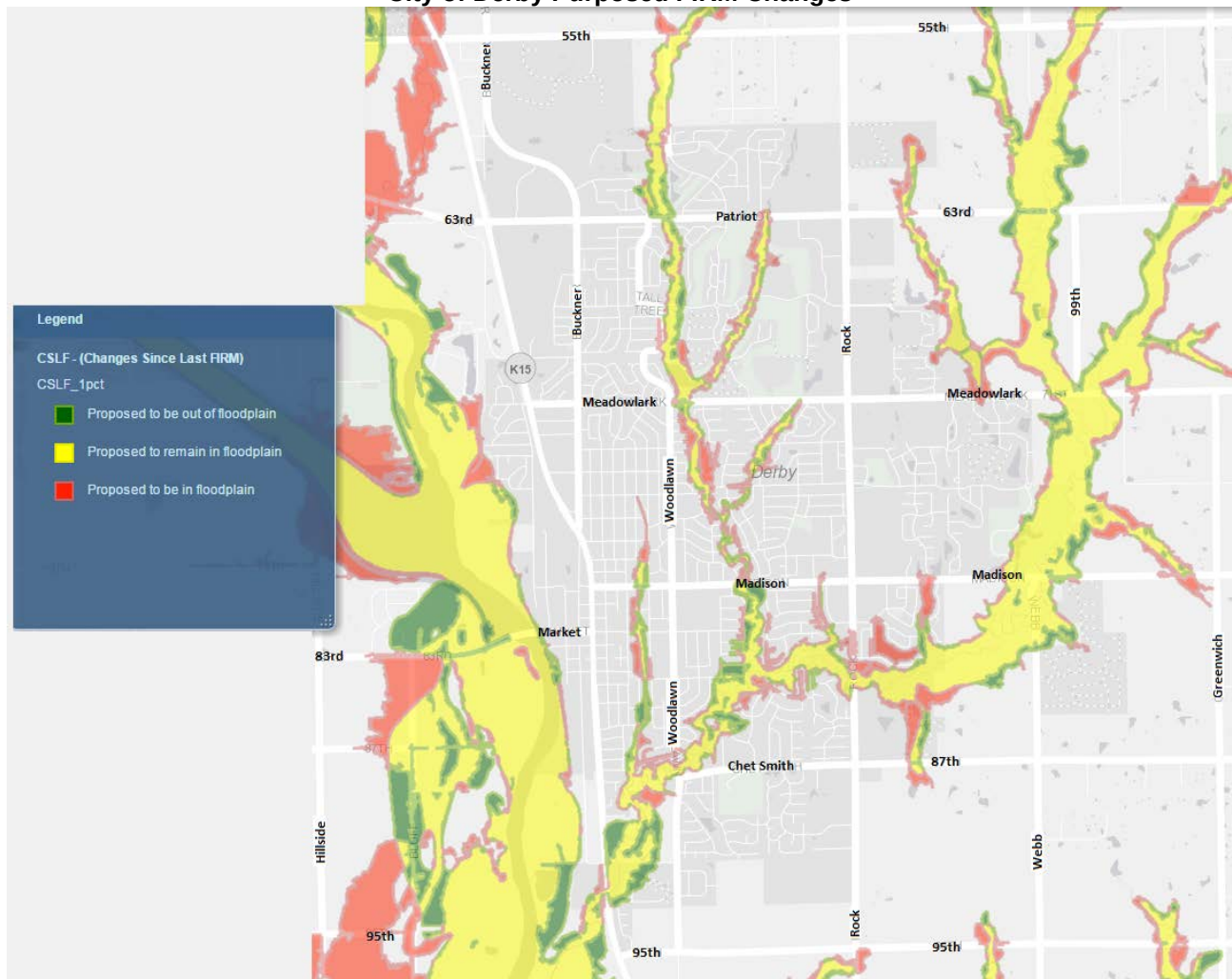


City of Colwich Purposed FIRM Changes

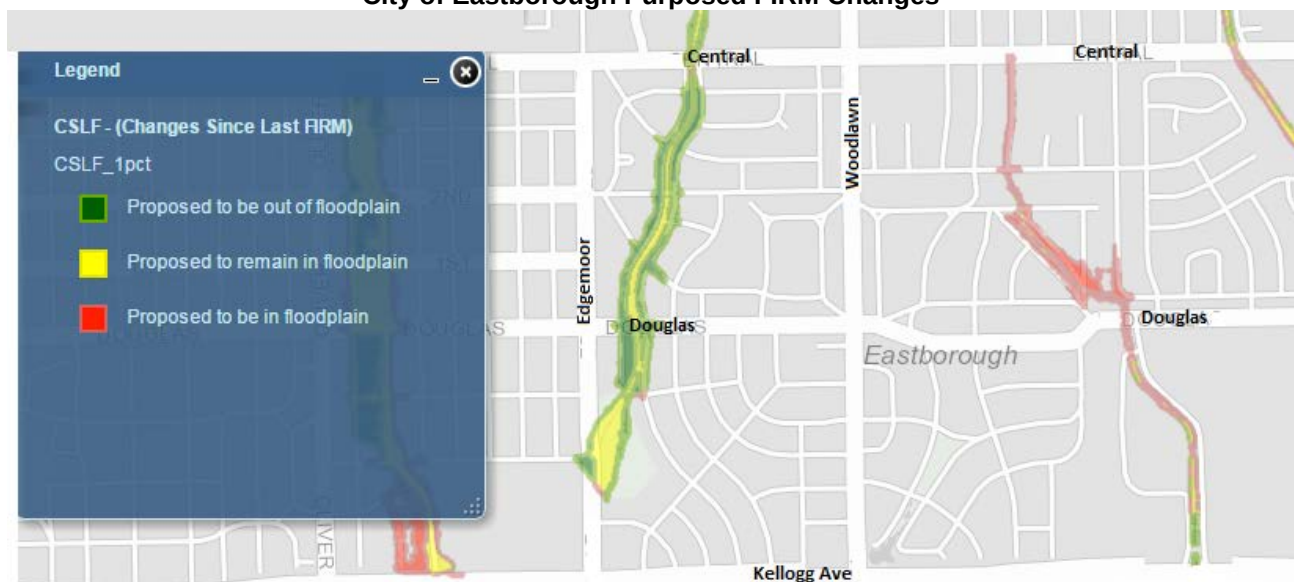




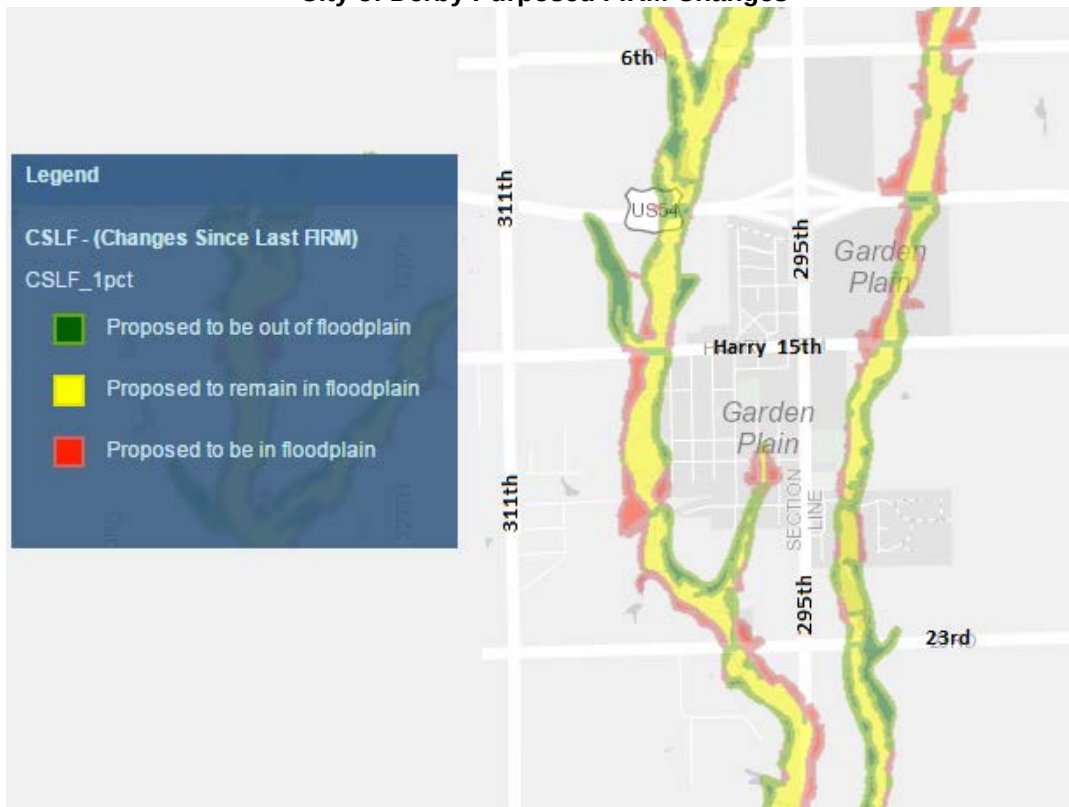
### City of Derby Purposed FIRM Changes



### City of Eastborough Purposed FIRM Changes



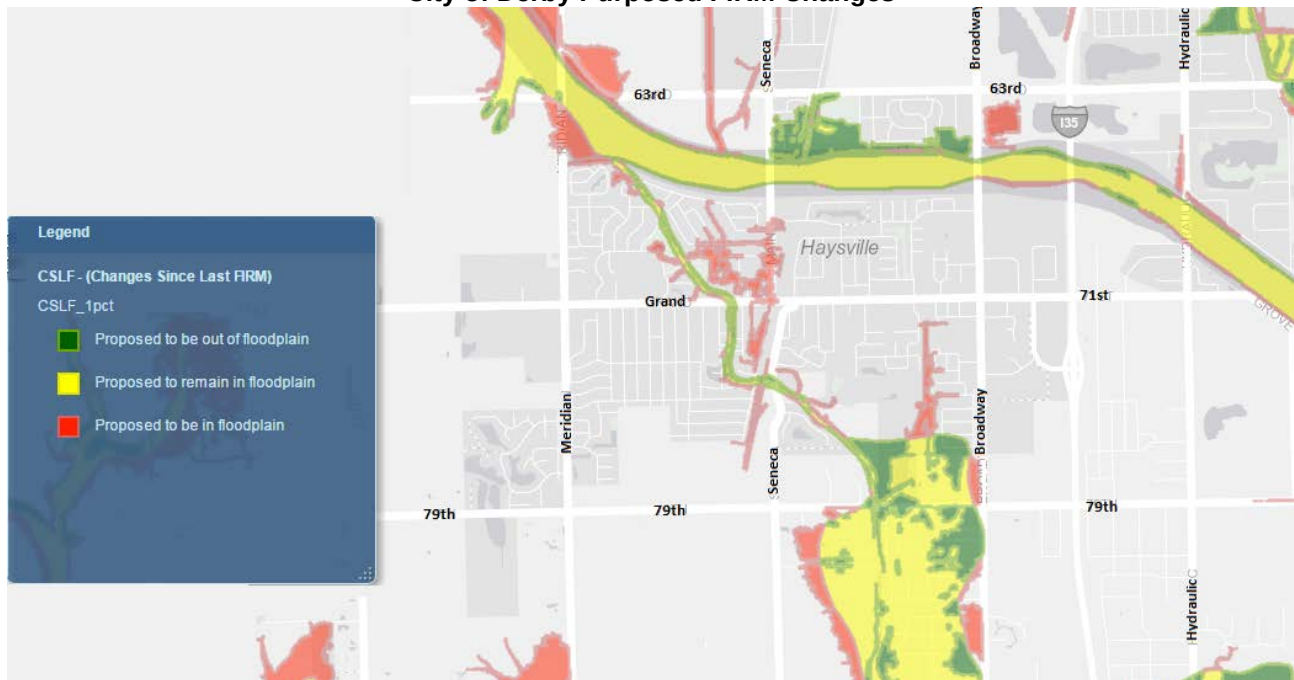
City of Derby Purposed FIRM Changes



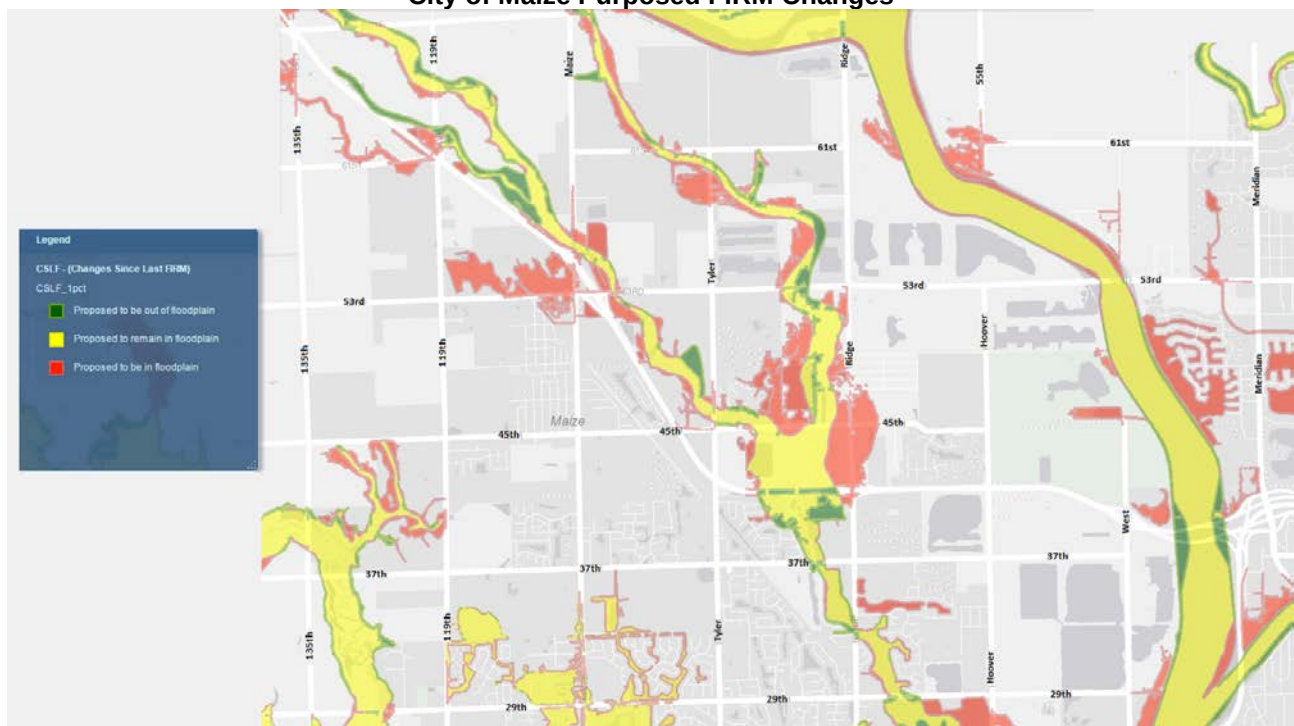
City of Derby Purposed FIRM Changes



### City of Derby Purposed FIRM Changes

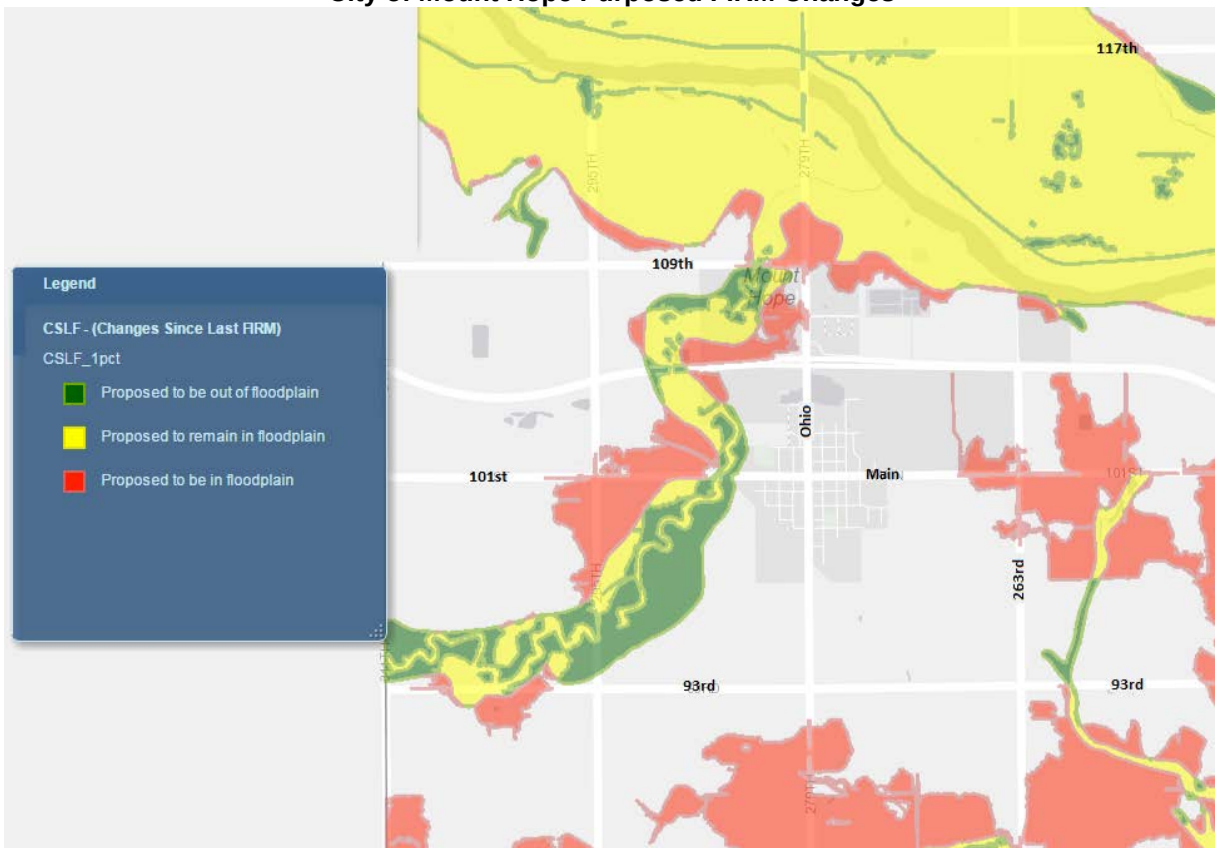


### City of Maize Purposed FIRM Changes

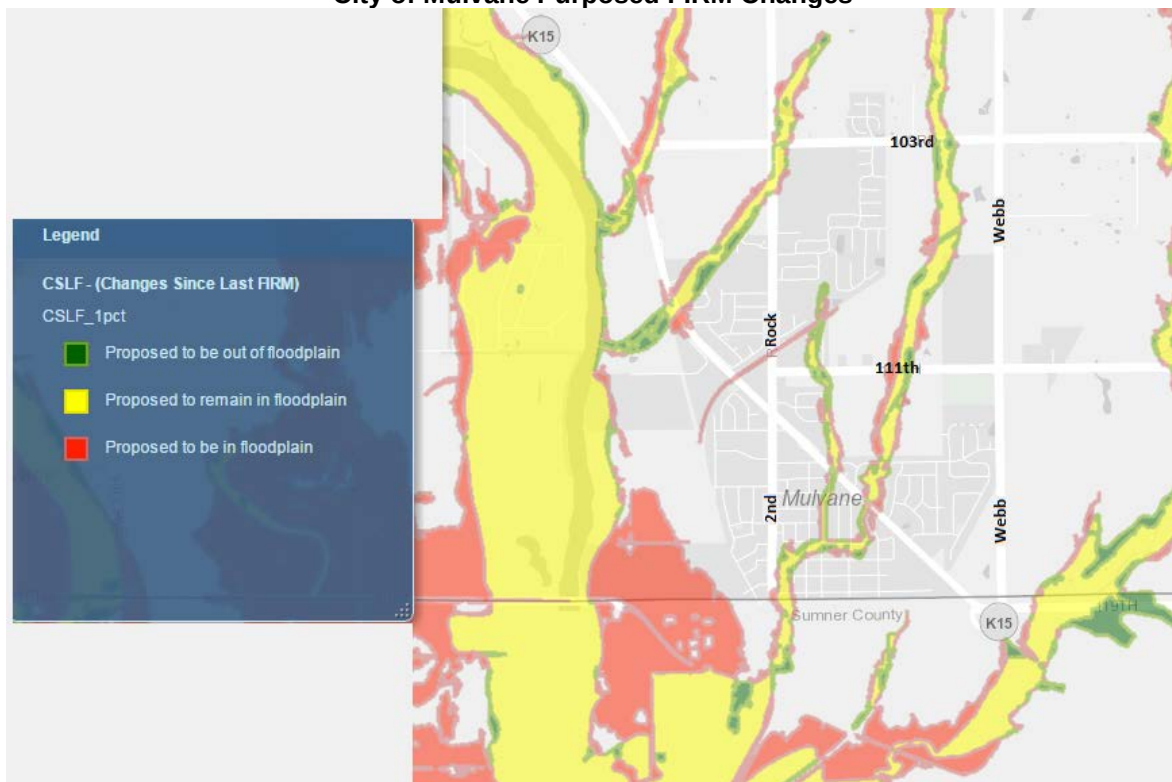




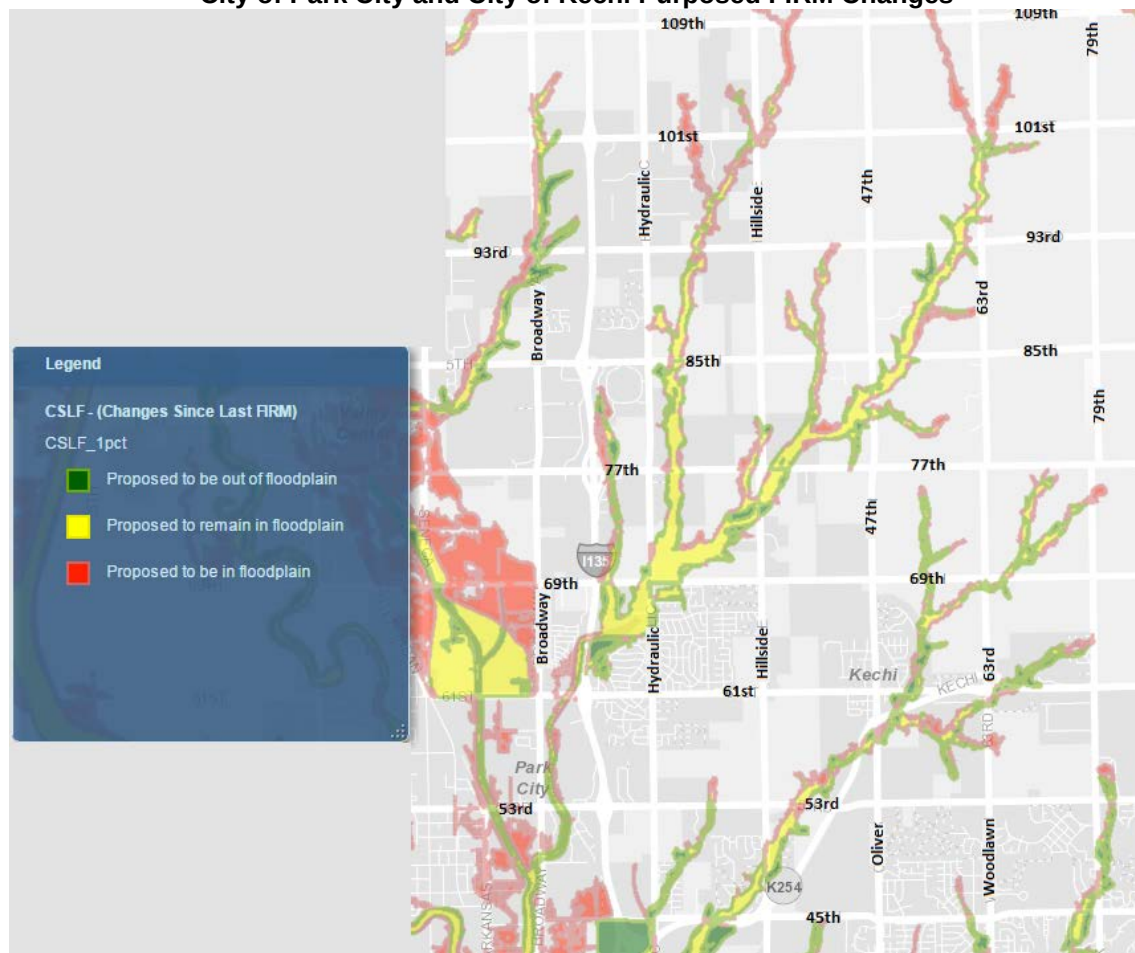
City of Mount Hope Purposed FIRM Changes



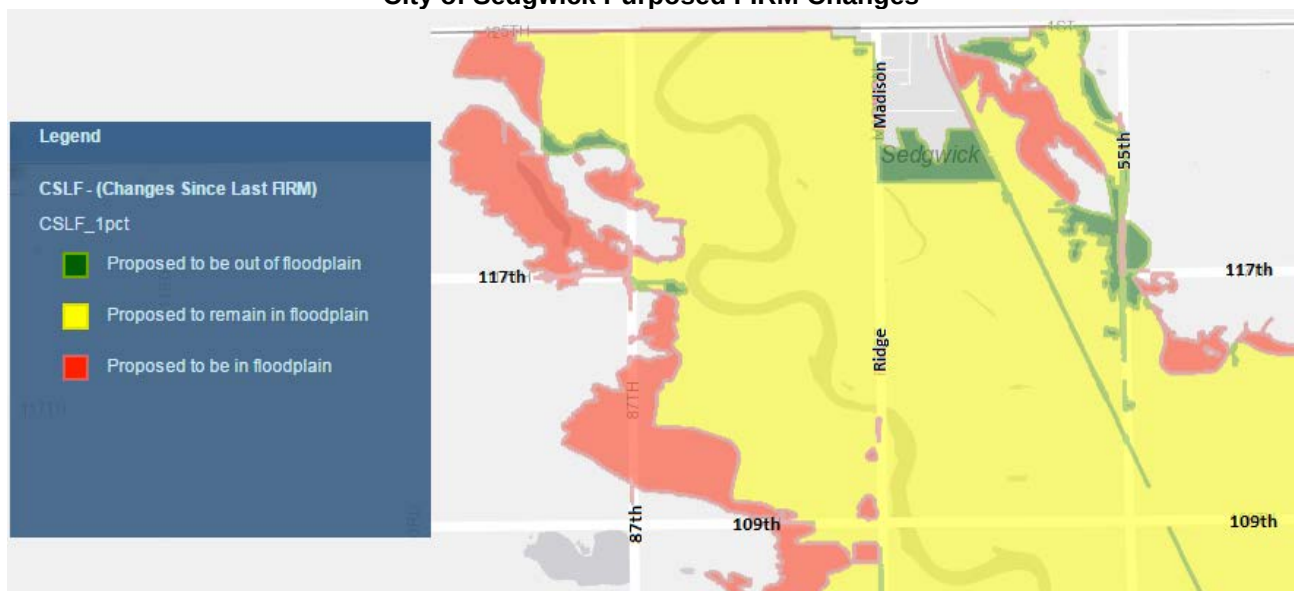
City of Mulvane Purposed FIRM Changes



City of Park City and City of Kechi Purposed FIRM Changes

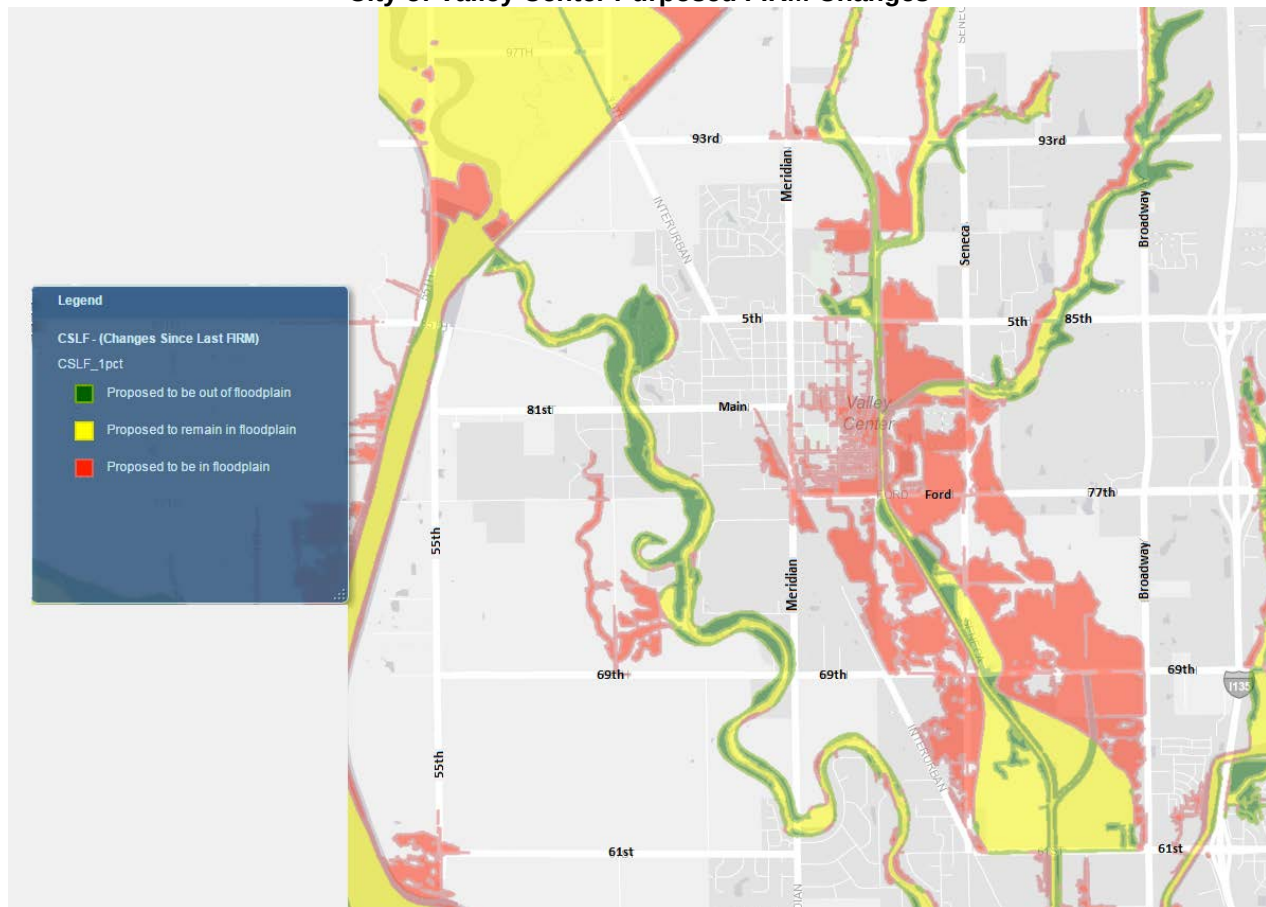


City of Sedgwick Purposed FIRM Changes

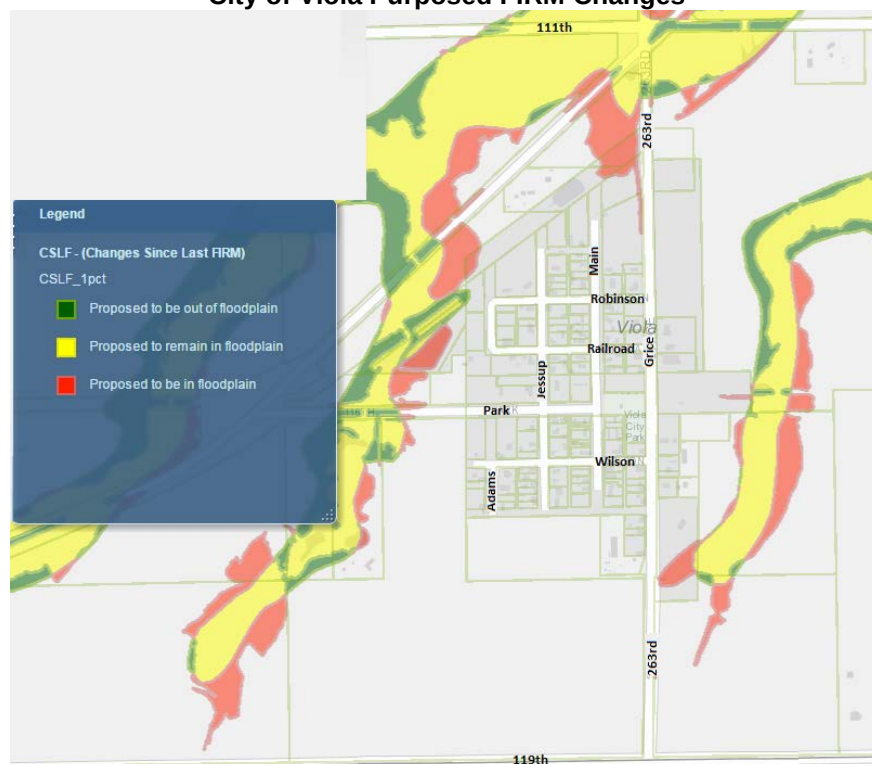




## City of Valley Center Purposed FIRM Changes

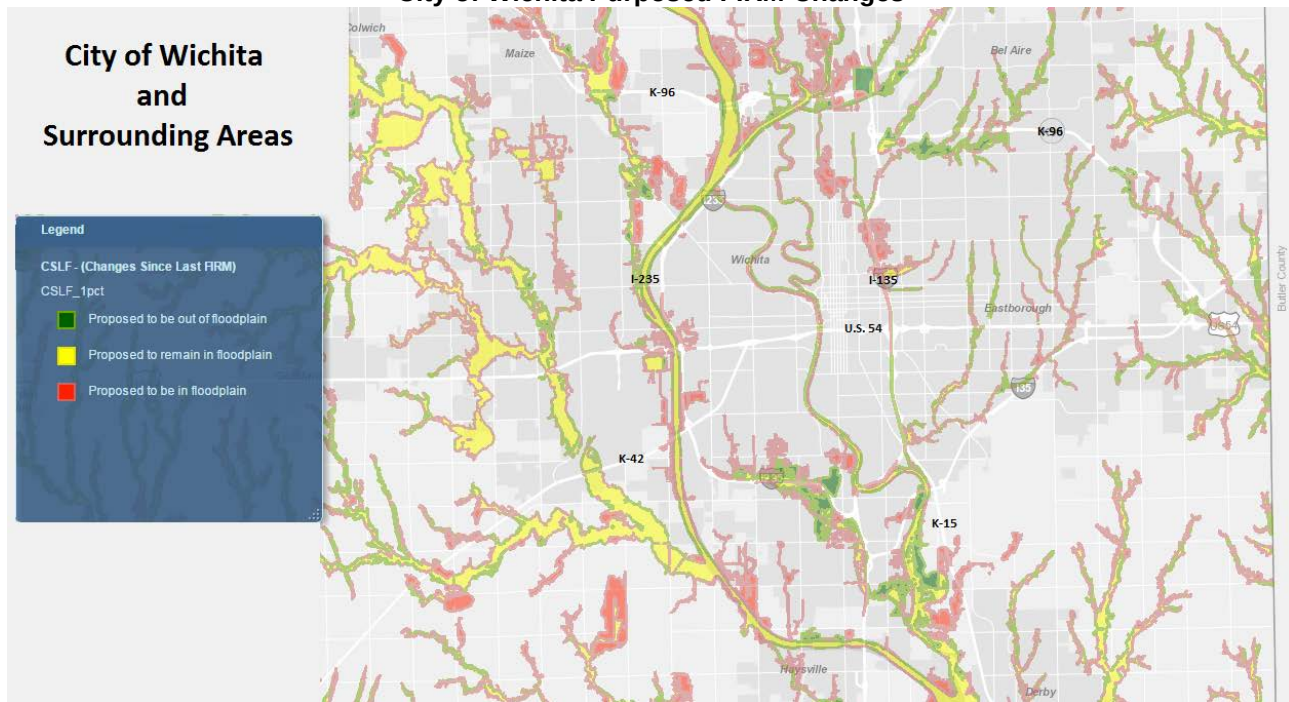


## City of Viola Purposed FIRM Changes



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### City of Wichita Purposed FIRM Changes



### Regulatory

Chapter 13 of the Sedgwick County Code relates to Floodplain Management for Sedgwick County, Kansas. Other jurisdictions with Sedgwick County have also adopted similar floodplain management codes (i.e. Title 27, Chapter 27.06 for the City of Wichita). As of November 12, 2015, the following communities are in FEMA's National Flood Program as reported in the Community Status Book Report:

### Communities Participating in the National Flood Program

| CID     | Community Name         | County                        | Init FHBM Identified | Init FIRM Identified | Curr Eff Map Date | Reg-Emer Date |
|---------|------------------------|-------------------------------|----------------------|----------------------|-------------------|---------------|
| 200322# | ANDALE, CITY OF        | SEDGWICK COUNTY               | 08/16/74             | 02/02/07             | (NSFHA)           | 06/11/76      |
| 200864# | BEL AIRE, CITY OF      | SEDGWICK COUNTY               | 03/18/85             | 03/18/87             | 02/02/07          | 03/15/87      |
| 200390# | BENTLEY, CITY OF       | SEDGWICK COUNTY               |                      | 02/02/07             | (NSFHA)           | 08/12/09      |
| 200478# | CHENEY, CITY OF        | SEDGWICK COUNTY               | 03/26/76             | 02/02/07             | 02/02/07          | 11/30/05      |
| 200482# | CLEARWATER, CITY OF    | SEDGWICK COUNTY               | 09/05/75             | 08/15/80             | 02/02/07          | 08/15/80      |
| 200484# | COLWICH, CITY OF       | SEDGWICK COUNTY               | 09/26/75             | 07/11/78             | 02/02/07          | 07/11/78      |
| 200323# | DERBY, CITY OF         | SEDGWICK COUNTY               | 06/28/74             | 10/15/81             | 02/02/07          | 10/15/81      |
| 200498# | GARDEN PLAIN, CITY OF  | SEDGWICK COUNTY               | 08/15/75             | 09/18/85             | 02/02/07          | 09/18/85      |
| 200500# | GODDARD, CITY OF       | SEDGWICK COUNTY               | 07/16/76             | 02/02/07             | 05/02/12          | 06/10/80      |
| 200324# | HAYSVILLE, CITY OF     | SEDGWICK COUNTY               | 06/28/74             | 08/17/81             | 02/02/07          | 08/17/81      |
| 200429# | KECHI, CITY OF         | SEDGWICK COUNTY               | 04/23/76             | 08/15/80             | 02/02/07          | 08/15/80      |
| 200520# | MAIZE, CITY OF         | SEDGWICK COUNTY               | 10/29/76             | 02/02/07             | 05/02/12          | 12/24/02      |
| 200325# | MOUNT HOPE, CITY OF    | SEDGWICK COUNTY               | 10/18/74             | 02/02/07             | 02/02/07          | 06/27/78      |
| 200326# | MULVANE, CITY OF       | SUMNER COUNTY/SEDGWICK COUNTY | 06/28/74             | 09/29/78             | 11/18/09          | 09/29/78      |
| 200963# | PARK CITY, CITY OF     | SEDGWICK COUNTY               |                      | 11/19/86             | 02/02/07          | 11/19/86      |
| 200321# | SEDGWICK COUNTY*       | SEDGWICK COUNTY               | 08/02/74             | 06/03/86             | 05/02/12          | 06/03/86      |
| 200134# | SEDGWICK, CITY OF      | SEDGWICK COUNTY/HARVEY COUNTY | 06/07/74             | 09/15/78             | 08/04/14          | 09/15/78      |
| 200327# | VALLEY CENTER, CITY OF | SEDGWICK COUNTY               | 06/28/74             | 01/14/77             | 02/02/07          | 01/14/77      |
| 200328# | WICHITA, CITY OF       | SEDGWICK COUNTY               | 12/27/74             | 05/15/86             | 05/02/12          | 05/15/86      |

### Communities Not in the National Flood Program

| CID     | Community Name       | County          | Init FHBM Identified | Init FIRM Identified | Curr Eff Map Date | Sanction Date |
|---------|----------------------|-----------------|----------------------|----------------------|-------------------|---------------|
| 200491# | EASTBOROUGH, CITY OF | SEDGWICK COUNTY | 09/19/75             | 02/02/07             | 02/02/07          | 09/19/76      |
| 200870# | VIOLA, CITY OF       | SEDGWICK COUNTY |                      | 02/02/07             | 02/02/07          | 02/02/08      |

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

In addition, Wichita and Sedgwick County have adopted the 2006 International Code Council's International Building Code. This code has Section 1612 that specifically addresses flood loads. Information on this section can be found at: [http://publicecodes.cyberregs.com/icod/ibc/2006f2/icod\\_ibc\\_2006f2\\_16\\_sec012.htm](http://publicecodes.cyberregs.com/icod/ibc/2006f2/icod_ibc_2006f2_16_sec012.htm)

### Community Rating System

FEMA's National Flood Insurance Program Community Rating System (CRS) is a voluntary program for National Flood Insurance Program (NFIP) participating communities. The goals of the CRS are to reduce flood damages to insurable property, strengthen and support the insurance aspects of the NFIP, and encourage a comprehensive approach to floodplain management. The CRS has been developed to provide incentives in the form of premium discounts for communities to go beyond the minimum floodplain management requirements to develop extra measures to provide protection from flooding. As of October 1, 2015, the following communities are identified as CRS participants:

#### **COMMUNITY RATING SYSTEM ELIGIBLE COMMUNITIES EFFECTIVE OCTOBER 1, 2015**

| COMMUNITY NUMBER | COMMUNITY NAME         | CRS ENTRY DATE | CURRENT EFFECTIVE DATE | CURRENT CLASS | % DISCOUNT FOR SFHA <sup>1</sup> | % DISCOUNT FOR NON-SFHA | STATUS <sup>2</sup> |
|------------------|------------------------|----------------|------------------------|---------------|----------------------------------|-------------------------|---------------------|
| 200864           | Bel Aire, City of      | 05/1/14        | 05/1/14                | 8             | 10                               | 5                       | C                   |
| 200323           | Derby, City of         | 10/1/13        | 10/1/13                | 8             | 10                               | 5                       | C                   |
| 200324           | Haysville, City of     | 10/1/13        | 10/1/13                | 8             | 10                               | 5                       | C                   |
| 200327           | Valley Center, City of | 05/1/13        | 05/1/13                | 8             | 10                               | 5                       | C                   |

1 For the purpose of determining CRS discounts, all AR and A99 Zones are treated as non-SFHAs.

2 Status: C = Current, R = Rescinded

### *Hazard Severity Ratings*

The following rating table indicates the probability of a major flood event occurring at least once every 25 years, impacting less than 25% of the land, resulting in minor injuries and/or illnesses with few homes destroyed and/or damaged, having short term recovery of resources, and low direct and/or indirect costs.

FLOOD HAZARD AND EVENT RATING TABLE

| Consequence          | Probable Rating | Catastrophic Rating |
|----------------------|-----------------|---------------------|
| Area Impacted        | 1               | 3                   |
| Probability          | 3               | 2                   |
| Health & Safety      | 1               | 4                   |
| Property             | 2               | 4                   |
| Environment          | 2               | 3                   |
| Economic             | 1               | 4                   |
| <b>Total Ratings</b> | <b>10</b>       | <b>20</b>           |

### *Catastrophic Event*

A probable and catastrophic worst-case event resulting in the failure of the Wichita and Valley Center Floodway located on the west of the city. Events leading up to this type of event are conditions equal or exceeding the 1979, 1998 and 2008 flood events with near maximum capacities of the Little Arkansas River and Wichita Drainage Canals. Over half of the City of Wichita would be inundated by a sizeable breach of the levee system.



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 11.2 TORNADOES

*Definition:* According to the *Glossary of Meteorology* (AMS 2000), a tornado is "a violently rotating column of air, pendant from a cumuliform cloud or underneath a cumuliform cloud, and often (but not always) visible as a funnel cloud." Literally, in order for a vortex to be classified as a tornado, it must be in contact with the ground and the cloud base. Tornadoes can travel over the ground at 20 to 40 mph, been known to reach 2.5 miles in width, and have ground level wind speeds up to 318 mph.

Although tornadoes have been documented on every continent, they occur most frequently in the United States east of the Rocky Mountains. Kansas is situated in an area that is generally known as "Tornado Alley." Climatological conditions are such that warm and cold air masses meet in the center of the country to create conditions of great instability and fast moving air at high pressure that can ultimately result in the formation of tornado funnels. In Kansas, most tornadoes and tornado-related deaths and injuries occur during the months of April, May, and June. However, tornadoes have struck in every month. Similarly, while most tornadoes occur between 3:00 and 9:00 p.m., a tornado can strike at any time.

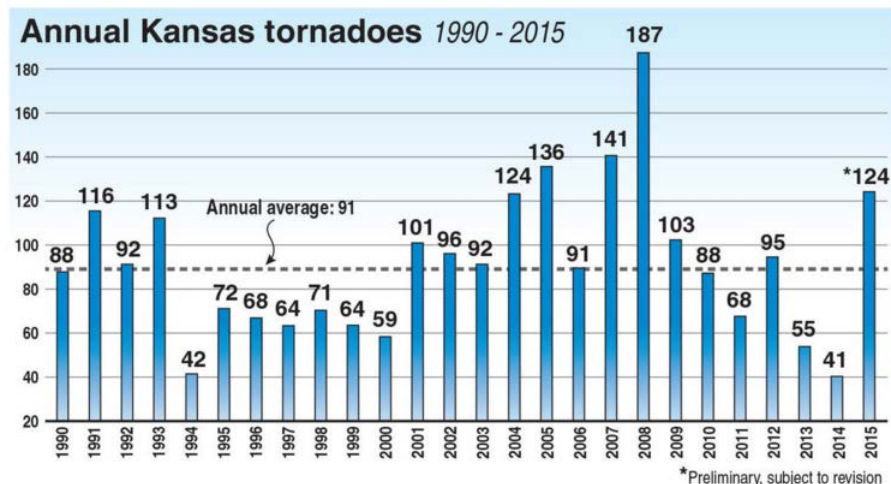
Prior to February 1, 2007, tornado intensity was measured by the Fujita (F) scale. This scale was revised and is now the Enhanced Fujita scale. Both scales are sets of wind estimates (not measurements) based on damage. The new scale provides more damage indicators (28) and associated degrees of damage,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

Comparison of Fujita and Enhanced Fujita Scales

| FUJITA SCALE |                        |                     | DERIVED EF SCALE |                     | OPERATIONAL EF SCALE |                     |
|--------------|------------------------|---------------------|------------------|---------------------|----------------------|---------------------|
| F Number     | Fastest 1/4-mile (mph) | 3 Second Gust (mph) | EF Number        | 3 Second Gust (mph) | EF Number            | 3 Second Gust (mph) |
| 0            | 40-72                  | 45-78               | 0                | 65-85               | 0                    | 65-85               |
| 1            | 73-112                 | 79-117              | 1                | 86-109              | 1                    | 86-110              |
| 2            | 113-157                | 118-161             | 2                | 110-137             | 2                    | 111-135             |
| 3            | 158-207                | 162-209             | 3                | 138-167             | 3                    | 136-165             |
| 4            | 208-260                | 210-261             | 4                | 168-199             | 4                    | 166-200             |
| 5            | 261-318                | 262-317             | 5                | 200-234             | 5                    | Over 200            |

Source: <http://www.spc.noaa.gov/faq/tornado/ef-scale.html>

Since 1990, the average number of tornadoes in Kansas is 91 as the chart below shows with 2015 ranking fifth and tying with 2004.



## KANSAS TORNADO STATISTICS

by County  
1950 - 2014

### TORNADOES

|                |               |                |                |                |                |                |                 |                  |                |                    |                  |                   |
|----------------|---------------|----------------|----------------|----------------|----------------|----------------|-----------------|------------------|----------------|--------------------|------------------|-------------------|
| CHEYENNE<br>42 | RAWLINS<br>47 | DECATUR<br>45  | NORTON<br>27   | PHILLIPS<br>41 | SMITH<br>43    | JEWELL<br>38   | REPUBLIC<br>52  | WASHINGTON<br>36 | MARSHALL<br>32 | NEMAH<br>37        | BROWN<br>44      | DONIPHAN<br>19    |
| SHERMAN<br>104 | THOMAS<br>46  | SHERIDAN<br>38 | GRAHAM<br>38   | ROOKS<br>49    | OSBORNE<br>42  | MITCHELL<br>47 | CLOUD<br>47     | CLAY<br>38       | RILEY<br>27    | POTTAWATOMIE<br>31 | JACKSON<br>30    | ATCHISON<br>15    |
| WALLACE<br>35  | LOGAN<br>26   | GOVE<br>48     | TREGO<br>59    | ELLIS<br>57    | RUSSELL<br>77  | LINCOLN<br>31  | OTTAWA<br>27    | DICKINSON<br>37  | GEARY<br>17    | WABAUNSEE<br>32    | SHAWNEE<br>50    | JEFFERSON<br>40   |
| GREELEY<br>34  | WICHITA<br>25 | SCOTT<br>44    | LANE<br>33     | NESS<br>45     | RUSH<br>49     | BARTON<br>95   | ELLSWORTH<br>49 | SALINE<br>38     | MORRIS<br>31   | LYON<br>45         | OSAGE<br>43      | DOUGLAS<br>39     |
| HAMILTON<br>23 | KEARNY<br>42  | FINNEY<br>88   | HODGEMAN<br>46 | PAWNEE<br>50   | STAFFORD<br>70 | RENO<br>77     | RICE<br>45      | MCPHERSON<br>54  | MARION<br>47   | CHASE<br>38        | COFFEY<br>23     | ANDERSON<br>15    |
| STANTON<br>22  | GRANT<br>24   | HASKELL<br>29  | GRAY<br>39     | FORD<br>82     | EDWARDS<br>47  | PRATT<br>70    | KIOWA<br>57     | KINGMAN<br>62    | HARVEY<br>47   | BUTLER<br>77       | GREENWOOD<br>41  | WOODSON<br>12     |
| MORTON<br>18   | STEVENS<br>24 | SEWARD<br>34   | MEADE<br>44    | CLARK<br>39    | COMANCHE<br>38 | BARBER<br>34   | HARPER<br>61    | SUMNER<br>83     | COWLEY<br>69   | ELK<br>24          | WILSON<br>15     | NEOSHO<br>31      |
|                |               |                |                |                |                |                |                 |                  |                | CHAUTAUQUA<br>19   | MONTGOMERY<br>33 | LABETTE<br>35     |
|                |               |                |                |                |                |                |                 |                  |                |                    |                  | CHEROKEE<br>36    |
|                |               |                |                |                |                |                |                 |                  |                |                    |                  | LEAVENWORTH<br>30 |
|                |               |                |                |                |                |                |                 |                  |                |                    |                  | WYANDOTTE<br>10   |

Source: National Weather Service

## KANSAS TORNADO STATISTICS

by County  
1950 - 2014

### FATALITIES

|               |              |               |               |               |               |               |                |                 |               |                   |                 |                  |
|---------------|--------------|---------------|---------------|---------------|---------------|---------------|----------------|-----------------|---------------|-------------------|-----------------|------------------|
| CHEYENNE<br>0 | RAWLINS<br>0 | DECATUR<br>0  | NORTON<br>0   | PHILLIPS<br>0 | SMITH<br>0    | JEWELL<br>0   | REPUBLIC<br>0  | WASHINGTON<br>2 | MARSHALL<br>0 | NEMAH<br>0        | BROWN<br>0      | DONIPHAN<br>0    |
| SHERMAN<br>0  | THOMAS<br>0  | SHERIDAN<br>0 | GRAHAM<br>0   | ROOKS<br>0    | OSBORNE<br>0  | MITCHELL<br>0 | CLOUD<br>1     | CLAY<br>1       | RILEY<br>0    | POTTAWATOMIE<br>1 | JACKSON<br>4    | ATCHISON<br>0    |
| WALLACE<br>0  | LOGAN<br>0   | GOVE<br>0     | TREGO<br>5    | ELLIS<br>0    | RUSSELL<br>1  | LINCOLN<br>0  | OTTAWA<br>2    | DICKINSON<br>1  | GEARY<br>0    | WABAUNSEE<br>1    | SHAWNEE<br>18   | JEFFERSON<br>0   |
| GREELEY<br>0  | WICHITA<br>0 | SCOTT<br>1    | LANE<br>0     | NESS<br>0     | RUSH<br>0     | BARTON<br>2   | ELLSWORTH<br>0 | SALINE<br>0     | MORRIS<br>0   | LYON<br>7         | OSAGE<br>17     | DOUGLAS<br>1     |
| HAMILTON<br>0 | KEARNY<br>0  | FINNEY<br>1   | HODGEMAN<br>0 | PAWNEE<br>0   | STAFFORD<br>3 | RENO<br>0     | RICE<br>0      | MCPHERSON<br>1  | MARION<br>1   | CHASE<br>0        | COFFEY<br>0     | ANDERSON<br>3    |
| STANTON<br>0  | GRANT<br>0   | HASKELL<br>0  | GRAY<br>0     | FORD<br>0     | EDWARDS<br>0  | PRATT<br>3    | KIOWA<br>11    | KINGMAN<br>0    | HARVEY<br>1   | BUTLER<br>28      | GREENWOOD<br>0  | WOODSON<br>0     |
| MORTON<br>1   | STEVENS<br>1 | SEWARD<br>0   | MEADE<br>0    | CLARK<br>0    | COMANCHE<br>0 | BARBER<br>0   | HARPER<br>0    | SUMNER<br>5     | COWLEY<br>77  | ELK<br>2          | WILSON<br>0     | NEOSHO<br>0      |
|               |              |               |               |               |               |               |                |                 |               | CHAUTAUQUA<br>0   | MONTGOMERY<br>1 | LABETTE<br>1     |
|               |              |               |               |               |               |               |                |                 |               |                   |                 | CHEROKEE<br>4    |
|               |              |               |               |               |               |               |                |                 |               |                   |                 | LEAVENWORTH<br>2 |
|               |              |               |               |               |               |               |                |                 |               |                   |                 | WYANDOTTE<br>2   |

Source: National Weather Service

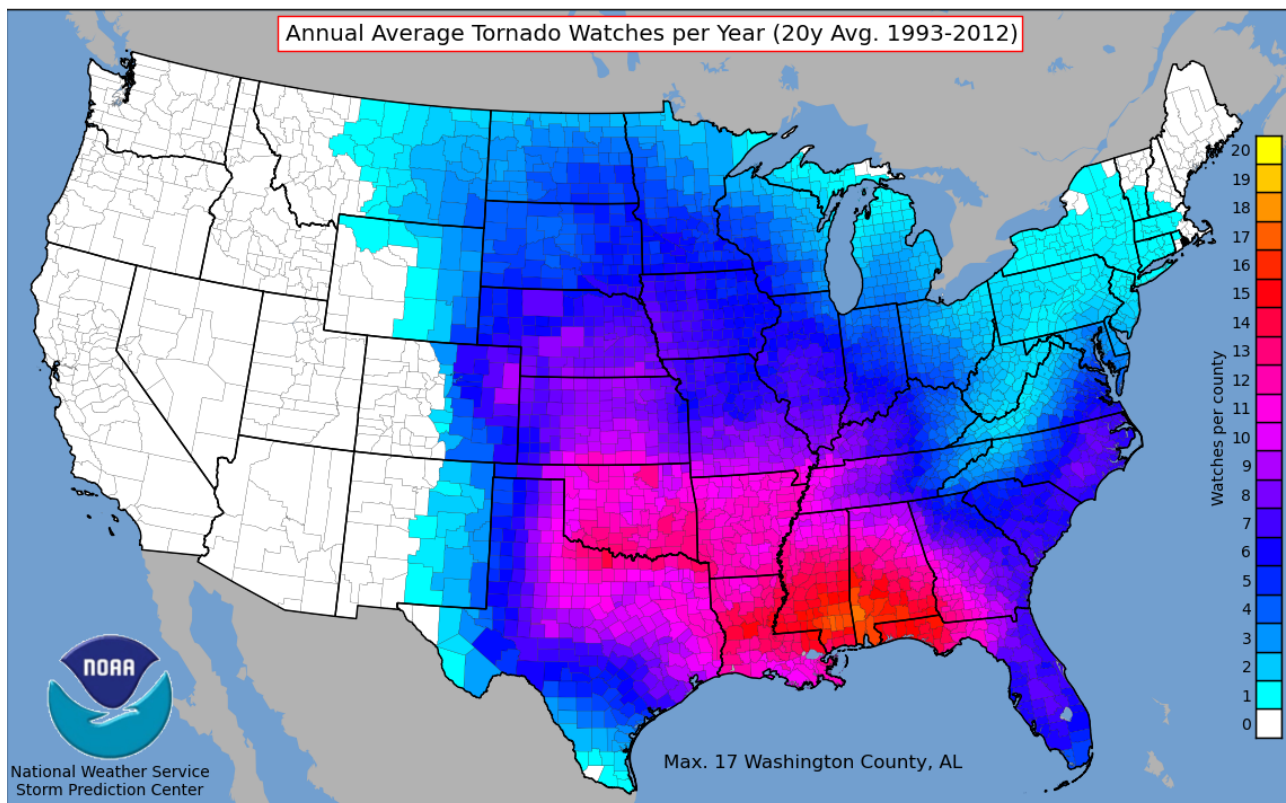


## KANSAS TORNADO STATISTICS

by County  
1950 - 2014  
INJURIES

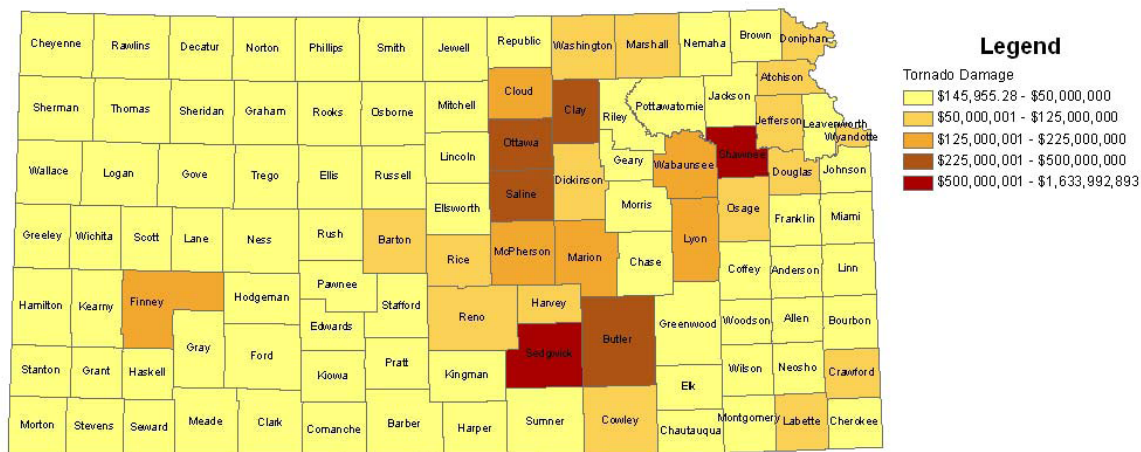
|          |         |          |          |          |          |          |           |            |          |              |            |           |
|----------|---------|----------|----------|----------|----------|----------|-----------|------------|----------|--------------|------------|-----------|
| CHEYENNE | RAWLINS | DECATUR  | NORTON   | PHILLIPS | SMITH    | JEWELL   | REPUBLIC  | WASHINGTON | MARSHALL | NEMAH        | BROWN      | DONIPHAN  |
| 0        | 4       | 5        | 0        | 1        | 2        | 1        | 1         | 12         | 1        | 3            | 5          | 2         |
| SHERMAN  | THOMAS  | SHERIDAN | GRAHAM   | ROOKS    | OSBORNE  | MITCHELL | CLOUD     | CLAY       | RILEY    | POTTAWATOMIE | JACKSON    | ATCHISON  |
| 0        | 1       | 0        | 0        | 6        | 13       | 5        | 8         | 31         | 51       | 5            | 17         | 11        |
| WALLACE  | LOGAN   | GOVE     | TREGO    | ELLIS    | RUSSELL  | LINCOLN  | OTTAWA    | DICKINSON  | GEARY    | WABAUNSEE    | SHAWNEE    | JEFFERSON |
| 4        | 0       | 3        | 101      | 6        | 7        | 2        | 9         | 12         | 3        | 26           | 528        | 101       |
| GREELEY  | WICHITA | SCOTT    | LANE     | NESS     | RUSH     | BARTON   | ELLSWORTH | SALINE     | MORRIS   | OSAGE        | DOUGLAS    | JOHNSON   |
| 0        | 4       | 1        | 2        | 4        | 8        | 38       | 0         | 66         | 7        | 6            | 48         | 12        |
| HAMILTON | KEARNY  | FINNEY   | HODGEMAN | PAWNEE   | STAFFORD | RICE     | McPHERSON | MARION     | CHASE    | LYON         | COFFEY     | ANDERSON  |
| 1        | 0       | 41       | 4        | 1        | 5        | 6        | 16        | 2          | 2        | 222          | 5          | 12        |
| STANTON  | GRANT   | HASKELL  | GRAY     | FORD     | EDWARDS  | PRATT    | RENO      | HARVEY     | BUTLER   | GREENWOOD    | WOODSON    | ALLEN     |
| 0        | 9       | 10       | 3        | 0        | 7        | 10       | 22        | 63         | 225      | 10           | 8          | 4         |
| MORTON   | STEVENS | SEWARD   | MEADE    | CLARK    | COMANCHE | BARBER   | HARPER    | SUMNER     | COWLEY   | CHAUTAQUA    | MONTGOMERY | LABETTE   |
| 2        | 5       | 15       | 0        | 0        | 2        | 2        | 1         | 14         | 293      | 0            | 1          | 29        |
|          |         |          |          |          |          |          |           |            |          |              |            | CHEROKEE  |
|          |         |          |          |          |          |          |           |            |          |              |            | 66        |

Source: National Weather Service



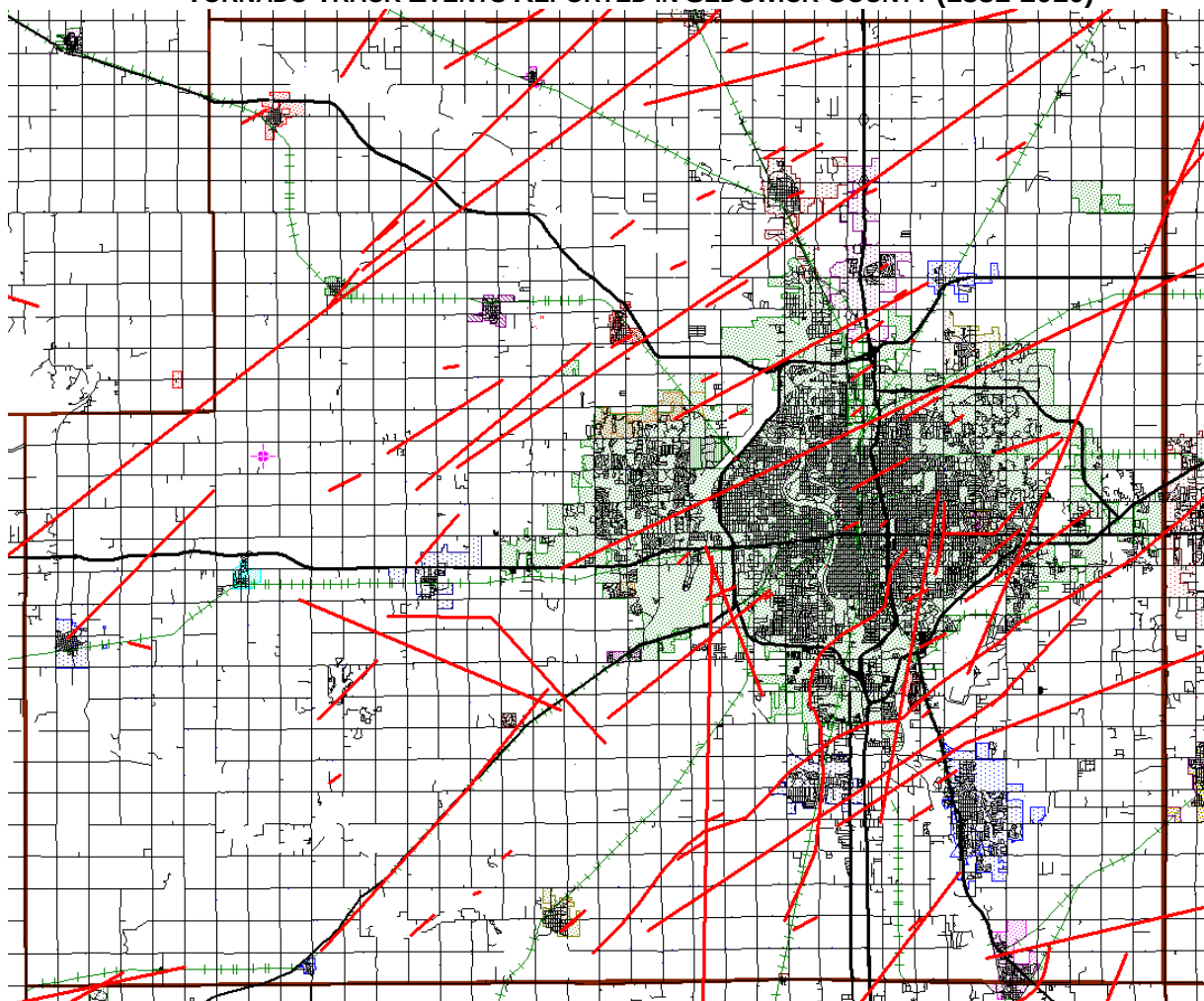
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### TORNADO DAMAGE 1950–2006



Source: National Climatic Data Center  
Map Compilation: AMEC 8/31/07

### TORNADO TRACK EVENTS REPORTED IN SEDGWICK COUNTY (1881-2010)



About 59% of tornadoes occur during the months of May and June. Historical information was obtained from the NOAA's National Climatic Data Center (NCDC), the National Weather Service, and the book entitled "Significant Tornadoes 1680-1991" by Thomas P. Grazulis.

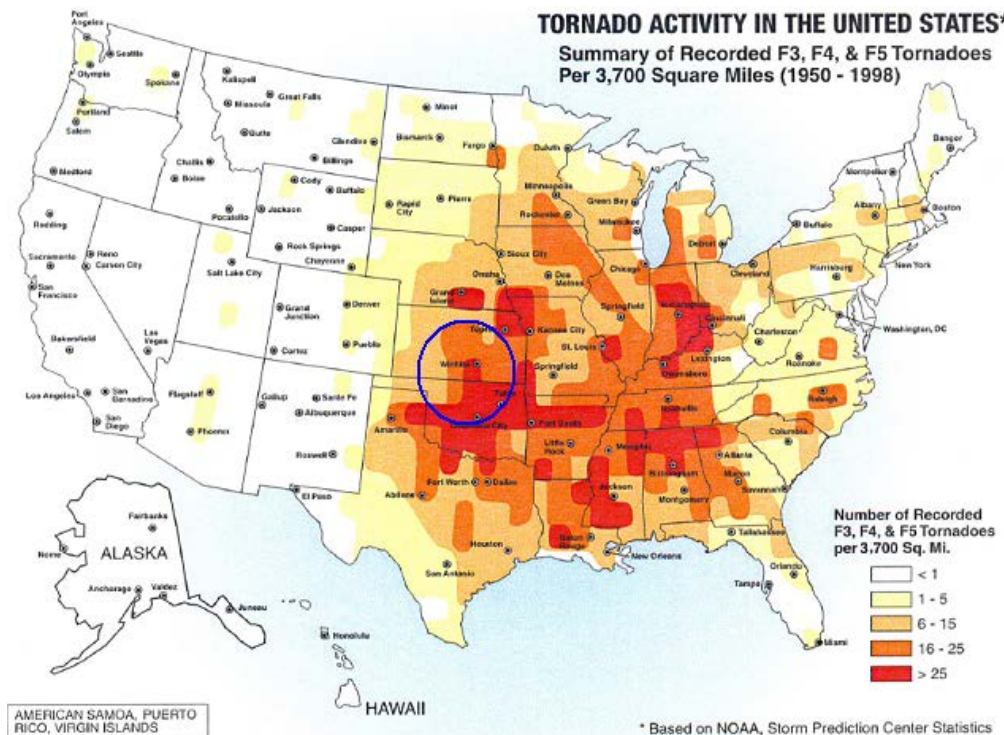
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

**Warning Time:** Less than 10 minutes (sighting)

**Duration:** Minutes to less than one hour

### Geographic Location

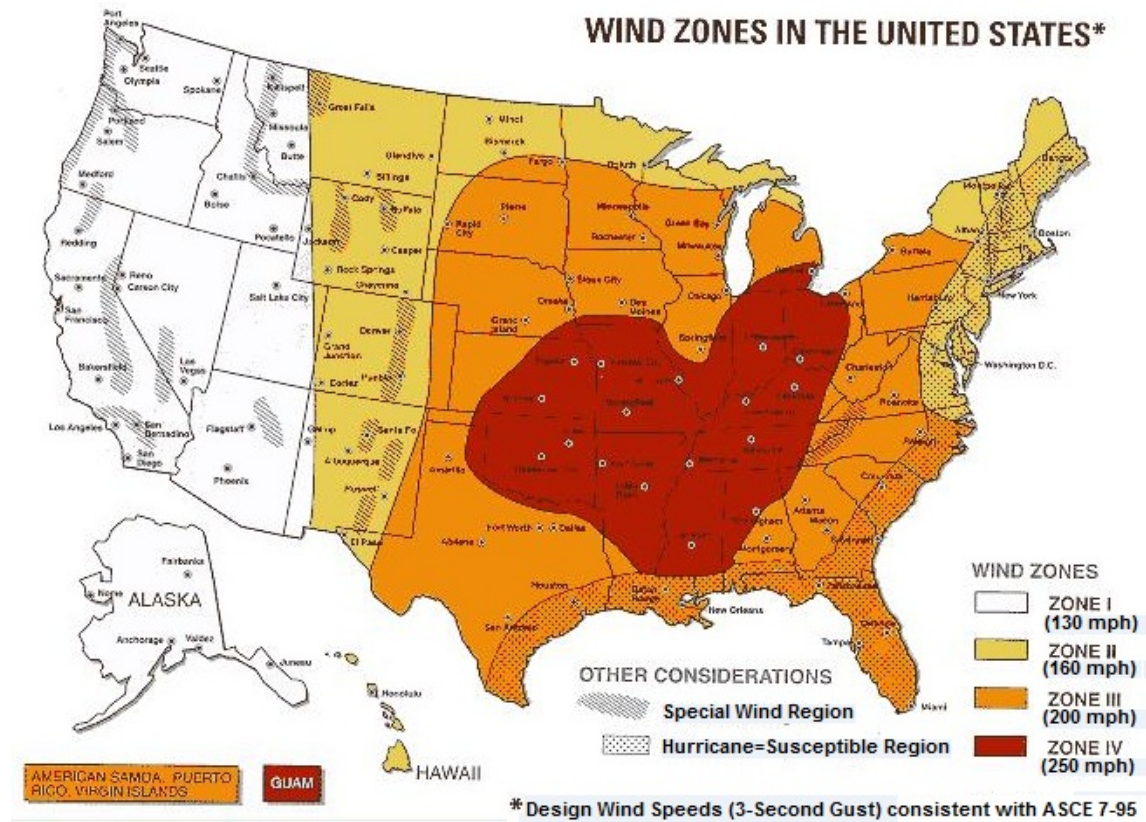
While tornadoes can occur in all areas of the State of Kansas, historically, some areas of the state have been more susceptible to this type of damaging storm. The tornado figure shown on the next page illustrates the number of F3, F4, and F5 tornadoes recorded in the United States per 3,700 square miles between 1950 and 1998. Sedgwick County is shown to have 16-25 tornadoes of this magnitude during this 48-year period. Additionally, according to the following wind zone figure, Sedgwick County is in Wind Zone IV, the zone in the US that has experienced the most and the strongest tornado activity.



The number of tornadoes recorded per 3,700 square miles

Source: *Taking Shelter from the Storm*, FEMA, 2004





According to the National Weather Service, there have been a total of 3,051 tornadoes reported throughout the state of Kansas between 1950 and 2005, or annual average of 54.5 tornadoes. There have been 75 tornado events recorded for Sedgwick County during that same period (Appendix B), or approximately 2.5% of the state total. In Sedgwick County, there were a reported 13 deaths and 321 injuries from the tornadoes, and resulting in over \$427 million in damages/losses. About 59% of tornadoes occur during the months of May and June. Historical information was obtained from the NOAA's National Climatic Data Center (NCDC), the National Weather Service, and the book entitled *"Significant Tornadoes 1680-1991"* by Thomas P. Grazulis.



Andale 1917



Wichita-Andover 1991

## Regulatory

Although there are no regulatory requirements for building protection, the Federal Emergency Management Agency (FEMA) does provide guidance under FEMA 361 "Design and Construction Guidance for Community Shelters" for new construction. This guidance manual is for engineers, architects, building officials, and prospective shelter owners. It presents important information about the design and construction of community

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

shelters that will provide protection during tornado and hurricane events. For the purpose of this manual, a community shelter is defined as a shelter that is designed and constructed to protect a large number of people from a natural hazard event. This differs slightly from FEMA 320 *"Taking Shelter from the Storm: Building a Safe Room Inside Your House"* which is a guidance manual for homeowners.

Using Project Impact funding in 2001, the Wichita School District (USD 259) started undergoing an initiative for the construction of school shelters using criteria outlined in FEMA 361. Park Elementary contains the first multipurpose room shelter and was ready for use on March 25, 2002. About three months after completion it had already been used three times during high-wind events. As in many other schools, the hallways in Park Elementary were the originally designated refuge areas.

### *Hazard Severity Ratings*

The following rating table indicates the probability of a major tornado event occurring at least once every 25 years, impacting less than 25% of the land, resulting in few fatalities with many homes destroyed and/or damaged, having short term recovery of resources, and low direct and/or indirect costs.

TORNADO HAZARD AND EVENT RATING TABLE

| Consequence          | Probable Rating | Catastrophic Rating |
|----------------------|-----------------|---------------------|
| Area Impacted        | 1               | 1                   |
| Probability          | 3               | 3                   |
| Health & Safety      | 3               | 4                   |
| Property             | 3               | 3                   |
| Environment          | 2               | 3                   |
| Economic             | 1               | 3                   |
| <b>Total Ratings</b> | <b>13</b>       | <b>17</b>           |

### *Catastrophic Event*

A catastrophic worst case event would be several tornadoes of category F3 and higher intensity from a multi-supercell storm system striking the City of Wichita on work days between 0800 and 0900 hours, 1630 and 1730 hours, and after 2100 hours. Transportation would be greatly impacted with high traffic volume during these workday periods, and nighttime hours can affect individual's asleep and reduced visual acuity. Additional economic impact may result from the loss of the business center and historical sites (i.e. Old Town).



### 11.3 STORMS (WINTER-SUMMER)

*Definition:* An atmospheric disturbance manifested in strong winds accompanied by rain, snow, or other precipitation and often by thunder and lightning.

#### 11.3.1 STORM CLASSIFICATIONS

- **Single cell (pulse) storms** are rare and typically last 20-30 minutes and can produce severe weather elements such as downbursts, hail, some heavy rainfall and occasionally weak tornadoes.
- **Multicell cluster storms** are a group of cells moving as a single unit, with each cell in a different stage of the thunderstorm life cycle and can produce moderate size hail, flash floods and weak tornadoes.
- **Multicell line storms (squall lines)** consist of a line of storms with a continuous, well developed gust front at the leading edge of the line and can produce small to moderate size hail, occasional flash floods and weak tornadoes.
- **Supercells** are thunderstorms with a rotating updraft, and can produce strong downbursts, large hail, occasional flash floods and weak to violent tornadoes.
- **Severe Thunderstorms** are defined any thunderstorm which produces tornadoes, hail 0.75 inches or more in diameter, or winds of 50 knots (58 mph) or more.
- **Winter storm or heavy snow event** consists of a snowfall of at least four inches in 12 hours or six inches in 24 hours.
- **Blizzard** consists of winds exceeding 56 km (35 mi) per hour and the temperature at -7° C (20° F) or lower combining with either falling snow or snow on the ground reducing visibilities to 1/4 mile or less for at least three hours.



Downdrafts associated with thunderstorms can be very strong and localized, with damaging winds that can reach over 100 mph. A downburst is a strong downdraft that includes an outburst of potentially damaging winds on or near the ground (straight-line winds). Downbursts with a diameter of less than 2.5 miles are called microbursts whereas macrobursts are greater than 2.5 miles in diameter.



A derecho is a widespread and long-lived windstorm that is associated with a band of rapidly moving thunderstorms that are often "curved" in shape and can appear on radar with a single bow echo or multiple bow echoes. They have sustained winds greater than 57 mph and can exceed over 100 mph in intensity.



Gustnado (or Gustinado) is slang for a gust front tornado. It is a small tornado (F0 or F1), usually weak and short-lived, that occurs along the gust front of a thunderstorm. Often it is visible only as a debris cloud or dust whirl near the ground. Gustnadoes are not associated with storm-scale rotation (i.e. mesocyclones); they are more likely to be associated visually with a shelf cloud than with a wall cloud.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis



Hail is produced by intense thunderstorms as water droplets are picked up by strong updrafts and can be carried well above the freezing level. As the frozen droplets fall, the updraft can carry them back up to the top of the storm adding more ice layers. Typically the stronger the updraft, the more times a hailstone repeats this cycle and consequently, the larger it grows. Once the hail stone becomes too heavy to be supported by the updraft, it falls out of the cloud toward the surface. The hailstone reaches the ground as ice.

### 11.3.2 STORM DAMAGE LOSSES

Estimated storm loss data consist of windstorm, tornado and hail damage or other weather-related claim losses for insured real and personal property in Kansas reported for each calendar year and monthly during the calendar year. Estimated flood losses and other insured perils are not included in the data. The data shown below includes only estimated storm losses reported at the request of the Insurance Commissioner by the private insurance companies selling and servicing property insurance coverage in Kansas. It should be noted that most losses occur between the months of May through August. (Source: Kansas Insurance Department)

| Kansas Estimated Storm Losses |                  |                        |
|-------------------------------|------------------|------------------------|
| Year                          | No. Storm Claims | Est. Storm Losses      |
| 1996                          | 46,150           | \$100,000,000          |
| 1997                          | 53,600           | \$87,950,300           |
| 1998                          | 30,250           | \$103,700,000          |
| 1999                          | 80,925           | \$350,000,000          |
| 2000                          | 35,344           | \$118,000,000          |
| 2001                          | 103,149          | \$256,700,000          |
| 2002                          | 82,872           | \$248,800,000          |
| 2003                          | 63,778           | \$275,000,000          |
| 2004                          | 50,250           | \$199,550,000          |
| 2005                          | 63,875           | \$184,000,000          |
| 2006                          | 133,285          | \$394,287,000          |
| 2007                          | 32,290           | \$325,100,000          |
| 2008                          | 131,485          | \$595,800,000          |
| 2009                          | 137,400          | \$602,000,000          |
| 2010                          | 94,400           | \$370,000,000          |
| 2011                          | 197,255          | \$1,095,030,000        |
| 2012                          | 96,775           | \$400,335,000          |
| 2013                          | 86,990           | \$284,604,290          |
| 2014                          | 46,400           | \$112,396,455          |
| 2015                          | 54,870           | \$173,637,443          |
| 2016                          | 51,708           | \$107,260,873          |
| 2017                          | 47,736           | \$194,599,103          |
| <b>Total</b>                  | <b>1,720,787</b> | <b>\$6,578,750,464</b> |

Estimated storm loss data consist of windstorm, tornado, and hail damage or other weather-related claim losses for insured real and personal property in Kansas reported for each calendar year and monthly during the calendar year. Estimated flood losses and other insured perils are not included in the data. The data include only estimated storm losses reported at the request of the Insurance Commissioner by the private insurance companies selling and servicing property insurance coverage in Kansas.

There is no Kansas state law requiring the collection of the storm loss data. This reporting of estimated insured storm losses is a service provided by the Insurance Commissioner to the insuring public and news media.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

Estimated storm loss data are collected from insurance companies by the Commissioner, usually on a monthly basis and through special calls to report particularly significant tornado damage in cities, counties, or other affected areas. Data are reported to the public through news releases and on the website.

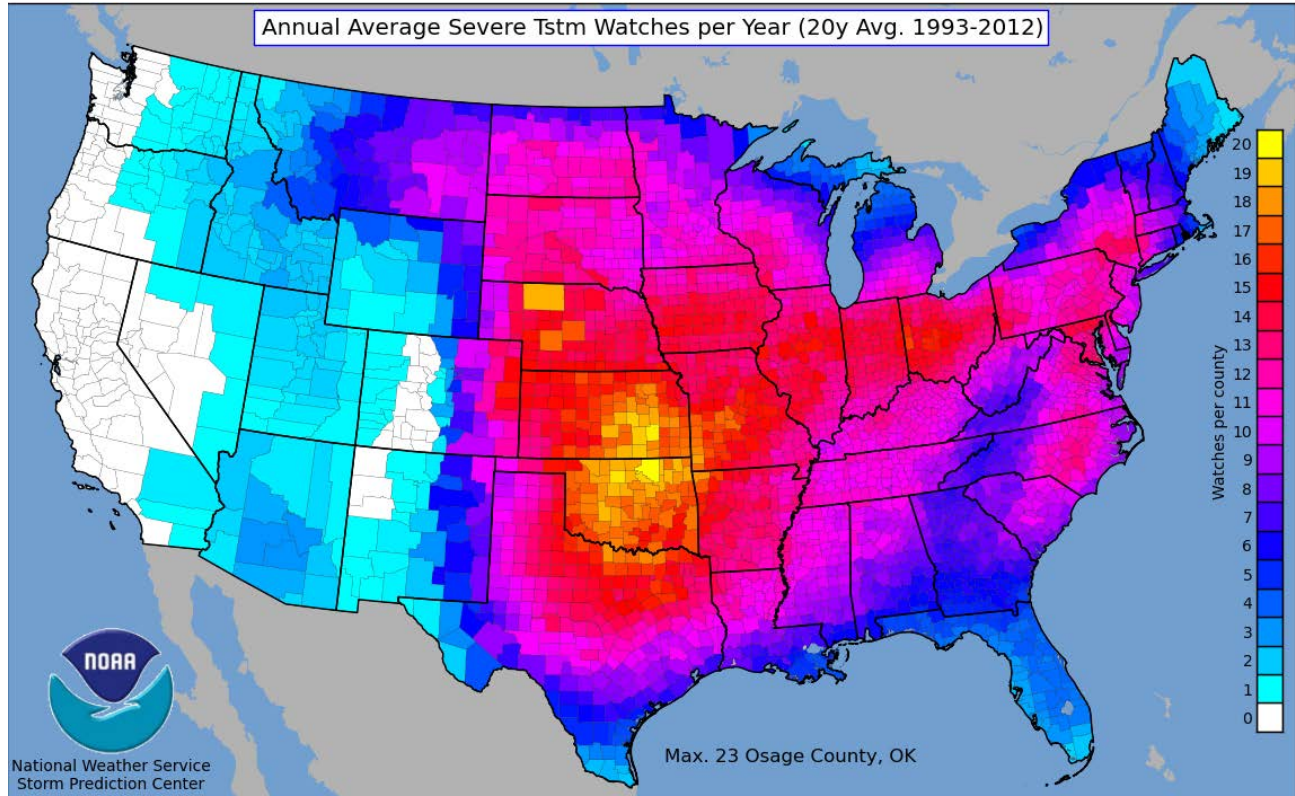
### 11.3.3 THUNDERSTORMS

Thunderstorms typically consist of winds, lightning, and precipitation which are reported individually by the NCDC.

There are two types of thunderstorm categories: Dry and Wet. Dry thunderstorms describe storms that produce little or no rainfall at the ground. They produce rain just below the cloud base but evaporates prior to reaching the ground –otherwise known as virga. In many areas, 0.10 inch is a general threshold for determining whether a storm is categorized as “wet” or “dry” during a storm’s life cycle. Potential impacts from dry thunderstorms are that when they are combined with dry vegetation, fire ignitions may occur as a result of cloud-to-ground lightning. In addition, dry thunderstorms can produce wildland fires, in addition to strong gusty winds that allows new or ongoing fires to spread rapidly.

Wind events shown are for the period April 30, 1950 to August 31, 2011:

- Thunderstorm winds and high winds are synonymous in reporting but are listed separately in the NCDC database. The NCDC recorded 647 thunderstorm wind events resulting in 31 injuries, over \$57 million in property damage, and \$50,000 in crop damage. The NCDC recorded 20 high wind events resulting in one death, two injuries, and \$1 million in property damage.
- Precipitation is heavy rainfall that does not become snow, fog, hail, or ice. The NCDC recorded nine (9) between September 2008 and September 2009 with no reportable damage.



The following storm events are considered the most notable to affect Sedgwick County:

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

- June 14, 1931, the heaviest 15-minute rainfall ever recorded in Wichita occurred, when 1.52 inches fell.
- June 24, 1951, a massive hailstorm moved from South Central Kansas into southern Missouri. The storm produced a 200-mile long hail swath, and ranks as one of the most severe hailstorms in Kansas's history.
- June 21, 1954, a severe hailstorm struck Wichita, Kansas and vicinity causing nine million dollars in damage.
- May 25, 1963, a 90-minute hailstorm battered much of Wichita, with hail as large as softballs. The storm damaged 81 schools.
- December 13, 1975, unusually strong December thunderstorms produced winds of 50 to 100 mph across South Central Kansas. Extensive damage occurred in both Wichita and Hutchinson.
- July 4, 1987, thunderstorms produced a wind gust to 82 mph in Clearwater Kansas.
- July 5, 1987, tornadoes and straight-line winds gusting to 100 mph, caused severe damage in the Wichita area. Three tornadoes struck eastern Sedgwick, and southern Butler counties. Straight-line winds of 80 to 100 mph hit El Dorado Lake.
- June 19, 1992, a huge mass of thunderstorms formed over Hutchinson and took a wide swath southeast through Wichita and across the Oklahoma border south of Arkansas City affecting several Kansas counties. Hail up to the size of softballs accompanied the storms resulting in damage to more than 10,000 homes. Wichita, Derby, and points in northwestern Sumner and Cowley Counties were especially hard hit. Roof and window damage was widespread. Cars lost windshields and were severely dented. That part of Wichita between Ridge Road and the Arkansas River was hit especially hard; as was Derby. Ten people were treated for minor injuries at the Hutchinson hospital, and 60 were treated in Wichita hospitals primarily for minor cuts from broken glass due to the widespread midday severe thunderstorms. The driver of a tractor-semi trailer was injured when a wind gust overturned the truck at interstate 235 and K-42 Highways. The hail left most wheat fields in its path a near total loss of 167,000 acres of cropland damaged in Sedgwick County, 100,000 acres in Sumner County, 50,000 acres in Cowley County, 30,000 acres in Reno County, and 15,000 acres each in Harvey and Butler Counties. The storms also spawned three tornadoes, but each touched ground only briefly and left no damage. High winds caused considerable damage in Medora, Buhler, Mount Hope, and Wichita. This ranked as one of the most damaging storms on record in Kansas. In all, property damage estimates totaled nearly \$500 million, with crop damage at another \$100 million. The majority of the property damage was done in and near Wichita during the midday severe storm ranked several south-central Kansas counties.
- July 1, 1994, a massive windstorm, known as a derecho, rolled southeast across Kansas. It caused tremendous damage over the central and eastern parts of the state. Hurricane-force winds blew across the county as thunderstorms rumbled through. Eighty-two mph winds were recorded in Valley Center where a metal shed was blown over and fences were damaged. The winds were not as strong when they went across Wichita and were about 65 mph. Damage in Wichita was mainly broken tree limbs and downed fences. Winds were clocked at 101 mph in Goddard where three trailers blew over and 70 feet of sheet metal was peeled off the side of the Rubbermaid plant. Clearwater was the hardest hit where the fire department lost its roof and ceiling and half of the lumber company building was blown away. Damage just to power lines and poles were \$10 million. One hundred fifty thousand Kansas Gas and Electric customers were without power--some for four days. One Andale farmer lost ten percent of his corn crop, otherwise there was no major crop loss. Total loss in this storm event was approximately \$50 million in property damage, and about \$50,000 in crop damage.
- July 10, 1998, severe thunderstorm winds, ranging from 52-80KT, ripped across the Wichita Metropolitan area, inflicting widespread damage to trees, roofs, power lines and power poles.



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

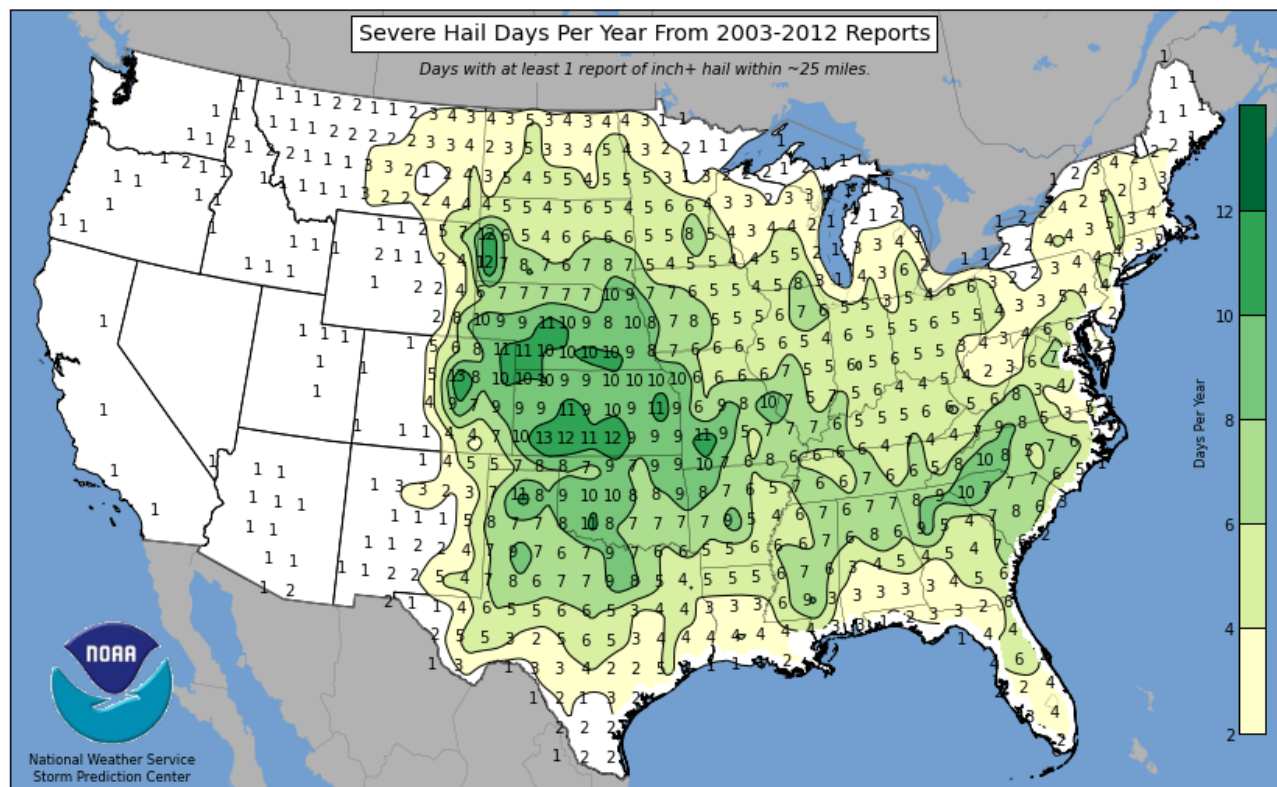
Approximately 60,000 people lost power, about 15,000 of which remained without power for 3 days. Total loss in this storm event was approximately \$3 million.

- June 17, 2004, a severe thunderstorm affected Cheney with winds up to 80 knots, causing major tree damage and some minor damage to buildings. One garage and two metal buildings were destroyed. Total loss in this storm event was approximately \$600,000.

### 11.3.4 HAIL

The NCDC also recorded 909 events of hail between April 30, 1950 and August 31, 2011 resulting in over \$302 million in property damage/loss, \$20 million in crops damage/loss, and 80 injuries during the same period. The following table shows a breakdown of hail sizes and number of reported occurrences:

| Size (Inch)           | Occurrences | Size (Inch)        | Occurrences |
|-----------------------|-------------|--------------------|-------------|
| 0.75 (Penny)          | 222         | 2.50 (Tennis Ball) | 13          |
| 0.88 (Nickel)         | 97          | 2.75 (Baseball)    | 17          |
| 1.00 (Quarter)        | 263         | 3.00 (Tea Cup)     | 5           |
| 1.25 (Half Dollar)    | 39          | 4.00 (Grapefruit)  | 3           |
| 1.50 Walnut/Ping Pong | 49          | 4.50 (Softball)    | 9           |
| 1.75 Golf Ball        | 163         | 5.0                | 1           |
| 2.00 Hen Egg          | 23          | 7.75               | 1           |
| 2.25                  | 1           | Unclassified       | 2           |



The following recent hail events are notable due to the amount of property and crop damage/loss including injuries:

- April 24, 2006 – An early morning severe thunderstorm pounded western and central portions of Sedgwick County with destructive hail as large as 3 inches in diameter between roughly 6:10 and 6:30 AM CST. Several instances of 1.75 to 3 inch hail occurred from Goddard into western and central

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

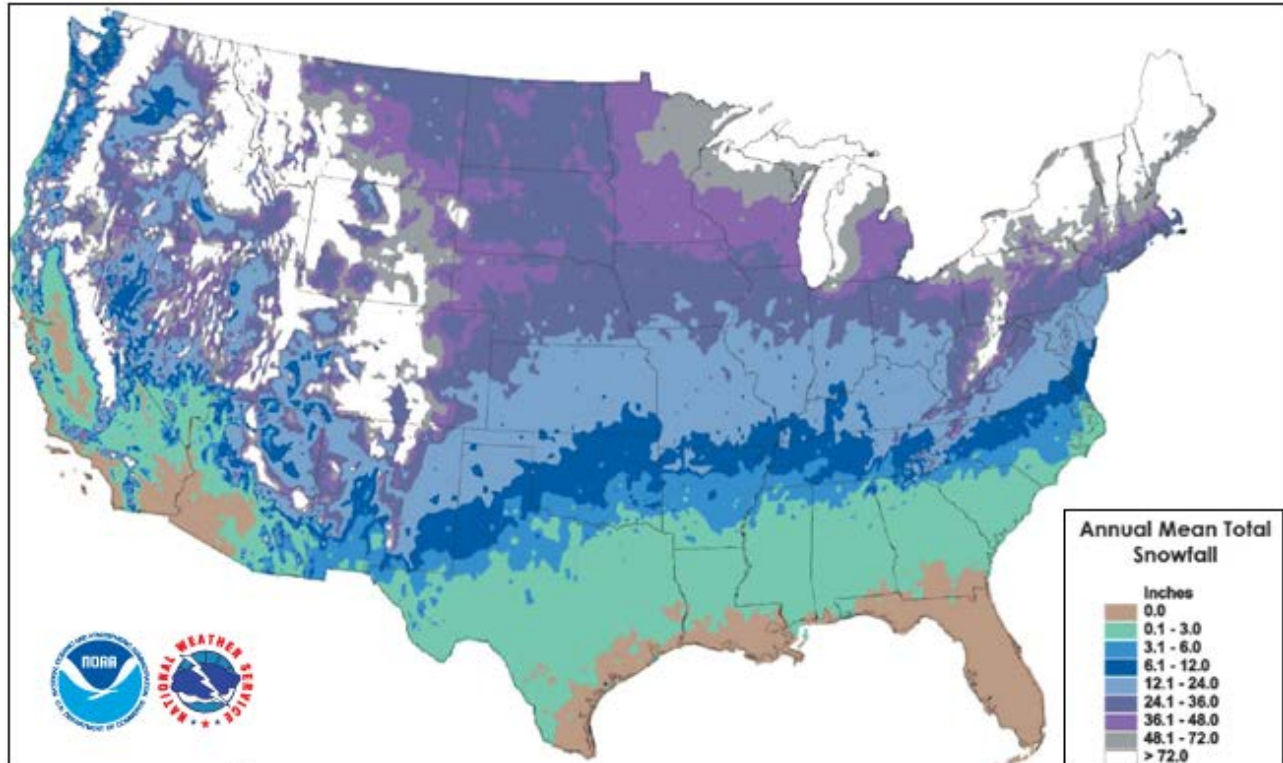
---

portions of Wichita, generally between 13th and Kellogg, and into the downtown area. Another area of large hail around 1.75 inches in diameter affected northern and northeast portions of Wichita, generally east of I-135 along K96. Surrounding the very large hail area were numerous reports of 0.75 to 1.25 inch hail, affecting portions of South, North, and East Wichita. The large hail inflicted widespread property damage across the Wichita area, some of which was rather severe, to automobiles, homes, and businesses. A handful of golf courses had to close for the day due to large divots on the putting greens, and Botanica Gardens just west of downtown sustained damage. Additionally, 17 police cars at the Patrol West Bureau near Central and I-235 had windows and/or flashing emergency lights shattered. Property damage estimates were \$70 million.

- July 8, 2010 – Large Hail ranging in size from golf ball to baseball sized moved across Downtown Wichita, causing devastating damage to cars and roofs. During the half hour hail storm, thousands of cars either had roof, windshield or hood damage. Insurance agencies reported 10 to 15 thousand cars may have damaged by the hail storm. The hail was so large and numerous that it killed numerous birds in the Delano district, and injured 20 fans at Lawrence Dumont Stadium as the hail turned the minor league baseball field white. Stain glassed windows were destroyed at Friends University and hundreds of homes and businesses received roof and window damage. Property damage estimates were \$10 million.
- September 15, 2010 – A combination of a low pressure area along the Kansas Oklahoma border, and an outflow boundary across South Central Kansas, led to the development of supercell thunderstorms across South Central Kansas. The swath of hail was approximately 5 miles wide and 15 miles long, stretching from northwest of Goddard, Kansas through the western and southern half of Wichita, Kansas to near Rose Hill, Kansas. Hail as large as softball and grapefruit size pounded roofs and cars along its path with over 35,000 claims turned into insurance agencies with property losses at \$150 million. Some of the hail came through roofs, including the terminal at the Mid Continent Airport in Wichita. Three commercial airliners were damaged and had to be towed to hangers for repairs. The National Weather Service in Wichita suffered damage to its vehicles, including one hail dent that was almost 10 inches across. One such hail stone in West Wichita, Kansas, breaking the state record with a diameter of 7.75 inches. A few weak tornadoes were also produced, with all the tornadoes moving across open country.
- June 9, 2011 – Hail up to golfball size fell in a wide band from near Garden Plain to Goddard, producing drifts of hail at times. The hail often occurred with wind gusts up to 60 mph winds. The large hail likely inflicted damage to various roofs and vehicles. According to newspaper reports, up to 100,000 acres of wheat may have been damaged across the area. Crop damage was estimated at \$20 million while property damage was estimated at \$1 million. Hail up to baseball and softball size also pummeled the Mount Hope area in Sedgwick County, associated with an impressive supercell thunderstorm. That same storm produced a brief tornado near Colwich, producing no known damage. Other storms produced many other reports of large hail and damaging winds across the area, producing additional property and crop damage (\$3 million), particularly across Sedgwick County. Additionally, very heavy rainfall on the order of 2 to 3 inches produced widespread street flooding across the Wichita Area.

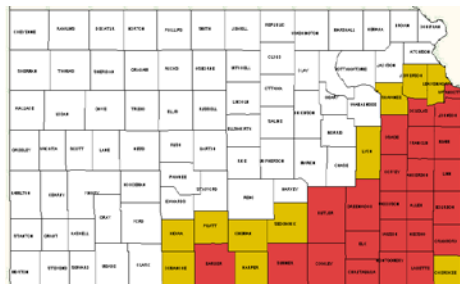
### 11.3.5 SNOW AND ICE STORMS

The NCDC recorded 42 snow & ice storm events between April 30, 1950 and August 31, 2011 resulting in approximately \$49 million in damages, 5 deaths and 18 injuries. A 1998 storm spread 6-10 inch snowfalls across South-Central Kansas with locally heavier amounts around 1 foot in parts of Sedgwick, Sumner, Cowley and Butler counties. This was the worst snowstorm to hit South-Central Kansas in 27 years. Freezing rain and sleet became so intense in 2001 that widespread ice accumulations of 1/4-3/4 inch teamed with north winds of 20-30 mph to result in spotty power outages and numerous accidents. Sleet reached depths around 1 inch. An estimated 100 accidents occurred just in the Wichita area alone.



Other notable snow and ice storm events to affect Sedgwick County are as follows:

- January 13, 1886, a massive blizzard struck nearly all of Kansas with little warning. The storm claimed between 50 and 100 lives, and nearly 80 percent of the cattle in the state were killed.
- September 26, 1942, a trace of snow was observed in Wichita. This is the earliest snowfall on record for the city.
- March 15, 1970, the greatest 24-hour snowstorm in Wichita's history began. By the 17th, 13.5 inches had accumulated at Wichita's Mid Continent Airport.
- February 21, 1971, a blizzard struck the southern half of Kansas, dumping 10 to 13 inches of snow. Northeast winds up to 40 mph produced near zero visibility. Wichita's Mid Continent Airport received 12.8 inches of snow, making it one of the 5 worst snowstorms to hit the area since weather records began in 1888.
- March 20, 1984, a major winter storm ravaged an area from Western Sedgwick County north and northeast to Kansas City. Snowfall ranged from 6 inches to one foot. The top 76 feet of the KFDI radio tower buckled under the weight of the ice, and a 1,400-foot TV tower near Topeka collapsed.
- January 29, 2002, precipitation began late Tuesday afternoon (Jan 29th) in



the form of freezing rain and drizzle. The areas that experienced the most precipitation also had numerous power outages due to ice accumulation on the trees that fell on power lines. Sleet and ice accumulation depths were on the order of 1 to 2 inches. A presidential declaration (FEMA-1402-DR) was issued on February 6, 2002 covering an incident period between January 29 and February 15 of which Sedgwick County was covered under individual assistance.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

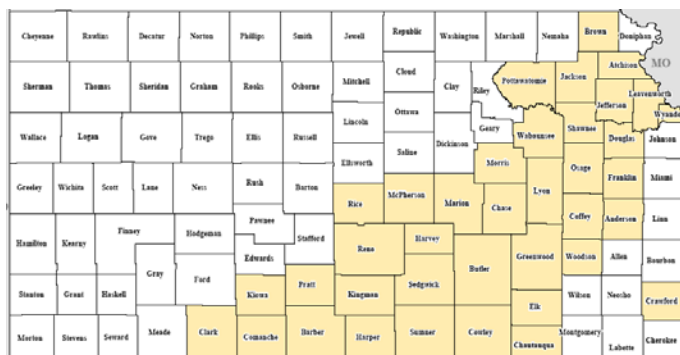
- January 3, 2005, a strong cold front surged south across Kansas & Oklahoma before stalling along/near the Red River during the afternoon of the 4th. A shallow layer of moist, sub-freezing air spread south over all but Southeast Kansas, as an 850-mb cold front, oriented in a southwest to northeast manner from the Oklahoma Panhandle to near Kansas City, teamed with an inverted 850-mb troph positioned over Western Kansas to enable much warmer, moisture-laden air to overrun the layer of sub-freezing air beneath. The result was what many consider to be the worst ice storm since 1982 to ravage all of Central & most of South-Central Kansas from the afternoon of the 4th thru the morning of the 5th, coating almost the entire warning area with 1/2 to 1 inch of ice. Although freezing rain was the primary culprit, the winter storm was magnified considerably by periods of sleet that accumulated to depths of 1 to 2 inches.

In Central Kansas, the situation was further worsened by periods of light snow that accumulated to 3 to 5 inch depths in Russell, Lincoln, and Saline counties. Damage to trees and power lines were major! In the latter case, the damage resulted both from heavy ice accumulations as well as from trees and limbs that fell onto the power lines in question. Trees as tall as 22 feet were split and either fell or eventually felled, and limbs of 6-12 inches were downed at many locations. In some cases, the downed trees and limbs blocked roads and highways. No doubt, power outages were widespread, with many areas experiencing multiple outages. A few areas were without power for 1 1/2 weeks. Countless residents were forced to evacuate their homes, seeking refuge in designated shelters. Fires posed major problems, and were ignited primarily by power lines falling onto trees and houses. Particularly hard hit were Butler & Sedgwick counties.

In Sedgwick County, an estimated \$15 million damage was inflicted; \$7.5 million upon Wichita alone. Westar Energy, assisted by power companies from 15 states, provided an estimated 360,000 electrical service restorations to 211,000 customers; 121,000 in Wichita. On January 4th, Sedgwick County Communications was deluged by 561 calls between 12 noon and 12 midnight, an average of 1 call every 77 seconds for 12 consecutive hours. On January 4th, Westar Energy received around 104,000 calls. Typical call volume is around 8,000. On January 6th, more power outages resulted as melting ice fell from power lines, causing them sag further then whip or snap, as well as from damaged limbs that thawed and fell onto power lines.

As of Saturday evening, January 8th, approximately 30,300 Westar customers in Wichita were still without power. Other counties experiencing \$1 million or more in damage: Harvey: \$3,300,000; Harper: \$1,730,420; Kingman: \$1,199,000. Obviously, countless accidents occurred, and were not only traffic-related, but also occurred during the extensive cleanup of tree damage.

It was in Wichita that all three fatalities occurred. In South Wichita, a 63-year old woman succumbed to carbon monoxide after using a portable generator inside her home. Also in South Wichita, an unidentified elderly man using a portable generator was found dead in his home. (Pending further details, his age listed at the end of this report is an approximation.) In West Wichita, an 80-year old man died outside his home while trying to remove downed tree limbs. Two people were seriously injured. A 39-year old man was listed in serious condition at Via Christi Regional Medical Center with head and neck injuries after a 15-foot tree limb fell as he was sawing it, and a power line crewman was listed in serious condition at Via Christi Regional Medical Center's burn unit when he came into contact with a 12,700 volt power line.



Approximately 370 utility crews from 15 states assisted Westar Energy with power restoration. Working 12-16 hour days, the crews responded from as far as Illinois, Indiana, Kentucky, Minnesota, New Mexico, South Texas, Tennessee, and West Virginia. A presidential declaration (FEMA-1579-DR)

was declared on February 8, 2005 during the incident period January 4-6, 2005 for public assistance for the counties highlighted on the map shown.



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### *Regulatory*

There is no regulatory guidance for thunderstorm, hail, snow or ice storm events. However, since each of these events can also cause flooding and tornadic events, FEMA 320 and 361 can greatly reduce or eliminate the effects of summer and winter storm events. Also, mitigative efforts such as alternate power sources (backup generators) and burying electrical power lines can also greatly improve continuity of utility service.

### *Hazard Severity Ratings*

The following rating table indicates the probability of a major storm event occurring annually, impacting less than 50% of the land, resulting in minor injuries and/or illnesses, with few homes damaged, having short term recovery of resources, and low direct and/or indirect costs.

STORM HAZARD AND EVENT RATING TABLE

| <b>Consequence</b>   | <b>Probable Rating</b> | <b>Catastrophic Rating</b> |
|----------------------|------------------------|----------------------------|
| Area Impacted        | 2                      | 4                          |
| Probability          | 4                      | 3                          |
| Health & Safety      | 1                      | 3                          |
| Property             | 1                      | 2                          |
| Environment          | 2                      | 2                          |
| Economic             | 1                      | 2                          |
| <b>Total Ratings</b> | <b>11</b>              | <b>16</b>                  |

### *Catastrophic Event*

Summer storms comparable to the June 19, 1992 storm event would be classified as catastrophic due to causing power outages, impeding transportation, property and crop damages, and causing numerous injuries and/or deaths. Winter storms comparable to the March 20, 1984 snow event and the January 3, 2005 winter ice storm event could be classified as a catastrophic event since electrical power outages were impeded for several days as well as transportation.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 11.4 DROUGHT

*Definition:* A deficiency of precipitation over an extended period of time, resulting in a water shortage for some activity, group, or environmental sector. (National Drought Mitigation Center)



According to the United States Geological Survey (USGS), five droughts were identified for the State of Kansas that has directly or indirectly impacted Sedgwick County. The following information is provided by the USGS on each of these drought periods:

**1929-42:** Regional in scale and affected many of the Midwestern and Western States. The recurrence interval was greater than 25 years throughout Kansas. Although the number of streamflow records long enough to include the entire drought was insufficient, data from adjoining States confirmed the severity. Agricultural losses during the **1929-41** droughts were extreme, and many farms were abandoned.

**1952-57:** This drought also was regional with a recurrence interval greater than 25 years statewide except in the Big Blue River Basin, where the recurrence interval was 10-25 years. Because of its severity and areal extent, the drought of **1952-57** is used as the base period for studies of reservoir yields in Kansas.

**1962-72:** Regional drought duration varied considerably across the State. Many of the streamflow records indicated alternating less-than-average and greater-than-average flows, whereas others indicated a steady deficit throughout the entire period. Similarly, the drought of **1974-82** appeared to be a series of relatively short-duration droughts at several gauging stations but sustained or long-term droughts at others.

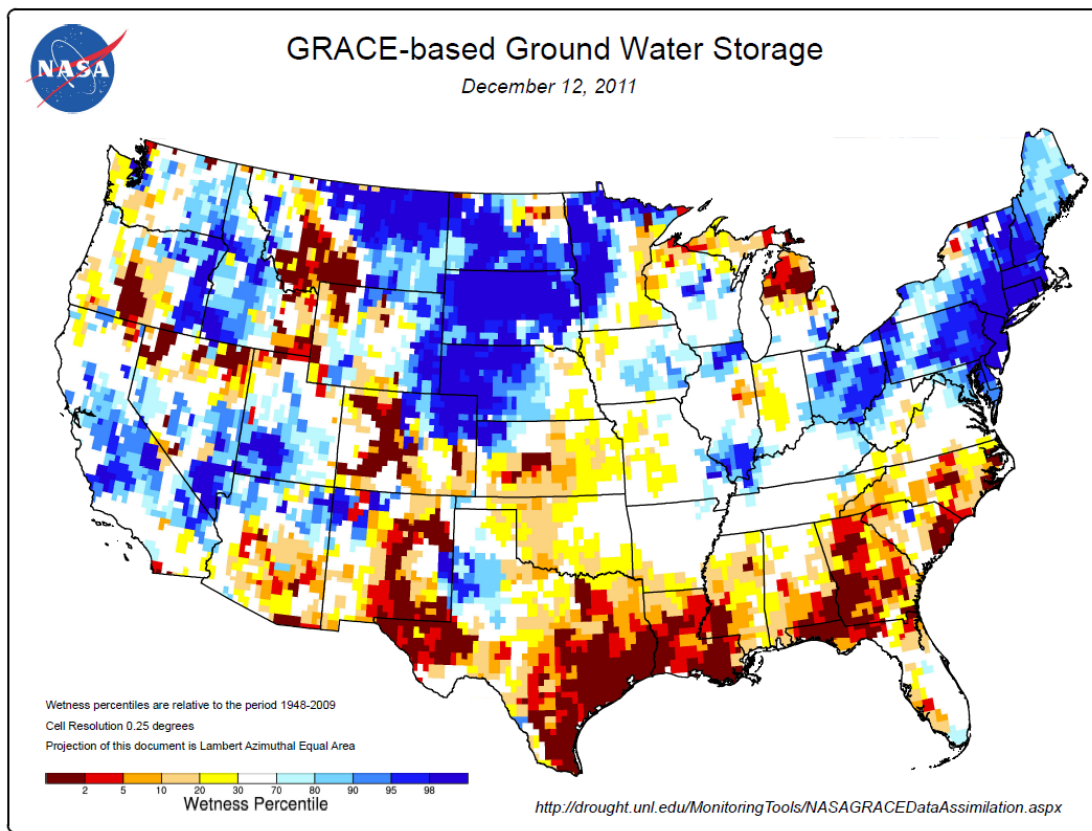
**1962-72:** This drought recurrence interval generally was greater than 25 years. However, in parts of the northwestern, northeastern, southern, and southeastern areas of the State, recurrence intervals were 10-25 years. The recurrence interval of the **1974-82** droughts was greater than 25 years in the north-central and southeastern parts but was between 10 and 25 years across the remaining eastern two-thirds of the State. Because of inadequate streamflow information for comparison, the severity of the **1974-82** drought could not be determined in the western one-third of the State.

**1988:** The severity of this drought varied across the State. The drought was most severe in the southwestern, central, and northeastern parts of the State but minimal in the northwestern and southeastern parts. At the beginning of the drought, reservoir storage was near or above average; hence, surface-water supplies were sufficient to meet demands through the end of water year 1988. Rainfall during the period generally was less than 50 percent of the long-term average, and quantities were insufficient to maintain soil moisture or contribute to ground-water supplies. The decreased soil moisture resulted in considerable damage to maturing grain crops, decreased the growth of forage grasses, and threatened the germination of the winter wheat crop. Estimated losses to 1988 crops resulting from the effects of the drought were \$1 billion (Wichita Eagle and Beacon, June 7, 1989). Water levels in the shallow aquifers declined rapidly, which resulted in the abandonment of many domestic water wells. At the end of 1988, the effects of the drought were continuing to worsen. As a result, State and local officials were considering measures to decrease water use and were requesting financial relief for the agricultural industry.

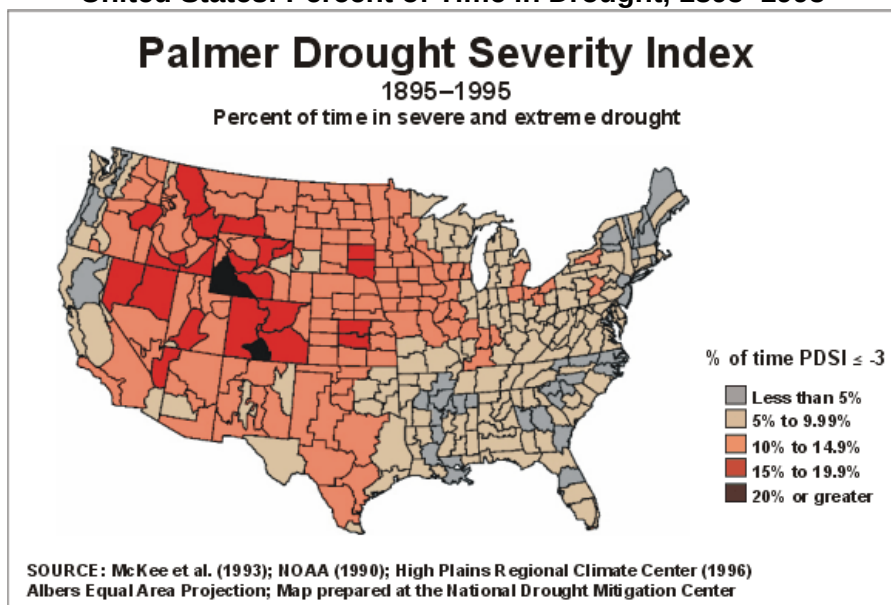
The drought of **1988** continued into the 1990's, but at a reduced level. In the fall of 1989 precipitation returned to near normal, and the spring of 1990 was somewhat wet. However, by the fall of 1990 it had dried out again and continued until July of 1992. It has continued to be on the wet side since the fall of 1992, except for a dry winter of **1995-96** and the current water year (**2000**).

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

Scientists at NASA's Goddard Space Flight Center generate groundwater and soil moisture drought indicators each week. They are based on terrestrial water storage observations derived from GRACE satellite data and integrated with other observations, using a sophisticated numerical model of land surface water and energy processes. The drought indicators describe current wet or dry conditions, expressed as a percentile showing the probability of occurrence within the period of record from 1948 to the present. Sedgwick County is shown to be approximately 20%:



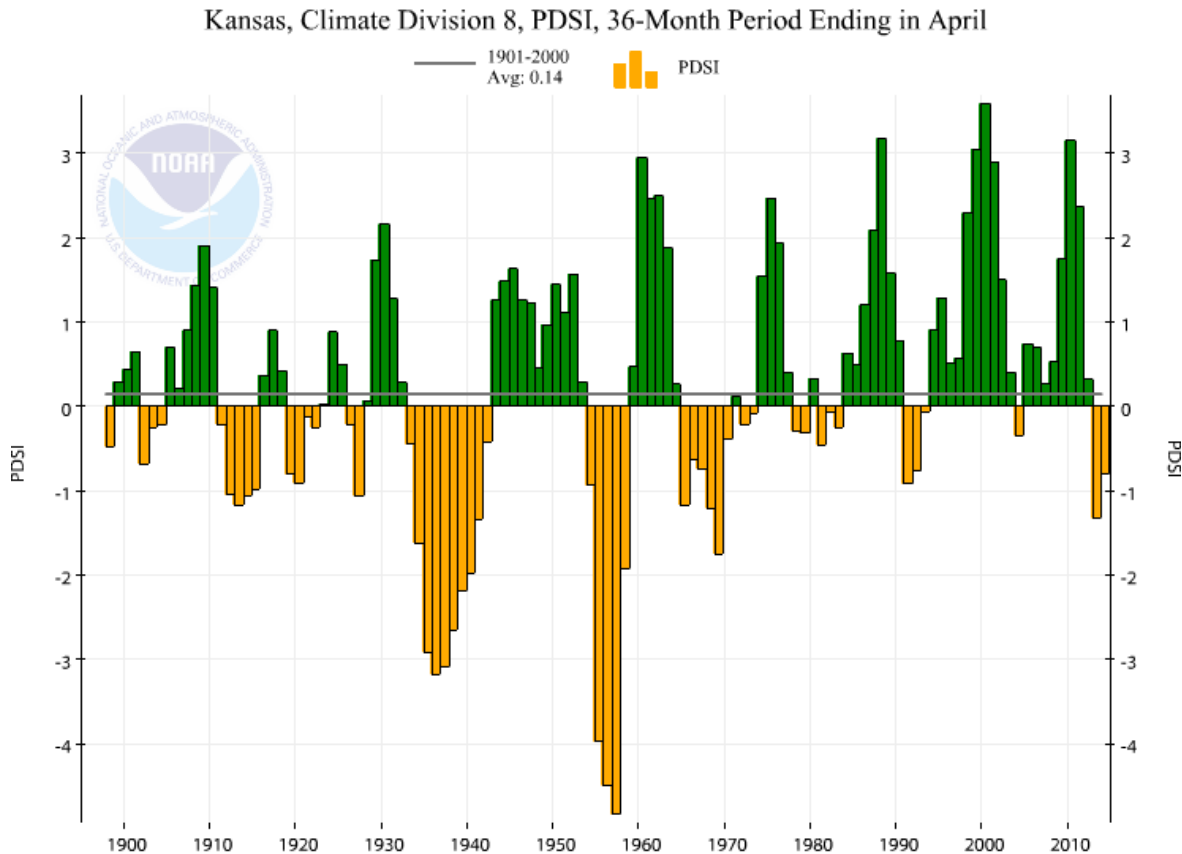
### United States: Percent of Time in Drought, 1895–1995



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### COMPARING PAST DROUGHTS

Statewide, the 2011 drought is considered to be as severe if not more severe than the droughts of the 1930's and 1950's, particularly over the west/southwest portions of Kansas to include the panhandles of Texas and Oklahoma. The following graph shows the historical drought for south-central Kansas since 1895:



*Three-year Palmer Drought Severity Index values since 1895 for south-central Kansas. Negative (yellow) values denote drought, positive (green) values denote wet or drought-free conditions. Even though periodic severe dry spells have affected south-central Kansas since 2011, there have been enough wet periods to limit the long-term drought fingerprint.*

### PUBLIC WATER SUPPLIER VULNERABILITIES

Drought can severely challenge a public water supplier through depletion of the raw water supply and greatly increased customer water demand. Even if the raw water supply remains adequate, problems due to limited treatment capacity or limited distribution system capacity may be encountered. A 2007 assessment of 800 city or rural water district drinking water systems by the Kansas Water Office found 133 in the State of Kansas of which three (3) are shown to be in Sedgwick County as drought vulnerable:

- Derby (El Paso WC) – Distribution System
- Goddard – Distribution System
- Sedgwick RWD #02 - Contractual

### Drought Limitation Categories

**Contractual Limitation**—The supplier's sole water source is purchased from another system that is drought vulnerable and there is a drought-cut-off clause in their water purchase contract. In such situations where there is not a drought cut-off clause, the purchaser is considered drought vulnerable under the same limitation category as the seller.



***Distribution System Limitation***—*The supplier has difficulty or is unable to meet drought-induced customer demand for water because of inadequate finished water storage capacity, inadequate finished water pumping capacity, inadequate transmission line sizes, etc.*

### *Regulatory*

The Kansas Emergency Management Act (K.S.A. 48-924) states that the Governor shall be responsible for meeting the dangers to the state and people presented by disasters, and that the Governor may declare a state of drought for specific areas or communities, for specific water sources, or statewide. The Kansas Water Office is charged by statute (K.S.A. 74-2608), with advising the Governor when drought conditions exist within the state, and recommending assembly of the Governor's Drought Response Team.

The descriptions in the following table are from the U.S. Drought Monitor while the possible impacts are derived from both sources. Impacts are shown for illustrative purposes only and may vary throughout the state or from time-to-time.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### KANSAS PHASED DROUGHT RESPONSE SUMMARY

(Ref: Kansas Water Office Operations Plan)

| Stage                                                                                                                                                                                                                                                                                       | Description                  | Declared by | Possible Impacts                                                                                                                                                                                   | Response Summary <sup>1</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Drought Watch                                                                                                                                                                                                                                                                               | Moderate Drought             | Governor    | Some damage to crops and pastures. High rangeland fire danger. Serious public water system water shortages not imminent, but likelihood of shortages growing.                                      | Governor notified by Kansas Water Office and Governor's Drought Response Team activated. County, municipal and public water system officials notified. Outdoor burning bans may be imposed. Public water systems may implement Stage 1 Water Watch phase of municipal water conservation plan.                                                                                                                                                                                                                           |
| Drought Warning                                                                                                                                                                                                                                                                             | Severe Drought               | Governor    | Crop or pasture losses likely. Some stock water shortages. Very high rangeland fire danger. Public water system water shortages present. Some streamflow targets not met.                          | Public water systems may implement Stage 2 Water Warning phase of municipal water conservation plan. Hay and Pasture Exchange activated. Urgent surplus water contracts from state controlled storage authorized. Governor may request authorization for haying and grazing of Conservation Reserve Program acres.                                                                                                                                                                                                       |
| Drought Emergency                                                                                                                                                                                                                                                                           | Extreme/ Exceptional Drought | Governor    | Widespread major crop and pasture losses. Extreme rangeland fire danger. Widespread stock water shortages. Widespread severe public water system water shortages. Many streamflow targets not met. | Governor may declare outdoor burning ban upon advice of Adjutant General. Public water systems may implement Stage 3 Water Emergency phase of municipal water conservation plans triggered. Emergency surplus water contracts from state controlled storage authorized. Emergency water withdrawals from USACE reservoirs and state fishing lakes per MOU's authorized. USACE emergency water assistance if needed. Governor may request Presidential disaster declaration and/or USDA disaster declaration for drought. |
| <sup>1</sup> . See Tables 1-3 for a comprehensive listing of response actions.<br>USACE – United States Army Corps of Engineers<br>USDA – United States Department of Agriculture<br>Adopted from U.S. Drought Monitor (2001) and Kansas 1990 Municipal Water Conservation Plan Guidelines. |                              |             |                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

#### Hazard Severity Ratings

The following rating table indicates the probability of a major drought event occurring every 25 years or less, impacting over 75% of the land, resulting in minor injuries and/or illnesses, with few homes (property) damaged, having short term recovery of resources, and low direct and/or indirect costs.

DROUGHT HAZARD AND EVENT RATING TABLE

| Consequence          | Probable Rating | Catastrophic Rating |
|----------------------|-----------------|---------------------|
| Area Impacted        | 4               | 4                   |
| Probability          | 3               | 3                   |
| Health & Safety      | 1               | 1                   |
| Property             | 1               | 2                   |
| Environment          | 2               | 2                   |
| Economic             | 1               | 2                   |
| <b>Total Ratings</b> | <b>11</b>       | <b>14</b>           |

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### *Catastrophic Event*

Any drought period resulting in a drought emergency where most or all of Sedgwick County's 69% of cropland, and 16% of grassland, is mostly or totally destroyed. Results from this type of severity would impact almost 375,000 acres and 1,400 farms within Sedgwick County. Total losses would be estimated at up to \$56 million for crops, almost \$18 million in livestock and poultry, and almost \$18 million in cattle. \*

*\*Kansas County Profile Report for Sedgwick County, Kansas Center for Community Economic Development*

### 11.5 EARTHQUAKES

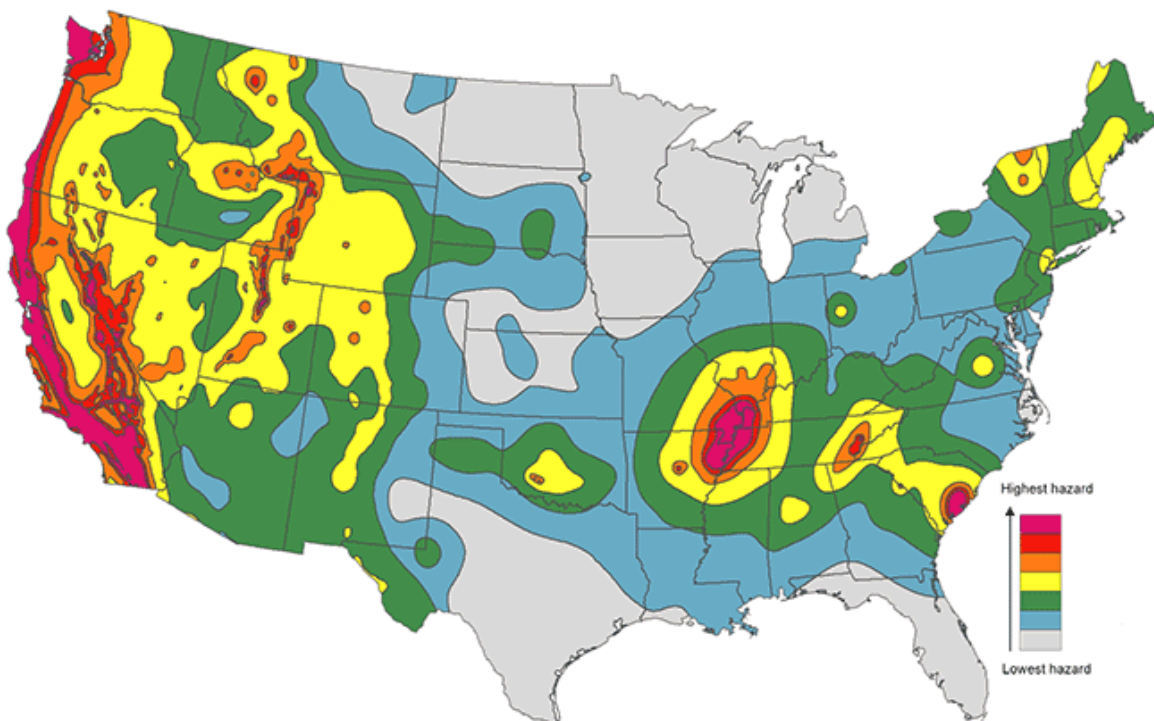
**Definition:** An earthquake is the shaking of the Earth's surface caused when energy stored within the Earth's crust, usually in the form of strain in rocks, suddenly releases. This energy is transmitted to the surface of the Earth by seismic waves. The destruction an earthquake causes depends on its magnitude and duration, or the amount of shaking that occurs. Earthquakes vary from small, imperceptible shaking to large shocks felt over thousands of kilometers. Earthquakes can deform the ground; make buildings and other structures collapse, and cause soil liquefaction.

Microearthquakes are low intensity earthquakes registering a magnitude of 2.0 or less having a limited range of five miles or less from the epicenter. Hydraulic fracturing (fracking) usually has an intensity of less than a magnitude of zero.<sup>46</sup> It should be noted that only a few hydraulic fracturing cases have caused earthquakes worldwide and are referred to as "induced seismicity."

Historically, Kansas has experienced small low risk magnitude earthquakes on a routine basis, but few are of a magnitude that could cause damage to buildings or the infrastructure. However, earthquakes were becoming more commonplace in the south-central region (mainly in Harper and Sumner counties) starting in 2013, about three years after horizontal drilling, hydraulic fracturing, and subsequent wastewater disposal escalated there.

Earthquake hazard maps show the probability that ground shaking will exceed a certain level over a 50-year period. The low-hazard areas have a 2% chance of exceeding a designated low level of shaking and the high-hazard areas have a 2% chance of topping a much greater level (modified from USGS, 2014).

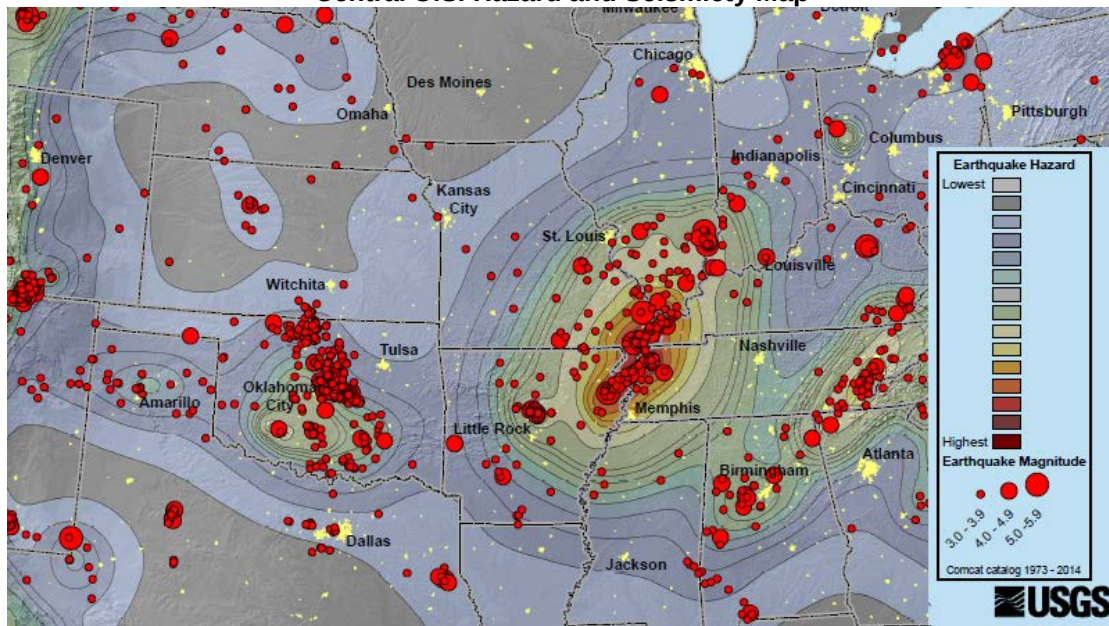
**Earthquake Probability Hazard Map**



<sup>46</sup> *Induced Seismicity: The Potential for Triggered Earthquakes in Kansas* (Buchanan et al, 2015)



**Central U.S. Hazard and Seismicity Map**

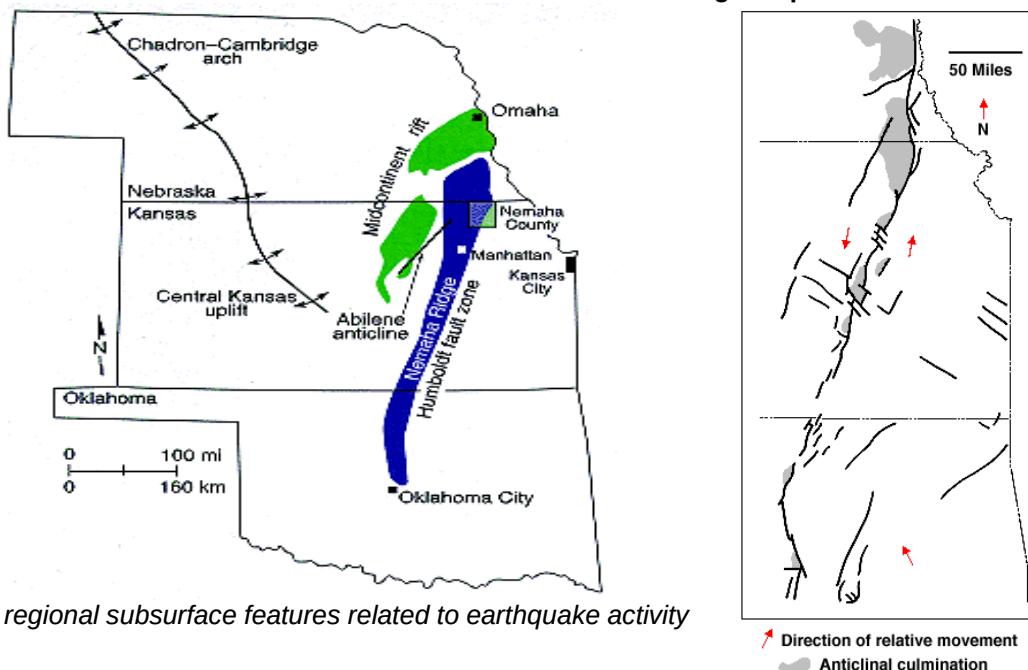


This map shows earthquakes (circles) greater than magnitude 3.0 since 1974 plotted on the 2014 USGS National Seismic Hazard Map for the central and eastern United States. Warmer colors on this map indicate areas of higher hazard. Larger earthquakes are represented by larger circles.

Some Kansas earthquakes are associated with the Nemaha Ridge, a buried granite "mountain range" that extends from roughly Omaha, Nebraska, to Oklahoma City. This subsurface range was formed about 300 million years ago with peak to valley elevations ranging from 2,300 to 3,300 feet near Manhattan.

The Nemaha Ridge is broken by cross faults, apparent shears of northwest trend, and evidence of reverse faulting. Faults that bound it are still active today, especially the Humboldt fault zone that forms the eastern boundary of the Nemaha Ridge, passing near Wamego, east of Manhattan, and near El Dorado, east of Wichita.

**Humboldt Fault Zone / Nemaha Ridge Maps**



*Major regional subsurface features related to earthquake activity*

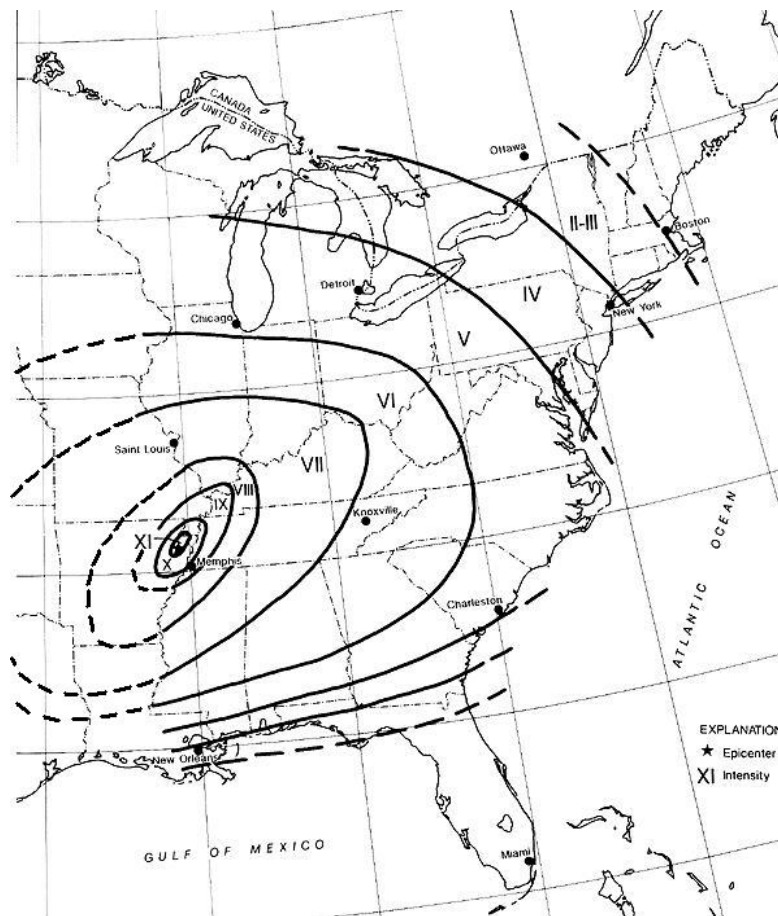
E

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

The earliest reported in Kansas, and also the strongest, occurred on April 24, 1867, in the Humboldt Fault zone near the town of Wamego. It had a magnitude of 5.1 and a 1931 Modified Mercalli Intensity (MMI) scale of VII causing structural damage in Manhattan (Riley County) and minor damage in other nearby communities. There were several injuries and some damage as well as a two-foot wave on the Kansas River at Manhattan. The affected area reportedly covered 300,000 square miles east of the epicenter. Moderate earthquakes near Topeka, Kansas, in 1875 and 1906, caused MMI scales of V and VII, respectively, in the epicenter area and Intensities VI and IV, respectively, in both Kansas City and St. Joseph, Missouri.

Besides the Humboldt Fault, the New Madrid fault is located approximately 430 miles ESE near New Madrid, Missouri. The strongest on record resulted from several earthquakes ranging from 7.8 to 8.1 on the Richter scale between 1811 and 1812. The intensities on the MMI from these earthquakes ranged from XII at the epicenter to VII at Saint Louis. Information on intensities from these earthquakes for south-central Kansas was not available due to sparse population; however, isoseismal projections indicate there was a potential impact of MMI VI to VII.

### USGS ISOSEISMAL PROJECTIONS



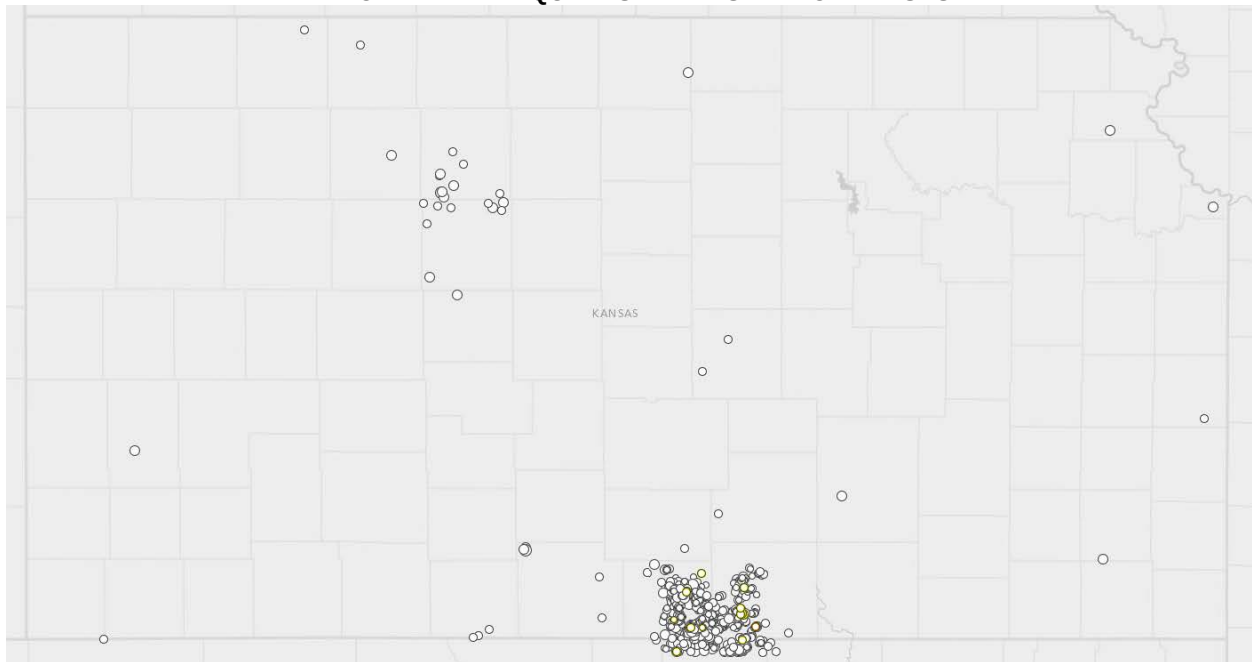
Based on USGS disaggregated seismic hazard projections for 0.2 second and 1.0 second spectral accelerations at 0.0592g to 0.169g, there is the potential for up to a magnitude 5.0 earthquake of MMI VI in south-central Kansas if comparable 1811-1812 New Madrid earthquake magnitudes occurred.

The majority of earthquakes that have occurred in the south-central Kansas and northern Oklahoma areas generally occur near and west of the Humboldt Fault. Most of these have been small and did not cause significant damage and may not even have been felt. Between August 1, 1981 and October 27, 2015, there have been 2,113 reported earthquakes in the State of Kansas according to the US Geological Survey

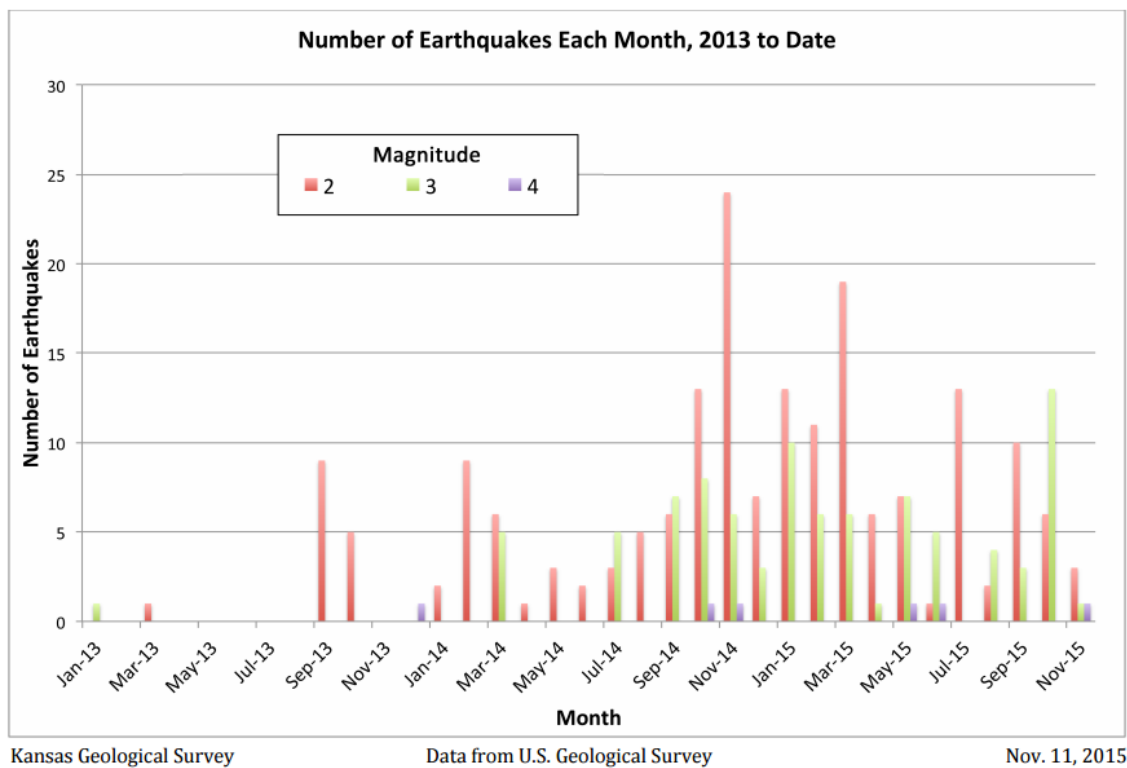
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

Earthquake Hazards Program. Earthquake magnitudes have ranged between 1.5 and 4.9 (average 2.1) with depths ranging from 0.25 kilometers to 11.2 kilometers (average 5 kilometers).

### REPORTED EARTHQUAKES IN THE STATE OF KANSAS

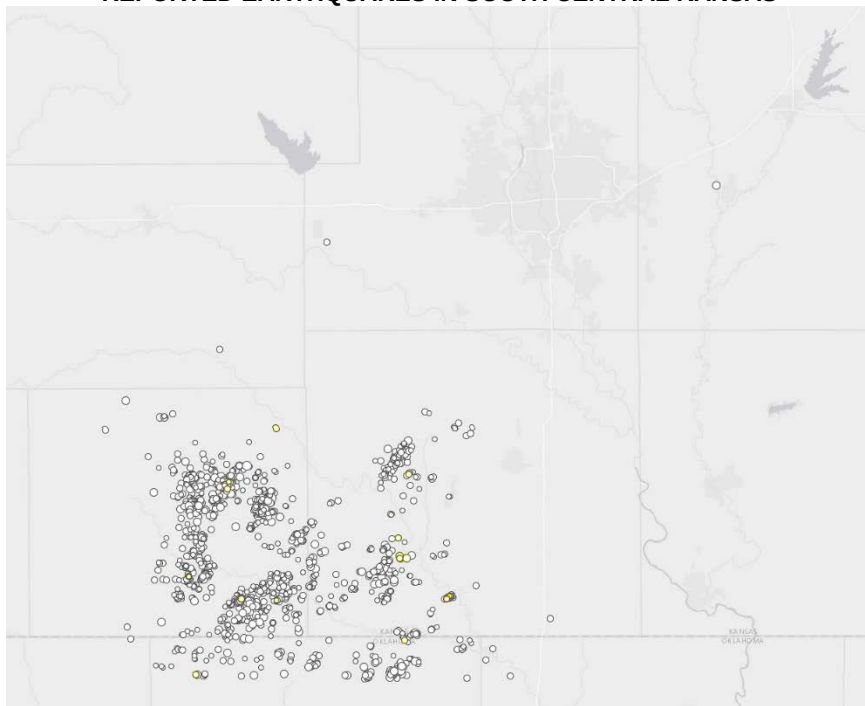


Source: United State Geological Survey

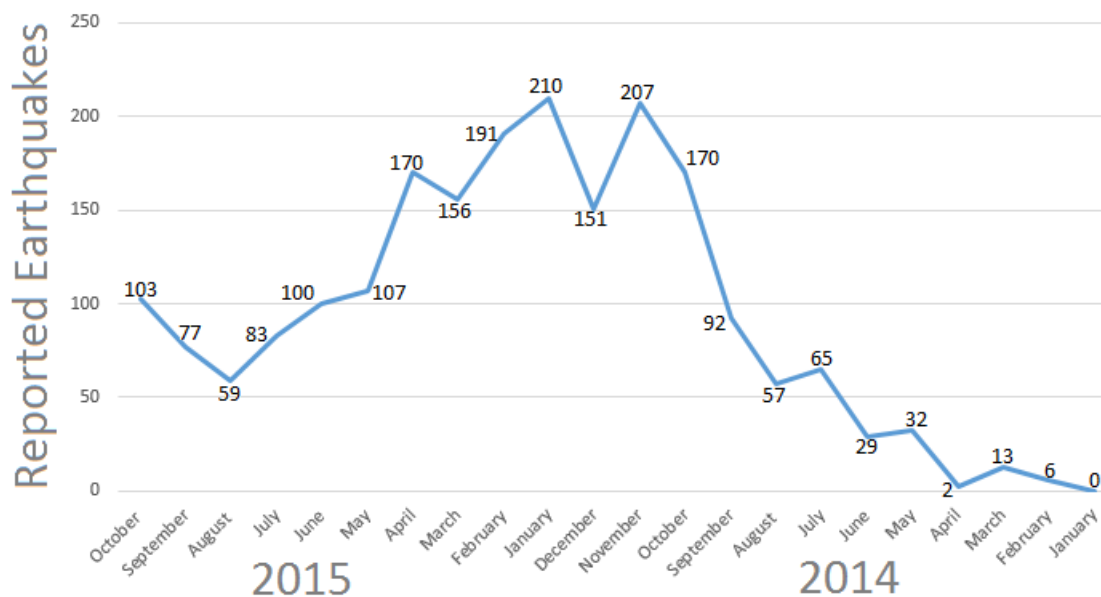


Until 2014, there were 33 reported earthquakes. In 2014, the number of earthquakes dramatically increased to 824 for that year alone, and 1,256 earthquakes between January 1 and October 27, 2015. The majority of these earthquakes occurred in south-central Kansas and are shown on the next page.

REPORTED EARTHQUAKES IN SOUTH CENTRAL KANSAS



NUMBER OF REPORTED EARTHQUAKES PER MONTH FOR 2014 AND 2015



Source: United State Geological Survey

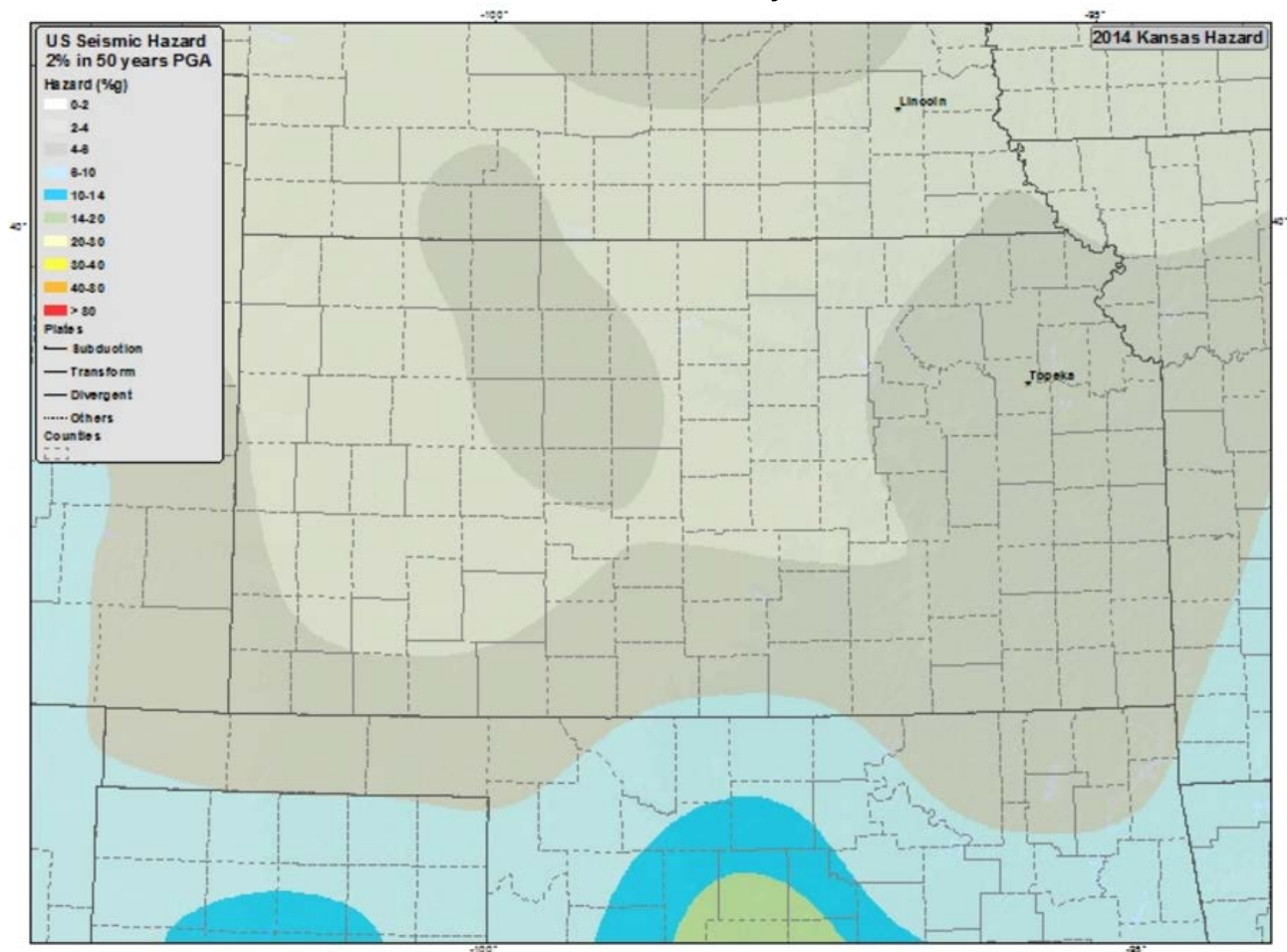
Geographically, the central portion of Sedgwick County consists of unconsolidated subsurface deposits of sand, silt, and clay flanked on the east and west with Wellington and Ninnescah shale, respectively. According to information in the Kansas Geological Survey's (KGS) Environmental Geology Series 2 report and the National Oceanographic Atmospheric Administration's National Geophysical Data Center, there were six reported "earthquakes" in 1882, 1906, 1919, 1925, 1948, and 1952 in Sedgwick County. The January 7, 1906



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

earthquake was noted to have impacted Wichita around 6:25PM lasting several seconds and was felt only in the large downtown buildings and residential districts located on the west side of the Arkansas River.<sup>47</sup>

U.S. Seismic Hazard 2% in 50 years PGA



After 63 years since the last reported earthquake in Sedgwick County, one occurred two kilometers southeast of the city of Cheney on July 10, 2015 at 12AM, measuring a magnitude 2.8 with an MMI of IV at a depth of two kilometers.

### Risk Assessment

Based on current trends of seismic activity, there is the potential for a magnitude 5.0 or greater from the Humboldt Fault to affect the Wichita metropolitan area. In addition, the Missouri Department of Natural Resources predicts a 7-10% probability of a repeat 1811-1812 New Madrid earthquake with a magnitude of 7.5 to 8.

If any of these events were to occur, impacts could include injuries and fatalities from collapsing structures or falling objects. Most homes in Kansas are subject to damage because foundation systems consist of unreinforced block. Brick and block facades are also popular in Kansas and are frequently separated from building surfaces during an earthquake, causing life safety hazards to nearby individuals. Reservoirs and historic buildings built near fault lines or on unstable soil could be at risk of damage or destruction. Other earthquake-related impacts to people, property, and the environment could result from failures of utilities, dams and hazardous materials conveyance or storage vessels (e.g., gas pipelines); landslides; subsidence; and fires. An earthquake could also disrupt businesses and industries, causing loss of revenue and employment.

<sup>47</sup> *Kansas Historical Collections Vol XII (1911-1912)*, Pg 131, *Kansas State Historical Society*, 1912



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

There is also the potential for cracking of the Hutchinson Salt Member that could lead to increased sinkhole development in south-central Kansas from dissolution of the salt.

*Note: It is unknown if a cascading effect from the New Madrid earthquake could trigger additional fault zones such as the Humboldt. Infrastructure impacts would increase dramatically eastward from Sedgwick County thus resulting in the displacement of millions, and projections from a New Madrid earthquake could cause over 50,000 individuals to move westward into Kansas. There would also be disruptions of utilities for weeks or longer, and diminished economic conditions nationwide. Major cities such as Saint Louis and Memphis would be greatly impacted from another comparable 1811-1812 New Madrid earthquake, and portions of Louisville could be flooded similar to New Orleans after Hurricane Katrina in 2005 due to surges from the Mississippi River. Liquefaction of soils could severely damage buildings and highways with increased hazardous materials release concerns and contamination of the Mississippi Valley.*

### Regulatory

Wichita and Sedgwick County have adopted the 2006 International Code Council's International Building Code. This code has Section 1613 that specifically addresses earthquake loads. Detailed information on this section can be found at [http://publicecodes.cyberregs.com/icod/ibc/2006f2/icod\\_ibc\\_2006f2\\_16\\_sec013.htm](http://publicecodes.cyberregs.com/icod/ibc/2006f2/icod_ibc_2006f2_16_sec013.htm)

### Hazard Severity Ratings

The following rating table indicates the probability of an earthquake event occurring every 25 years or less, impacting less than 25% of the land, resulting in minor injuries and/or illnesses, with few homes damaged, having short term recovery of resources, and low direct and/or indirect costs.

| EARTHQUAKE HAZARD AND EVENT RATING TABLE |                 |                     |
|------------------------------------------|-----------------|---------------------|
| Consequence                              | Probable Rating | Catastrophic Rating |
| Area Impacted                            | 1               | 4                   |
| Probability                              | 3               | 0                   |
| Health & Safety                          | 1               | 3                   |
| Property                                 | 1               | 3                   |
| Environment                              | 1               | 2                   |
| Economic                                 | 1               | 3                   |
| <b>Total Ratings</b>                     | <b>8</b>        | <b>15</b>           |

### Catastrophic Event

A 5.0 or greater earthquake resulting from the Humboldt Fault or triggered by one of the east-west traverse faults in Missouri caused by an 1811-12 New Madrid event. Sustained aftershocks may also result in minor liquefaction of soils, particularly in downtown Wichita, causing foundation shifting. Transportation, utility, commercial, and industrial disruptions would also be anticipated. Also, medical facilities and public safety agencies would rapidly become overwhelmed.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 11.6 Fog

**Definition:** Vapor condensed to fine particles of water suspended in the lower atmosphere that differs from cloud only in being near the ground.



Information developed from the Wichita National Weather Service over a 10-year period indicates that there is an average of almost 16 days of ground fog occurring annually. The months of December through February are highest with an average of 2.5 days of fog. The months of July and August are the lowest at less than 0.1 days of fog for those months.

Although the Wichita Mid-Continent Airport has not reported flight accidents attributed to fog, but there have been occasional delays. The potential of fog related incidents in general aviation with the smaller planes is considered greater than with commercial aviation since the airlines almost universally follow policies which are more restrictive than FAA requirements. The following tables are from the National Oceanic and Atmospheric Administration's (NOAA) International Station Meteorological Climate Summary program. They reflect the percentage of days per month when fog occurrences may happen during Instrument Flight Rules (IFR) and Very Low Instrument Flight Rule (VLIFR) situations:

#### Near-VLIFR Climatology for Wichita

(% with ceiling below 200 feet and/or visibilities below ¾ mile)

| Hour                  | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Yr |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| 2400                  | 3   | 4   | 1   | *   | *   | 0   | 0   | 0   | *   | 1   | 2   | 4   | 1  |
| 0300                  | 5   | 5   | 1   | 1   | 1   | *   | *   | *   | 1   | 2   | 2   | 5   | 2  |
| 0600                  | 5   | 6   | 3   | 2   | 2   | 1   | *   | 1   | 2   | 2   | 4   | 5   | 3  |
| 0900                  | 5   | 6   | 2   | 1   | 0   | 0   | *   | *   | 1   | 2   | 2   | 6   | 2  |
| 1200                  | 2   | 2   | 1   | *   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 3   | 1  |
| 1500                  | 2   | 2   | *   | *   | *   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | *  |
| 1800                  | 2   | 2   | 1   | *   | *   | 0   | 0   | *   | *   | *   | *   | 2   | 1  |
| 2100                  | 3   | 2   | 1   | *   | *   | 0   | 0   | 0   | *   | 1   | 1   | 3   | 1  |
| All                   | 3   | 4   | 1   | 1   | *   | *   | *   | *   | 1   | 1   | 2   | 4   | 1  |
| * Between 0 and 0.5 % |     |     |     |     |     |     |     |     |     |     |     |     |    |

#### IFR Climatology for Wichita

(% with ceiling less than 1,000 feet and/or visibilities less than 3 miles)

| Hour                  | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Yr |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| 2400                  | 13  | 13  | 10  | 7   | 6   | 2   | 1   | 2   | 5   | 8   | 11  | 15  | 8  |
| 0300                  | 15  | 17  | 13  | 9   | 8   | 4   | 2   | 4   | 8   | 9   | 13  | 16  | 10 |
| 0600                  | 16  | 19  | 16  | 11  | 13  | 8   | 5   | 7   | 12  | 11  | 14  | 18  | 13 |
| 0900                  | 20  | 21  | 16  | 12  | 9   | 6   | 3   | 6   | 12  | 13  | 17  | 20  | 13 |
| 1200                  | 16  | 16  | 11  | 7   | 4   | 2   | 1   | 2   | 5   | 7   | 11  | 16  | 8  |
| 1500                  | 12  | 12  | 9   | 5   | 2   | 1   | *   | 1   | 4   | 5   | 9   | 13  | 6  |
| 1800                  | 11  | 11  | 8   | 6   | 2   | 1   | *   | 1   | 3   | 5   | 8   | 11  | 6  |
| 2100                  | 11  | 12  | 8   | 6   | 3   | 1   | 1   | 1   | 4   | 6   | 10  | 13  | 9  |
| All                   | 14  | 15  | 12  | 8   | 6   | 3   | 2   | 3   | 7   | 8   | 12  | 15  | 9  |
| * Between 0 and 0.5 % |     |     |     |     |     |     |     |     |     |     |     |     |    |

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### *Regulatory*

General transportation safety guidelines and requirements would apply as identified by the Kansas Division of Motor Vehicles, Federal Aviation Administration, and respective railroads.

### *Hazard Severity Ratings*

The following rating table indicates the probability of a fog event occurring once a year or more, impacting less than 25% of the land. It is not anticipated to impact health and safety, property, the environment, or economic value.

FOG HAZARD AND EVENT RATING TABLE

| Consequence          | Probable Rating | Catastrophic Rating |
|----------------------|-----------------|---------------------|
| Area Impacted        | 1               | 4                   |
| Probability          | 4               | 0                   |
| Health & Safety      | 0               | 0                   |
| Property             | 0               | 0                   |
| Environment          | 0               | 0                   |
| Economic             | 0               | 0                   |
| <b>Total Ratings</b> | <b>5</b>        | <b>4</b>            |

### *Catastrophic Event*

Based on Wichita's geographical location, there are no anticipated catastrophic fog events.

### 11.7 HAZARDOUS MATERIAL

*Definition:* A hazardous material is generally defined as any substance or material could adversely affect the safety of the public, handlers or carriers during transportation. According to Subpart A, Part 105, Subchapter A, Chapter I, Subtitle B of Title 49 of the Code of Federal Regulations (CFR), The U.S. Department of Transportation defines a hazardous material as a substance or material that the Secretary of Transportation has determined is capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and has designated as hazardous under section 5103 of Federal hazardous materials transportation law (49 U.S.C. 5103). The term includes hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table (see 49 CFR 172.101 ), and materials that meet the defining criteria for hazard classes and divisions in part 173 of subchapter C of this chapter.

#### *Types of Hazardous Materials Classes:*

- Explosive, compressed gases, flammable liquids and solids (flammable and combustible), oxidizers and organic peroxides, toxic materials (poisonous and infectious), radioactive material, corrosive material, and miscellaneous materials.

#### *Sources of Hazardous Materials:*

- Manufacturer and processing facilities, storage and warehouse facilities, and transportation (aircraft, vehicular, rail, and pipelines)

#### *Effects of Release:*

- Environmental pollution (soil, air, and water), and public safety

The following guidance is used for determining if transported commodities are hazardous material: the Secretary of Transportation shall designate material (including an explosive, radioactive material, etiologic agent, flammable or combustible liquid or solid, poison, oxidizing or corrosive material, and compressed gas) or a group or class of material as hazardous when the Secretary decides that transporting the material in commerce in a particular amount and form may pose an unreasonable risk to health and safety or property. (ref. Title 49, Subtitle III, Chapter 51, Section 5103).

A material is hazardous if it exhibits one or more of the following characteristics:

- Ignitability: Can create fires under certain conditions. Examples include liquids that catch fire, such as solvents and fuels, and friction-sensitive substances.
- Corrosivity: Is acidic (pH less than 7) and capable of corroding metal such as tanks, containers, drums, and barrels.
- Reactivity: Can create explosions or toxic fumes, gases, and vapors when exposed or mixed with water.
- Toxicity: Harmful or fatal when ingested, inhaled, or absorbed by the skin.

Hazardous materials may be in a solid, liquid or gaseous form and exhibit the following hazardous conditions: flammable, radioactive, corrosive, ignitable, chemically reactive, or unstable after prolonged storage in quantity posing a threat to life, property, or the environment.

Environmental concerns include discharge to soil and water. Discharges can also affect the groundwater via soil contamination.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### 11.7.1 U.S. CENSUS BUREAU GENERAL DEFINITIONS

#### *Commodity*

The U.S. Census Bureau defines a commodity as products that an establishment produces, sells, or distributes. This does not include items that are considered as excess or by products of the establishment's operation.

#### *Shipment*

A shipment is considered an individual movement of commodities from an establishment to a customer or to another location of the originating company (including a warehouse, distribution center, retail or wholesale outlet). A shipment uses one or more modes of transportation including parcel delivery, U.S. Postal Service, courier, private truck, for-hire truck, rail, water, pipeline, air, and other modes.

#### MODE DEFINITIONS (U.S. CENSUS BUREAU)

#### *Parcel Delivery/Courier/USPS*

Delivery services, parcels, packages, and other small shipments that typically weigh less than 100 pounds. Includes bus parcel delivery services.

#### *Private Truck*

Trucks operated by a temporary or permanent employee of an establishment other than buyer/receiver of the shipment.

#### *For-Hire Truck*

Trucks that carry freight for a fee collected from the shipper, recipient of the shipment, or an arranger of the transportation.

#### *Railroad*

Any common carrier or private railroad.

#### *Pipeline*

Movements of oil, petroleum, gas, slurry, etc. through pipelines that extend to other establishments or locations beyond the shipper's establishment. Aqueducts for the movement of water are not included.

#### *Air*

Commercial or private aircraft and all air service for shipments that typically weigh more than 100 pounds. Includes airfreight and air express.

### 11.7.2 HAZARDOUS MATERIAL DEFINITIONS

*U.S. Department of Transportation* – “Any substance or material in any form or quantity which poses an unreasonable risk to safety and health and to property when transported in commerce”

*U.S. Environmental Protection Agency* – “Any material, which when discharged into the environment, may be harmful to the public health or welfare of the United States”



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### 11.7.3 HAZARDOUS SUBSTANCE DEFINITIONS

**OSHA (29 CFR 1910.120(3)):** Any biologic agent and other disease-causing agent which after release, into the environment and upon exposure, ingestion, inhalation, or assimilation into any person, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformations in such persons or their offspring.

**CERCLA (42 U.S.C. 103.9601(14)):** Any substance designated pursuant to section 311(b)(2)(A) of the Clean Water Act (CWA); any element, compound, mixture, solution, or substance designated pursuant to section 102 of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); any hazardous waste having the characteristics identified under or listed pursuant to section 3001 of the Solid Waste Disposal Act (but not including any waste the regulation of which under the Solid Waste Disposal Act (42 U.S.C. 6901 et seq.) has been suspended by Act of Congress); any toxic pollutant listed under section 307(a) of the CWA; any hazardous air pollutant listed under section 112 of the Clean Air Act (42 U.S.C. 7521 et seq.); and any imminently hazardous chemical substance or mixture with respect to which the EPA Administrator has taken action pursuant to section 7 of the Toxic Substances Control Act (15 U.S.C. 2601 et seq.). The term does not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance in the first sentence of this paragraph, and the term does not include natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas).

### 11.7.4 HAZARDOUS MATERIAL CLASSIFICATIONS (USDOT)

|         |                                                                                                  |
|---------|--------------------------------------------------------------------------------------------------|
| Class 1 | Explosives or blasting agents                                                                    |
| Class 2 | Gases                                                                                            |
| Class 3 | Flammable Liquids                                                                                |
| Class 4 | Flammable solids; spontaneously combustible materials; and materials that are dangerous when wet |
| Class 5 | Oxidizers and organic peroxides                                                                  |
| Class 6 | Poisonous and etiologic agents (infectious materials)                                            |
| Class 7 | Radioactive materials                                                                            |
| Class 8 | Corrosives                                                                                       |
| Class 9 | Other regulated or miscellaneous hazardous materials                                             |

### 11.7.5 HAZARDOUS MATERIAL CATEGORIES

**Explosive substances:** Releases pressure, gas and heat when subjected to sudden shock, heat, or high pressure. Examples include explosives, fuel oil mixtures, ammonium nitrate, and ammunition.

**Flammable and Combustible Substances:** Both liquid and solids that can be easily ignited. Flammable liquids have a flashpoint (spontaneous combustion) below 100°F. Combustible liquids have a flashpoint at or above 100°F. Examples include petroleum substances and ethylene glycol.

**Toxic Materials (also called Poisons):** Substances that can cause injury or death when they enter the bodies of living things. Toxic materials can be classified both by their *chemical nature* or *toxic action*. Examples include: heavy metals, cyanides, corrosives, and irritants.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

**Oxidizers:** Supplies oxygen to support normally non-flammable materials, whereas Organic Peroxides are explosive and sensitive to heat, shock, and friction (potentially toxic). Examples include: fertilizers (oxidizers) and peroxides.

**Radioactive Materials:** Emits harmful rays and particles when they decay, as they change from one element to another. Examples include: plutonium, cobalt, and uranium.

**Etiological Materials:** Those materials that cause disease or infection. Examples include: germs that cause rabies, botulism, or tetanus.

### 11.7.6 COMMODITY CODE CLASSIFICATIONS

**SCTG** - The Standard Classification of Transported Goods (SCTG) has been created jointly by agencies of the United States (U.S.) and Canadian governments to address statistical needs that the U.S. and Canada share in common, and to meet the individual needs of each country in regard to products transported. The original purpose of the Standard Transportation Commodity Classification (STCC) was for identification of commodities for purposes of assigning rates for ICC-regulated rail carriers. The STCC continues to be used by the Association of American Railroads (AAR) as a tariff mechanism. The SCTG employs a five-digit numbering system, the structure of which is hierarchical. The hierarchy has four levels, each of which follows two important principles: 1) each level covers the universe of transported goods, and 2) the commodities in a given classification of a given level are mutually exclusive of those in any other classification of that level. Product classifications in the SCTG reflect the movement of goods by all modes rather than a single mode; the STCC emphasizes goods that move by regulated rail only. The goods most important to each mode of freight transportation have been included, with importance measured by the characteristics of weight, value, and shipment distance. Product classifications at the SCTG's two-digit level have been designed to link to industry classifications at the two-digit level of the Standard Industrial Classification (SIC) and the North American Industrial Classification System (NAICS). However, The SCTG does not include any designations for hazardous materials.

**HS** – The Harmonized Commodity Description and Code System (HS) or Harmonized Tariff System (HTS) is the predominant product coding system currently in use worldwide. The HS is an international commodity classification (six digit) developed under the auspices of the Canadian Customs Cooperation Council. It was extended to ten digits for imports to serve as the basis for customs tariffs and international trade statistics. For export purposes, the international six-digit "root" was extended to eight digits. U.S. domestic imports data are collected using a ten-digit product classification that is an extension of the HS. In the HS, goods are classified by what they are and not according to their stage of fabrication, their use, or origin. The HS nomenclature is logically structured by economic activity or component material.

**HTSA** - The USITC (Office of Tariff Affairs and Trade Agreements) is responsible for publishing the *Harmonized Tariff Schedule of the United States Annotated* (HTSA). The HTSA provides the applicable tariff rates and statistical categories for all merchandise imported into the United States; it is based on the international *Harmonized System*, the global classification system that is used to describe most world trade in goods.

**NAICS** – The North American Industry Classification System (NAICS) replaced the SIC system. The U.S., Canada, and Mexico provide new comparability in statistics about business activity across North America developed NAICS jointly.

**SIC** - The Standard Identification Classification (SIC) code was developed by the Department of Labor to classify industries. The codes only describe industries and do not describe occupations that people hold within those industries. While the NAICS has generally superseded usage of the SIC, some government agencies and departments still use the SIC code.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 11.7.7 2007 U.S. COMMODITY FLOW SURVEY

#### Overview

The following tables were derived from the U.S. Census Bureau's American Fact Finder 2007 Commodity Flow Survey for the State of Kansas. Estimates are based on data from the 2007 Commodity Flow Surveys. Due to rounding, estimates may not add-up to totals. Data rows which are not available or could not be published are not shown and are identified with an "S."

Geographic Area Series: Shipment Characteristics by Origin Geography by Mode: 2007

|                             | Value(\$mil) | Tons (1,000) | Ton-miles (mil) | Avg miles |
|-----------------------------|--------------|--------------|-----------------|-----------|
| All modes                   | 149,210      | 178,327      | 41,690          | 570       |
| Single modes                | 126,851      | 173,009      | 37,471          | 233       |
| Truck                       | 105,121      | 148,320      | 22,681          | 218       |
| For-hire truck              | 67,710       | 95,135       | 18,175          | 398       |
| Private truck               | 37,411       | 53,186       | 4,506           | 103       |
| Rail                        | 7,362        | 20,229       | 14,628          | 678       |
| Air (incl truck & air)      | 11,722       | S            | 85              | 984       |
| Pipeline                    | 2,646        | 4,381        | S               | S         |
| Multiple modes              | 18,114       | 4,320        | 4,028           | 819       |
| Parcel, U.S.P.S. or courier | 15,158       | 466          | 314             | 818       |
| Truck and rail              | 2,779        | 3,840        | 3,670           | 1,272     |
| Truck and water             | S            | S            | 26              | 3,261     |
| Rail and water              | S            | S            | S               | S         |
| Other multiple modes        | S            | S            | S               | S         |
| Other and unknown modes     | S            | 998          | 191             | S         |

Geographic Area Series: Shipment Characteristics by Origin Geography by NAICS: 2007

| NAICS code | Meaning of NAICS code                      | Value(\$mil) | Tons (1,000) | Ton-miles (mil) | Avg miles | Value CV | Tons CV | Ton-miles CV | Avg miles CV |
|------------|--------------------------------------------|--------------|--------------|-----------------|-----------|----------|---------|--------------|--------------|
| 212        | Mining (except oil and gas)                | 319          | 38,676       | 3,271           | 69        | 16.2     | 22.8    | 21.9         | 16.9         |
| 31-33      | Manufacturing                              | 75,885       | 57,555       | 19,972          | 878       | 11       | 5.5     | 9.9          | 9.5          |
| 311        | Food manufacturing                         | 17,302       | 11,981       | 7,599           | 715       | 7.3      | 9.7     | 6.8          | 12.2         |
| 312        | Beverage and tobacco product manufacturing | 348          | 702          | 91              | S         | 30       | 21.7    | 25.1         | S            |
| 313        | Textile mills                              | S            | S            | S               | S         | S        | S       | S            | S            |
| 314        | Textile product mills                      | 146          | 28           | 25              | 849       | 21.4     | 28.4    | 28.3         | 6.4          |
| 315        | Apparel manufacturing                      | S            | S            | S               | S         | S        | S       | S            | S            |
| 321        | Wood product manufacturing                 | 391          | 523          | 126             | 515       | 11.4     | 19      | 23.8         | 23.4         |
| 322        | Paper manufacturing                        | 696          | 691          | 202             | 201       | 28       | 31.7    | 26.9         | 24.9         |
| 323        | Printing and related support activities    | 1,633        | 294          | 172             | 895       | 17.8     | 21.3    | 23.4         | 6.5          |
| 324        | Petroleum and coal products manufacturing  | 8,940        | 18,112       | 1,752           | S         | 29.1     | 23.7    | 29.7         | S            |

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

| NAICS code | Meaning of NAICS code                                        | Value(\$mil) | Tons (1,000) | Ton-miles (mil) | Avg miles | Value CV | Tons CV | Ton-miles CV | Avg miles CV |
|------------|--------------------------------------------------------------|--------------|--------------|-----------------|-----------|----------|---------|--------------|--------------|
| 325        | Chemical manufacturing                                       | 6,015        | 8,533        | 4,130           | 720       | 21.9     | 23.2    | 29.8         | 11.9         |
| 326        | Plastics and rubber products manufacturing                   | 3,493        | 1,188        | 779             | 865       | 21.5     | 22.7    | 19.9         | 9.6          |
| 327        | Nonmetallic mineral product manufacturing                    | 1,496        | 10,875       | 1,608           | 190       | 15.4     | 13.8    | 17           | 16.7         |
| 331        | Primary metal manufacturing                                  | 527          | S            | 85              | 311       | 49.5     | S       | 27.9         | 39.1         |
| 332        | Fabricated metal product manufacturing                       | 3,590        | 786          | 606             | 882       | 14.1     | 13.5    | 14.7         | 6.8          |
| 333        | Machinery manufacturing                                      | 5,016        | S            | 586             | 834       | 13.2     | S       | 21.7         | 7.5          |
| 334        | Computer and electronic product manufacturing                | 4,175        | 48           | 48              | 1,099     | 24       | 32.8    | 37.8         | 11.9         |
| 335        | Electrical equipment, appliance, and component manufacturing | 1,080        | 341          | 321             | 755       | 19.2     | 20.2    | 23           | 15.1         |
| 336        | Transportation equipment manufacturing                       | 19,669       | 721          | 603             | 640       | 34       | 30.5    | 36.1         | 9.8          |
| 337        | Furniture and related product manufacturing                  | 710          | 120          | 74              | 561       | 17.6     | 15      | 24.4         | 17.6         |
| 339        | Miscellaneous manufacturing                                  | S            | S            | S               | 772       | S        | S       | S            | 10.5         |
| 42         | Wholesale trade                                              | 47,728       | 78,783       | 17,410          | 315       | 12.7     | 20.8    | 23.6         | 17.6         |
| 423        | Merchant wholesalers, durable goods                          | 14,815       | 7,534        | 1,412           | 299       | 12.4     | 31      | 16.3         | 16.6         |
| 4231       | Motor vehicle and parts merchant wholesalers                 | 1,320        | 268          | 142             | 262       | 16.2     | 23.1    | 30           | 18.4         |
| 4232       | Furniture and home furnishing merchant wholesalers           | 324          | 99           | 21              | S         | 29.9     | 40.8    | 30.8         | S            |
| 4233       | Lumber and other construction materials merchant wholesalers | 1,044        | S            | 175             | 87        | 12.7     | S       | 37.5         | 12.3         |
| 4234       | Commercial equip. merchant wholesalers                       | 1,684        | S            | S               | 288       | 34.7     | S       | S            | 33.3         |
| 4235       | Metal and mineral (except petroleum) merchant wholesalers    | 969          | 268          | 50              | 531       | 47.3     | 38.8    | 25.7         | 20.8         |
| 4236       | Electrical and electronic goods merchant wholesalers         | 2,107        | S            | S               | S         | 29.5     | S       | S            | S            |
| 4237       | Hardware and plumbing merchant wholesalers                   | 1,027        | 105          | 12              | S         | 23.1     | 40.7    | 35.5         | S            |
| 4238       | Machinery, equipment, and supplies merchant wholesalers      | 5,558        | 787          | S               | 393       | 22.3     | 24.2    | S            | 20.3         |
| 4239       | Miscellaneous durable goods merchant wholesalers             | 783          | 1,416        | 651             | 633       | 19.4     | 36.1    | 27.4         | 12.7         |

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

| NAICS code | Meaning of NAICS code                                             | Value(\$mil) | Tons (1,000) | Ton-miles (mil) | Avg miles | Value CV | Tons CV | Ton-miles CV | Avg miles CV |
|------------|-------------------------------------------------------------------|--------------|--------------|-----------------|-----------|----------|---------|--------------|--------------|
| 424        | Merchant wholesalers, nondurable goods                            | 32,913       | 71,248       | 15,997          | 324       | 14.8     | 22.4    | 25.9         | 20.6         |
| 4241       | Paper and paper product merchant wholesalers                      | 607          | 221          | 16              | 294       | 24.1     | 48.7    | 32.5         | 40.1         |
| 4242       | Drugs and druggists' sundries merchant wholesalers                | 1,113        | S            | S               | 255       | 50       | S       | S            | 49           |
| 4243       | Apparel, piece goods, and notions merchant wholesalers            | 990          | 58           | 21              | 818       | 40.1     | 34.9    | 38.1         | 11.9         |
| 4244       | Grocery and related product merchant wholesalers                  | 6,203        | 3,635        | 298             | 247       | 23.2     | 30.6    | 22.5         | 22.5         |
| 4245       | Farm product raw material merchant wholesalers                    | 9,337        | 48,589       | 13,699          | S         | 23.9     | 28.5    | 29.2         | S            |
| 4246       | Chemical and allied products merchant wholesalers                 | 989          | S            | S               | S         | 22.9     | S       | S            | S            |
| 4247       | Petroleum and petroleum products merchant wholesalers             | 9,738        | 10,947       | 601             | 224       | 33.1     | 29      | 24.7         | 25           |
| 4248       | Beer, wine, and distilled alcoholic beverage merchant wholesalers | 676          | 375          | 11              | 39        | 18.1     | 29.4    | 23.5         | 11.4         |
| 4249       | Miscellaneous nondurable goods merchant wholesalers               | 3,259        | 5,686        | 404             | 462       | 21.4     | 40.4    | 40.1         | 23.9         |
| 4541       | Electronic shopping and mail-order houses                         | S            | 34           | 25              | 752       | S        | 46.3    | 32.8         | 13.7         |
| 45431      | Fuel dealers                                                      | 298          | 450          | 9               | 25        | 22.6     | 28.7    | 3.6          | 18.8         |
| 4931       | Warehousing and storage                                           | S            | 1,498        | 359             | 862       | S        | 34.3    | 33.1         | 18.2         |
| 5111       | Newspaper, periodical, book, and directory publishers             | 2,367        | 163          | 62              | 354       | 23       | 20.8    | 25.5         | 29.3         |
| 551114     | Corporate, subsidiary, and regional managing offices              | 6,301        | 1,169        | S               | 807       | 42       | 44.6    | S            | 21.4         |

### Hazardous Materials Series: HazMat Shipment Characteristics by Origin State: 2007

| Value(\$mil) | Tons (1,000) | Ton-miles (mil) | Avg miles | Value CV | Tons CV | Ton-miles CV | Avg miles CV |
|--------------|--------------|-----------------|-----------|----------|---------|--------------|--------------|
| 19,784       | 29,512       | 3,424           | 59        | 19.0     | 17.8    | 6.3          | 22.3         |



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 11.7.8 HAZARDOUS MATERIALS SHIPMENTS

The following tables are contained in the Bureau of Transportation Statistics (BTA) 2009 *State Transportation Statistics* report and show the hazardous materials shipments or origination and destination of the top 20 states in the United States which includes Kansas.

**Hazardous Material Shipments by Selected State of Origin: 2007  
(Ranked by tons)**

| State                | Value<br>(\$ millions) | Tons<br>(thousands) | Ton-miles<br>(millions) |
|----------------------|------------------------|---------------------|-------------------------|
| Texas                | 340,144                | 499,592             | 76,530                  |
| Louisiana            | 126,043                | 221,005             | 37,565                  |
| California           | 151,684                | 199,755             | 9,720                   |
| Illinois             | 73,473                 | 114,925             | 32,108                  |
| Pennsylvania         | 53,480                 | 95,592              | 9,895                   |
| New Jersey           | 47,908                 | 78,894              | 4,421                   |
| Florida              | 45,582                 | 68,259              | 9,429                   |
| Georgia              | 35,767                 | 67,633              | 6,608                   |
| Ohio                 | 48,758                 | 66,218              | 10,576                  |
| New York             | 37,438                 | 56,577              | 4,411                   |
| Oklahoma             | 30,998                 | 50,428              | 7,543                   |
| Indiana              | 19,168                 | 46,314              | 5,818                   |
| Massachusetts        | 21,489                 | 43,187              | 1,611                   |
| Minnesota            | 23,938                 | 42,960              | 5,621                   |
| Washington           | 28,513                 | 40,661              | 10,860                  |
| Kentucky             | 27,644                 | 39,242              | 3,203                   |
| Mississippi          | 14,586                 | 37,253              | 9,961                   |
| Michigan             | 24,593                 | 34,455              | 3,011                   |
| Kansas               | 19,784                 | 29,512              | 3,424                   |
| Utah                 | 12,596                 | 28,063              | 6,542                   |
| Top 20 states        | 1,183,586              | 1,860,525           | 258,857                 |
| All other states     | 264,632                | 370,608             | 64,600                  |
| United States, total | 1,448,218              | 2,231,133           | 323,457                 |

**Hazardous Material Shipments  
by Selected State of Destination: 2007  
(Ranked by tons)**

| State                | Value<br>(\$ millions) | Tons<br>(thousands) | Ton-miles<br>(millions) |
|----------------------|------------------------|---------------------|-------------------------|
| Texas                | 318,321                | 487,434             | 52,256                  |
| California           | 159,535                | 211,302             | 30,720                  |
| Louisiana            | 101,838                | 182,088             | 18,759                  |
| Florida              | 57,547                 | 88,865              | 23,422                  |
| Illinois             | 56,291                 | 80,466              | 16,557                  |
| New Jersey           | 45,654                 | 80,041              | 9,624                   |
| Georgia              | 39,381                 | 69,241              | 10,316                  |
| New York             | 46,247                 | 67,308              | 7,446                   |
| Pennsylvania         | 40,415                 | 67,220              | 6,103                   |
| Ohio                 | 47,924                 | 66,226              | 9,921                   |
| Indiana              | 28,394                 | 51,746              | 7,119                   |
| Oklahoma             | 31,499                 | 47,195              | 5,590                   |
| Michigan             | 32,165                 | 44,694              | 9,828                   |
| Massachusetts        | 20,208                 | 43,425              | 1,957                   |
| Minnesota            | 24,029                 | 42,515              | 3,410                   |
| Kentucky             | 25,965                 | 39,180              | 6,852                   |
| Alabama              | 17,935                 | 31,853              | 7,044                   |
| Mississippi          | 18,384                 | 31,548              | 5,132                   |
| Washington           | 23,273                 | 31,526              | 5,181                   |
| Kansas               | 20,106                 | 31,514              | 4,480                   |
| Top 20 states        | 1,155,111              | 1,795,387           | 241,717                 |
| All other states     | 293,107                | 435,746             | 81,740                  |
| United States, total | 1,448,218              | 2,231,133           | 323,457                 |

# 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

## 11.7.9 COMMODITY TYPES

### MOTOR CARRIER

The Federal Motor Carrier Safety Administration's Intermodal Transportation Database containing the Motor Carrier Management Information System (MCMIS) Census File lists approximately 1,001 hazardous material motor carriers located and operating in the State of Kansas.

### 2002 COUNTY FLOW SURVEY

In 2002, Sedgwick County Emergency Management submitted commodity flow survey forms to 356 regionally local motor carriers. The local carriers were chosen from the statewide listing of 1,001 reported hazardous materials motor carriers. The forms requested information pertaining to type commodities, quantities transported, times, and shipment locations. Of those motor carriers, 312 were not deliverable at the given address or no response was given. The remaining 44 carriers either showed no hazardous materials transporting (24) or out of business (11). Only nine motor carriers reported hazardous materials transport to include the following commodities:

|               |                    |             |                  |         |
|---------------|--------------------|-------------|------------------|---------|
| Adhesives     | Cleaning Compounds | Fertilizers | Gasoline         | Fly Ash |
| Herbicides    | Insecticides       | Paints      | Sodium Hydroxide | Acids   |
| Acrylonitrile | Waste Paints       | Waste Oils  | Hazardous Waste  |         |

CFS forms were also sent out to a total of 209 industrial facilities that had previously submitted Tier II chemical inventory forms under the requirements of the Emergency Planning and Community Right-to-Know Act of 1986 also known as Superfund Amendments and Reauthorization Act (SARA) Title III. Of the 121 responses received (57.9% of submissions), 112 facilities completed their forms that also contained carrier information. Those facilities reported the following chemicals are routinely transported to and from their facilities using various carriers.

|                    |                  |                  |                 |
|--------------------|------------------|------------------|-----------------|
| Anhydrous Ammonia  | Jet Fuel         | Calcium Chloride | Chlorine        |
| Aluminum Phosphide | Gasoline         | Industrial Gases | Crude Oil       |
| Antifreeze         | Diesel           | Caustic Soda     | Cyclohexanone   |
| Acetone            | Xylene           | Fertilizers      | Pesticides      |
| Insecticides       | Sodium Hydroxide | Solvents         | Acids           |
| Acrylonitrile      | Paints & Waste   | Waste Oils       | Hazardous Waste |

The following tables are contained in BTA's 2009 *State Transportation Statistics* report and reflect hazardous materials incident comparisons between 2008 and 2009 including deaths and injuries, mode of transportation, and pipeline incidents.

**Hazardous Materials Incidents: 2008 and 2009**  
(Not including pipelines or bulk, nonpackaged water incidents)

| 2008      |        |          |       |       | 2009         |           |        |          |       |       |              |
|-----------|--------|----------|-------|-------|--------------|-----------|--------|----------|-------|-------|--------------|
| Incidents | Deaths | Injuries |       |       | Damages (\$) | Incidents | Deaths | Injuries |       |       | Damages (\$) |
|           |        | Total    | Major | Minor |              |           |        | Total    | Major | Minor |              |
| 337       | 0      | 6        | 0     | 6     | 555          | 316       | 0      | 2        | 0     | 2     | 372          |

**Hazardous Materials Incidents by Mode: 2008 and 2009**  
(Not including pipelines or bulk, nonpackaged water incidents)

| 2008    |      |     |                    |       | 2009    |      |     |                    |       |
|---------|------|-----|--------------------|-------|---------|------|-----|--------------------|-------|
| Mode    |      |     |                    | Total | Mode    |      |     |                    | Total |
| Highway | Rail | Air | Water <sup>2</sup> |       | Highway | Rail | Air | Water <sup>2</sup> |       |
| 322     | 7    | 8   | 0                  | 337   | 299     | 9    | 8   | 0                  | 316   |

**Natural Gas Distribution Pipeline Incidents: 2008 and 2009**

| 2008                |                      |                    |           | Property damage (dollars) | 2009                |                      |                    |           | Property damage (dollars) |
|---------------------|----------------------|--------------------|-----------|---------------------------|---------------------|----------------------|--------------------|-----------|---------------------------|
| Number of incidents | Number of fatalities | Number of injuries | Number of |                           | Number of incidents | Number of fatalities | Number of injuries | Number of |                           |
| 1                   | 0                    | 0                  | 0         | 139,600                   | 2                   | 0                    | 3                  | 0         | 703,740                   |

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

**Natural Gas Transmission Pipeline Incidents: 2008 and 2009**

| 2008                |                      |                    |                           | 2009                |                      |                    |                           |
|---------------------|----------------------|--------------------|---------------------------|---------------------|----------------------|--------------------|---------------------------|
| Number of incidents | Number of fatalities | Number of injuries | Property damage (dollars) | Number of incidents | Number of fatalities | Number of injuries | Property damage (dollars) |
| 4                   | 0                    | 0                  | 831,994                   | 1                   | 0                    | 1                  | 110,863                   |

**Hazardous Liquid Pipeline Incidents: 2008 and 2009**

| 2008                |                      |                    |                                        | 2009                |                      |                    |                                        |
|---------------------|----------------------|--------------------|----------------------------------------|---------------------|----------------------|--------------------|----------------------------------------|
| Number of incidents | Number of fatalities | Number of injuries | Property damage <sup>2</sup> (dollars) | Number of incidents | Number of fatalities | Number of injuries | Property damage <sup>2</sup> (dollars) |
| 10                  | 0                    | 0                  | 9,746,712                              | 8                   | 0                    | 0                  | 135,153                                |

### 11.7.10 U.S. EPA TOXIC RELEASE INVENTORY (TRI)

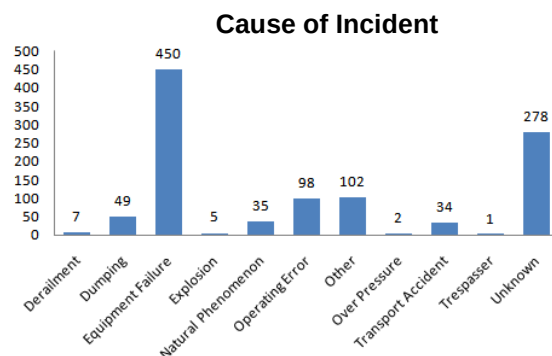
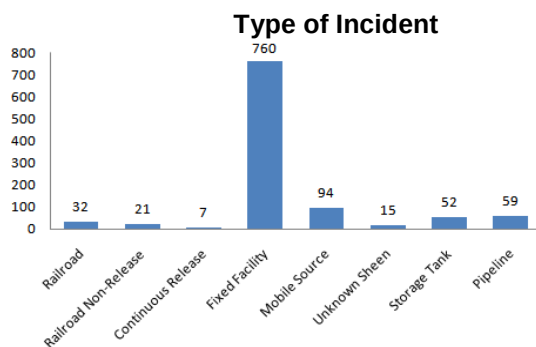
The TRI is a publicly available EPA database that contains information on specific toxic chemical releases and other waste management activities reported annually by certain covered industry groups as well as federal facilities. This inventory was established under the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA), which requires facilities to use their best readily available data to calculate their releases and waste management estimates.

Since 1999, there appears to have been almost a 50% reduction of on-site releases and off-site transfers of waste (total and metals). The following release report summary is provided for Sedgwick County during reporting year 2009 which is the most recent TRI data available:

|                                 |                                                          |
|---------------------------------|----------------------------------------------------------|
| Number of reporting facilities: | Total On-Site Releases: 1,332,568 pounds                 |
| Sedgwick County: 44             | Total Off-Site Releases: 1,680,816 pounds                |
| State of Kansas: 285            | Total Transfers (Transported) Off-Site: 8,553,228 pounds |

Waste toxic chemicals transported in large quantities or roughly equivalent to a railroad tank car (over 100,000 pounds) include: trichloroethylene, tetrachloroethylene, and ethylene glycol.

*Historical Note: On August 9, 1928, an oil well located 1.5 miles south of Valley Center on the Wright farm created one of the first gushers in Sedgwick County and pumping at the rate of 1,800 barrels per day. The nearby Goodrich well produced up to 7,000 barrels of oil per day on December 6, 1928, and considered the largest oil field in Kansas history.<sup>48</sup>*



<sup>48</sup> Valley Center: Its Founding & Major Events, Frank Hutchings, Valley Center, 1976

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 11.7.11 NATIONAL RESPONSE CENTER

The primary function of the National Response Center is to serve as the sole national point of contact for reporting all oil, chemical, radiological, biological, and etiological discharges into the environment anywhere in the United States and its territories. A listing of incidents reported to the National Response Center between 1990 and 2010 are summarized in the following table.

#### **Sedgwick County Incident Report Information From the National Response Center Between February 1990 and November 2010**

*Railroad Non-Release Reports:* 21 (Number 2 diesel)

*Continuous Release Reports:* 7 (Anhydrous ammonia, nitrogen dioxide, and nitrogen oxide)

*Fixed Facility Reports:* 760 (toluene, ferric chloride, potassium chlorate, sulfuric acid, 1,1,1-trichloroethane, trichloroethylene, perchloroethylene, gasoline, mixed acids, chlorine, methyl chloride, chloroform, mineral spirits, carbon tetrachloride, sodium hydroxide, dimethyl sulfoxide, dimethylamine, barium chlorate, p-xylene, n-butyl alcohol, phosphoric acid, tipperdine, JP-4 aviation fuel, muriatic acid, hexachlorobutadiene, hexachlorobenzene, polychlorinated biphenyls, benzyl cyanide, hydrogen fluoride, hydrochloric acid, waste oil, waste water, fuel oil no. 2, pentachlorophenol, Dow Den 438/439, and Curithane 103)

*Railroad Reports:* 32 (asbestos, carbon dioxide, methylene dianiline, chlorine, lubricating oil, sodium hydroxide, diesel fuel, motor oil, soybean oil, carbon tetrachloride, hydrogen fluoride, toluene, dimethyl amino propylamine, ammonia fertilizer, hydrochloric acid, and cyclohexylamine)

*Mobile Source Reports:* 94 (diesel fuel, hydraulic oil, fuel oil no. 2, JP-8 jet fuel, nitrogen, methyl alcohol, potassium sodium hydroxide, automotive gasoline, , 1,1,1-trichloroethane, motor oil, hydrochloric acid, waste flammable liquid, AFFF, sodium hydroxide, carbon tetrachloride, JP-4 jet fuel, asphalt emulsion, nitric acid, natural gas, waste perchloroethylene, phosphoric acid, ferrous chloride, 4,4-methylene dianiline, perchloroethylene, industrial sludge, waste treatment sludge, dicamba, MCPA, pendimethaline, potassium, and liquefied nitrogen)

*Unknown Sheen Reports:* 15 (various oils, hydrochloric acid, chloroform, chlorine, hydrogen fluoride, and carbon tetrachloride)

*Storage Tank Reports:* 52 (chloroform, perchloroethylene, sodium hydroxide, kerosene, diesel oil, heptachlor, chlorine, chrome, ferric sulfate, trichloroethylene, fuel oil no. 2, carbon tetrachloride, ethylene glycol, refrigerant gases, caustic soda, n,n-dimethylcyclohexylamine, deoxidizer 16, trimethylamine, motor oil, hydraulic oil, automotive gasoline, nitric acid, ferrous chloride, anhydrous ammonia, 10-34-0 liquid fertilizer, and JP-8 aviation fuel)

*Pipeline Reports:* 59 (crude oil, JP-8 jet fuel, natural gas, propane, chloroform, methylene chloride, methyl chloride, carbon tetrachloride, AFFF, hydrochloric acid, automotive gasoline, Jet A oil, and naphtha coal tar)

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 11.7.12 HAZMAT INCIDENT SUMMARY

U.S. Department of Transportation Office of Hazardous Materials Safety's Hazardous Materials Information System reports the following information between the years 2001 and 2010 for the State of Kansas:

**U.S. Department of Transportation  
Pipeline and Hazardous Materials Safety Administration  
Office of Hazardous Material Safety  
Hazmat Summary by Incident State**

|      |           | Injuries     |                  |            |             |
|------|-----------|--------------|------------------|------------|-------------|
| Year | Incidents | Hospitalized | Non-Hospitalized | Fatalities | Damages     |
| 2010 | 261       | 0            | 0                | 0          | \$323,892   |
| 2009 | 322       | 0            | 3                | 0          | \$371,648   |
| 2008 | 337       | 0            | 6                | 0          | \$555,409   |
| 2007 | 402       | 0            | 16               | 0          | \$1,403,483 |
| 2006 | 481       | 0            | 4                | 0          | \$660,098   |
| 2005 | 336       | 1            | 10               | 0          | \$504,761   |
| 2004 | 304       | 0            | 2                | 0          | \$367,472   |
| 2003 | 392       | 0            | 1                | 0          | \$914,550   |
| 2002 | 384       | 0            | 1                | 0          | \$305,608   |
| 2001 | 341       | 0            | 5                | 0          | \$895,441   |

Source: [https://hip.phmsa.dot.gov/analytics/saw.dll?Dashboard&\\_scid=K579VFV65A8](https://hip.phmsa.dot.gov/analytics/saw.dll?Dashboard&_scid=K579VFV65A8)

### 11.7.13 RADIOLOGICAL CONCERNS/INCIDENTS

The last radiological incident reported in Sedgwick County occurred March 22, 1979 at the I-235 underpass near the Meridian Street exit. The incident involved a semi-trailer overturned containing refined uranium 235 "Yellow Cake" (uranium oxide) LSA drums. Several drums were breached and radioactivity was detected on the ground. Over excavation of the soils was performed. No injuries were reported and resulted primarily in over packing the uranium containing drums and excavated soils.

According to Wolf Creek nuclear power plant located in Coffey County, uranium fuel pellets and rods are not transported through the south-central Kansas area and is not considered to be a concern.

### 11.7.14 NUCLEAR WEAPONS TRANSPORTATION

The Department of Energy's National Nuclear Security Administration (NNSA) Office of Secure Transportation (OST) is responsible for the safe and secure transport in the contiguous United States of government-owned special nuclear materials. These classified shipments can contain nuclear weapons or components, enriched uranium, or plutonium. The cargo is transported in highly modified secure tractor-trailers and escorted by armed Federal Agents in other vehicles who provide security and national incident command system response in the event of emergencies. The Amarillo, Texas command serves the Midwest states, and the Transportation and Emergency Control Center (TECC) center monitors the status and location and maintains real-time communications 24 hours a day, 365 days a year, with every convoy. Historically, deliberate threat attempts have been made on convoys to damage shipments by perpetrators; however, no shipments have been lost since 1947 when the program began.

The covert usage of radiological materials by terrorist groups as a weapon of mass destruction (WMD) is a concern. The weapon could be detonated using conventional means and spread radioactivity over a large area. It is anticipated that one pound of radioactive material could affect an area greater than one mile depending on atmospheric conditions. Inhalation hazards and general contamination of persons, buildings and equipment are the primary concern.



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 11.7.15 METHAMPHETAMINE/CLANDESTINE LAB INCIDENTS

Methamphetamine is a synthetic amphetamine or stimulant that is produced and sold illegally in pill form, capsules, powder, or chunks and produced in illegal clandestine drug laboratories that are commonly found in motels; rural areas away from the general public; and residential areas, including houses, apartments, and garages. Mobile labs have also been found in vehicles and discarded along roadsides or parking lots.

Methamphetamine is produced from 19 chemicals regulated under the Chemical Control Act with specific reported requirements from chemical industry manufacturers and retailers. Anhydrous ammonia is one of the primary chemicals of concern because of its commonality and can affect persons living near ammonia storage facilities. Explosions from chemical mixes and chemical vapors from the mixing are also of concern for persons in close proximity to the illegal laboratories. Lab Types consisting of anhydrous ammonia; hydriodic acid; hydrogenation; ice conversion; methamphetamine; p2p methylamine; tablet extraction; and, urine extraction.

The following seizures, reported by the Kansas Bureau of Investigation (KBI) for the past ten years, show a consistent drop statewide:

**Methamphetamine/Clandestine Lab Seizures for Sedgwick County**

| Year | Chemical Only or Equipment Only | Dumpsite | Laboratory | Total | Statewide |
|------|---------------------------------|----------|------------|-------|-----------|
| 2015 | 0                               | 0        | 2          | 2     | 26        |
| 2014 | 0                               | 1        | 1          | 2     | 50        |
| 2013 | 0                               | 3        | 0          | 3     | 57        |
| 2012 | 2                               | 2        | 1          | 5     | 143       |
| 2011 | 1                               | 0        | 0          | 1     | 214       |
| 2010 | 0                               | 0        | 1          | 1     | 109       |
| 2009 | 0                               | 0        | 0          | 0     | 121       |
| 2008 | 1                               | 0        | 0          | 0     | 153       |
| 2007 | 0                               | 0        | 1          | 1     | 97        |
| 2006 | 0                               | 2        | 0          | 2     | 168       |
| 2005 | 8                               | 3        | 19         | 30    | 390       |
| 2004 | 1                               | 6        | 13         | 20    | 583       |
| 2003 | 9                               | 7        | 6          | 22    | 649       |
| 2002 | 3                               | 19       | 10         | 32    | 728       |
| 2001 | 12                              | 14       | 17         | 43    | 847       |

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### 11.7.16 WASTE TRANSFERS

According to the U.S. Environmental Protection Agency's Toxic Release Inventory (TRI) facility report, there are 33 Sedgwick County facilities that have reported waste transfers off-site for the year 2000. The following table shows the transfer type and estimated quantity that can be transported annually by highway and rail:

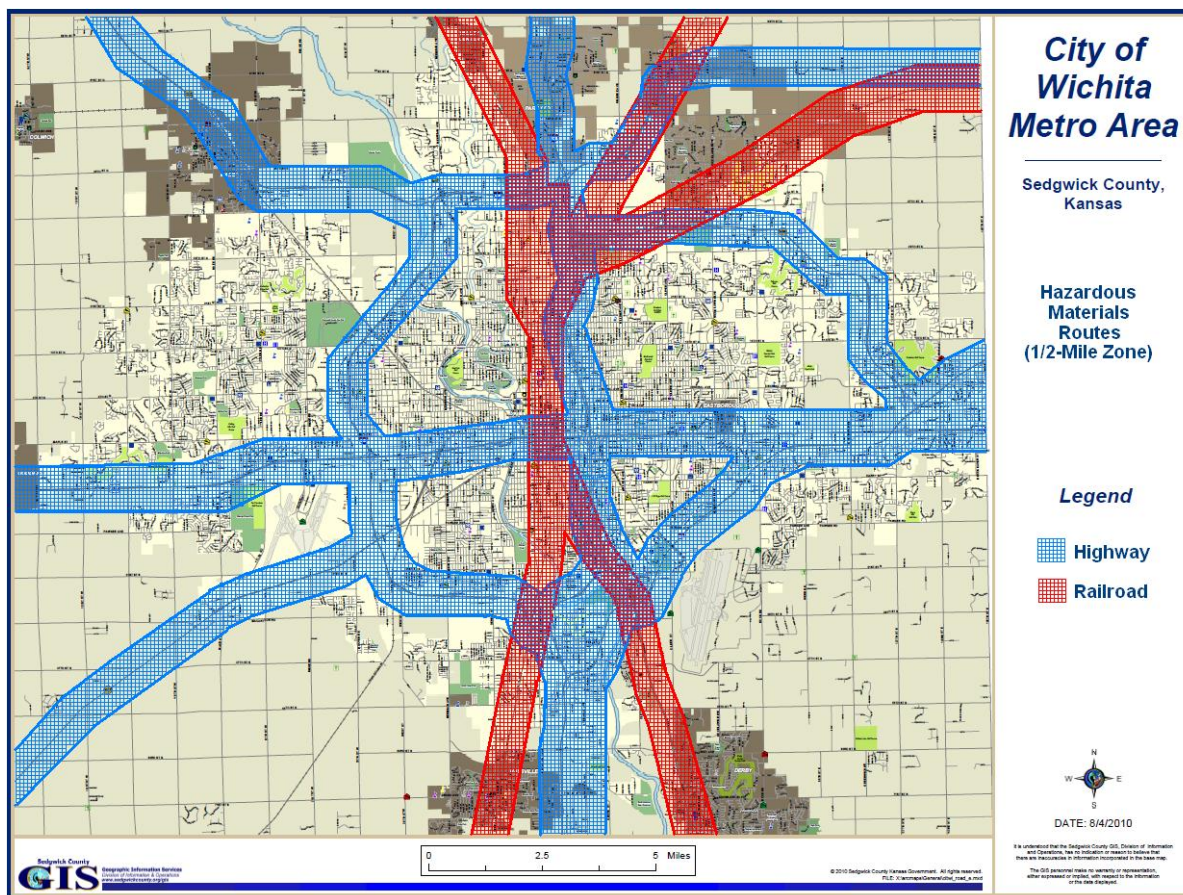
WASTE TRANSFER REPORT

| Facility and Chemical | Transfers to Recycling | Transfers to Energy Recovery | Transfers to Treatment | Transfers to POTWs | Other Off-site Transfers | Total Transfers Off-site for Further Waste Management |
|-----------------------|------------------------|------------------------------|------------------------|--------------------|--------------------------|-------------------------------------------------------|
| Total                 | 7,610,987              | 373,066                      | 12,475                 | 208,452            | 1,053                    | 8,553,228                                             |

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 11.7.17 SUSCEPTIBLE POPULATION PROXIMITY

As shown in the following map, the following highway and railroad corridors identifies at least 35% of residents to be at risk of a release of hazardous materials within ½-mile of the right-of-ways.



*Regulatory*

*Hazard Severity Ratings*

The following rating table indicates the probability of a hazardous materials event occurring once a year or more, impacting less than 25% of the land. It is not anticipated to impact health and safety, property, the environment, or economic value.

HAZARDOUS MATERIALS HAZARD AND EVENT RATING TABLE

| Consequence          | Probable Rating | Catastrophic Rating |
|----------------------|-----------------|---------------------|
| Area Impacted        | 1               | 3                   |
| Probability          | 4               | 0                   |
| Health & Safety      | 0               | 4                   |
| Property             | 0               | 1                   |
| Environment          | 0               | 2                   |
| Economic             | 0               | 3                   |
| <b>Total Ratings</b> | <b>5</b>        | <b>13</b>           |

### *Catastrophic Event*

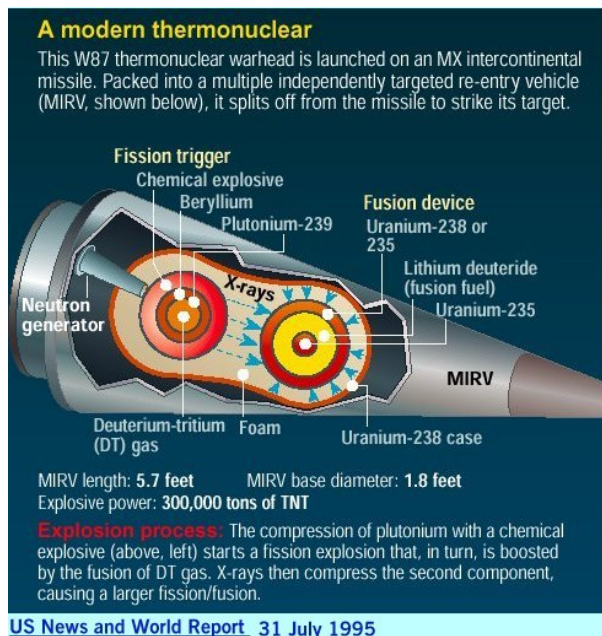
A catastrophic event would result in the release by a facility's Risk Management Plan chemical release worst case scenario affecting at least one quarter or more of the population, or a transportation accident resulting in the total release a chemical having a reportable quantity.

### 11.8 RADIOLOGICAL

**Definition:** Radiation is a process of emission of energy or particles. Various forms of radiation may be distinguished, depending on the type of the emitted energy/matter, the type of the emission source, properties and purposes of the emission, etc. Hazards that may face Sedgwick County may be through explosive technological release or solar impact.

#### 11.8.1 NUCLEAR WEAPON (IONIZING RADIATION)

Nuclear weapons can range in size and yield, with the smallest (Davy Crockett) weighing 51 pounds with a yield of 10 tons of trinitrotoluene (TNT) up to the 27 ton Tsar Bomba bomb with a yield of 50 megatons (50 million tons of TNT). By comparison, the Oklahoma City bombing non-radioactive yield was 2 tons of TNT.



Nuclear fission is used to produce energy for nuclear power and to drive the explosion of nuclear weapons. Nuclear fusion of light elements releases the energy that causes nuclear weapons to explode.

For a low altitude atmospheric detonation of a moderate sized weapon in the kiloton range, the energy is distributed roughly as follows: 50% as blast; 35% as thermal radiation; and, 15% as nuclear radiation of which 5% is initial ionizing radiation within the first minute after detonation, and 10% as residual nuclear radiation (fallout).

**Surface Burst:** An explosion in which a weapon is detonated on or slightly above the surface of the earth so that the fireball actually touches the land or water surface.

**Subsurface Burst:** An explosion in which the point of the detonation is beneath the surface of land or water.

**High Altitude Burst:** The weapon is exploded at such an altitude (above 30 km) that the fireball is much larger and expands much more rapidly. The ionizing radiation from the high altitude burst can travel for hundreds of miles before being absorbed. Significant ionization of the upper atmosphere (ionosphere) can occur. Severe disruption in communications can occur following high altitude bursts. They also lead to generation of an intense electromagnetic pulse (EMP) that can significantly degrade performance of or destroy sophisticated electronic equipment. There are no known biological effects of EMP; however, indirect effects may result from failure of critical medical equipment.

*National Nuclear Security Administration (NNSA) Office of Secure Transportation (OST)*



The Department of Energy's NNSA OST is responsible for the safe and secure transport in the contiguous United States of government-owned special nuclear materials. These classified shipments can contain nuclear weapons or components, enriched uranium, or plutonium. The cargo is transported in highly modified secure tractor-trailers and escorted by armed Federal Agents in other vehicles who provide security and national incident command system response in the event of emergencies. The Safeguards Transporter (SGT) is a specially designed part of an 18-wheel rig that incorporates various deterrents to prevent unauthorized removal of cargo.



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

The trailer has been designed to protect the cargo against damage in the event of an accident. superior structural characteristics and a highly reliable cargo tie - down system similar to that used aboard aircraft. The thermal characteristics of the SGT would allow the trailer to be totally engulfed in a fire without incurring damage to the cargo. The tractors are standard production units that have been modified to provide the federal agents protection against attack. Escort vehicles accompany the tractor-trailers during transportation activities. Transport shipments occur to and from the Pantex facility in Amarillo, Texas and have passed through the State of Kansas (including Sedgwick County) using alternating routes.

### 11.8.2 RADIOLOGICAL DISPERSAL DEVICE (RDD)

An RDD or “dirty bomb” combines a conventional explosive, such as dynamite, with radioactive material. In most instances, the conventional explosive itself would have more immediate lethality than the radioactive material. At the levels created by most probable sources, not enough radiation would be present in a dirty bomb to kill people or cause severe illness. Contamination caused by the use of certain types of radioactive materials would be the main concern in the release of an RDD.

### 11.8.3 ELECTROMAGNETIC RADIATION/PULSE (EMR/EMP)

The electromagnetic radiation from an explosion (especially nuclear explosions) or an intensely fluctuating magnetic field caused by Compton-recoil electrons (increase in wavelength decrease in energy) which occurs when X-ray (or gamma ray) photons with energies of around 0.5 MeV to 3.5 MeV interact with electrons in a material) and photoelectrons from photons scattered in the materials of the electronic or explosive device or in a surrounding medium. An EMP acts like a stroke of lightning but is stronger, faster, and shorter. It can seriously damage electronic devices connected to power sources or antennas. This includes communication systems, computers, electrical appliances, and automobile or aircraft ignition systems. The damage could range from a minor interruption to actual burnout of components. Battery-powered radios with short antennas generally would not be affected. A nuclear burst of approximately 20 megatons over the central part of the United States at an altitude of 500 kilometers would produce an EMP field that would incapacitate all communications systems in the continental United States.

Electrical power is necessary to maintain and support critical infrastructure with main sources of power and transmission lines located above ground. Hazards to these sources include natural, technological, and civil disruptions. It is anticipated by power utility companies that interruptions to service will be limited with a short recovery time based on previous disasters that have occurred around the world. During the “Cold War”, civil defense became concerned with the misuse of atomic power leading to the concern for a high altitude detonation above the United States causing an electromagnetic pulse which would dampen electrical and communications systems with slow recovery across the country. This concern is still reflected in the United States Congress including a special 2008 commission report which states:

*The electromagnetic pulse (EMP) generated by a high altitude nuclear explosion is one of a small number of threats that can hold our society at risk of catastrophic consequences. The increasingly pervasive use of electronics of all forms represents the greatest source of vulnerability to attack by EMP. Electronics are used to control, communicate, compute, store, manage, and implement nearly every aspect of United States (U.S.) civilian systems. The Commission's view is that the Federal Government does not today have sufficiently robust capabilities for reliably assessing and managing EMP threats.*<sup>49</sup>

EMP is a burst of electromagnetic radiation (EMR) that can be derived from nuclear explosions, non-nuclear explosions, and geomagnetic storms. Saturation of the air by high electron volts can result in damaging or destroying telecommunications and electrical systems. The intensity of EMP is the proximity of the explosion to the target, and for high altitude nuclear explosions, based on the magnetic field intensity of the earth and ionization of the upper atmosphere. Nuclear EMP components include:

E1 Pulse – high altitude/fast moving gamma radiation of two million electron volts (2 MeV) knocking electrons out of the air (electrifying) and proceeding at near light speed velocity towards the earth with

---

<sup>49</sup> Report of the Commission to Assess the Threat to the United States from Electromagnetic Pulse (EMP) Attack – Critical National Infrastructures, April 2008

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

an electric current (Compton Effect) and lasting less than one to a few nanoseconds. Faraday cages do not protect against this type of pulse.

E2 Pulse – typically follows an E1 pulse and lasts from one microsecond to one second over a large geographic area, generally comparable to a multiple lightning strike.

E3 Pulse – considered to be the late time EMP, can last a minute or more and comparable to an extreme geomagnetic storm (Category 5).

Although there have been nuclear tests conducted during the “Cold War” with megaton yields to determine the effect of EMP on a large area (i.e. continental United States), concerns of the 21<sup>st</sup> century are from smaller explosions and geomagnetic storms.

10 Kiloton Nuclear Detonation – Considered to be a plausible threat in high altitude or ground detonation (gun-type weapon) within the United States by rogue countries with nuclear power or terrorist organizations (i.e. Al-Qaeda) with adequate funding and procurement. The following excerpts are from the 1999 congressional testimony<sup>50</sup> to the Committee on Armed Forces in relation to the North Korean nuclear threat of that time from Dr. Lowell Wood, Commissioner of the EMP Commission:

“Special purpose nuclear warheads, on a kiloton scale, can have much more of EMP effect than ordinary nuclear warheads on the megaton scale. Less than ten kilotons properly employed in the type of warheads which have actually been examined, both in the Soviet Union and in the United States experimentally, warheads of less than 10-kiloton yields can put out very large EMP signals.”

“In order to be noncontroversial, I will just quote a CIA estimate that has been briefed by a senior cognizant CIA national intelligence officer on the Hill here during the last year, on an unclassified basis, where he considered a hypothetical laydown of the type that could be posed by a Taepo Dong missile over the central United States and presented the unclassified calculations of what the EMP yield or the EMP consequences would be at the coasts of the United States; in other words, most distant from the explosion. The EMP field strengths that were calculated there—and nobody seriously questions these calculations, they are with tool sets that are community tool sets that have been around for decades—with the field strengths that were demonstrated at the coasts, the maximum distance, you would see upset or damage to a wide variety of civilian equipment that has been documented to fail at these field strengths, and you would see some damage to military equipment.”

According to the 2008 commission report, the following are considered examples of non-nuclear EMP disruptions:

*Bellingham Pipeline Incident.* On June 10, 1999, one of the Olympic pipelines transporting gasoline ruptured in the Whatcom Falls Park area of Bellingham, Washington. Causes included improperly set relief valves, delayed maintenance inspections, and SCADA system discrepancies. The electronic disturbance of an EMP event could be expected to precipitate SCADA failures and the ensuing loss of valve controls.

*Carlsbad Pipeline Incident.* On August 19, 2000, an explosion occurred on one of three adjacent large natural gas pipelines near Carlsbad, New Mexico, operated by the El Paso Natural Gas Company. The explosion happened because of failures in maintenance and loss of situational awareness, conditions that would be replicated by data acquisition disruptions caused by an EMP event.

*Pembroke Refinery Incident.* On July 24, 1994, a severe thunderstorm passed over the Pembroke refinery in the United Kingdom. Lightning strikes resulted in a 0.4 second power loss and subsequent power dips throughout the refinery. Consequently, numerous pumps

---

<sup>50</sup> *Electromagnetic Pulse Threats to the U.S. Military and Civilian Infrastructure (1999), Committee on Armed Services, House of Representatives, 106<sup>th</sup> Congress, pg 49 and 50*

and overhead fin-fan coolers tripped repeatedly, resulting in the main crude column pressure safety valves lifting and major upsets in the process units in other refinery units, including those within the fluid catalytic cracking (FCC) complex. There was an explosion in the FCC unit and a number of isolated fires continued to burn at locations within the FCC, butamer, and alkylation units. The disturbances caused by the lightning strikes — power loss and degradation — would also result from an EMP event.

The Commission has also investigated the impact of a 100-year super storm. The induced geomagnetic superstorm currents in the transmission lines will cause hundreds of high voltage transformers to saturate, creating a severe reactive load in the power system leading to voltage collapse in the affected area and damage to elements of the transmission system.

### 11.8.4 GEOMAGNETIC STORMS<sup>51</sup>

Solar Cycle 10 began in 1855 with a smoothed sunspot number maximum of 96 by September 1859. At 11:18 AM on the cloudless morning of Thursday, September 1, 1859, 33-year-old Richard Carrington captured the likeness of an enormous group of sunspots. Suddenly, two brilliant beads of blinding white light appeared over the sunspots, intensified rapidly, and became kidney-shaped. Approximately 18 hours later, just before dawn the next day, skies all over planet Earth erupted in red, green, and purple auroras so brilliant that newspapers could be read as easily as in daylight. Auroras pulsated even at near tropical latitudes over Cuba, the Bahamas, Jamaica, El Salvador, and Hawaii. However, telegraph systems worldwide went haywire. Spark discharges shocked telegraph operators and set the telegraph paper on fire. Even when telegraphers disconnected the batteries powering the lines, aurora-induced electric currents in the wires still allowed messages to be transmitted. “What Carrington saw was a white-light solar flare—a magnetic explosion on the sun,” explained David Hathaway, solar physics team lead at NASA’s Marshall Space Flight Center in Huntsville, Alabama.

A huge solar flare on August 4, 1972 during Solar Cycle 20 knocked out long-distance telephone communication across Illinois. That event caused AT&T to redesign its power system for transatlantic cables. A similar flare on March 13, 1989, provoked geomagnetic storms that disrupted electric power transmission from the Hydro Québec generating station in Canada, blacking out most of the province and plunging 6 million people into darkness for 9 hours; aurora-induced power surges even melted power transformers in New Jersey as well as damaging a 1200 MVA 500kV transformer at the Salem nuclear power plant. In December 2005, X-rays from another solar storm disrupted satellite-to-ground communications and Global Positioning System (GPS) navigation signals for about 10 minutes.

### 11.8.5 NATURAL EMP VS EMP ATTACK

Historically, only one or several critical elements within a system were incapacitated; whereas, an EMP attack would damage or disrupt multiple elements over a broad geographic area with cascading failures.

Telecommunications and SCADA systems typically were not affected by natural EMP; however, an attack would cause damage and disruption of these systems and require minimal communications for immediate responses to restore the system.

Critical infrastructure sectors would be temporarily impeded in a natural EMP; however, multiple sectors (i.e. finance, transportation, etc) would continue to deteriorate from the EMP attack and cause secondary disasters (i.e. accidents, economic impact, etc).

### 11.8.6 SOLAR CYCLES/FLARES AND CORONAL MASS EJECTIONS

Coronal Mass Ejection (CME): Are balloon-shaped bursts of solar wind rising above the solar corona, expanding as they climb. Solar plasma is heated to tens of millions of degrees, and electrons, protons, and heavy nuclei are accelerated to near the speed of light. The super-heated electrons from CMEs move along the magnetic field lines faster than the solar wind can flow. Rearrangement of the magnetic field, and solar flares may result in the formation of a shock that accelerates particles ahead of the CME loop. Each CME

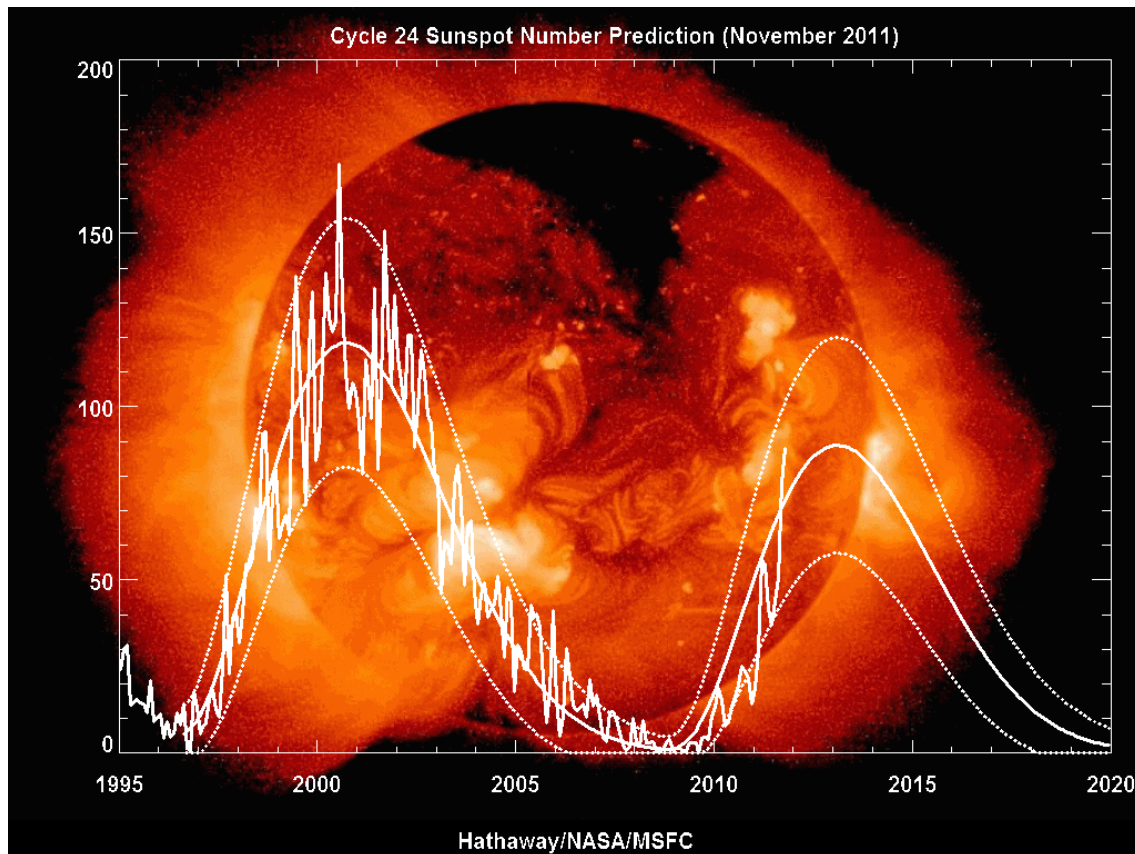
---

<sup>51</sup> NASA Science News, May 6, 2008

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

releases up to 100 billion kg (220 billion lb) of this material, and the speed of the ejection can reach 1000 km/second (2 million mph) in some flares. Solar flares and CMEs are currently the biggest "explosions" in our solar system, roughly approaching the power in ONE BILLION hydrogen bombs. (NASA definition)

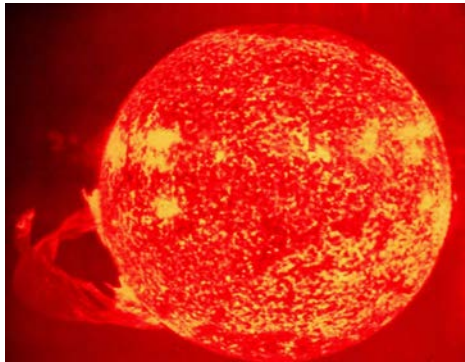
Solar Cycle: Occurs every 11 years. **Solar maximum** is the term for the maximum in solar activity that takes place approximately every eleven years; **solar minimum** is the lowest point of solar activity. The current prediction for Solar Cycle 24 gives a smoothed sunspot number maximum of about 89 in May of 2013. Increased activity in the last few months has raised the predicted maximum above the 64.2 for the Cycle 14 maximum in 1907. The current predicted size still make this the smallest sunspot cycle in over 80 years.



CMEs, along with solar flares of other origin, can disrupt radio transmissions and cause damage to satellites and electrical transmission line facilities, resulting in potentially massive and long-lasting power outages. CMEs typically reach Earth one to five days after the eruption from the Sun. CMEs interact with the solar wind and the Interplanetary Magnetic Field (IMF). As a consequence, slow CMEs are accelerated toward the speed of the solar wind and fast CMEs are decelerated toward the speed of the solar wind. Fast CMEs (faster than about  $500 \text{ km s}^{-1}$ ) eventually drive a shock. This shock wave is part of a geomagnetic storm which interacts with the Earth's magnetic field. The increase in the solar wind pressure initially compresses the magnetosphere and the solar wind magnetic field will interact with the Earth's magnetic field and transfer an increased amount of energy into the magnetosphere. (National Academy of Sciences)

Co-author John Kappenmann of the Metatech Corporation looked at the great geomagnetic storm of May 1921, which produced ground currents as much as ten times stronger than the 1989 Quebec storm (Solar Cycle 22 with a smoothed sunspot number maximum of 158), and modeled its effect on the modern power grid. He found more than 350 transformers at risk of permanent damage and 130 million people without power. The loss of electricity would ripple across the social infrastructure with "water distribution affected within several hours; perishable foods and medications lost in 12-24 hours; loss of heating/air conditioning, sewage disposal, phone service, fuel re-supply and so on. The State of Kansas is shown with 27% potential loss of power that could extend into years. [http://science.nasa.gov/science-news/science-at-nasa/2009/21jan\\_severespaceweather/](http://science.nasa.gov/science-news/science-at-nasa/2009/21jan_severespaceweather/)





The National Oceanic and Atmospheric Administration (NOAA) Space Weather Prediction Center (SWPC) monitors solar activity from the sun to determine the effects of geomagnetic storms, solar radiation storms, and radio blackouts that may occur on Earth. Intensities of each of these solar effects are measured on a scale from 1 (minor) to 5 (extreme). Geomagnetic storms are disturbances in the geomagnetic field caused by gusts in the solar wind that blows by Earth; Solar radiation storms have elevated levels of radiation that occur when the numbers of energetic particles increase; and, Radio blackouts are disturbances of the ionosphere caused by X-ray emissions from the Sun.

Descriptions of each of these storm types, occurrences, durations, and potential effects on Earth are shown below:

## 11.8.7 NOAA SPACE WEATHER SCALES



# NOAA Space Weather Scales



| Category                  |            | Effect                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Average Frequency<br>(1 cycle = 11 years)                            |
|---------------------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| Scale                     | Descriptor | Duration of event will influence severity of effects                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                      |
| <b>Geomagnetic Storms</b> |            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Number of storm events when Kp level was met; (number of storm days) |
| <b>G 5</b>                | Extreme    | <u>Power systems:</u> widespread voltage control problems and protective system problems can occur, some grid systems may experience complete collapse or blackouts. Transformers may experience damage.<br><u>Spacecraft operations:</u> may experience extensive surface charging, problems with orientation, uplink/downlink and tracking satellites.<br><u>Other systems:</u> pipeline currents can reach hundreds of amps, HF (high frequency) radio propagation may be impossible in many areas for one to two days, satellite navigation may be degraded for days, low-frequency radio navigation can be out for hours, and aurora has been seen as low as Florida and southern Texas (typically 40° geomagnetic lat.).** | 4 per cycle<br>(4 days per cycle)                                    |
| <b>G 4</b>                | Severe     | <u>Power systems:</u> possible widespread voltage control problems and some protective systems will mistakenly trip out key assets from the grid.<br><u>Spacecraft operations:</u> may experience surface charging and tracking problems, corrections may be needed for orientation problems.<br><u>Other systems:</u> induced pipeline currents affect preventive measures, HF radio propagation sporadic, satellite navigation degraded for hours, low-frequency radio navigation disrupted, and aurora has been seen as low as Alabama and northern California (typically 45° geomagnetic lat.).**                                                                                                                            | 100 per cycle<br>(60 days per cycle)                                 |
| <b>G 3</b>                | Strong     | <u>Power systems:</u> voltage corrections may be required, false alarms triggered on some protection devices.<br><u>Spacecraft operations:</u> surface charging may occur on satellite components, drag may increase on low-Earth-orbit satellites, and corrections may be needed for orientation problems.<br><u>Other systems:</u> intermittent satellite navigation and low-frequency radio navigation problems may occur, HF radio may be intermittent, and aurora has been seen as low as Illinois and Oregon (typically 50° geomagnetic lat.).**                                                                                                                                                                           | 200 per cycle<br>(130 days per cycle)                                |
| <b>G 2</b>                | Moderate   | <u>Power systems:</u> high-latitude power systems may experience voltage alarms, long-duration storms may cause transformer damage.<br><u>Spacecraft operations:</u> corrective actions to orientation may be required by ground control; possible changes in drag affect orbit predictions.<br><u>Other systems:</u> HF radio propagation can fade at higher latitudes, and aurora has been seen as low as New York and Idaho (typically 55° geomagnetic lat.).**                                                                                                                                                                                                                                                               | 600 per cycle<br>(360 days per cycle)                                |
| <b>G 1</b>                | Minor      | <u>Power systems:</u> weak power grid fluctuations can occur.<br><u>Spacecraft operations:</u> minor impact on satellite operations possible.<br><u>Other systems:</u> migratory animals are affected at this and higher levels; aurora is commonly visible at high latitudes (northern Michigan and Maine).**                                                                                                                                                                                                                                                                                                                                                                                                                   | 1700 per cycle<br>(900 days per cycle)                               |

\* Based on this measure, but other physical measures are also considered

\*\* For specific locations around the globe, use geomagnetic latitude to determine likely sightings (see [www.swpc.noaa.gov/Aurora](http://www.swpc.noaa.gov/Aurora))



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

| Category                      |            | Effect                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Average Frequency<br>(1 cycle = 11 years)  |
|-------------------------------|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| Scale                         | Descriptor | Duration of event will influence severity of effects                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                            |
| <b>Solar Radiation Storms</b> |            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Number of events when flux level was met** |
| <b>S 5</b>                    | Extreme    | <u>Biological</u> : unavoidable high radiation hazard to astronauts on EVA (extra-vehicular activity); passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk. ***<br><u>Satellite operations</u> : satellites may be rendered useless, memory impacts can cause loss of control, may cause serious noise in image data, star-trackers may be unable to locate sources; permanent damage to solar panels possible.<br><u>Other systems</u> : complete blackout of HF (high frequency) communications possible through the polar regions, and position errors make navigation operations extremely difficult. | Fewer than 1 per cycle                     |
| <b>S 4</b>                    | Severe     | <u>Biological</u> : unavoidable radiation hazard to astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk.***<br><u>Satellite operations</u> : may experience memory device problems and noise on imaging systems; star-tracker problems may cause orientation problems, and solar panel efficiency can be degraded.<br><u>Other systems</u> : blackout of HF radio communications through the polar regions and increased navigation errors over several days are likely.                                                                                                               | 3 per cycle                                |
| <b>S 3</b>                    | Strong     | <u>Biological</u> : radiation hazard avoidance recommended for astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk.***<br><u>Satellite operations</u> : single-event upsets, noise in imaging systems, and slight reduction of efficiency in solar panel are likely.<br><u>Other systems</u> : degraded HF radio propagation through the polar regions and navigation position errors likely.                                                                                                                                                                                          | 10 per cycle                               |
| <b>S 2</b>                    | Moderate   | <u>Biological</u> : passengers and crew in high-flying aircraft at high latitudes may be exposed to elevated radiation risk.***<br><u>Satellite operations</u> : infrequent single-event upsets possible.<br><u>Other systems</u> : effects on HF propagation through the polar regions, and navigation at polar cap locations possibly affected.                                                                                                                                                                                                                                                                                                    | 25 per cycle                               |
| <b>S1</b>                     | Minor      | <u>Biological</u> : none.<br><u>Satellite operations</u> : none.<br><u>Other systems</u> : minor impacts on HF radio in the polar regions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 50 per cycle                               |

\* Flux levels are 5 minute averages. Flux in particles  $s^{-1}ster^{-1}cm^{-2}$  Based on this measure, but other physical measures are also considered.

\*\* These events can last more than one day.

\*\*\* High energy particle (>100 MeV) are a better indicator of radiation risk to passenger and crews. Pregnant women are particularly susceptible.

| Category               |            | Effect                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Average Frequency<br>(1 cycle = 11 years)                        |
|------------------------|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
| Scale                  | Descriptor | Duration of event will influence severity of effects                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                  |
| <b>Radio Blackouts</b> |            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Number of events when flux level was met; (number of storm days) |
| <b>R 5</b>             | Extreme    | <u>HF Radio</u> : Complete HF (high frequency**) radio blackout on the entire sunlit side of the Earth lasting for a number of hours. This results in no HF radio contact with mariners and en route aviators in this sector.<br><u>Navigation</u> : Low-frequency navigation signals used by maritime and general aviation systems experience outages on the sunlit side of the Earth for many hours, causing loss in positioning. Increased satellite navigation errors in positioning for several hours on the sunlit side of Earth, which may spread into the night side. | Fewer than 1 per cycle                                           |
| <b>R 4</b>             | Severe     | <u>HF Radio</u> : HF radio communication blackout on most of the sunlit side of Earth for one to two hours. HF radio contact lost during this time.<br><u>Navigation</u> : Outages of low-frequency navigation signals cause increased error in positioning for one to two hours. Minor disruptions of satellite navigation possible on the sunlit side of Earth.                                                                                                                                                                                                             | 8 per cycle<br>(8 days per cycle)                                |
| <b>R 3</b>             | Strong     | <u>HF Radio</u> : Wide area blackout of HF radio communication, loss of radio contact for about an hour on sunlit side of Earth.<br><u>Navigation</u> : Low-frequency navigation signals degraded for about an hour.                                                                                                                                                                                                                                                                                                                                                          | 175 per cycle<br>(140 days per cycle)                            |
| <b>R 2</b>             | Moderate   | <u>HF Radio</u> : Limited blackout of HF radio communication on sunlit side of the Earth, loss of radio contact for tens of minutes.<br><u>Navigation</u> : Degradation of low-frequency navigation signals for tens of minutes.                                                                                                                                                                                                                                                                                                                                              | 350 per cycle<br>(300 days per cycle)                            |
| <b>R 1</b>             | Minor      | <u>HF Radio</u> : Weak or minor degradation of HF radio communication on sunlit side of the Earth, occasional loss of radio contact.<br><u>Navigation</u> : Low-frequency navigation signals degraded for brief intervals.                                                                                                                                                                                                                                                                                                                                                    | 2000 per cycle<br>(950 days per cycle)                           |

\* Flux, measured in the 0.1-0.8 nm range, in  $W \cdot m^{-2}$ . Based on this measure, but other physical measures are also considered.

\*\* Other frequencies may also be affected by these conditions.

URL: [www.swpc.noaa.gov/NOAA\\_scales](http://www.swpc.noaa.gov/NOAA_scales)

April 7, 2011

An example of a G5 storm is one that occurred in 1989 that made currents on the ground that caused a failure in the Hydro-Quebec electric power system. This prevented 6 million people in Canada and the US from having electricity for over 9 hours.

### Regulatory

There are no regulatory guidelines except those in place for the tracking and management of nuclear material by the U.S. Department of Energy, Nuclear Regulatory Commission, and U.S. Department of Transportation.

### Hazard Severity Ratings

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

The following rating table indicates the probability of a radiological event occurring rarely, impacting less than 25% of the land. It is not anticipated to impact health and safety, property, the environment, or economic value.

RADIOLOGICAL HAZARD AND EVENT RATING TABLE

| <b>Consequence</b>   | <b>Probable Rating</b> | <b>Catastrophic Rating</b> |
|----------------------|------------------------|----------------------------|
| Area Impacted        | 1                      | 3                          |
| Probability          | 0                      | 0                          |
| Health & Safety      | 0                      | 1                          |
| Property             | 0                      | 0                          |
| Environment          | 0                      | 0                          |
| Economic             | 0                      | 1                          |
| <b>Total Ratings</b> | <b>1</b>               | <b>5</b>                   |

### *Catastrophic Event*

The catastrophic event mentioned shows the probability of a solar radiation occurrence in which some power outages may occur and reduction of telecommunications. EMP protection typically does not exist in the State of Kansas or Sedgwick County with the exception of key buildings housing security information sharing (i.e. Fusion Centers). None of the utilities have been actively pursuing EMP protection; however, many SCADA systems do have manual controls in case of failure or cyber attack. For the most part, critical infrastructure affecting the 18 sector specific areas is not considered to be protected against any of the EMP pulse classifications. Recovery time will be based on availability of parts for repair, and repair time required to service connections and lines/cables.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 11.9 FIRE/WILDFIRE

**Definition:** A rapid, persistent chemical change that releases heat and light and is accompanied by flame, especially the exothermic oxidation of a combustible substance.

The history of fire in Sedgwick County goes back to the late 1800s and early 1900s. Range fires were common in the 30s, 40s, and 50s. During the 20-year period between 1954 and 1973 inclusive, there was an average of one fire with an estimated loss of more than \$100,000 per year. The worst single year was 1968 with four such fires recorded totaling \$902,000 loss. The worst single fire in the period was recorded in 1959 with an \$800,000 loss. Seven of those twenty years experienced no fires of \$100,000 or more loss.

In 2009, the Wichita Fire Department responded to 43,711 calls for service with an average response time of 0:04:34. Calls for service in 2009 included:

|                                            |        |
|--------------------------------------------|--------|
| Fires (All Types)                          | 1,645  |
| Emergency Medical Services                 | 31,352 |
| Hazardous Conditions (Not Involving Fire)  | 1,117  |
| Good Intent (No Emergency or Hazard Found) | 4,315  |
| False Alarms                               | 1,632  |
| Public Assistance                          | 2,663  |

In 2009, Sedgwick County Fire District #1 responded to 6,071 calls for service with an average response time of 0:06:02. Calls for service in 2009 included:

|                                            |       |
|--------------------------------------------|-------|
| Fires (All Types)                          | 618   |
| Emergency Medical Services                 | 3,583 |
| Hazardous Conditions (Not Involving Fire)  | 190   |
| Good Intent (No Emergency or Hazard Found) | 897   |
| False Alarms                               | 282   |
| Public Assistance                          | 501   |

The following table shows the fire and medical response calls provided by each of the 7 in-county fire departments and the Sedgwick County Emergency Management fire reserve unit:

| DISPATCH CALLS OF VOLUNTEER FIRE DEPARTMENTS FOR 2005*      |            |               |             |
|-------------------------------------------------------------|------------|---------------|-------------|
| Department                                                  | Fire Calls | Medical Calls | Total Calls |
| Bentley                                                     | 59         | 34            | 93          |
| Cheney                                                      | 86         | 105           | 191         |
| Clearwater                                                  | 15         | 156           | 171         |
| Colwich                                                     | 68         | 66            | 134         |
| Mount Hope                                                  | 28         | 43            | 71          |
| Valley Center                                               | 173        | 65            | 238         |
| Viola                                                       | 26         | 11            | 37          |
| Fire Reserve Unit                                           | 140        | 117           | 257         |
| * Information from Sedgwick County Emergency Communications |            |               |             |

The following volunteer organizations were shown to have made dispatch calls in 2005 to support fire departments developed from Sedgwick County Emergency Communications:

Red Cross: 72 calls  
Salvation Army: 4 calls

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### *Regulatory*

Regulatory guidance is contained in National Fire Protection Association (NFPA) codes and standards and the 2003 International Fire Code. Compliance with ISO fire suppression requirements for specific fire insurance ratings.

### *Hazard Severity Ratings*

The following rating table indicates the probability of a fire event occurring more than once per year but affecting less than 25% of an area. Minor injuries and/or illnesses have been reported on occasion, with some buildings damaged or destroyed. Minor environmental damages, mostly resulting from run-off, and the potential for high direct costs associated with equipment and personnel.

FIRE HAZARD AND EVENT RATING TABLE

| <b>Consequence</b>   | <b>Probable Rating</b> | <b>Catastrophic Rating</b> |
|----------------------|------------------------|----------------------------|
| Area Impacted        | 1                      | 1                          |
| Probability          | 4                      | 3                          |
| Health & Safety      | 1                      | 3                          |
| Property             | 2                      | 3                          |
| Environment          | 1                      | 2                          |
| Economic             | 2                      | 2                          |
| <b>Total Ratings</b> | <b>11</b>              | <b>14</b>                  |

### *Catastrophic Event*

A catastrophic event could occur in the event of a natural disaster causing numerous fires and affecting high rise structures and chemical facilities. Since the fire departments respond to hazardous materials releases, a combination of fire and hazardous material local response could exhaust resources quickly.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### 11.10 WEAPON OF MASS DESTRUCTION

*Definition:* According to Title 18 United States Code (USC) Section 2332a, a weapon of mass destruction is defined as: “(A) any destructive device as defined in section 921 of this title; (B) any weapon that is designed or intended to cause death or serious bodily injury through the release, dissemination, or impact of toxic or poisonous chemicals, or their precursors; (C) any weapon involving a biological agent, toxin, or vector (as those terms are defined in section 178 of this title); or (D) any weapon that is designed to release radiation or radioactivity at a level dangerous to human life.”

An explosive is a sudden rapid violent release of mechanical, chemical, or nuclear energy from a confined region; especially such a release that generates a radial transmitting shock wave accompanied by a loud, sharp report, flying debris, heat, light and fire. There are three types of explosives: low, high and tertiary.

#### 11.10.1 Low Explosives

A low explosive is a combustible substance that decomposes rapidly (deflagration), but does not explode under normal conditions. Under certain conditions, though, it is possible for them to detonate, usually through the combined use with high explosives. Low explosives are normally employed as propellants. Most low explosives are mixtures; most high explosives are compounds, but to both there are notable exceptions. They undergo deflagration at rates that vary from a few centimeters per second to approximately 400 meters per second. Included in this group are smokeless powders and pyrotechnics such as flares and illumination devices.

#### 11.10.2 High Explosives

High explosives are normally employed in mining, demolition, and military warheads. They undergo detonation at rates of 1,000 to 9,000 meters per second. High explosives are conventionally subdivided into two classes differentiated by sensitivity:

- Primary explosives are extremely sensitive to shock, friction, and heat. They will burn rapidly or detonate if ignited.
- Secondary explosives, also called base explosives, are relatively insensitive to shock, friction, and heat. They may burn when ignited in small, unconfined quantities, but detonation can occur. These are sometimes added in small amounts to blasting caps to boost their power.

#### 11.10.3 Tertiary Explosives

Also called blasting agents, are so insensitive to shock that they cannot be reliably detonated by practical quantities of primary explosive, and instead require an intermediate explosive booster of secondary explosive.

#### 11.10.4 Emergency Response Calls

Sedgwick County Emergency Communications is the primary answering point for 9-1-1 calls in Sedgwick County and provides dispatch services for the Sedgwick County Sheriff's Office, Sedgwick County Fire Department, and Sedgwick County Emergency Medical Service. Additionally, they provide dispatch services for the Wichita Police and Fire Departments, as well as outlying municipalities including: Andale, Bel Aire, Cheney, Clearwater, Colwich, Eastborough, Garden Plain, Goddard, Kechi, Maize, Mt. Hope and Park City. As a result, Sedgwick County agencies generally respond to 60 device calls, 24 bomb threats, and 114 explosive calls annually. Some of these calls included the discovery of pipe bombs, hand grenades, fireworks, artillery shells, and methamphetamine laboratories.

#### *Regulatory*

The Wichita Police Department's Explosive Ordnance Disposal (EOD) team is assigned to the Special Operations Bureau and is one of only several bomb units within the state of Kansas, and the only civilian team within the southern half of the state. The EOD Team supports the regional office of Bureau of Alcohol, Tobacco and Firearms (BATF) within their 69 county regional jurisdictions. They are called upon to respond to any



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

incident that requires handling or securing of explosives, suspected devices, or weapons of mass destruction. McConnell AFB also has an EOD team; however, they are used to handle only un-improvised military style ordinance outside the military installation.

### *Hazard Severity Ratings*

The following rating table indicates the probability of a fire event occurring more than once per year but affecting less than 25% of an area. Minor injuries and/or illnesses have been reported on occasion, with some buildings damaged or destroyed. Minor environmental damages and the potential for low direct costs associated with equipment and personnel.

EXPLOSIVE HAZARD AND EVENT RATING TABLE

| <b>Consequence</b>   | <b>Probable Rating</b> | <b>Catastrophic Rating</b> |
|----------------------|------------------------|----------------------------|
| Area Impacted        | 1                      | 1                          |
| Probability          | 4                      | 0                          |
| Health & Safety      | 1                      | 4                          |
| Property             | 2                      | 2                          |
| Environment          | 1                      | 2                          |
| Economic             | 1                      | 2                          |
| <b>Total Ratings</b> | <b>10</b>              | <b>11</b>                  |

### *Catastrophic Event*

A catastrophic event would result from an incident involving a special event (see Terrorism).

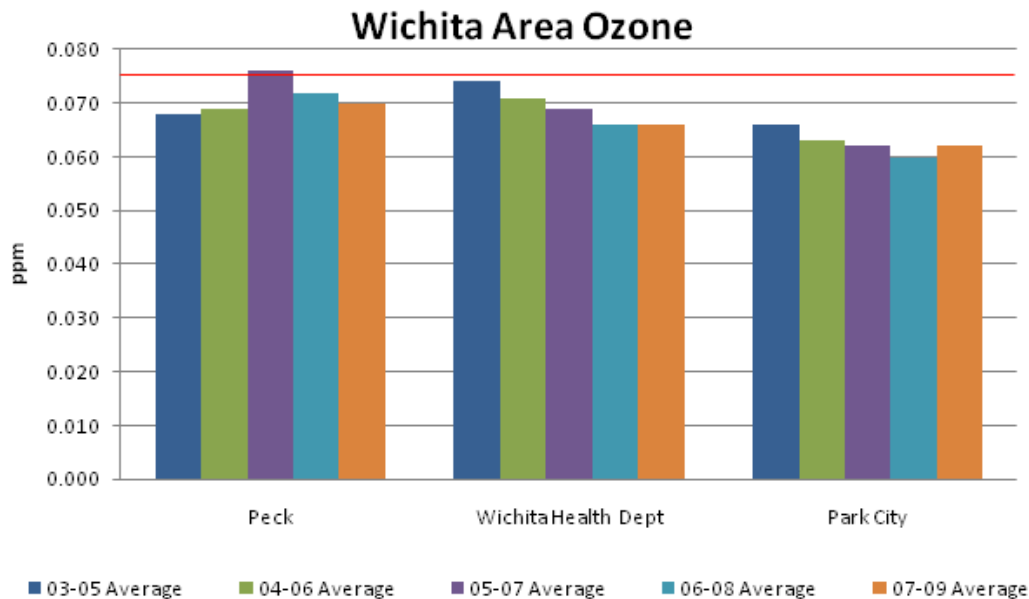
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 11.11 POLLUTION

*Definition:* To pollute is to contaminate an environment with natural or man-made material.

#### 11.11.1 AIR QUALITY

For reporting year 2000, the total fugitive air and stack release amounts (in pounds) reported by the U.S. EPA was over 2.2 millions pounds for on-site and off-site locations in Sedgwick County. In addition, over 18 grams of dioxin or dioxin-like compounds were also reportedly released. Sedgwick County. The city of Wichita measures ground level ozone at four sites in Sedgwick County. A monitor at Peck records the level of ozone in the air as it blows into our community from the south. Readings taken at the monitor at 1900 E. Ninth St. are considered typical levels in the city. A monitor near Park City measures ozone in the air as it exits Wichita. The fourth monitor near Sedgwick was added in 2009. Three years' data must be collected before adding this new site to the graph below.



Ozone readings from three consecutive years are averaged when determining a community's ozone status. The levels of ozone in Sedgwick County are currently below the current .075 ppm ozone standard.

#### 11.11.2 WASTE CHEMICAL RELEASES

The U.S. EPA also indicates 85,466 pounds of waste chemicals have been released into the environment due to catastrophic or one-time events by industry. Historically, there have been environmental releases onto the ground by industrial businesses in the City of Wichita. Some of these releases have resulted in contamination of the groundwater where remediation is currently being conducted.

#### 11.11.3 HAZARDOUS WASTE SITES

There are 28 identified hazardous waste sites in various stages of remediation in Sedgwick County. These sites are the result of historical chemical releases and dumping from industrial facilities. One of these sites remains on the U.S. EPA's national priorities list (NPL). The primary concern from these sites is groundwater contamination.

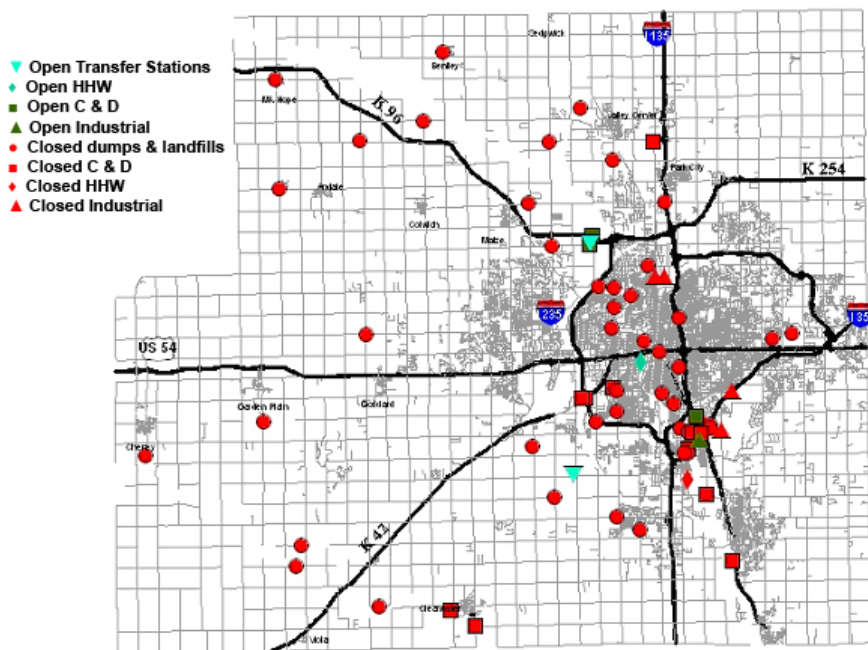
#### 11.11.4 DISPOSAL/SOLID WASTE SITES

Solid waste facilities are permitted by the Kansas Department of Health and Environment (KDHE) and operate under stringent federal, state, and local regulations. Sedgwick County performs weekly inspections at the transfer stations and construction and demolition (C & D) landfills. There are more than 60 closed dumps and

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

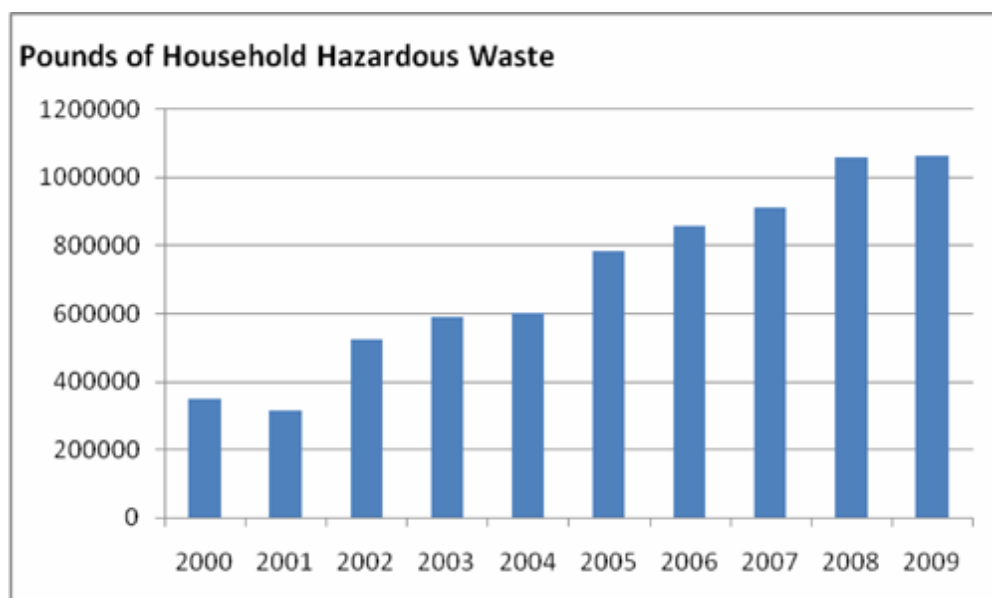
landfills scattered throughout Sedgwick County. The following information is provided by Sedgwick County Environmental Resources.

### Active and Closed Disposal Sites in Sedgwick County



Solid waste, or municipal solid waste (MSW), includes more than trash. The construction or the demolition of homes, commercial buildings, roads and highways produces waste that is called construction and demolition (C&D) debris. In 2001, Sedgwick County banned commercially generated C&D debris from the transfer stations. This waste is taken to a C&D landfill. There are two C&D landfills in Sedgwick County.

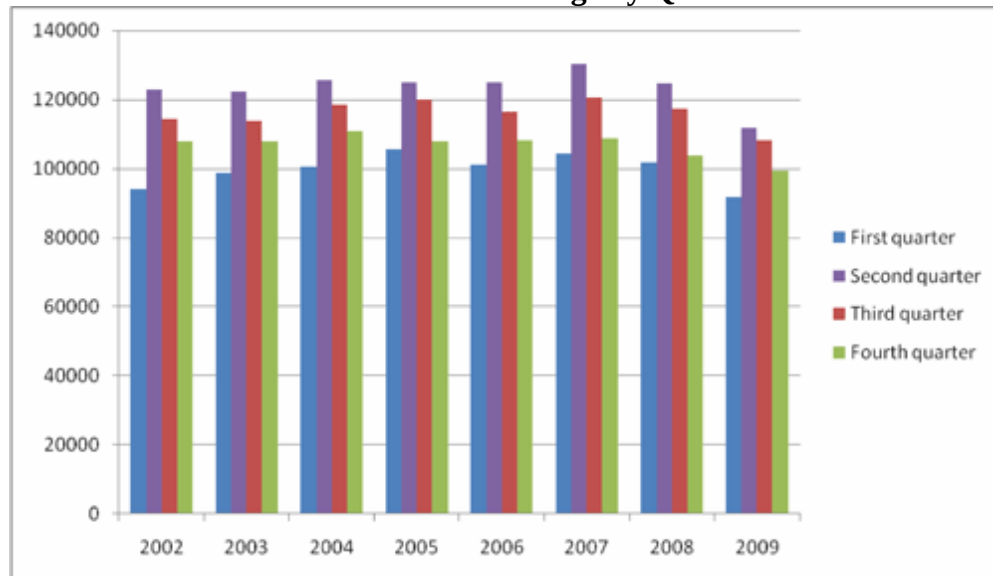
MSW also includes wood waste, yard waste and household hazardous waste. Household hazardous waste is the term given to the chemicals we use at our homes such as paint and paint products, automobile fluids, garden chemicals, and cleaners. MSW includes household and business recyclables.



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

In 2009, 63 percent of the MSW generated in Sedgwick County passed through the transfer stations before disposal in a MSW landfill. The remaining 37 percent was diverted to a C&D landfill, or through recycling, composting and the Household Hazardous Waste Facility.

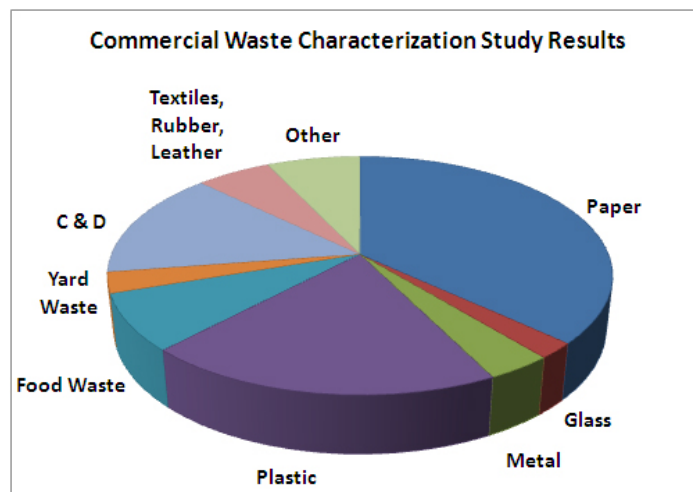
**Transfer Station Tonnage by Quarter**



In 2008 - 2009, Sedgwick County took an in-depth look at the trash in the local transfer stations. The results of this analysis will help determine the direction of future waste minimization efforts. The results of the waste analysis will also help determine if grass clippings should be banned from the transfer stations. A similar study was performed in 1997 - 1998 at Brooks Landfill. The intent of that study was to evaluate the composition of the trash disposed of at the landfill. The new study will allow the county to assess the progress made by recycling and other waste diversion programs since 1998.

**Commercial Waste Characterization Study Results Breakdown**

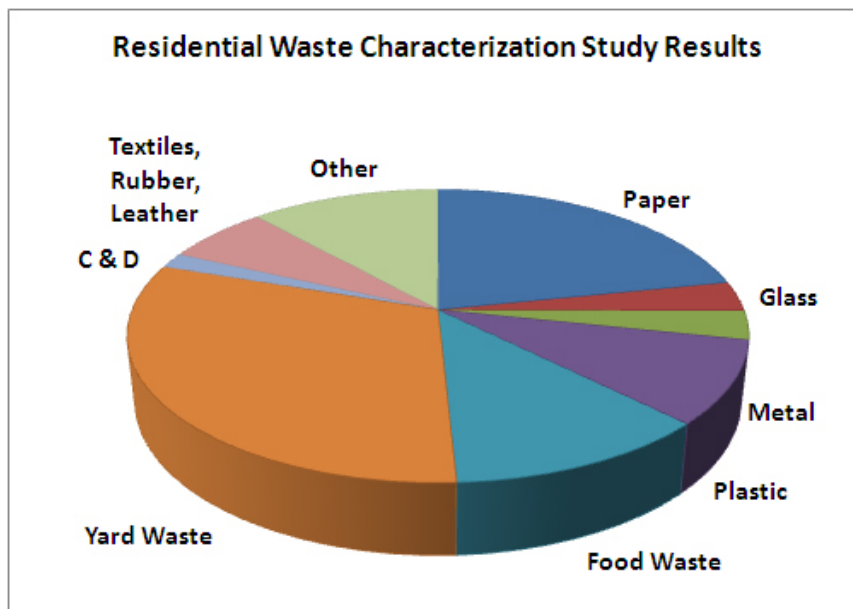
| Waste      | %    | Waste                     | %    |
|------------|------|---------------------------|------|
| Paper      | 36.9 | Yard Waste                | 2.8  |
| Glass      | 2.1  | Construction/Demolition   | 14.6 |
| Metal      | 3.6  | Textiles, Rubber, Leather | 5.7  |
| Plastic    | 19.5 | Other                     | 7.1  |
| Food Waste | 7.7  |                           |      |



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

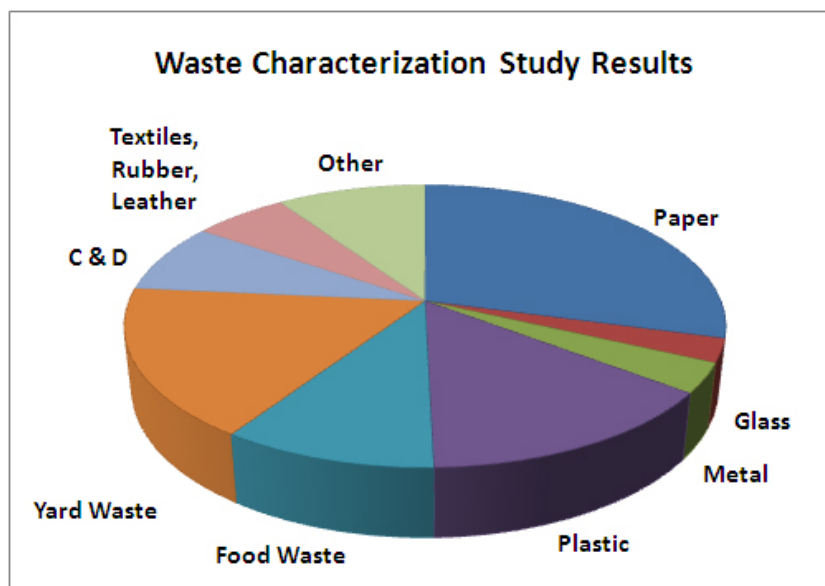
**Residential Waste Characterization Study Results Breakdown**

| Waste      | %    | Waste                     | %    |
|------------|------|---------------------------|------|
| Paper      | 21.8 | Yard Waste                | 31.0 |
| Glass      | 3.3  | Construction/Demolition   | 1.7  |
| Metal      | 3.2  | Textiles, Rubber, Leather | 6.4  |
| Plastic    | 9.1  | Other                     | 11.7 |
| Food Waste | 11.8 |                           |      |



**Overall Waste Characterization Study Results Breakdown**

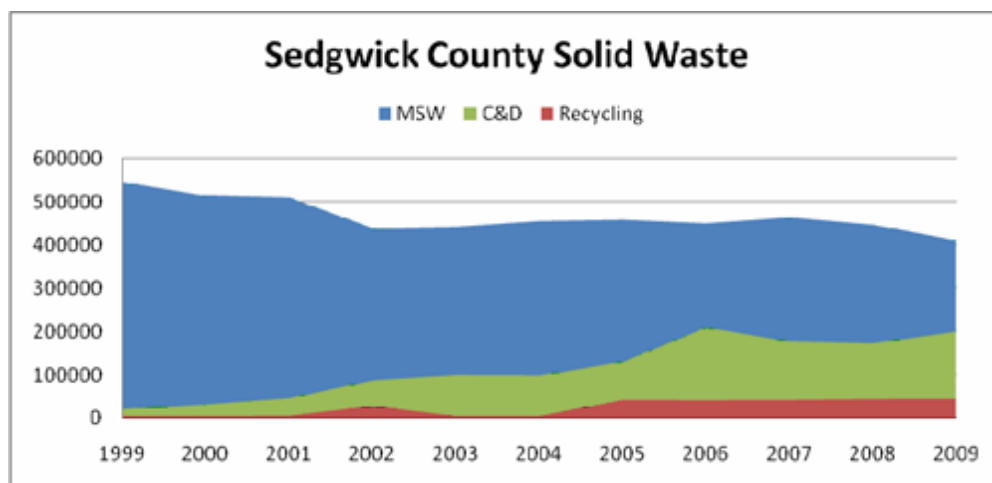
| Waste      | %    | Waste                     | %    |
|------------|------|---------------------------|------|
| Paper      | 29.2 | Yard Waste                | 17.1 |
| Glass      | 2.7  | Construction/Demolition   | 8.0  |
| Metal      | 3.4  | Textiles, Rubber, Leather | 6.0  |
| Plastic    | 14.3 | Other                     | 9.5  |
| Food Waste | 9.8  |                           |      |





## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

In 2009, 63 percent of the MSW generated in Sedgwick County passed through the transfer stations before disposal in a MSW landfill. The remaining 37 percent was diverted to a C&D landfill, or through recycling, composting and the Household Hazardous Waste Facility.



### *Regulatory*

The Wichita Health Department performs inspections of waste sites and air pollution permits. The Sedgwick County Household Hazardous Waste Department has a program to assist businesses with hazardous waste disposal and waste reduction

### *Hazard Severity Ratings*

The following rating table indicates the probability of a pollution event occurring more than once per year but affecting less than 25% of an area. Minor injuries and/or illnesses have been reported on occasion, with few properties damaged. Minor environmental damages and the potential for low direct costs associated with equipment and personnel.

POLLUTION HAZARD AND EVENT RATING TABLE

| Consequence          | Probable Rating | Catastrophic Rating |
|----------------------|-----------------|---------------------|
| Area Impacted        | 1               | 3                   |
| Probability          | 4               | 0                   |
| Health & Safety      | 1               | 4                   |
| Property             | 1               | 1                   |
| Environment          | 1               | 2                   |
| Economic             | 1               | 3                   |
| <b>Total Ratings</b> | <b>10</b>       | <b>13</b>           |

### *Catastrophic Event*

A catastrophic event would result in the release by a facility's Risk Management Plan chemical release worst case scenario affecting at least one quarter or more of the population, or a transportation accident resulting in the total release a chemical having a reportable quantity.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### 11.12 DAMS AND LEVEES

*Definition:* A dam is an artificial barrier usually constructed across a stream channel to impound water. A dike or levee is any artificial barrier together with appurtenant works that will divert or restrain the flow of a stream or other body of water for the purpose of protecting an area from inundation by floodwaters.

There have been no dam or levee failures reported in Sedgwick County. There are 68 low hazard, seven significant hazard, and five high hazard dams with none considered to be in poor condition.

#### 11.12.1 TUTTLE CREEK DAM STUDY

Cheney reservoir dam is similarly constructed to the Tuttle Creek Dam that is located approximately five miles north of Manhattan, Kansas. Based on information developed in the Hazards Analysis plan, there is a potential for up to a magnitude 6 earthquake in Sedgwick County. The following information, developed on Tuttle Creek Dam by the U.S. Army Corps of Engineers, may help in determining the probability of a natural breach Cheney Reservoir Dam in the event of an earthquake.

Currently, seismologists at the U.S. Army Corps of Engineers are studying Tuttle Creek Dam. The study found that a magnitude 5.7 earthquake, located 12 miles from the dam (at the Humboldt fault), is the smallest earthquake that could potentially cause significant damage. This hypothetical earthquake would probably not cause consequential movement of the dam, but it could damage relief wells that control the flow of water under the dam and lead to dam failure. A seismic event of this nature has a probability of occurrence of about once in 1,800 years.

On the other hand, a magnitude 6.6 earthquake would cause the sand deposits under the dam to liquefy, or turn to quicksand, and lose their ability to support the dam. This, in turn, would allow the base of the dam to spread and the top to drop, and cracking would significantly reduce the ability of the dam to hold water. Although the top of the dam would probably not drop below the lake level, cracking and deformation could allow water to seep through the dam, leading to internal erosion, and eventually, uncontrolled release of the lake. This scenario has a very low probability of occurrence of about once in 10,000 years.

#### *Regulatory*

Effective October 13, 2004, Sedgwick County adopted a resolution (#183-2004) amending Chapter 13 of the Sedgwick County Code related to Floodplain Management for Sedgwick County, Kansas. The purpose of the chapter is to promote public health, safety, and general welfare and to minimize public and private losses due to flood conditions in specific areas by provisions designed to: protect human life and health; minimize expenditure of public money for costly flood control projects; minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public; minimize prolonged business interruptions; minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets and bridges located in floodplains; help maintain a stable tax base by providing for the sound use and development of flood prone areas in such a manner as to minimize future flood blight areas; ensure that potential home buyers are notified that property is in a flood area; and, ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.

Creation of a stormwater utility by the City of Wichita under section 16.30.020. Pursuant to the provisions of K.S.A. 12-3101, et seq., as modified by city Charter Ordinance No. 147, the Wichita city council does establish a stormwater utility and stormwater management system and declares its intention to be responsible for the operation, construction, maintenance and repair of a stormwater management system and stormwater utility. (Ord. No. 41-948 § 2)

Title 33, Chapter 15 of the U.S. Code of Federal Regulations addresses flood control to include floodplain management, projects, and levees. Cheney reservoir dam is maintained under the Reclamation Safety of Dams Act, Public Law 95-578 and amended in 1984 under Public Law 98-404.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### *Hazard Severity Ratings*

The following rating table indicates the probability of a major levee or dam failure event occurring at least once every 25 years, impacting less than 25% of the land, resulting in minor injuries and/or illnesses with few homes destroyed and/or damaged, having short term recovery of resources, and low direct and/or indirect costs.

LEVEE OR DAM FAILURE HAZARD EVENT RATING TABLE

| <b>Consequence</b>   | <b>Probable Rating</b> | <b>Catastrophic Rating</b> |
|----------------------|------------------------|----------------------------|
| Area Impacted        | 1                      | 3                          |
| Probability          | 3                      | 2                          |
| Health & Safety      | 1                      | 4                          |
| Property             | 2                      | 4                          |
| Environment          | 2                      | 3                          |
| Economic             | 1                      | 4                          |
| <b>Total Ratings</b> | <b>10</b>              | <b>20</b>                  |

### *Catastrophic Event*

A probable and catastrophic worst-case event resulting in the failure of the Wichita and Valley Center Floodway located on the west of the city. Events leading up to this type of event are conditions equal or exceeding the 1979 and 1998 flood events with near maximum capacities of the Little Arkansas River and Wichita Drainage Canals. Over half of the City of Wichita would be inundated by a sizeable breach of the levee system.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 11.13 EMERGING PUBLIC HEALTH THREATS

*Definition:* Threats of illness and disease (viral and bacteriological), community infections, early diagnosis and treatment of illnesses and diseases, or any other health related mechanism that can cause harm to individuals, whether intentional or accidental. This includes the potential for widespread (epidemic) outbreak of a disease, or a large number of cases of a disease in a single community or relatively small area. An epidemic may be restricted to one locale or may even be global (pandemic).

#### 11.13.1 HISTORY

A March 7, 1885 Kansas quarantine law against the Texas tick fever prohibited the entry of Texas bovines along the Chisholm Trail, and the January 1886 blizzard which killed all of the cattle in southwest Kansas destroyed most of the range cattle industry

#### 11.13.2 COMMUNICABLE DISEASE

The following reported numbers and respective communicable disease were identified by the Kansas Division of Environment and Health (KDHE) during the period Jan 1, 1995 through October 6, 2005:

| COMMUNICABLE DISEASE                                 | Case Counts |
|------------------------------------------------------|-------------|
| AMEBIASIS                                            | 7           |
| ANIMAL BITE                                          | 2           |
| BLASTOCYSTIS HOMINIS                                 | 18          |
| BOTULISM, INFANT                                     | 2           |
| BRUCELLOSIS                                          | 1           |
| CALICIVIRUS/NORWALK-LIKE VIRUS                       | 1           |
| CAMPYLOBACTER                                        | 391         |
| CRYPTOSPORIDIOSIS                                    | 36          |
| DENGUE FEVER                                         | 1           |
| E. COLI O157:H7                                      | 27          |
| E. COLI, ETEC                                        | 17          |
| EHRlichiosis HUMAN, OTHER                            | 3           |
| EHRlichiosis, HUMAN GRANULOCYTIC (HGE)               | 16          |
| EHRlichiosis, HUMAN MONOCYTIC (HME)                  | 17          |
| ENCEPHALITIS, CALIFORNIA                             | 1           |
| ENCEPHALITIS, INFECTIOUS, OTHER                      | 1           |
| ENCEPHALITIS, ST. LOUIS                              | 2           |
| ENCEPHALITIS, WESTERN EQUINE                         | 1           |
| FLU-LIKE ILLNESS                                     | 1           |
| FOOD BORNE ILLNESS                                   | 8           |
| GIARDIASIS                                           | 322         |
| GUILLAIN-BARRE                                       | 1           |
| HAEMOPHILUS INFLUENZAE                               | 3           |
| HAEMOPHILUS, BACTEREMIA                              | 1           |
| HEPATITIS A                                          | 185         |
| HEPATITIS B, ACUTE                                   | 140         |
| HEPATITIS B, CHRONIC                                 | 770         |
| HEPATITIS C, ACUTE                                   | 18          |
| HEPATITIS C, CHRONIC (HUMAN IMMUNE-DEFICIENCY VIRUS) | 4,430       |
| INFLUENZA, A&B                                       | 88          |
| INFLUENZA, HIB                                       | 1           |
| LEAD, ADULT                                          | 1           |

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

| COMMUNICABLE DISEASE                                   | Case Counts |
|--------------------------------------------------------|-------------|
| LEAD, PEDIATRIC                                        | 4           |
| LEGIONELLOSIS                                          | 8           |
| LISTERIOSIS                                            | 3           |
| LYME DISEASE                                           | 52          |
| MALARIA                                                | 7           |
| MEASLES                                                | 9           |
| MENINGITIS, ASEPTIC                                    | 36          |
| MENINGITIS, CRYPTOCOCCAL                               | 4           |
| MENINGITIS, HIB                                        | 2           |
| MENINGITIS, NEISSERIA MENINGITIDIS                     | 15          |
| MENINGITIS, OTHER BACTERIAL                            | 34          |
| MENINGITIS, OTHER FUNGAL                               | 7           |
| MENINGITIS, STREP PNEUMONIAE                           | 23          |
| MENINGOCOCCEMIA                                        | 8           |
| MUMPS                                                  | 18          |
| MYCOBACTERIUM OTHER THAN TB (MOTT)                     | 316         |
| PERTUSSIS                                              | 211         |
| Q FEVER                                                | 37          |
| RESPIRATORY SYNCYTIAL VIRUS (RSV)                      | 1           |
| RHEUMATIC FEVER                                        | 1           |
| ROCKY MOUNTAIN SPOTTED FEVER                           | 56          |
| RUBELLA                                                | 15          |
| SALMONELLA                                             | 653         |
| SHIGELLA                                               | 269         |
| STAPH. NOSOCOMIAL                                      | 4           |
| STREP. A, INVASIVE                                     | 110         |
| STREP. PNEUMONIA, INVASIVE                             | 169         |
| TETANUS                                                | 1           |
| TOXIC SHOCK SYNDROME, STAPHYLOCOCCAL                   | 2           |
| TRICHINOSIS                                            | 1           |
| TUBERCULOSIS, ACTIVE DISEASE                           | 562         |
| TUBERCULOSIS, INFECTION                                | 8,749       |
| TULAREMIA                                              | 20          |
| TYPHOID FEVER                                          | 3           |
| VARICELLA (CHICKENPOX)                                 | 223         |
| WEST NILE, ACUTE FLACCID PARALYSIS                     | 1           |
| WEST NILE, ENCEPHALITIS/MENINGITIS                     | 18          |
| WEST NILE, NON-NEUROLOGICAL (INCLUDES WEST NILE FEVER) | 17          |
| YERSINIOSIS                                            | 1           |

### 11.13.3 REPORTABLE DISEASE OUTBREAKS

Examples of outbreaks from reportable diseases from poor health practices:

- Marion County Viral Gastroenteritis Outbreak Attributed to Norovirus (July 2005) - 52 of 96 people contracted norovirus (foodborne illness)
- Greenwood County Assisted Living Facility Outbreak of Diarrheal Illness (April 2005) - 22 of 40 people contracted diarrheal illness (improper health prevention)
- Osage County Grade School Viral Gastroenteritis Outbreak Attributed to Norovirus (March 2005) - 55 of 70 students contracted viral gastroenteritis and norovirus (foodborne illness)



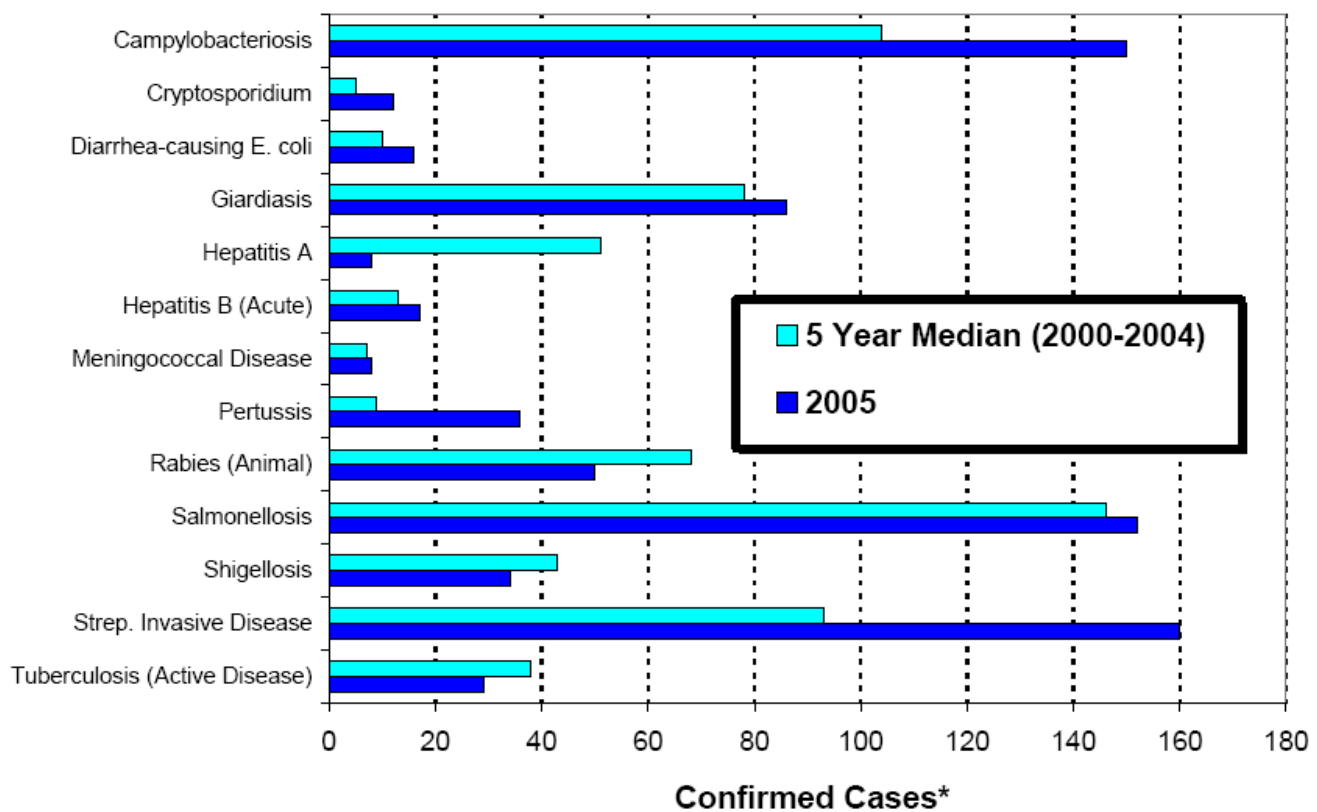
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

- Sedgwick County Day Care Viral Gastroenteritis Outbreak Attributed to Norovirus (February 2005) - 6 of 6 people contracted norovirus (foodborne illness)
- *Salmonella typhimurium* Outbreak at a Department Store - Kansas November-December 2004 - 27 of 99 people contracted salmonella (foodborne illness)

Examples of large outbreaks from reportable diseases from accidental contamination:

- New York County Fair (Albany, NY): In September 1999, there was a reported 1,013 suspected and confirmed cases of *E. coli* O157:H7 infection resulted from drinking water from a contaminated well and spread from person to person because of poor sanitary practices.
- Municipal Water Supply (Walkerton, Ontario): In May 2000, 1,304 people became infected with *E. coli* O157:H7 after one of the city's water wells became contaminated due to flooding from agricultural field run-off from a cattle manure farm and overwhelming the water treatment system because of increased turbidity.

### Selected Reportable Diseases, January - June, Kansas



*\*The 2005 data is preliminary—because it has not been comprehensively checked for accuracy, and because diseases are not always promptly reported, the 2005 cases are subject to change.*

#### 11.13.4 EPIDEMIC AND PANDEMIC DISEASES

Examples of recent epidemic and pandemic diseases:

- West Nile Virus: According to the 2003 Public Health Service's Centers for Disease Control and Prevention report *Epidemic/Epizootic West Nile Virus in the United States: Guidelines for Surveillance, Prevention, and Control*, the first domestically acquired human cases of West Nile (WN) encephalitis were documented in the U.S. in late summer 1999. Surveillance tracked the spread of WNV throughout much of the U.S. between 2000 and 2002. By the end of 2002, WNV activity had been

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

identified in 44 states and the District of Columbia. The 2002 WNV epidemic and epizootic resulted in reports of 4,156 reported human cases of WN disease (including 2,942 meningoencephalitis cases and 284 deaths), 16,741 dead birds, 6,604 infected mosquito pools, and 14,571 equine cases. The 2002 WNV epidemic was the largest recognized arboviral meningoencephalitis epidemic in the Western Hemisphere and the largest WN meningoencephalitis epidemic ever recorded. Significant human disease activity was recorded in Canada for the first time, and WNV activity was also documented in the Caribbean basin and Mexico.

- Avian Influenza: In the United States, an outbreak of highly pathogenic avian influenza (HPAI) A (H5N2) was detected in February 2004 through routine surveillance and reported in a flock of 7,000 chickens in Gonzales County in south-central Texas. This was the first outbreak of HPAI in the United States in 20 years. During the same time, an outbreak of low pathogenic avian influenza (LPAI) A (H7N2) was reported on two chicken farms in Delaware; LPAI H7N2 was reported from a flock of chickens in Pocomoke City, Maryland; and, LPAI H2N2 was reported in a layer flock located in Pennsylvania. In November 2003, there was been one reported case of human infection through the LPAI H7N2 in New York, and two Canadian poultry related laboratory confirmed cases of H7N3 in the Fraser Valley region of British Columbia. Influenza A (H5N1) virus was first identified in birds in South Africa and has spread throughout 14 countries in Asia and resulted in the death or destruction of more than 100 million birds including poultry. In 1997 the first case of spread from a bird to a human was seen during an outbreak of bird flu in poultry in Hong Kong causing severe respiratory illness in 12 people and six deaths. Since that time, there have been human cases of H5N1 infection occurring in Thailand, Vietnam and Cambodia during large H5N1 outbreaks in poultry. H5N1 has a human mortality rate of 50 percent.

### 11.13.5 NATURALLY OCCURRING OUTBREAKS

- Hantavirus Pulmonary Syndrome: Although present in the U.S. since 1959, it was not until 1993 when an outbreak occurred in the southwest U.S. after heavy rains created an overpopulation of rodents. Between May 1993 and July 6, 2005, a total of 396 cases (14 in Kansas) of hantavirus pulmonary syndrome have been reported in the United States. Thirty-six percent of all reported cases have resulted in death.
- Monkeypox: A rare viral disease that occurs mostly in central and western Africa first found in 1958 in laboratory monkeys and later found in African squirrels, rats, mice, and rabbits. Monkeypox was reported in humans for the first time in 1970, and a multi-state outbreak occurred in the United States (including one in Kansas) in July 2003 infecting 71 people after importation of small mammals to Texas from Ghana. The mortality rate is estimated between one and ten percent of those infected.

### 11.13.6 BIOLOGICAL WEAPON POTENTIAL

Diseases potentially used as biological weapons:

This type of usage includes any infectious agents or toxic chemical that could in theory be engineered for deliberate use as a weapon. Experts in this field believe that anthrax, botulism, plague, smallpox, tularemia, and viral hemorrhagic fever are the pathogens most likely to be used.

- Anthrax: Grazing livestock can become infected by anthrax spores in the soil, and humans can contract the disease by handling products (cutaneous transmission) from infected animals, by breathing (inhalation transmission) anthrax spores from infected animal products (i.e. wool from sheep), or eating (digestive transmission) undercooked meat from infected animals. In the United States, 22 cases of anthrax infection were reported from a higher grade form of anthrax and delivered through the mail system to intentionally contaminate individuals for terrorist purposes.
- Botulism: There are three main kinds of botulism: foodborne botulism is caused by eating foods that contain the botulism toxin; wound botulism is caused by toxin produced from a wound infected with *Clostridium botulinum*; and, infant botulism is caused by consuming the spores of the botulinum

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

bacteria, which then grow in the intestines and release toxin. In the United States an average of 110 cases of botulism are reported each year of which 25% are foodborne and 72% are infant botulism.

- **Plague:** Plague is an infectious disease of animals and humans caused by a bacterium named *Yersinia pestis*. Fleas feeding on infected animals transmit the disease to humans and mammals. The disease can also be transmitted through handling infected animals or exposure to persons or animals with plague pneumonia and cough. Human plague in the United States has occurred as mostly scattered cases in rural areas (an average of 5 to 15 persons each year). About 14% (1 in 7) of all plague cases in the United States are fatal.
- **Smallpox:** Smallpox is a serious, contagious, and sometimes fatal infectious disease. The last case of smallpox in the United States was in 1949. The last naturally occurring case in the world was in Somalia in 1977. Smallpox also can be spread through direct contact with infected bodily fluids, direct and fairly prolonged face-to-face contact, or contaminated objects such as bedding or clothing.
- **Tularemia:** Tularemia is one of the most infectious pathogenic bacteria known that occurs naturally in the United States and is caused by the bacterium *Francisella tularensis* which is especially found in rodents, rabbits, and hares. Humans can become infected through diverse environmental exposures to include bites by infected arthropods; handling infectious animal tissues or fluids; direct contact with or ingestion of contaminated food, water, or soil; and inhalation of infective aerosols. It is. Between 1985 and 1992, 1409 cases and 20 deaths were reported in the U.S., a case fatality rate of 1.4%.
- **Viral Hemorrhagic Fever:** Generally, this group of illnesses cause severe multisystem syndrome (multiple organ systems in the body are affected), the overall vascular system is damaged, and the body's ability to regulate itself is impaired. For the most part, rodents and arthropods are the main reservoirs for the viruses. This includes Argentine hemorrhagic fever, Bolivian hemorrhagic fever, Sabia-associated hemorrhagic fever, Venezuelan hemorrhagic fever, Lassa fever, Lymphocytic choriomeningitis (LCM), Crimean-Congo hemorrhagic fever (CCHF), Hantavirus Pulmonary Syndrome (HPS), hemorrhagic fever with renal syndrome (HFRS), Rift Valley fever, Ebola hemorrhagic fever, Marburg hemorrhagic fever, Kyasanur Forest disease, Omsk hemorrhagic fever, tick-borne encephalitis, Hendra virus disease, and Nipah virus encephalitis.

### Regulatory

There are numerous health plans in effect; medical quarantine procedures by local area hospitals, and inoculations are required of school-aged children.

### Hazard Severity Ratings

The following rating table indicates the probability of an emerging public health threat event occurring at least once every 25 years, impacting less than 25% of the land, resulting in minor injuries and/or illnesses.

EMERGING PUBLIC HEALTH THREAT HAZARD EVENT RATING TABLE

| Consequence          | Probable Rating | Catastrophic Rating |
|----------------------|-----------------|---------------------|
| Area Impacted        | 1               | 4                   |
| Probability          | 4               | 0                   |
| Health & Safety      | 1               | 4                   |
| Property             | 0               | 0                   |
| Environment          | 0               | 0                   |
| Economic             | 0               | 2                   |
| <b>Total Ratings</b> | <b>6</b>        | <b>10</b>           |

### Catastrophic Event

## **2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis**

---

A catastrophic worst-case event could result in quarantines resulting from an H5N1 type pandemic influenza impact to Sedgwick County.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### 11.14 UTILITIES

*Definition:* Utilities can be defined as a public service that provides power, heat and water. Forms of energy and planning for use in Sedgwick County are nuclear, electric, gas, solar, wind and petroleum base fuels.

#### 11.14.1 ELECTRIC

Contact with a Westar official established that their records typically indicate that several times per year small areas in Sedgwick County have resulted in a power outage with on-line capabilities within hours to several days depending on the extent of damage to utilities. These outages are significant enough to call all available crews to duty for more than a 24-hour period. Causes of the power failures are largely due to high winds that damage power lines. Lightning, ice storms, and heavy rain or snowstorms have also contributed to the cause of power outages. Rural electric companies such as Butler Rural Electric Cooperative are more susceptible to long duration outages due to population density over a large area resulting in longer electric power transfer or switching time. Natural gas and electric companies have internal dispatch centers to maintain service.

#### 11.14.2 PIPELINES

The U.S. Department of Transportation's Office of Pipeline Safety average and summary statistics for hazardous liquid and distribution/transmission of natural gas were reviewed for determining commodity type, cause, and numbers of pipeline incidents. The only pipeline incident in the south-central Kansas area was reported in 2000 at Winfield, Kansas.

All of the pipeline companies routinely do fly over inspections of the entire pipeline systems for visual indications of leakages or damage to the pipelines. Electronic monitoring equipment continually monitors pressure changes within the pipelines to aid in leak or breach detections. ConocoPhillips also has aquatic response capability for the pipeline located at El Dorado Lake.

#### ABENGOA BIOENERGY

Methane wells located within the former Brooks landfill site are siphoned off to an underground pipeline which proceeds to the Abengoa Bioenergy Colwich plant for ethanol processing. The plant is one of three operational plants fully owned by Abengoa Bioenergy Corporation in North America. manufacturers approximately 25 million gallons of ethanol from grain annually.

#### AIR PRODUCTS & CHEMICALS INC

Air Products operates a hydrogen transmission pipeline in Sedgwick County near the Air Products & Chemicals plan west of Haysville.

#### *Regulatory*

The Kansas Corporation Commission protects the public interest through impartial and efficient resolution of all jurisdictional issues. The agency regulates rates, service and safety of public utilities, common carriers, motor carriers, and regulates oil and gas production by protecting correlative rights and environmental resources.

#### *Hazard Severity Ratings*

The following rating table indicates the probability of an emerging public health threat event occurring at least once every 25 years, impacting less than 25% of the land, resulting in minor injuries and/or illnesses.



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

UTILITIES HAZARD EVENT RATING TABLE

| Consequence          | Probable Rating | Catastrophic Rating |
|----------------------|-----------------|---------------------|
| Area Impacted        | 1               | 4                   |
| Probability          | 4               | 0                   |
| Health & Safety      | 1               | 3                   |
| Property             | 0               | 0                   |
| Environment          | 0               | 0                   |
| Economic             | 0               | 2                   |
| <b>Total Ratings</b> | <b>6</b>        | <b>9</b>            |

### *Catastrophic Event*

A catastrophic worst-case event would be loss of electrical power at peak summer or winter months where restoration may take days.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 11.15 TRANSPORTATION ACCIDENTS

*Definition:* Transportation accidents can be all modes of travel in and around the community.

Major highway transportation routes in Sedgwick County include: I-35, I-135, I-235, and U.S. 54/U.S. 400, and K-96. Railroads in Sedgwick County include the Burlington, Northern and Santa Fe (BNSF); Kansas and Oklahoma (K&O); the Union Pacific; and, the Wichita Terminal Association. Airports in Sedgwick County average approximately 900 flights per day and include: Mid-Continent, Beech, Cessna, Colonel James Jabara, Riverside, Westport, Cook, Hamilton, and Maize. There are an average of three motor carrier accidents annually, two accidents per year involving railroads, and less than two accidents per year for aircraft. Notable accidents that have occurred in Sedgwick County are as follows:

- A motor carrier incident occurred on March 22, 1979 when a semi-trailer overturned at the I-235 overpass near the Meridian Street exit containing refined uranium 235 “Yellow Cake” (uranium oxide) LSA drums. Several drums were breached and radioactivity was detected on the ground requiring over excavating of topsoil.
- A BNSF train derailment occurred August 30, 2001 near the intersection of Greenwich & 103<sup>rd</sup> Street South in Sedgwick County. Several railcars were on fire with the following chemicals: carbon dioxide (2 cylinders of 12 kilograms each), nitrogen (one cylinder of 0.75 kilogram), perfume products (1,358 pounds), white asbestos (44,782 pounds plus 1,020 pounds of intermodal), plastics, FAK, and sodium hydroxide. Evacuation was at one-mile from site with two reported injuries.
- A KC-135R military tanker crashed after take-off near north 20<sup>th</sup> Street and Piatt in east Wichita on January 16, 1965 resulting in over 20 homes destroyed and 23 people killed. The tanker contained over 240,000 pounds of jet fuel prior to impact.

#### *Regulatory*

The respective carriers and haulers maintain transportation safety regulations.

#### *Hazard Severity Ratings*

The following rating table indicates the probability of an emerging public health threat event occurring annually and impacting less than 25% of the area.

TRANSPORTATION HAZARD EVENT RATING TABLE

| <b>Consequence</b>   | <b>Probable Rating</b> | <b>Catastrophic Rating</b> |
|----------------------|------------------------|----------------------------|
| Area Impacted        | 1                      | 1                          |
| Probability          | 4                      | 0                          |
| Health & Safety      | 0                      | 4                          |
| Property             | 0                      | 3                          |
| Environment          | 0                      | 2                          |
| Economic             | 0                      | 2                          |
| <b>Total Ratings</b> | <b>5</b>               | <b>12</b>                  |

#### *Catastrophic Event*

A worst-case scenario would be one involving a release of chemicals passing across the most populated areas of the County. The magnitude of a catastrophic event would be comparable to the 2001 BNSF train derailment in a populated area.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 11.16 CIVIL DISTURBANCES

**Definition:** Civil disturbances can be riots, protests, demonstrations, bomb threats, and any form resulting in terrorism.

The following civil disturbances are the most notable that have occurred in Sedgwick County since 1958:

- A three-week sit-in protest in Wichita in August 1958 involving African-Americans protesting local racial segregation laws by banding together to demand service, often at whites-only lunch counters, and refusing to leave until served.
- In August 1976, 19 year old Michael Soles had positioned himself in the southwest area on top of the 26-story Holiday Inn plaza and started shooting into crowds below on the city streets, killing two and injuring seven.
- In April 1979, a riot erupted at Herman Hill Park between police and concert goers that initially started as police ordering people to remove their cars from the grass.
- Racial tensions building between the minority community and the police department erupted in violence in April 1980 along the 21st Street corridor between Grove and Hillside.
- Operation Rescue conducted its "Summer of Mercy" anti-abortion protest in July 1991 resulting in sit downs, blockading and storming the Women's Health Care Services Clinic (formerly Wichita Family Planning) in 1991 resulting in 13 arrests.
- On December 13, 2013, former aviation technician Terry Loewen used his access card at Wichita's Mid-Continent Airport in an attempt to drive explosives into the terminal. After a six-month FBI investigation, inert explosives were unknowingly purchased by Loewen from an undercover FBI agent thus thwarting his plan and then arrested by the FBI.

#### 11.16.1 HATE GROUPS

According to information provided by the Southern Poverty Law Center, some of the nationally recognized hate groups that are present in Sedgwick County are Midland Hammerskins<sup>1</sup> (racist skinheads), the National Socialist Movement<sup>2</sup> (neo-Nazi), and the Imperial Klans of America Knights of the Ku Klux Klan<sup>3</sup>. The most recent incident in Sedgwick County occurred at Derby in August 2003 where a cross was burned on the front yard of a Hispanic family's residence and a brick with a racial message written on it was thrown through one of the windows. Westboro Baptist Church (WBC) has conducted nationwide protests.



*Racist Skinheads form a particularly violent element of the white supremacist movement, and have often been referred to as the "shock troops" of the hoped-for revolution. The classic Skinhead look is a shaved head, black Doc Martens boots, jeans with suspenders and an array of typically racist tattoos.*



*Neo-Nazi groups share a hatred for Jews and a love for Adolf Hitler and Nazi Germany. While they also hate other minorities, homosexuals and even sometimes Christians, they perceive "the Jew" as their cardinal enemy, and trace social problems to a Jewish conspiracy that supposedly controls governments, financial institutions and the media. While some neo-Nazi groups emphasize simple hatred, others are more focused on the revolutionary creation of a fascist political state.*



*The Ku Klux Klan, with its mystique and its long history of violence, is the most infamous -- and oldest -- of American hate groups. Although blacks have typically been the Klan's primary target, it also has attacked Jews, immigrants, homosexuals and, until recently, Catholics.*

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis



Incorporated in 1967 as a not-for-profit organization, Westboro Baptist Church considers itself an “Old School (or Primitive)” Baptist Church. Members protests include anti-Semitic, anti-gay, schools and churches perceived to be pro-gay, veteran funerals, etc.

### 11.16.2 GANGS

According to Wichita Police Department statistics, there are at least 62 gang sets in the Wichita area and 2,986 documented gang members of which 1,717 members are active with 772 associates. On average 350 are incarcerated annually and 71 were deceased. The average age of active and associate gang members is 20.6 years. Drive-by shootings have decreased from a high of 241 in 1993 to 38 by 2009 (28 gang related). The following gangs have been identified by Wichita Police as active, and are broken down according to race:

| AFRICAN AMERICAN GANGS                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <u>CRIPS</u><br>Neighborhood Crips<br>North Side Crips<br>357 Clown Crips<br>Hoover 107 Crips<br>Insane Crips<br>Pretty Boy Gangster Crips<br><br><u>BLOODS</u><br>Lincoln Park Bloods<br>Piru Bloods<br>Inglewood Family Gangsters<br>Original Wichita Villains<br>Bounty Hunter Bloods<br>Family Bloods | <u>FOLKS</u><br>Black Gangster Disciples<br>Gangster Disciples<br>Tru Boys<br><br><u>LOCAL</u><br>Ask Park Gangsters<br>Junior Boys<br>2 <sup>nd</sup> Street<br>Hill Block<br>Original Mafia Gangsters<br>Young Bucks<br>Two Thirds/Lost Boy Gangsters |
| HISPANIC GANGS                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                         |
| Vato Loco Boys<br>Spanish Disciples<br>Junior Loco Boys<br>Mara Salvatrucha (MS-13)<br>Playboy Locos<br>Florencia 13 (FL 13) – Sureños<br>Banditos (BDS) – Sureños                                                                                                                                        | Kids of Destruction<br>Latin Kings<br>Latin Queens<br>Northside Gangsters<br>Players for Life<br>Meadow Creek Gangsters<br>Jackson Street Gangsters                                                                                                     |
| WHITE GANGS                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                         |
| River City Skin Heads<br>Aryan Brotherhood<br>8-Ball Kings<br>Insane Clown Posse                                                                                                                                                                                                                          | <b>Mix with other race gangs:</b><br>Dark Side Bloods<br>Gangster Disciples<br>2 <sup>nd</sup> Street<br>Insane Crips<br>Delano Mafia Gangsters                                                                                                         |
| ASIAN GANGS                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                         |
| Asian Pride<br>Asian Boyz<br>Buc Lao Killers<br>Lao Boy Crips<br>Oriental Lazy Boyz<br>Viet Boyz<br>Dead Everlasting Gangsters<br>Flat Line                                                                                                                                                               | Oriental Killer Boyz<br>West Side Jones Boys<br>Kai Bang<br>Young Oriental Gangsters<br>Little Saigon Hoodlums<br>Cold Blooded Cambodians<br>Crazy Boyz<br>Oriental Troops<br>Oriental Boy Soldiers                                                     |

### 11.16.3 ACTIVIST GROUPS

#### ANONYMOUS<sup>52</sup>

An international hacking group, spread through the Internet, initiating active civil disobedience, while attempting to maintain anonymity. Originating in 2003, the term refers to the concept of many online community users simultaneously existing as an anarchic, chaotic, global brain. It is also generally considered to be a blanket term for members of certain Internet subcultures, a way to refer to the actions of people in an environment where their actual identities are not known. Beginning with 2008, the Anonymous collective has become increasingly associated with collaborative, international hacktivism, undertaking protests and other actions, often with the goal of promoting internet freedom and freedom of speech.

#### OCCUPY MOVEMENT<sup>53</sup>

The Occupy movement is an international protest movement which is primarily directed against economic and social inequality. The first Occupy protests to be widely covered were "Occupy Wall Street" in New York City and "Occupy San Francisco", both taking place on September 17, 2011. By October 9, Occupy protests had taken place or were ongoing in over 95 cities across 82 countries, and over 600 communities in the United States. The movement was initiated by the Canadian activist group Adbusters, and partly inspired by the Arab Spring, especially Cairo's Tahrir Square protests, and the Spanish Indignants. The protests have focused on social and economic inequality, high unemployment, greed and corruption, and the undue influence of corporations—particularly that of the financial services sector—on government, and the movement commonly uses the slogan "*We are the 99%*."

#### SOVEREIGN CITIZENS<sup>54</sup>

The "sovereign citizen" movement is a loosely organized collection of groups and individuals who have adopted a right-wing anarchist ideology originating in the theories of a group called the Posse Comitatus in the 1970s. Its adherents believe that virtually all existing government in the United States is illegitimate and they seek to "restore" an idealized, minimalist government that never actually existed. To this end, sovereign citizens wage war against the government and other forms of authority using "paper terrorism" harassment and intimidation tactics, and occasionally resorting to violence. Notable actions taken by the movement include the 1996 Montana Freeman standoff; 1997 Republic of Texas standoff Tactics "Paper terrorism," including frivolous lawsuits, frivolous liens, fictitious financial instruments, fictitious automobile-related documents, and misuse of genuine documents such as IRS forms; various frauds and scams. In April 2010, a sovereign citizen group calling itself Guardians of the Free Republics issued ultimatums to all 50 governors to vacate their offices within 72 hours. On May 20, 2010, two West Memphis, Arkansas, police officers were killed and two Crittenden County sheriff's officers wounded in two linked shootouts involving an anti-government sovereign citizen with ties to Ohio and Florida.

#### PEOPLE FOR THE ETHICAL TREATMENT OF ANIMALS (PETA)<sup>55</sup>

Founded in 1980, PETA is the largest animal rights organization in the world, with more than 3 million members and supporters based in Norfolk, Virginia. PETA focuses its attention on the four areas in which the largest numbers of animals suffer the most intensely for the longest periods of time: on factory farms, in the clothing trade, in laboratories, and in the entertainment industry. We also work on a variety of other issues, including the cruel killing of beavers, birds, and other "pests" as well as cruelty to domesticated animals. PETA works through public education, cruelty investigations, research, animal rescue, legislation, special events, celebrity involvement, and protest campaigns.

---

<sup>52</sup> Wikipedia

<sup>53</sup> Wikipedia

<sup>54</sup> Anti Defamation League

<sup>55</sup> PETA Website



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### ANIMAL LIBERATION FRONT (ALF)<sup>56</sup>

Founded in 1976, ALF is an international, underground leaderless resistance that engages in illegal direct action in pursuit of animal liberation. Activists see themselves as a modern-day "Underground Railroad", removing animals from laboratories and farms, destroying facilities, arranging safe houses and veterinary care, and operating sanctuaries where the animals live out the rest of their lives. ALF has used violence (i.e. bombings and arson) to further their cause. Between 1996 and 2002, the Animal Liberation Front (ALF) and the Earth Liberation Front (ELF) had committed more than 600 criminal acts since 1996 that resulted in a minimum of \$43 million in damage.<sup>57</sup>

### EARTH LIBERATION FRONT (ELF)<sup>58</sup>

Founded in 1977 as the Environmental Life Force, ELF's first "commando style" attack was an attempt to place fire bombs on seven crop dusters. ELF would have no central leadership or chain of command with each cell intended to be autonomous. Today's ELF, Earth Liberation Front, came into being around 1992 and rejoined the battle to protect Earth by using the same tactics employed by the original ELF fifteen years earlier. Members who *"have served or are serving their prison sentences honorably (without snitching), can make official comments and speak as a legitimate ELF spokesperson. Prison validates an ELF spokesperson's credentials."*

### BLACK LIVES MATTER<sup>59</sup>

Created in 2012 after the shooting of Trayvon Martin in Florida, a group of individuals called to action an ideological and political intervention with liberation response to perceived anti-Black racism. The group believes that Black lives are being systematically and intentionally targeted for demise; therefore, they strive to restore freedom from oppression and justice for Black people.

#### 11.16.4 TERRORISM

There is no single, universally accepted, definition of terrorism. Terrorism is defined in the Code of Federal Regulations as "the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives" (28 C.F.R. Section 0.85).

#### **Definitions of Terrorism in the U.S. Code**

18 U.S.C. § 2331 defines "international terrorism" and "domestic terrorism" for purposes of Chapter 113B of the Code, entitled "Terrorism":

"International terrorism" means activities with the following three characteristics:

- Involve violent acts or acts dangerous to human life that violate federal or state law;
- Appear to be intended (i) to intimidate or coerce a civilian population; (ii) to influence the policy of a government by intimidation or coercion; or (iii) to affect the conduct of a government by mass destruction, assassination, or kidnapping; and
- Occur primarily outside the territorial jurisdiction of the U.S., or transcend national boundaries in terms of the means by which they are accomplished, the persons they appear intended to intimidate or coerce, or the locale in which their perpetrators operate or seek asylum.\*

---

<sup>56</sup> Wikipedia

<sup>57</sup> Southern Poverty Law Center/FBI

<sup>58</sup> ELF Website

<sup>59</sup> BlackLivesMatter Website

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

"Domestic terrorism" means activities with the following three characteristics:

- Involve acts dangerous to human life that violate federal or state law;
- Appear intended (i) to intimidate or coerce a civilian population; (ii) to influence the policy of a government by intimidation or coercion; or (iii) to affect the conduct of a government by mass destruction, assassination, or kidnapping; and
- Occur primarily within the territorial jurisdiction of the U.S.

18 U.S.C. § 2332b defines the term "federal crime of terrorism" as an offense that:

- Is calculated to influence or affect the conduct of government by intimidation or coercion, or to retaliate against government conduct; and
- Is a violation of one of several listed statutes, including § 930(c) (relating to killing or attempted killing during an attack on a federal facility with a dangerous weapon); and § 1114 (relating to killing or attempted killing of officers and employees of the U.S.).

\* *FISA defines "international terrorism" in a nearly identical way, replacing "primarily" outside the U.S. with "totally" outside the U.S. 50 U.S.C. § 1801(c).*

The FBI Divides Terrorist-Related Activities into Two Categories:

- A terrorist *incident* is a violent act or an act dangerous to human life, in violation of the criminal laws of the United States, or of any state, to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives.
- A terrorism *prevention* is a documented instance in which a violent act by a known or suspected terrorist group or individual with the means and a proven propensity for violence is successfully interdicted through investigative activity.

The following local events are classified as an attempted attack related to international terrorism:

- Dwight D. Eisenhower National Airport, Wichita KS (2013)

Terry Lee Loewen, a former avionics technician at the airport, was inspired by the teachings of Osama bin Laden and Anwar al-Awlaki and wanted to commit a violent act on a civilian target. He envisioned walking up to an aircraft, shooting the pilots, and exploding C4 on fuel trucks. Between October and December, the technician unknowingly worked with undercover FBI agents to create a vehicle-borne improvised explosive device (VBIED). Loewen was unaware that the device was inert and was arrested by an undercover FBI agent on December 13<sup>th</sup> after attempting to gain entrance to the tarmac.

- Kansas Letter Bomb, Leavenworth KS (1997)

On January 3, three letter bombs disguised as holiday cards and postmarked from Alexandria, Egypt were discovered by a postal worker outside the Leavenworth penitentiary and were addressed to a parole officer at the prison. At the time Leavenworth's inmate population included Mohammed Salameh who was one of four people convicted in the 1993 World Trade Center bombing. The letter bombs were believed to have been tied to the five letter bombs discovered a day earlier in Washington DC.

The following national events are some of the successful and attempted attacks that have occurred in the U.S. which are classified as terrorism.

- World Trade Center, New York City NY (1993)

Islamic extremist groups (including the Islamic Jihad, Hamas and Sudanese National Islamic Front) gathered materials for approximately two months prior to the February 26 bombing. They resided in New Jersey and apparently rented storage space that was used as a staging area for the bomb and subsequent loading of it into a Ryder rental van. The terrorists drove the 1,500-pound urea-nitrate bomb into the basement parking area of the World Trade Center's North Tower and then set the timer

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

and left. It was intended to knock the North Tower (Tower One) into the South Tower (Tower Two), bringing both towers down and killing thousands of people. However, at 12:17PM Ramzi Yousef detonated the explosive and blast opened a 100 foot (30 m) hole through five sublevels with the greatest damage occurring on levels B1 and B2 and significant structural damage on level B3 of the North Tower killing six people and injuring 1,042 others.

- Alfred P. Murrah Federal Building, Oklahoma City OK (1995)

Timothy McVeigh, U.S. Army veteran and militia movement sympathizer, chose to bomb the Murrah building in retaliation for the government actions of the Waco Siege (which happened exactly two years prior in 1993) and the siege at Ruby Ridge. At 9:02 a.m. on April 19, a Ryder rental truck, containing approximately 5,000 pounds (2,300 kg) of ammonium nitrate fertilizer, nitromethane, and diesel fuel was parked along NW 5th Street between the building and the street in a loading zone located in front of the building's north entrance and detonated. The blast destroyed a third of the building and caused severe damage to several other buildings located nearby. As a result of the explosion, 168 people were killed, including 19 children, and over 800 others were injured. Rescue and recovery efforts were concluded at 11:50 p.m. on May 4, with the bodies of all but three victims recovered.

- Centennial, Olympic Park, Atlanta GA (1996)

The park was designed as the "town square" of the Olympics, and thousands of spectators had gathered for a late concert by the band Jack Mack and the Heart Attack. Eric Robert Rudolf planted a green U.S. military ALICE pack (field pack) containing a steel plate as a directional device, three pipe bombs weighing in excess of 40 pounds, and nitroglycerin surrounded by nails underneath a bench near the base of a concert sound tower. A security guard, discovering the pack and reporting it to the Georgia Bureau of Investigation, began clearing the immediate area before the bomb exploded at 1:20 a.m. on July 27<sup>th</sup>. The bomb killed one and wounded 111 others. Turkish cameraman Melih Uzunyol died from a heart attack he suffered while running to cover the blast

- Columbine High School, Columbine CO (1999)

Eric Harris and Dylan Klebold felt as if they were at war against society and needed to take action toward those they hated. Journal entries revealed that the pair had an elaborate plan for a major bombing rivaling that of Oklahoma City. Prior to the attack, they acquired two 9mm firearms and two 12-gauge shotguns, as well as building 99 improvised explosive devices of various designs and sizes. At 11:10 a.m. April 20, they arrived at Columbine High School in separate cars. After entering the cafeteria, two 20 pound (9 kg) propane bombs in bags were placed and left back to their cars. When the bombs failed to explode, they began shooting at students outside at 11:19 a.m. and proceeded to enter the school library hallway. Carbon dioxide bombs were thrown into the cafeteria area and started shooting in the library at 11:37 a.m. before leaving at 11:42 a.m.... At 12:08p.m., they re-entered the library and committed suicide. In the aftermath, they killed 12 students and one teacher. They also injured 21 other students directly, and three people were injured while attempting to escape.

- World Trade Center, New York City NY (2001)

World Trade Center (WTC) was a complex of seven buildings in Lower Manhattan in New York City built between 1975 and 1981 and contained 13.4 million square feet of office space. Financial/trade and communications offices were in WTC #1 (North Tower) and WTC #2 (South Tower); Marriott Hotel in WTC #3; various exchanges, Deutsche Bank and NY Board of Trade in WTC #4; financials and various offices in WTC #5; U.S. government office in WTC #6; and, financials as well as U.S. government offices and the New York City Office of Emergency Management in WTC #7. On September 11, 19 Al-Qaeda-affiliated hijackers flew two 767 jets into the complex, American Airlines Flight 11 in the North Tower at 08:46, impacting between the 93rd and 99th floors, and 17 minutes later United Airlines Flight 175 into the South Tower, impacting between the 77th and 85th floors. At 9:59 a.m., the South Tower collapsed due to fire, and the North Tower collapsed at 10:28 a.m. The attacks on the World Trade Center resulted in 2,752 deaths including 343 firefighters and 60 police officers from New York City and the Port Authority. World Trade Center 7 collapsed later in the day and the other buildings, although they did not collapse, had to be demolished because they were

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

damaged beyond repair. The process of cleanup and recovery at the World Trade Center site took eight months.

- Pentagon (2001)

Within 30 minutes of two planes hitting the World Trade Center twin towers, American Airlines Flight 77 departed Dulles International Airport bound for Los Angeles. The Boeing 757 was hijacked and crashed, loaded with 10,000 gallons of fuel, at 345 mph into the west side of the Pentagon. The plane hit the helicopter landing pad and hit the outermost ring of the Pentagon, (E Ring) midway between corridors 4 and 5. It cut a wedge through the D and C rings and stopping at the B ring. All 58 passengers, four flight attendants, and both pilots on board, as well as 125 occupants of the Pentagon died in the attack.

- Shanksville, Pennsylvania (2001)

United Airlines Flight 93, a Boeing 757-200, was hijacked around 9:28 a.m. by four al-Qaeda terrorists 46 minutes into the flight from Newark International Airport to San Francisco International Airport. Originally projected to leave at 8:01 a.m., the plane was delayed until 8:42 a.m. before takeoff. It is believed the pilot was overpowered and diverted toward Washington D.C. until passengers overpowered the terrorists. The plane crashed in a field in Stonycreek Township, near Shanksville, in Somerset County, Pennsylvania, about 80 miles southeast of Pittsburgh and 150 miles northwest of Washington, D.C., killing all 37 passengers and seven crew members, including the four hijackers.

- American Airlines Flight 63 (2001) - Attempted

On December 22, Islamic fundamentalist Richard Colvin Reid unsuccessfully tried to light a fuse leading into a shoe containing 100 milligrams of TATP and PETN while flying from Charles De Gaulle International Airport in Paris, France, to Miami International Airport in Miami, Florida. After being subdued in-flight, the plane was redirected to Logan International Airport in Boston, Massachusetts.

- West Nickel Mines School, Nickel Mines PA (2006)

On October 2, Charles Carl Roberts IV (a milk truck driver who served several Amish farms in the area) backed a pickup truck up to the front of the Amish one-room schoolhouse and entered the school at approximately 10:25 a.m. EDT with a 9mm handgun, shortly after the children had returned from recess. He had the boys carry lumber, a shotgun, a stun-gun, wires, chains, nails, tools and a small bag. Roberts barricaded the front door. He ordered the girls to line up against the chalkboard and allowed a pregnant woman, three parents with infants, and all remaining boys to exit the building. At approximately 11:07 a.m., Roberts began shooting the ten remaining girls (aged 6-13 years). As the first Pennsylvania State trooper reached a window, the shooting abruptly stopped after Roberts had committed suicide. Five of the girls were all shot in the head at close range, with 17 or 18 shots fired in all.

- Fort Dix, New Jersey (2007) - Attempted

On May 8, six radical extremists (Dritan Duka (age 28), Shain Duka (26) and Eljvir Duka (23) ethnic Albanians from the Republic of Macedonia; Mohamad Ibrahim Shnewer (22), Dritan Duka's brother-in-law, a Palestinian cab driver from Jordan; Serdar Tatar, born in Turkey; and, Agron Abdullahu, Albanian from Kosovo) were arrested by the FBI after attempting to murder U.S. service members. In 2006, they practiced firing semi-automatic weapons at a Pennsylvania firing range complete with video footage before authorities were alerted by a Circuit City store employee where the video was taken for duplication processing. The group was intending on purchasing a large number of weapons and grenade launchers from undercover FBI agents in early 2007 before the arrest.

- Virginia Polytechnic Institute, Blacksburg VA (2007)

Virginia Polytechnic Institute also known as Virginia Tech is a public university that was the location of an attack by a student on faculty and students alike on April 16. Seung-Hui Cho was senior English

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

major and diagnosed with severe anxiety disorder. Cho shot his two students around 7:15 a.m. in West Ambler Johnston Hall using a .22 caliber Walther P22 and 9mm Glock 19 before walking into Norris Hall two hours later with a backpack containing several chains, locks, a hammer, a knife, the two handguns, nineteen 10- and 15-round magazines, and almost 400 rounds of ammunition. During the second assault, Cho fired at least 174 rounds killing 29 more (five faculty and 24 students) before committing suicide.

- Fort Hood, Killeen TX (2009)

On November 5, 39-year old U.S. Army Major Nidal Malik Hasan (psychiatrist) entered his workplace, the Soldier Readiness Center, at 1:34PM where personnel receive routine medical treatment immediately prior to and on return from deployment. He started shooting armed with an FN Five-Seven handgun and .357 Magnum revolver. Over the next 10 minutes of shooting, 30 people were wounded and 13 killed (12 soldiers and one civilian) of which 11 died at the scene and two died later in a hospital. Investigations showed there were 146 spent shell casings recovered inside the building, and another 68 collected outside, for a total of 214. When the shooting ended, the wounded Hasan was still carrying 177 rounds of unfired ammunition in his pockets, contained in both 20- and 30-round magazines. Note: Possible ties to Anwar al-Awlaki.

- Northwest Airlines Flight 253, Detroit MI (2009) - Attempted

On December 25, 23-year old Umar Farouk Abdulmutallab is a Nigerian citizen who attempted to detonate plastic explosives hidden in his underwear while on board Northwest Airlines Flight 253, en route from Amsterdam to Detroit, Michigan. Reports indicate that he spent about 20 minutes in the bathroom as the flight approached Detroit, and then covered himself with a blanket after returning to his seat. Other passengers then heard popping noises, smelled a foul odor, and some saw Abdulmutallab's trouser leg and the wall of the plane on fire. His underwear contained a six-inch (15-cm) packet of PETN explosive which was sewn in along with TAPN. He indicated that he had been directed by al Qaeda, and that he had obtained the device in Yemen. He was subsequently charged on six criminal counts, including attempted use of a weapon of mass destruction and attempted murder of 289 people. Note: Possible ties to Anwar al-Awlaki.

- Times Square, New York NY (2010) - Attempted

On May 1, 30-year old Pakistani-born U.S. citizen Faisal Shahzad attempted to set off a vehicle borne device in Times Square. At 6:28 p.m., a video surveillance camera recorded what was believed to be the dark green Nissan S.U.V. driving west on 45th Street. Moments later, a T-shirt vendor on the sidewalk saw smoke coming out of vents near the back seat of the S.U.V. containing three canisters of propane, five-gallon cans of gasoline and consumer grade fireworks. The vendor called to a mounted police officer, who smelled gunpowder when he approached the S.U.V. and called for assistance. The police began evacuating Times Square, from 43rd Street to 48th Street, and from Sixth to Eighth Avenues which was closed for much of the evening.

- Christmas Lighting, Portland OR (2010) - Attempted

On November 26, 19-year old Mohamed Osman Mohamud, a Somali-born U.S. citizen and part-time student at Oregon State University, was arrested at 5:42 p.m., 18 minutes before the tree lighting was to occur, on an attempt to use a cell phone to explode a vehicle borne device loaded with six 55-gallon drums with detonation cords and plastic caps at the Christmas tree-lighting ceremony in Portland's Pioneer Courthouse Square. Unknown to Mohamud, he and undercover FBI agents traveled to a remote spot in Lincoln County on November 4 where they detonated a bomb concealed in a backpack as a trial run for the upcoming attack. The arrest was the culmination of a long-term undercover operation, during which Mohamud had been monitored for months as his alleged bomb plot developed for participating in violent jihad.



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

- Military Recruitment Center, Catonsville MD (2010) – Attempted

On December 8, 19-year old Mohamed Osman Mohamud was arrested in connection with a scheme to attack an Armed Forces recruiting station in Catonsville, Maryland, with a vehicle bomb. There was no actual danger to the public as the explosives were inert and the suspect had been carefully monitored by law enforcement for months. Believing he was receiving help from a larger ring of jihadists, he communicated details of the plot, including where to park the van filled with explosives to hurt the most people, was actually provided to undercover agents.

- Cinemark Century 16 Theater in Aurora, CO (2012)

At 0030 hours on July 20, James Holmes began shooting after releasing tear gas canisters in a crowded theater, killing 12 people and injuring 58 others. After he was arrested, police found his apartment booby-trapped with explosives.

- Sikh Temple of Wisconsin, Oak Creek WI (2012)

Six people were killed and four wounded on August 5 when Wade Michael Page shot inside and outside the Sikh Temple. The shooter committed suicide after being wounded by a police officer.

- Sandy Hook Elementary School, Newtown, Connecticut (2012)

Adam Lanza shot through a secured front door to the school on December 14 and killed 27 (20 children and six adults inside the school. In addition two more were wounded before the shooter committed suicide after police arrived.

- Washington Navy Yard, Washington DC (2013)

On September 16, civilian contractor and military veteran Aaron Alexis fatally shot 12 people and injured three others at random inside the NAVSEA headquarters building. The attack started at 0816 EDT and ended at 0920 when the shooter was killed by police.

### *Local Resources*

There are over 840 commissioned officers and staff in the Wichita Police Department, over 500 personnel in the Sheriff's department, and over 100 commissioned officers and staff in all remaining cities within Sedgwick County. Besides standard operating procedures, special event planning procedures are also used. Some of the sections administered by these departments include: adult and juvenile detention, K-9 unit, exploited and missing child unit (EMCU), work release, extradition, special weapons and tactics (SWAT), and investigations.

### *State Resources*

#### Kansas Homeland Security

Kansas Homeland Security, within the Adjutant General's Department, coordinates statewide activities pertaining to the prevention of and protection from terrorist-related events. This involves all aspects of prevention/mitigation, protection/preparedness, response and recovery. Kansas Homeland Security serves as a liaison between federal, state and local agencies and the private sector on matters relating to the security of Kansas and its citizens.

#### Kansas Bureau of Investigation (KBI)

The KBI is dedicated to providing professional investigative and laboratory services to criminal justice agencies, and the collection and dissemination of criminal justice information to public and private agencies, for the purpose of promoting public safety and the prevention of crime in Kansas. The Kansas Threat Integration Center (KSTIC) is a component of the KBI. The Information Technology department consists of application developers, technical support staff and information security personnel that collectively provide technology services to the KBI as well as technical and

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

administrative support for the Kansas Criminal Justice Information System (KCJIS). KCJIS provides access to vital, time-sensitive information from national and state criminal justice databases on a secure and reliable network. Through KCJIS criminal justice and law enforcement agencies have access to information sources such as the National Crime Information center (NCIC) wanted persons, known gang and terrorists and stolen property files.

### Kansas Highway Patrol – Homeland Security

Homeland Security/Special Operations is assigned to the Patrol's General Headquarters, is responsible for the agency's homeland security related functions, and administers the Homeland Security Grant Program and other related grant programs. It also includes the agency's personnel assigned to Criminal Interdiction/Asset Forfeiture, the U.S. Drug Enforcement Agency (DEA) Task Force, and the FBI's Joint Terrorism Task Force (JTTF).

### *Federal Resources*

#### FBI Counterterrorism Division

The FBI's Counterterrorism Division collects, analyzes, and shares critical information and intelligence with the proper authorities to combat terrorism on three fronts: 1) international terrorism operations both within the United States and in support of extraterritorial investigations; 2) domestic terrorism operations; and 3) counterterrorism relating to both international and domestic terrorism.

#### National Counterterrorism Center (NCTC)

At the NCTC, analysts from the FBI, CIA, DHS, DOD, DOE, Health and Human Services, the Nuclear Regulatory Commission, and the Capitol Police work side-by-side to analyze and confront the threats facing the U.S. and our interests. NCTC analysts produce the National Threat Bulletin for the president, the Threat Matrix, and other analytic products. Its secure website, NCTC Online, is the primary dissemination system for terrorism information produced by the NCTC and other counterterrorism mission partners, including international partners. The NCTC also conducts strategic operational planning.

#### Joint Terrorism Task Force (JTTF).

These task forces combine the resources of the Bureau, the intelligence community, the military, and state and local police officers. The National Joint Terrorism Task Force, located just outside Washington, D.C., includes representatives from more than 40 agencies, including components of the Department of Homeland Security (DHS), Central Intelligence Agency (CIA), Department of Defense (DOD), and the Department of Energy (DOE).

### *Federal Resources – Cont'd*

#### FBI Terrorist Screening Center (TSC)

The TSC was established in December 2003 to create a single comprehensive database of known or suspected terrorists (both domestic and international). The TSC leverages the FBI's law enforcement databases to provide real-time actionable intelligence to state and local law enforcement.

#### FBI Terrorism Financing Operations Section (TFOS)

The TFOS coordinates efforts to track and shut down terrorist financing and to exploit financial information in an effort to identify previously unknown terrorist cells and recognize potential activity/planning. TFOS builds on the FBI's expertise in conducting complex criminal financial investigations and long-established relationships with the financial services sector. Through this effort, the FBI has made tremendous progress in tracking and freezing terrorists' assets.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### FBI Counterintelligence Division

The FBI has the principal authority to conduct and coordinate counterintelligence investigations and operations within this country. It is the only federal agency with a mandate to investigate foreign counterintelligence cases within U.S. borders. Specially trained FBI counterintelligence experts monitor and neutralize foreign intelligence operations against the United States and investigate violations of federal laws against espionage, misuse of classified data, and other criminal matters relating to national security. The counterintelligence program is also involved in international terrorism threats, weapons of mass destruction threats, and attacks on the nation's critical infrastructures (i.e., communications, banking systems, and transportation systems).

### FBI Safe Streets Task Forces (SSTFs)

SSFTs are dedicated to identifying, prioritizing, and targeting violent gangs. These SSTFs are comprised of more than 2,000 local, federal, and state investigators representing 653 law enforcement agencies throughout the United States.

### National Gang Intelligence Center (NGIC)

The NGIC is a multi-agency effort that integrates gang-related intelligence assets from federal, state, and local law enforcement entities. It serves as a centralized intelligence resource for gang information and analytical support. The NGIC is co-located with GangTECC—the Gang Targeting, Enforcement, and Coordination Center—which is the national, multi-agency anti-gang task force created by the attorney general.

### *Hazard Severity Ratings*

The following rating table indicates the probability of a civil disturbance hazard event occurring at least once every 25 years, impacting less than 25% of the land, resulting in minor injuries and/or illnesses.

CIVIL DISTURBANCE HAZARD EVENT RATING TABLE

| <b>Consequence</b>   | <b>Probable Rating</b> | <b>Catastrophic Rating</b> |
|----------------------|------------------------|----------------------------|
| Area Impacted        | 1                      | 2                          |
| Probability          | 3                      | 0                          |
| Health & Safety      | 1                      | 4                          |
| Property             | 1                      | 3                          |
| Environment          | 1                      | 2                          |
| Economic             | 1                      | 2                          |
| <b>Total Ratings</b> | <b>8</b>               | <b>13</b>                  |

### *Catastrophic Event*

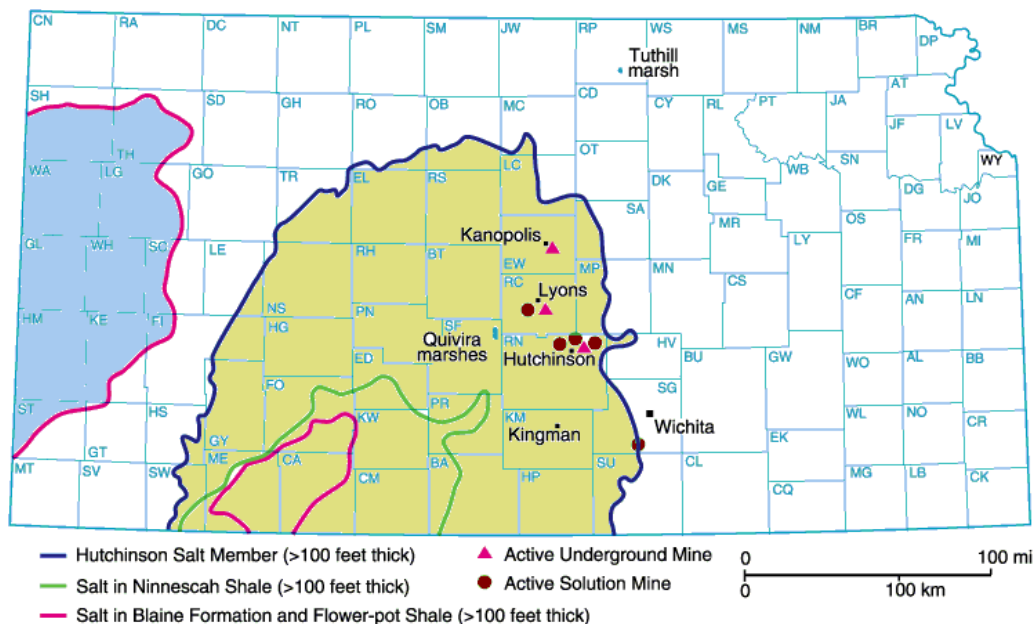
A catastrophic worst-case event could result in the event of martial law had to be declared due to widespread damages from a natural disaster and resulting in looting and rioting.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 11.17 SINKHOLES/SUBSIDENCE

**Definition:** Sinkhole development is associated with several of the following structural and topographic conditions: Structural crests of anticlines, upland drainage divides, nearly level to gently sloping land surface, entrenched river valleys nearby, and lack of thick surficial cover. These factors in combination are thought to enhance the possibility for vertical drainage of water into highly fractured, soluble bedrock with resulting sinkhole solution. Another example of potential sinkhole development is solution mining where water is injected into a salt formation and brine is extracted.

Sinkhole development has historically occurred in the western portion of Sedgwick County where the Hutchinson Salt member extends from a thickness of 300 feet near the Kingman County line and feathering out to the western edge of the City of Wichita. Some of the sinkholes have led to the development of several lakes, most notably Cadillac Lake in northwest Wichita. Indications from studies performed by the KGS seem to indicate sinkhole development is active in western Sedgwick County as salt brine is being carried away naturally by subsurface water erosion and brine extracts through solution mining.



Trapped gases created in sinkholes as well as natural gases released from abandoned wells are an explosive hazard consideration. Surface subsidence in western Kansas is possible and geologic subsurface evaluations are of great importance prior to development on the Hutchinson Salt member.

Information obtained from a June 22, 2006 letter from Mr. Howard Lubliner, Kansas Department of Transportation (KDOT) Road Design Engineer, the proposed Northwest Wichita Bypass (KDOT Project No. 87 K-8236-01) indicates there are no sinkhole locations along the proposed alignment based on geological investigations. KDOT is unaware of any oil and gas wells that would allow an influx of water into the salt layer that could cause a sinkhole. The risk of catastrophic collapse is extremely low because of the slow nature of the salt dissolution and the structural strength of the overlying sediment is not sufficient to allow bridging of the bedrock.

An active sinkhole in Sedgwick County is located near the intersection of 87<sup>th</sup> Street South and 135<sup>th</sup> Street West. The size of the sinkhole is generally 300 feet south of the intersection to 650 feet north of the intersection with an approximate 200-foot width. According to information from Sedgwick County Public Works, the surface in this area has subsided by as much as 5.5 feet between 1980 and 2004.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### *Regulatory*

Since around 1955, the Kansas Department of Health and Environment (KDHE) has had requirements for capping abandoned oil and gas wells; however, wells prior to 1955 may be improperly capped due.

### *Hazard Severity Ratings*

The following rating table indicates the probability of a sinkhole hazard event may rarely occur, impacting less than 25% of the land, few damages to property and minor environmental damage.

SINKHOLE/SUBSIDENCE HAZARD EVENT RATING TABLE

| Consequence          | Probable Rating | Catastrophic Rating |
|----------------------|-----------------|---------------------|
| Area Impacted        | 1               | 1                   |
| Probability          | 0               | 0                   |
| Health & Safety      | 0               | 1                   |
| Property             | 1               | 1                   |
| Environment          | 1               | 2                   |
| Economic             | 0               | 2                   |
| <b>Total Ratings</b> | <b>3</b>        | <b>7</b>            |

### *Catastrophic Event*

A catastrophic worst-case event could result if a sinkhole developed within a city causing structural collapse of buildings and/or railroad impairment causing a hazardous materials derailment.



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### 11.18 ASTEROIDS AND METEORITES

*Definition:* The following definitions are given for meteors, meteoroids, meteorites, and asteroids:

Meteor: is a bright streak of light that appears briefly in the sky and appears when a particle or chunk of metallic or stony matter called a meteoroid enters the earth's atmosphere from outer space. Meteoroids that reach the Earth are called meteorites.

Meteorite: Meteorites may be stony, iron, or stony-iron composition may disintegrate if they are too small or cause a mid-air explosion before reaching the Earth's surface. The largest meteorite ever found weighs about 66 short tons (60 metric tons).

Asteroid: Asteroids are metallic, rocky bodies without atmospheres that orbit the Sun but are too small to be classified as planets. Asteroids with orbits that bring them within 1.3 AU (121 million miles) of the Sun are known as Earth-approaching or near-Earth asteroids (NEAs). Approximately 250 NEAs have been found to date, probably only a few percent of their total population. The largest NEA presently known is 1036 Ganymed, with an approximate diameter of 25.5 miles.

Near-Earth Objects (NEOs): Comets and asteroids that have been nudged by the gravitational attraction of nearby planets into orbits that allow them to enter the Earth's neighborhood. Composed mostly of water ice with embedded dust particles, comets originally formed in the cold outer planetary system while most of the rocky asteroids formed in the warmer inner solar system between the orbits of Mars and Jupiter.

The following asteroids were recorded as recent near misses:

- March 23, 1989 – an asteroid 0.25-mile wide came within 400,000 miles of Earth.
- 2002 – a small asteroid (2002 MN) 150–360 ft in diameter, passed within 75,000 miles of Earth

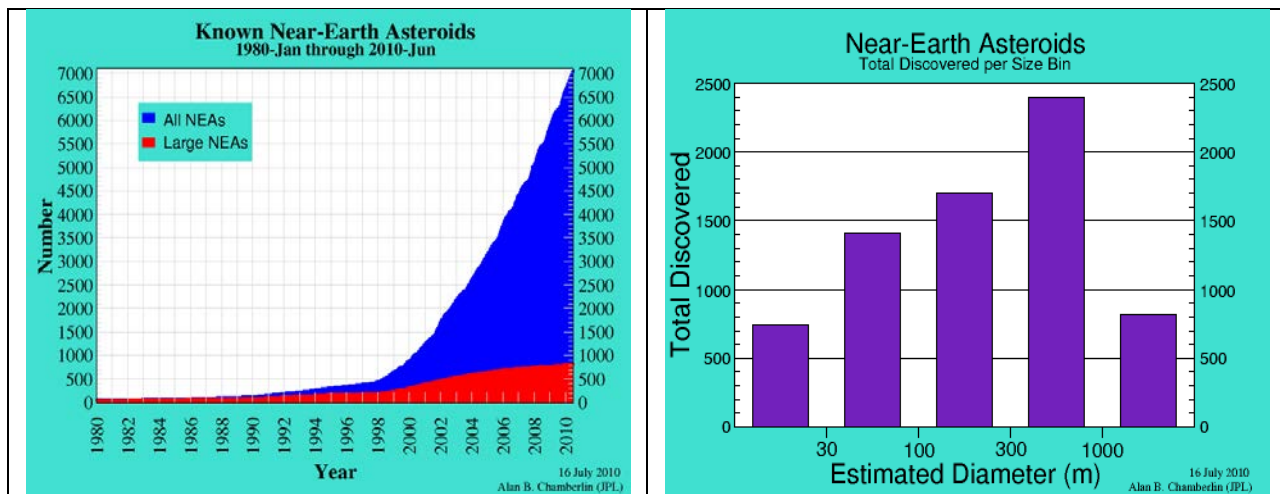
The following interplanetary objects entered earth's atmosphere:

- Peekskill – October 9, 1992, a 1.7 meter diameter meteor fireball was observed from Kentucky to West Virginia and covered a ground path between 700 to 800 kilometers. One H6 monomict breccia meteorite in Peekskill, New York from this event had a mass of 27 pounds.
- Pennsylvania – On July 23<sup>rd</sup>, 2001, a small asteroid or piece of comet was observed as a fireball brighter than a full moon over several states to include Maryland, New York and New Jersey the fireball was moving on an east-west trajectory that carried it directly over the state of Pennsylvania. "It was traveling perhaps 15 km/s (34,000 mph) or faster when it exploded in the atmosphere with the force of about 3 kilotons of TNT," says Bill Cooke, a member of the Space Environments team at the Marshall Space Flight Center. If this was a rocky asteroid, then it probably measured between 1 and 2 meters across and weighed 30 or so metric tons. "The pressure wave from the airburst shattered some windows in towns west of Williamsport," Cooke continued. "Breaking glass requires an overpressure of about 5 millibars (0.5 kPa), which means that those homes were within 100 km of the explosion."
- Indonesia – On October 8<sup>th</sup>, 2009, a 10 meter wide asteroid exploded with an estimated yield of about 50 kilotons at 3:00 Greenwich time. According to NASA, a fireball event of this magnitude occurs about once every 2 to 12 years on average. As a rule, the most common types of stony asteroids would not be expected to cause ground damage unless their diameters were about 25 meters in diameter or larger.
- Salt Lake City, Utah – On November 18<sup>th</sup>, 2009, a bolide meteor not part of the Leonid debris stream exploded over Utah after midnight (MST) and was observed as far away as Los Angeles and Las Vegas with an estimated yield of up to one kiloton.
- Eastern Slovakia – On March 2, 2010, a meteor estimated to be 0.5 to one meter in diameter was observed around 11:30 at night at an altitude of 30 kilometers and exploded causing a loud explosion followed by a shock wave.
- Chicago, Illinois – On April 14<sup>th</sup>, 2010, during a Gamma Virginids event a meteor was observed after 10PM (CST) causing numerous sightings over several states and causing sonic booms in Iowa's Quad City area before reaching the horizon and breaking apart.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

On a daily basis, about one hundred tons of interplanetary material drifts down to the Earth's surface. Most of the smallest interplanetary particles that reach the Earth's surface are the tiny dust particles that are released by comets as their ices vaporize in the solar neighborhood. The vast majority of the larger interplanetary material that reaches the Earth's surface originates as the collision fragments of asteroids that have run into one another some eons ago.

With an average interval of about 100 years, rocky or iron asteroids larger than about 50 meters would be expected to reach the Earth's surface and cause local disasters or produce the tidal waves that can inundate low lying coastal areas. On an average of every few hundred thousand years or so, asteroids larger than a kilometer could cause global disasters. In this case, the impact debris would spread throughout the Earth's atmosphere so that plant life would suffer from acid rain, partial blocking of sunlight, and from the firestorms resulting from heated impact debris raining back down upon the Earth's surface. Since their orbital paths often cross that of the Earth, collisions with near-Earth objects have occurred in the past and we should remain alert to the possibility of future close Earth approaches. It seems prudent to mount efforts to discover and study these objects, to characterize their sizes, compositions and structures and to keep an eye upon their future trajectories.



Source: NASA Jet Propulsion Laboratory

### Potential Impact

Astronomers estimate that there are approximately 1,100 NEAs larger than 0.6 mi in diameter, and more than a million larger than 30m in diameter (the approximate threshold for penetration through the Earth's atmosphere).



The most recent NEA hitting the earth was at Tunguska, Siberia in 1908 which was 60 meters in diameter and produced a very destructive explosion of about 10-15 megatons energy and causing a 20 mile area of felled and scorched trees when it disintegrated at an altitude of 6-8 km. In contrast, the energy of a 30 m stony asteroid at the same speed is about 1 megaton of kinetic energy, and it does not penetrate within 10 km of the surface.

### Potential Outcome

According to NASA's Science Definition Team (SDT), the following studies were found regarding asteroid impact potentials:

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

- Damage from a stony asteroid falls off very rapidly for sizes smaller than Tunguska, going to zero for energies below about 2 megatons.
- A one-megaton explosion exploding 15 km in the air may cause a large sonic boom with breakage of some windows near ground zero, but buildings would not generally suffer structural damage and trees would not be knocked down. Flying debris from short-lived gale-force winds might cause some injuries.
- There is a significant atmospheric attenuation of the hazard for impactors below about 70 m diameter, and that there would be no deaths from an impact smaller than about 45 m diameter.

### *Regulatory*

There are no regulatory procedures for this type of event.

### *Hazard Severity Ratings*

The following rating table indicates the probability of an asteroid and meteorite hazard event may rarely occur, impacting less than 25% of the land and few damages to property.

ASTEROID AND METEORITE HAZARD EVENT RATING TABLE

| <b>Consequence</b>   | <b>Probable Rating</b> | <b>Catastrophic Rating</b> |
|----------------------|------------------------|----------------------------|
| Area Impacted        | 1                      | 2                          |
| Probability          | 0                      | 0                          |
| Health & Safety      | 0                      | 4                          |
| Property             | 1                      | 3                          |
| Environment          | 0                      | 3                          |
| Economic             | 0                      | 2                          |
| <b>Total Ratings</b> | <b>2</b>               | <b>14</b>                  |

### *Catastrophic Event*

A catastrophic worst-case event equal or exceeding the Tunguska, Siberia event of 1908 that would level many buildings and cause widespread damage from debris.

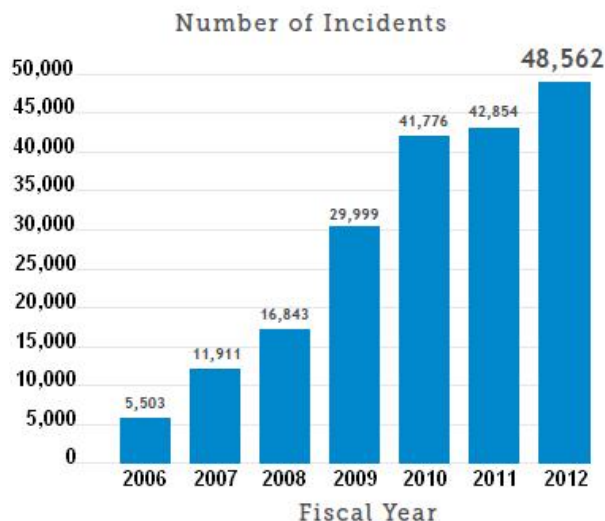
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 11.19 CYBERSPACE THREATS

**Definition:** The Department of Defense (DoD) defines cyberspace as follows: A global domain within the information environment consisting of the interdependent network of information technology infrastructures, including the Internet, telecommunications networks, computer systems, and embedded processors and controllers. (Joint Publication 1-02, *DoD Dictionary of Military Terms*, Washington, D.C.: Joint Staff, Joint Doctrine Division, J-7, October 17, 2008.) This encompasses hundreds of thousands of interconnected computers, servers, routers, switches, and fiber optic cables that typically allow critical infrastructures to work. Supervisory Control and Data Acquisition (SCADA) systems can also be attacked, especially since they have increasingly become more dependent on internet protocol-based systems.

Cyber-based threats to government systems and critical infrastructure are evolving and growing. These threats can be unintentional or intentional, targeted or non-targeted, and can come from a variety of sources, including criminals, terrorists, and adversarial foreign nations, as well as hackers and disgruntled employees.

Number of incidents reported to US-CERT from federal agencies (Fiscal years 2006-2012)



Source: GAO February 2013 Cybersecurity Report

Pervasive and sustained cyber-attacks continue to pose a potentially devastating threat to the systems and operations of the federal government. In recent months, federal officials have cited the continued efforts of foreign nations and criminals to target government and private sector networks; terrorist groups have expressed a desire to use cyber-attacks to target the United States; and press accounts have reported attacks on the Web sites of government agencies. The ever-increasing dependence of federal agencies on computerized systems to carry out essential, everyday operations can make them vulnerable to an array of cyber-based risks.

Cyber-attacks on United States information networks can have serious consequences such as disrupting critical operations, causing loss of revenue and intellectual property, or loss of life. The annual cost of cybercrime is estimated to be over \$1 trillion, and coordinated cyber-attacks have crippled and compromised critical infrastructure in some countries. Additionally, attacks have included espionage, indentifying targets, creating back doors

or other means for future access of vulnerable systems, intimidation, and eroding public confidence.

The February 2013 Government Accountability Office (GAO) report entitled *Cybersecurity: National Strategy, Roles, and Responsibilities Need to Be Better Defined and More Effectively Implemented* states that “*Threats to systems supporting critical infrastructure and federal information systems are evolving and growing. Advanced persistent threats—where adversaries that possess sophisticated levels of expertise and significant resources to pursue its objectives repeatedly over an extended period of time—pose increasing risks*”

While information and communication technologies have allowed for easier information sharing and gathering within the public and private sectors, increasing threats from social networking, cloud computing platforms, flash drives and other portable devices can unintentionally compromise unwitting third parties, which in turn can become the basis for actionable attacks against those third parties. Cyber-attacks can be launched from literally anywhere, including cybercafés, open Wi-Fi nodes, and suborned third-party computers. They do not require expensive or rare machinery. They leave next to no unique physical trace.

The *National Strategy to Secure Cyberspace* is part of the overall effort to protect the Nation. It is an implementing component of the *National Strategy for Homeland Security* and is complemented by a *National Strategy for the Physical Protection of Critical Infrastructures and Key Assets*.

# 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

## 10.19.1 THREAT AND VULNERABILITY: A 5-LEVEL PROBLEM

Managing threat and reducing vulnerability in cyberspace is a particularly complex challenge because of the number and range of different types of users. Cyberspace security requires action on multiple levels and by a diverse group of actors because literally hundreds of millions of devices are interconnected by a network of networks. The problem of cyberspace security can be best addressed on five levels.

### Level 1, the Home User/Small Business

Though not a part of a critical infrastructure the computers of home users can become part of networks of remotely controlled machines that are then used to attack critical infrastructures. Undefended home and small business computers, particularly those using digital subscriber line (DSL) or cable connections, are vulnerable to attackers who can employ the use of those machines without the owner's knowledge. Groups of such "zombie" machines can be used by third-party actors to launch denial-of-service (DoS) attacks on key Internet nodes and other important enterprises or critical infrastructures.

### Level 2, Large Enterprises

Large-scale enterprises (corporations, government agencies, and universities) are common targets for cyber-attacks. Many such enterprises are part of critical infrastructures. Enterprises require clearly articulated, active information security policies and programs to audit compliance with cyber security best practices. According to the U.S. intelligence community, American networks will be increasingly targeted by malicious actors both for the data and the power they possess.

### Level 3, Critical Sectors/Infrastructures

When organizations in sectors of the economy, government, or academia unite to address common cyber security problems, they can often reduce the burden on individual enterprises. Such collaboration often produces shared institutions and mechanisms, which, in turn, could have cyber vulnerabilities whose exploitation could directly affect the operations of member enterprises and the sector as a whole. Enterprises can also reduce cyber risks by participating in groups that develop best practices, evaluate technological offerings, certify products and services, and share information. Several sectors have formed Information Sharing and Analysis Centers (ISACs) to monitor for cyber-attacks directed against their respective infrastructures. ISACs are also a vehicle for sharing information about attack trends, vulnerabilities, and best practices.

### Level 4, National Issues and Vulnerabilities

Some cyber security problems have national implications and cannot be solved by individual enterprises or infrastructure sectors alone. All sectors share the Internet. Accordingly, they are all at risk if its mechanisms (e.g., protocols and routers) are not secure. Weaknesses in widely used software and hardware products can also create problems at the national level, requiring coordinated activities for the research and development of improved technologies. Additionally, the lack of trained and certified cyber security professionals also merits national level concern.

### Level 5, Global

The worldwide web is a planetary information grid of systems. Internationally shared standards enable interoperability among the world's computer systems. This interconnectedness, however, also means that problems on one continent have the potential to affect computers on another. We therefore rely on international cooperation to share information related to cyber issues and, further, to prosecute cyber criminals. Without such cooperation, the collective ability to detect, deter, and minimize the effects of cyber-based attacks would be greatly diminished.



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### 11.19.2 EXAMPLE ATTACKS

- A disgruntled software developer used stolen radio equipment to hack into a system controlling a sewage plant. On nearly 50 occasions, he sent malicious code that opened control valves, causing more than 200,000 gallons of sewage to ooze into nearby rivers and parks.
- Successful cyber-attacks against critical national infrastructures from outside the United States. The cyber-attacks were used to disrupt power equipment in several regions outside the U.S, and in at least one case, the disruption caused a power outage affecting multiple cities.
- Computers exploited with the Conficker worm turned into junk mail-spewing robots (bots) capable of sending billions of spam messages a day and clogging e-mail systems and servers.
- The most significant breach of U.S. military computers was caused by an infected flash drive inserted into a U.S. military laptop on a post in the Middle East. Malicious code placed on the drive by a foreign intelligence agency uploaded itself onto a network run by the U.S. military's Central Command and spreading undetected on both classified and unclassified systems.
- An international cyberattack on computer systems started in the Ukraine and spread around the world to include the United States using a stolen hacking tool (WannaCry) initially created by the National Security Agency. The attackers, reportedly identified as a group called the Shadow Brokers, demanded digital ransom in Bitcoin to regain access.

### 11.19.3 RESOURCES

#### *Local Resources*

##### Wichita Police Department

The Financial Crimes Section assesses and prioritizes the investigation of employee embezzlements, thefts by fraud, forgeries, check crimes, financial card crimes, identity theft, and computer crimes occurring within our jurisdiction.

#### *State Resources*

##### Kansas Homeland Security

Kansas Homeland Security, within the Adjutant General's Department, coordinates statewide activities pertaining to the prevention of and protection from terrorist-related events. This involves all aspects of prevention/mitigation, protection/preparedness, response and recovery. Kansas Homeland Security serves as a liaison between federal, state and local agencies and the private sector on matters relating to the security of Kansas and its citizens. This includes implementing the National Infrastructure Protection Plan along with a cyber-security plan in conjunction with the State's Information Technology Department.

#### *Federal Resources*

##### Federal Bureau of Investigation (FBI)

The FBI's cyber mission is four-fold: first and foremost, to stop those behind the most serious computer intrusions and the spread of malicious code; second, to identify and thwart online sexual predators who use the Internet to meet and exploit children and to produce, possess, or share child pornography; third, to counteract operations that target U.S. intellectual property, endangering our national security and competitiveness; and fourth, to dismantle national and transnational organized criminal enterprises engaging in Internet fraud. Pursuant to the National Strategy to Secure Cyberspace signed by the President, the Department of Justice and the FBI lead the national effort to investigate and prosecute cybercrime.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

*Cyber Action Team (CAT)* – Small, highly trained teams of FBI agents, analysts, and computer forensics and malicious code experts who travel around the world on a moment's notice to respond to cyber intrusions. Along the way, they gather vital intelligence on emerging threats and trends that help identify the cybercrimes that are most dangerous to national security and the economy.

### U.S. Department of Homeland Security (DHS)

The Science and Technology Directorate oversees the Cyber Security Division that looks at the security and resilience of the nation's critical infrastructure. One of its missions is to defend, mitigate and secure current and future systems, networks and infrastructure against cyberattack.

The National Protection and Programs Directorate oversees the Office of Cybersecurity and Communications that is responsible for enhancing security, resilience, and reliability of the Nation's cyber and communications infrastructure to include preventing and minimizing disruptions to critical information.

### *Regulatory*

There are no regulatory procedures for this type of event.

### *Hazard Severity Ratings*

The following rating table indicates the probability of cyber-attacks routinely occur; however, the level of magnitude of impact can vary.

CYBERSPACE THREAT HAZARD EVENT RATING TABLE

| <b>Consequence</b>   | <b>Probable Rating</b> | <b>Catastrophic Rating</b> |
|----------------------|------------------------|----------------------------|
| Area Impacted        | 1                      | 4                          |
| Probability          | 4                      | 0                          |
| Health & Safety      | 0                      | 4                          |
| Property             | 1                      | 3                          |
| Environment          | 0                      | 3                          |
| Economic             | 1                      | 4                          |
| <b>Total Ratings</b> | <b>7</b>               | <b>18</b>                  |

### *Catastrophic Event*

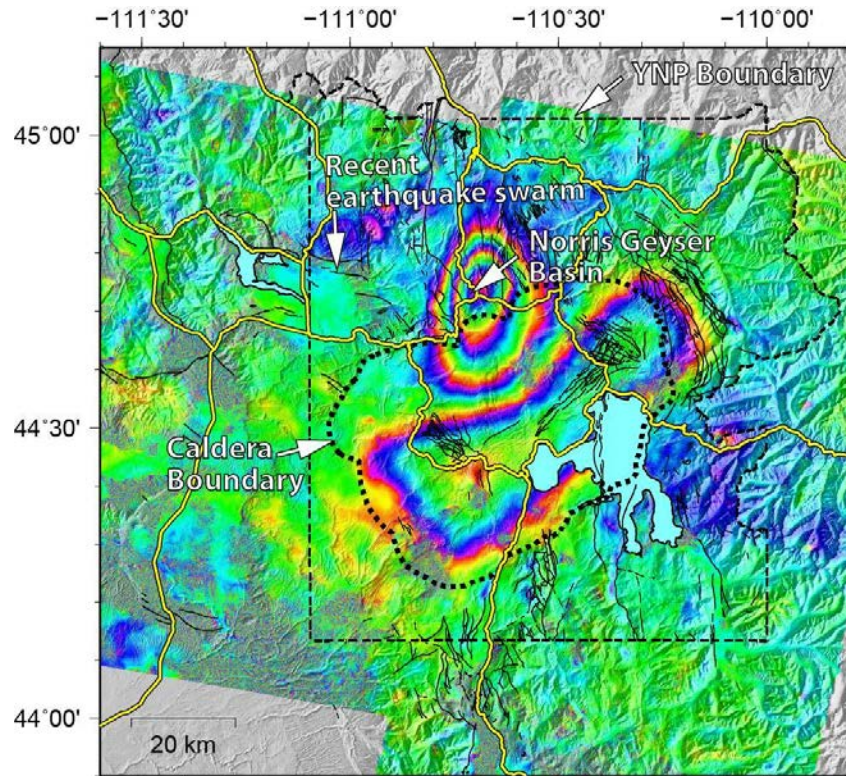
A catastrophic worst-case event would be impacting any of the sector specific areas as to impair or shut down its functionality and severe any interface with other sector specific areas.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

### 11.20 VOLCANOES

A volcano is generally classified as a vent in the earth's crust that can produce ash, steam, and lava. There are currently 169 potentially active volcanoes in the U.S. of which none are located in Kansas; however, there is one volcano that has the potential to impact Kansas and it is called the Yellowstone Caldera. Eruptions from this caldera have occurred once every 640,000 with the last one spewing 240 cubic miles of volcanic ash and rock into the air.

Ground deformations at Yellowstone National Park shown in the picture below have been increasing over the past two years (2015-2017) with a large earthquake swarm of almost 2,500 earthquakes from June to October 2017, the longest and most intense since 1985.



Source: USGS

<http://www.newsweek.com/when-will-yellowstone-supervolcano-erupt-decades-warning-683130>

2014 Modeling ash fall distribution from a Yellowstone super eruption

### **SUMMARY**

Table A on the following page depicts graphically the types of hazards and threats from natural, technological and civil areas that are of concern to Sedgwick County and rates each of the hazards as high, medium, or low in potential occurrence.

Table B illustrates the scoring for each of the hazards that are prevalent in the county and takes into account the area impacted, probability of occurrence, health and safety, property, environment, and economic impacts.

Table C shows the possible secondary events that could be triggered as a consequence of at least one hazard and/or threat occurring. It should be noted that it is generally more useful to consider all secondary events as a part of, and in the context of, the overall, situation created by the primary event.

# 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

**Table A - Types of Hazards**  
Specific Hazard or Potential Emergency

| Technological Hazards                         |      |        |     |  |
|-----------------------------------------------|------|--------|-----|--|
|                                               | High | Medium | Low |  |
| <b>1. Hazardous Materials</b>                 |      |        |     |  |
| a. Transportation                             |      |        |     |  |
| Motor Carrier                                 |      |        |     |  |
| Railroad                                      |      |        |     |  |
| Aviation                                      |      |        |     |  |
| Pipeline                                      |      |        |     |  |
| b. Fixed Facility                             |      |        |     |  |
| Explosion                                     |      |        |     |  |
| Fire                                          |      |        |     |  |
| Accidental Release                            |      |        |     |  |
| Theft / Loss                                  |      |        |     |  |
| c. Radiological                               |      |        |     |  |
| Accidental Release                            |      |        |     |  |
| Small Yield Detonation                        |      |        |     |  |
| Dirty Bomb Release                            |      |        |     |  |
| <b>2. Fire</b>                                |      |        |     |  |
| a. High Rise Buildings                        |      |        |     |  |
| b. Multiple Buildings                         |      |        |     |  |
| c. Rangeland                                  |      |        |     |  |
| d. Pipelines                                  |      |        |     |  |
| e. Refinery                                   |      |        |     |  |
| f. Chemical Plant                             |      |        |     |  |
| g. Industrial - Other                         |      |        |     |  |
| <b>3. Explosion</b>                           |      |        |     |  |
| a. Pipelines                                  |      |        |     |  |
| b. Industrial                                 |      |        |     |  |
| c. Chemical                                   |      |        |     |  |
| <b>4. Pollution</b>                           |      |        |     |  |
| a. Air                                        |      |        |     |  |
| b. Water                                      |      |        |     |  |
| Mineral Inflow                                |      |        |     |  |
| Rural Runoff                                  |      |        |     |  |
| Urban Runoff                                  |      |        |     |  |
| <b>5. Water Related</b>                       |      |        |     |  |
| a. Dam or Reservoir Failures                  |      |        |     |  |
| b. Dike or Levee Failure                      |      |        |     |  |
| c. Water Shortage                             |      |        |     |  |
| <b>6. Medical Epidemic</b>                    |      |        |     |  |
| a. Human                                      |      |        |     |  |
| b. Animal                                     |      |        |     |  |
| <b>7. Civil Disturbance/Criminal Activity</b> |      |        |     |  |
| a. Riot                                       |      |        |     |  |
| b. Bomb Threat                                |      |        |     |  |
| c. Terrorism / Sabotage                       |      |        |     |  |
| d. Active Shooter                             |      |        |     |  |
| e. Cyber Threat                               |      |        |     |  |

| Natural Hazards                |      |        |     |  |
|--------------------------------|------|--------|-----|--|
|                                | High | Medium | Low |  |
| <b>1. Floods</b>               |      |        |     |  |
| a. River                       |      |        |     |  |
| b. Creeks                      |      |        |     |  |
| c. Flash                       |      |        |     |  |
| <b>2. Tornadoes/High Winds</b> |      |        |     |  |
| <b>3. Storms</b>               |      |        |     |  |
| a. Lightning                   |      |        |     |  |
| b. Hail                        |      |        |     |  |
| c. Wind                        |      |        |     |  |
| d. Heavy Snow                  |      |        |     |  |
| e. Ice or Glaze                |      |        |     |  |
| <b>4. Drought</b>              |      |        |     |  |
| <b>5. Earthquake</b>           |      |        |     |  |
| <b>6. Sinkholes/Subsidence</b> |      |        |     |  |
| <b>7. Fog</b>                  |      |        |     |  |
| <b>8. Solar Flares/EMP</b>     |      |        |     |  |
| <b>9. Asteroids/Meteorites</b> |      |        |     |  |

## Critical Infrastructure

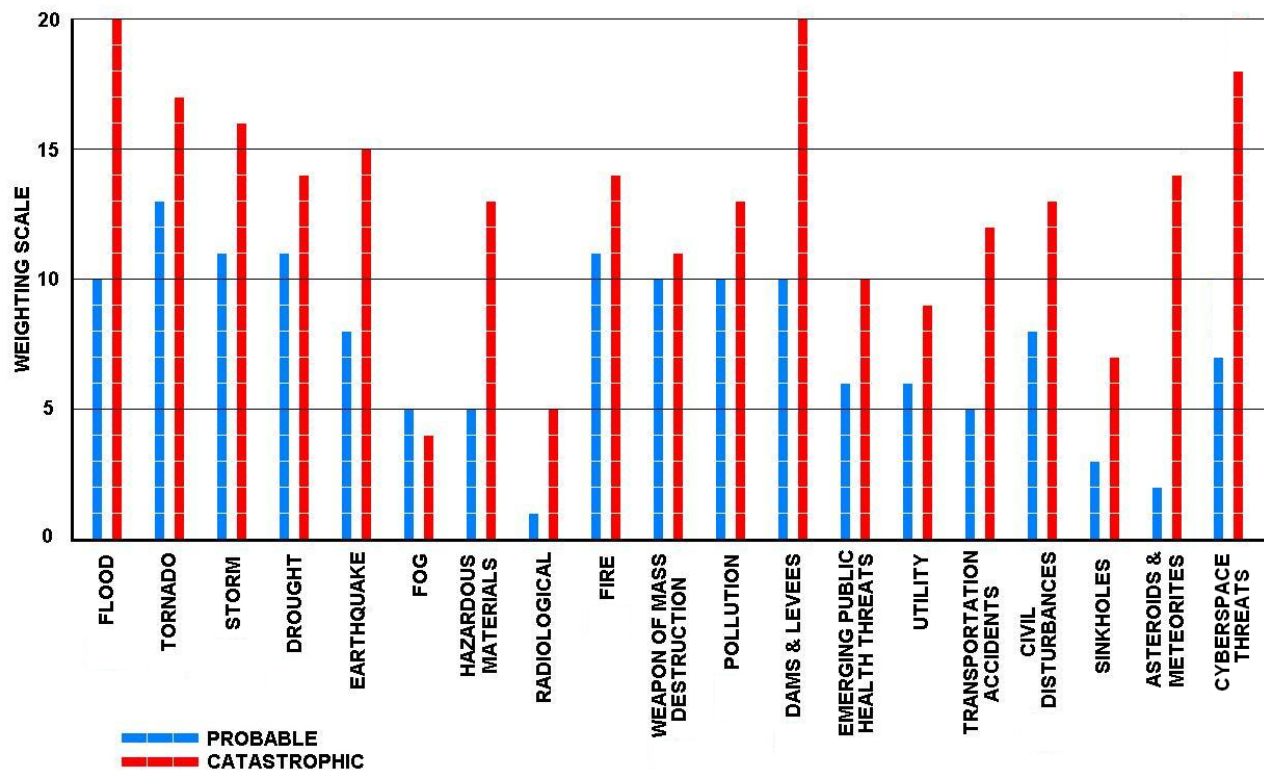
|                          | High | Medium | Low |  |
|--------------------------|------|--------|-----|--|
| <b>1. Utility</b>        |      |        |     |  |
| a. Electrical            |      |        |     |  |
| Substation               |      |        |     |  |
| Power Lines              |      |        |     |  |
| Power Poles              |      |        |     |  |
| b. Natural Gas           |      |        |     |  |
| Main Lines               |      |        |     |  |
| Service Connections      |      |        |     |  |
| c. Water                 |      |        |     |  |
| Water Treatment Plant    |      |        |     |  |
| Water Main Breakage      |      |        |     |  |
| Main Distribution System |      |        |     |  |
| d. Storm Drainage        |      |        |     |  |
| e. Sanitary System       |      |        |     |  |
| Sewage Plants            |      |        |     |  |
| Sewage Mains             |      |        |     |  |
| Lift Stations            |      |        |     |  |
| Settling Ponds           |      |        |     |  |



**TABLE B**  
**RANKED HAZARD AND EVENT RATING TABLE**

| Hazard                         | Probable Rating | Catastrophic Rating |
|--------------------------------|-----------------|---------------------|
| Tornado                        | 13              | 17                  |
| Storm                          | 11              | 16                  |
| Fire                           | 11              | 14                  |
| Drought                        | 11              | 14                  |
| Flood                          | 10              | 20                  |
| Dams and Levees                | 10              | 20                  |
| Pollution                      | 10              | 13                  |
| Weapon of Mass Destruction     | 10              | 11                  |
| Earthquake                     | 8               | 15                  |
| Civil Disturbances             | 8               | 13                  |
| Cyberspace Threats             | 7               | 18                  |
| Emerging Public Health Threats | 6               | 10                  |
| Utility                        | 6               | 9                   |
| Hazardous Materials            | 5               | 13                  |
| Transportation Accidents       | 5               | 12                  |
| Fog                            | 5               | 4                   |
| Sinkholes/Subsidence           | 3               | 7                   |
| Asteroids and Meteorites       | 2               | 14                  |
| Radiological                   | 1               | 5                   |

**19 HAZARDS SHOWN BY WEIGHTING OF PROBABLE AND CATASTROPHIC IMPACT POTENTIAL**



# 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

TABLE C

Possible Secondary Events  
(Events that could possibly  
be of major consequence in a  
selected area are presented  
in this listing.)

## Primary Disaster

|                            | Aircraft Accident | Animals-Loss/Injured/Dead | Crop Damage | Dam / Dike Failure | Epidemic | Explosion | Fallout | Fire | Flash Flood | Food Shortage | Fuel Shortage | Hazardous Materials Incident | Housing Shortage | Human Injured / Dead | Industrial Accident | Power / Gas Failure | Radiological Incident | Structural Collapse | Train Derailment | Vehicular Wreck | Water Shortage |
|----------------------------|-------------------|---------------------------|-------------|--------------------|----------|-----------|---------|------|-------------|---------------|---------------|------------------------------|------------------|----------------------|---------------------|---------------------|-----------------------|---------------------|------------------|-----------------|----------------|
| <b>NATURAL</b>             |                   |                           |             |                    |          |           |         |      |             |               |               |                              |                  |                      |                     |                     |                       |                     |                  |                 |                |
| 1. Flood                   |                   |                           |             |                    |          |           |         |      |             |               |               |                              |                  |                      |                     |                     |                       |                     |                  |                 |                |
| a. River                   |                   | X                         | X           | X                  | X        | X         |         | X    |             |               |               | X                            | X                | X                    |                     | X                   |                       | X                   | X                | X               | X              |
| b. Creeks                  |                   | X                         | X           | X                  | X        | X         |         | X    |             |               |               | X                            | X                | X                    |                     | X                   |                       | X                   | X                | X               | X              |
| c. Flash                   |                   | X                         | X           | X                  | X        | X         |         | X    |             |               |               | X                            | X                | X                    |                     | X                   |                       | X                   | X                | X               | X              |
| 2. Tornadoes               | X                 | X                         | X           |                    | X        | X         |         | X    |             | X             |               | X                            | X                | X                    | X                   | X                   |                       | X                   | X                | X               | X              |
| 3. Storms                  |                   |                           |             |                    |          |           |         |      |             |               |               |                              |                  |                      |                     |                     |                       |                     |                  |                 |                |
| a. Lightning               | X                 | X                         | X           |                    |          | X         |         | X    |             |               |               | X                            | X                | X                    |                     |                     |                       |                     |                  |                 | X              |
| b. Hail                    | X                 | X                         | X           |                    |          |           |         |      |             | X             |               |                              |                  | X                    | X                   |                     |                       |                     |                  | X               |                |
| c. Wind                    | X                 | X                         | X           |                    |          | X         |         |      |             |               |               | X                            | X                | X                    | X                   | X                   |                       | X                   |                  | X               |                |
| d. Blizzard                |                   |                           |             |                    |          |           |         |      |             |               |               |                              |                  |                      |                     |                     |                       |                     |                  |                 |                |
| 1. Heavy snow              | X                 | X                         | X           |                    | X        |           |         | X    | X           | X             | X             | X                            | X                | X                    | X                   | X                   |                       | X                   | X                | X               | X              |
| 2. Ice or Glaze            | X                 | X                         | X           |                    |          | X         |         | X    | X           | X             |               | X                            | X                | X                    |                     |                     |                       |                     |                  | X               | X              |
| 4. Drought                 |                   | X                         | X           |                    | X        |           |         |      |             | X             |               |                              |                  | X                    |                     |                     |                       |                     |                  |                 | X              |
| 5. Earthquake              |                   |                           |             | X                  | X        | X         |         | X    |             |               | X             | X                            | X                | X                    | X                   | X                   |                       | X                   | X                | X               | X              |
| 6. Fog                     | X                 |                           |             |                    |          |           |         |      |             |               |               | X                            |                  | X                    | X                   |                     |                       |                     | X                | X               |                |
| <b>TECHNOLOGICAL/CIVIL</b> |                   |                           |             |                    |          |           |         |      |             |               |               |                              |                  |                      |                     |                     |                       |                     |                  |                 |                |
| 1. Hazardous Materials     |                   |                           |             |                    |          |           |         |      |             |               |               |                              |                  |                      |                     |                     |                       |                     |                  |                 |                |
| a. Transportation          |                   |                           |             |                    |          |           |         |      |             |               |               |                              |                  |                      |                     |                     |                       |                     |                  |                 |                |
| 1. Vehicular Wreck         |                   | X                         |             |                    |          | X         |         | X    |             |               |               | X                            |                  | X                    |                     |                     | X                     |                     | X                | X               |                |
| 2 Train Derailment         |                   | X                         |             |                    |          | X         |         | X    |             |               |               | X                            |                  | X                    |                     | X                   | X                     |                     | X                | X               |                |
| 3 Downed Aircraft          |                   | X                         |             |                    |          | X         |         | X    |             |               |               | X                            |                  | X                    |                     |                     | X                     |                     |                  |                 |                |
| b. Industrial              |                   |                           |             |                    |          |           |         |      |             |               |               |                              |                  |                      |                     |                     |                       |                     |                  |                 |                |
| 1. Explosion               |                   |                           |             |                    |          | X         |         | X    |             |               |               | X                            |                  | X                    | X                   | X                   | X                     | X                   |                  |                 |                |
| 2. Fire                    |                   |                           |             |                    |          | X         |         | X    |             |               |               | X                            |                  | X                    | X                   | X                   | X                     | X                   |                  |                 |                |
| 3. Accidental Release      |                   | X                         |             |                    | X        |           |         |      |             |               |               | X                            |                  | X                    | X                   |                     | X                     |                     |                  |                 |                |
| 4. Theft / Loss            |                   |                           |             |                    |          |           |         |      |             |               |               | X                            |                  |                      |                     |                     | X                     |                     |                  |                 |                |
| 2. Radiological            |                   | X                         | X           | X                  | X        | X         | X       | X    |             | X             | X             | X                            | X                | X                    | X                   | X                   | X                     | X                   | X                | X               | X              |
| 3. Fire                    |                   |                           |             |                    |          |           |         |      |             |               |               |                              |                  |                      |                     |                     |                       |                     |                  |                 |                |
| a. High Rise               |                   |                           |             |                    |          |           |         |      |             |               |               |                              | X                | X                    |                     |                     |                       | X                   |                  |                 |                |
| b. Multiple Buildings      |                   |                           |             |                    |          | X         |         | X    |             |               |               |                              | X                | X                    |                     |                     |                       | X                   |                  |                 |                |
| c. Industrial              |                   |                           |             |                    |          | X         |         | X    |             |               |               | X                            |                  | X                    | X                   | X                   | X                     | X                   |                  |                 |                |
| d. Rangeland               |                   | X                         | X           |                    |          |           |         | X    |             | X             |               |                              |                  | X                    |                     |                     |                       |                     |                  |                 |                |
| e. Gas Lines               |                   |                           |             |                    |          | X         |         | X    |             |               | X             | X                            |                  | X                    | X                   |                     |                       |                     |                  |                 |                |
| f. Refinery                |                   |                           |             |                    |          | X         |         | X    |             |               | X             | X                            |                  | X                    | X                   |                     |                       |                     |                  |                 |                |
| g. Chemical Plant          |                   |                           | X           |                    | X        | X         |         | X    |             |               |               | X                            |                  | X                    | X                   |                     |                       |                     |                  |                 |                |
| h. Health Care Facilities  |                   |                           |             |                    | X        |           |         | X    |             |               |               | X                            |                  | X                    |                     | X                   |                       |                     |                  |                 |                |

# 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

TABLE C

Possible Secondary Events  
(Events that could possibly  
be of major consequence in a  
selected area are presented  
in this listing.)

## Primary Disaster

|                                    | Aircraft Accident | Animals<br>-Loss/Injured/Dead | Crop Damage | Dam / Dike Failure | Epidemic | Explosion | Fallout | Fire | Flash Flood | Food Shortage | Fuel Shortage | Hazardous Materials<br>Incident | Housing Shortage | Human Injured / Dead | Industrial Accident | Power / Gas Failure | Radiological Incident | Structural Collapse | Train Derailment | Vehicular Wreck | Water Shortage |
|------------------------------------|-------------------|-------------------------------|-------------|--------------------|----------|-----------|---------|------|-------------|---------------|---------------|---------------------------------|------------------|----------------------|---------------------|---------------------|-----------------------|---------------------|------------------|-----------------|----------------|
| <b>4. Explosion</b>                |                   |                               |             |                    |          |           |         |      |             |               |               |                                 |                  |                      |                     |                     |                       |                     |                  |                 |                |
| a. Pipe Lines                      |                   |                               |             |                    |          | X         |         | X    |             |               | X             | X                               |                  | X                    | X                   | X                   |                       | X                   | X                |                 |                |
| b. Industrial                      |                   |                               |             |                    |          | X         |         | X    |             |               |               | X                               |                  | X                    | X                   | X                   | X                     | X                   | X                |                 |                |
| c. Chemical                        |                   |                               |             |                    | X        | X         |         |      |             |               |               | X                               |                  | X                    |                     | X                   |                       |                     | X                |                 |                |
| <b>5. Pollution</b>                |                   |                               |             |                    |          |           |         |      |             |               |               |                                 |                  |                      |                     |                     |                       |                     |                  |                 |                |
| a. Air                             |                   | X                             | X           |                    | X        |           |         |      |             |               |               |                                 |                  |                      |                     |                     |                       |                     |                  |                 |                |
| b. Water                           |                   |                               |             |                    |          |           |         |      |             |               |               |                                 |                  |                      |                     |                     |                       |                     |                  |                 |                |
| 1. Mineral Inflow                  |                   | X                             | X           |                    |          |           |         |      | X           |               |               |                                 |                  | X                    |                     |                     |                       |                     |                  |                 | X              |
| 2. Rural Runoff                    |                   | X                             | X           |                    |          |           |         |      | X           |               |               |                                 |                  |                      |                     |                     |                       |                     |                  |                 |                |
| 3. Urban Runoff                    |                   |                               |             | X                  |          |           |         |      | X           |               |               |                                 |                  |                      |                     |                     |                       |                     |                  |                 |                |
| <b>6. Water Related</b>            |                   |                               |             |                    |          |           |         |      |             |               |               |                                 |                  |                      |                     |                     |                       |                     |                  |                 |                |
| a. Dam or Reservoir Failures       |                   | X                             | X           | X                  |          |           |         | X    | X           |               |               |                                 | X                | X                    |                     | X                   |                       | X                   | X                | X               | X              |
| b. Dike or Levee Failures          |                   | X                             | X           | X                  |          |           |         | X    | X           |               |               |                                 | X                | X                    | X                   | X                   |                       | X                   | X                | X               |                |
| c. Water Shortage                  |                   | X                             | X           |                    | X        |           |         |      |             |               |               |                                 |                  |                      |                     |                     |                       |                     |                  |                 | X              |
| <b>7. Medical Epidemic</b>         |                   |                               |             |                    |          |           |         |      |             |               |               |                                 |                  |                      |                     |                     |                       |                     |                  |                 |                |
| a. Human                           |                   |                               |             |                    | X        |           |         |      |             |               |               |                                 |                  | X                    |                     |                     |                       |                     |                  |                 |                |
| b. Animal                          |                   | X                             |             |                    | X        |           |         |      |             |               |               |                                 |                  |                      |                     |                     |                       |                     |                  |                 |                |
| <b>8. Utility</b>                  |                   |                               |             |                    |          |           |         |      |             |               |               |                                 |                  |                      |                     |                     |                       |                     |                  |                 |                |
| a. Power / Light                   |                   |                               |             |                    |          |           |         |      |             |               |               |                                 |                  |                      |                     |                     |                       |                     |                  |                 |                |
| 1. Sub Stations                    |                   |                               |             |                    |          | X         |         | X    |             |               |               |                                 |                  |                      |                     | X                   |                       |                     |                  |                 |                |
| 2. Downed Lines                    |                   |                               |             |                    |          | X         |         | X    |             |               | X             |                                 |                  |                      |                     | X                   |                       |                     |                  |                 |                |
| 3. Downed Poles                    |                   |                               |             |                    |          |           |         | X    |             |               | X             |                                 |                  |                      |                     | X                   |                       |                     |                  |                 |                |
| b. Natural Gas                     |                   |                               |             |                    |          | X         |         | X    |             |               | X             | X                               | X                |                      |                     | X                   |                       |                     |                  |                 |                |
| c. Water                           |                   |                               |             |                    |          |           |         |      |             |               |               |                                 |                  |                      |                     |                     |                       |                     |                  |                 |                |
| 1. Water Plant                     |                   |                               |             |                    |          |           |         |      |             |               | X             |                                 |                  |                      |                     | X                   |                       |                     |                  |                 | X              |
| 2. Water Mains                     |                   |                               |             |                    |          |           |         |      |             |               |               |                                 |                  |                      |                     |                     |                       |                     |                  |                 | X              |
| d. Storm Drainage                  |                   |                               |             |                    |          |           |         |      | X           |               |               |                                 |                  |                      |                     |                     |                       |                     |                  |                 |                |
| e. Sanitary Drainage               |                   |                               |             |                    |          |           |         |      |             |               |               |                                 |                  |                      |                     |                     |                       |                     |                  |                 |                |
| 1. Disposal Plant                  |                   |                               |             |                    | X        |           |         |      |             |               | X             |                                 |                  |                      |                     | X                   |                       |                     |                  |                 |                |
| 2. Sewage Mains                    |                   |                               |             |                    |          | X         |         |      |             |               |               |                                 |                  |                      |                     |                     |                       | X                   |                  |                 |                |
| 3. Lift Stations                   |                   |                               |             |                    | X        |           |         |      |             |               |               |                                 |                  |                      |                     | X                   |                       |                     |                  |                 |                |
| <b>9. Transportation Accidents</b> |                   |                               |             |                    |          |           |         |      |             |               |               |                                 |                  |                      |                     |                     |                       |                     |                  |                 |                |
| a. Truck                           |                   | X                             |             |                    |          | X         |         | X    |             |               | X             | X                               |                  | X                    |                     |                     | X                     | X                   | X                | X               |                |
| b. Rail                            |                   | X                             |             |                    |          | X         |         | X    |             |               | X             | X                               |                  | X                    |                     |                     | X                     | X                   | X                |                 |                |
| c. Air                             | X                 | X                             |             |                    |          | X         |         | X    |             |               |               | X                               |                  | X                    |                     |                     | X                     |                     |                  |                 |                |
| <b>10. Civil Disturbance</b>       |                   |                               |             |                    |          |           |         |      |             |               |               |                                 |                  |                      |                     |                     |                       |                     |                  |                 |                |
| a. Riot                            |                   |                               |             |                    |          | X         |         | X    |             | X             | X             |                                 | X                | X                    |                     |                     |                       |                     |                  | X               |                |
| b. Bomb Threat                     | X                 |                               |             | X                  |          | X         |         | X    |             |               |               | X                               |                  | X                    |                     |                     |                       |                     | X                | X               | X              |
| c. Terrorism / Sabotage            | X                 | X                             | X           | X                  | X        | X         | X       | X    | X           | X             | X             | X                               | X                | X                    | X                   | X                   | X                     | X                   | X                | X               | X              |
| d. Cyber Threat                    | X                 | X                             |             | X                  | X        | X         |         |      | X           | X             | X             | X                               | X                |                      | X                   | X                   | X                     |                     | X                | X               | X              |



## **DEFINITIONS**



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

Casualty – is a term used in this analysis to refer to human injury or death as a result of a disaster event. Other losses categorized as a result of a disaster, such as property, the environment or social and economic activity is to be evaluated under the category of property for vulnerability and maximum threat ratings.

Disaster/Emergency – An event that causes or threatens to cause loss of life, human suffering, public and private property damage, and economic and social disruption. Disasters and emergencies require guidance and resources that are beyond the scope of local agencies in routine responses to day-to-day emergencies and accidents, and may be of such magnitude or unusual circumstances as to require response by several or all levels of government – local, state, and federal.

Federal Emergency Management Agency (FEMA) – Responsible for overall disaster-related federal programs involved with mitigation, preparedness, response and recovery to natural and man-made disasters or nuclear attack.

Hazard – A potential event or situation that presents a threat to life and property.

Hazard Identification – The determination of possible hazards, their probability and intensity, and the impact area.

Hazard Analysis – A review of the vulnerability of life, property, the environment, and social and economic activity to the actual or potential impact of hazards.

History – The record of occurrences of previous disasters or events.

Maximum Treat – The greatest destruction that can be expected from an event.

Mitigation – Those actions (including threat and vulnerability assessments) taken to reduce the exposure to and detrimental effects of a WMD incident.

Plume – Airborne material spreading from a particular source; the dispersal of particles, gases, vapors, and aerosols into the atmosphere.

Probability – The likelihood that an even will occur.

Radiation – High-energy particles or gamma rays that are emitted by an atom as the substance undergoes radioactive decay. Particles can be either charged alpha or beta particles or neutral neutron or gamma rays.

Recovery – Includes all types of emergency actions dedicated to continued protection of the public or promoting the resumption of normal activities in the affected area.

Response – Executing the plan and resources identified to perform those duties and services to preserve and protect life and property as well as provide services to the surviving population.

Terrorism – The unlawful use of force or violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives. Domestic terrorism involves groups or individuals who are based and operate entirely within the United States and U.S. territories without foreign direction and whose acts are directed at elements of the U.S. government or population.

Toxicity – A measure of the harmful effects produced by a given amount of a toxin on a living organism.

Vulnerability (or Risk) – The degree to which people, property, the environment, or social and economic activity – in short, all elements at risk – are susceptible to injury, damage, disruption, or loss.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

Weapons-Grade Material – Nuclear material considered most suitable for a nuclear weapon. It usually connotes uranium enriched to above 90% uranium-235 or plutonium with greater than about 90% plutonium-239.

Weapon of Mass Destruction (WMD) – Any explosive, incendiary, or poison gas, bomb, grenade, rocket having a propellant charge of more than 4 ounces, or a missile having an explosive incendiary charge of more than 0.25 ounce, or mine or device similar to the above; poison gas; weapon involving a disease organism; or weapon that is designed to release radiation or radioactivity at a level dangerous to human life. (Source: 18 USC 2332a as referenced in 18 USC 921)

## **BIBLIOGRAPHY**

# 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

## BIBLIOGRAPHY – WEB SITES

AIRNAV

**AIRPORT DIRECTORY**

[HTTP://WWW.AIRNAV.COM/AIRPORTS/US/KS](http://www.airnav.com/airports/us/ks)

KANSAS DEPARTMENT OF HEALTH & ENVIRONMENT

BUREAU OF HEALTH FACILITIES –

[HTTP://WWW.KDHE.STATE.KS.US/BHFR/FAC\\_LIST/INDEX.HTML](http://www.kdhe.state.ks.us/bhfr/fac_list/index.html)

BUREAU OF WASTE MANAGEMENT –

[HTTP://PUBLIC1.KDHE.STATE.KS.US/LANDFILLS/LANDFILLS.NSF?OPENDATABASE](http://public1.kdhe.state.ks.us/landfills/landfills.nsf?opendatabase)

KANSAS DEPARTMENT OF TRANSPORTATION

SPILL INCIDENTS, OFFICE OF HAZARDOUS MATERIALS SAFETY –

[HTTP://HAZMAT.DOT.GOV/FILES/HAZMAT/HMISFRAME.HTM](http://hazmat.dot.gov/files/hazmat/hmisframe.htm)

KANSAS GEOLOGICAL SURVEY

OIL AND GAS FIELDS –

[HTTP://WWW.KGS.UKANS.EDU/PRS/COUNTY/RS/SEDGWICK.HTML](http://www.kgs.ukans.edu/prs/county/rs/sedgwick.html)

KANSAS STATE DEPARTMENT OF EDUCATION

K-12 SCHOOL REPORTS –

[HTTP://WWW.KSBE.STATE.KS.US/WELCOME.HTML](http://www.ksbe.state.ks.us/welcome.html)

NATIONAL OCEANIC ATMOSPHERIC ADMINISTRATION

HISTORICAL EARTHQUAKE INTENSITY DATABASE –

[HTTP://WWW.NGDC.NOAA.GOV/SEG/HAZARD/INT\\_SRCH.SHTML](http://www.ngdc.noaa.gov/seg/hazard/int_srch.shtml)

HISTORICAL WEATHER, NATIONAL CLIMATIC DATA CENTER –

[HTTP://WWW4.NCDC.NOAA.GOV/CGI-WIN/WWCGI.DLL?WWEVENT~STORMS](http://www4.ncdc.noaa.gov/cgi-win/wwwcgi.dll?wwevent~storms)

NATIONAL RESPONSE CENTER

HAZARDOUS MATERIAL INCIDENTS –

[HTTP://WWW.NRC.USCG.MIL/WDBCBI/WDBCBI.EXE/WWWUSER/WEBDB.FOIA\\_QUERY.SHOW\\_PARMs](http://www.nrc.uscg.mil/wdbcgi/wdbcgi.exe/wwwuser/webdb.foia_query.show_parms)

U.S. CENSUS BUREAU

COUNTY DEMOGRAPHICS –

[HTTP://QUICKFACTS.CENSUS.GOV/QFD/STATES/20000.HTML](http://quickfacts.census.gov/qfd/states/20000.html)

TOWNSHIP & CITY DEMOGRAPHICS –

[HTTP://WWW.CENSUS.GOV/PROD/CEN2000/DP1/2KH20.PDF](http://www.census.gov/prod/cen2000/dp1/2kh20.pdf)

U.S. CORPS OF ENGINEERS

NATIONAL INVENTORY OF DAMS –

[HTTP://CRUNCH.TEC.ARMY.MIL/NID/WEBPAGES/NID.CFM](http://crunch.tec.army.mil/nid/webpages/nid.cfm)

U.S. DEPARTMENT OF TRANSPORTATION

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

RAIL AFFAIRS UNIT –

[HTTP://KDOT1.KSDOT.ORG/PUBLIC/KDOT/BURRRAIL/RAILWBPG/FRNTPAGE.HTM](http://kdot1.ksdot.org/public/kdot/burrrail/railwbpg/frntpage.htm)

U.S. ENVIRONMENTAL PROTECTION AGENCY

WATERSHEDS –

[HTTP://CFPUB.EPA.GOV/SURF/STATE.CFM?STATEPOSTAL=KS](http://cfpub.epa.gov/surf/state.cfm?statepostal=KS)

TOXIC RELEASE INVENTORY EXPLORER –

[HTTP://WWW.EPA.GOV/TRIEXPLORER/REPORTS.HTM](http://www.epa.gov/triexplorer/reports.htm)



## **APPENDIX A**



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### HISTORIC FLOOD EVENTS

- **May 18, 1877:** According to National Weather Service records, the largest flood on the Arkansas River at Wichita occurred on May 18, 1877. Unprecedented high waters in the lower Arkansas River during May 1877 carried away or disabled all the bridges in Cowley County including the 6th Avenue Bridge in Arkansas City. The Arkansas River at Wichita (station 07144300) reached a stage of 21 feet; flood stage is 12 feet (river gage site and datum from reports of the U.S. Weather Bureau).
- **July 8, 1904:** The second largest flood on the river occurred July 8, 1904, and its level was about one-half foot lower than the 1877 flood. The Arkansas River at Wichita (station 07144300) reached a stage of 20.3 feet (river gage site and datum from reports of the U.S. Weather Bureau). Despite a slightly lower gage height than the 1877 flood, flooding was more widespread in Wichita because of backwater and overflow of the Little Arkansas River and Chisholm Creek as they entered the narrow channel of the Arkansas River in Wichita. Also, the six pile bridges crossing the Arkansas River at the time collected drift that retarded the flood-causing overflow. Approximately 30 percent of Wichita was submerged on July 8 resulting in \$30,000 in damages (almost \$600,000 in 2005 dollars). The 1904 flood caused more damage than the 1877 flood because Wichita was more populated in 1904. According to the Wichita Eagle, the Douglas Avenue Bridge was destroyed in the early afternoon of July 7, 1904.
- **October 1908:** Historic information indicates that the October 1908 flood was the largest along the main stem of the upper Arkansas River in Kansas since the turn of the century. The flood resulted from excessive rains between Holly and Las Animas, Colorado, and northward over the Big Sandy Creek drainage basin in southwestern Colorado. Maximum flows were estimated at 97,000 cubic feet per second near Coolidge and 87,000 cubic feet per second at Syracuse.
- **September 6, 1911:** During the late evening of September 6th and into the early morning hours of September 7th, Wichita received 7.99 inches of rain, which is the city's greatest 24-hour rainfall ever observed. Other records were set including, 4.94 inches in 3 hours and 3.54 inches in 2 hours.
- **June 8-9, 1923:** During the month of June, the entire drainage area between Hutchinson and Arkansas City received excessive rains. On June 8 and 9, Wichita reported 7.06 inches, Newton 5.75 inches, and Arkansas City 2.06 inches. Excessive precipitation fell over all of the Little Arkansas, Ninnescah, and Chikaskia River Basins as well as the Arkansas River Valley, and major flooding occurred on all of the affected streams. Wichita and Arkansas City were severely damaged. In Wichita, six square miles were inundated. At Arkansas City two lives were lost. Property damage was estimated at nearly \$20 million.
- **April 21-23, 1944:** The year 1944 was one of generally above-normal precipitation in the lower Arkansas River Basin. The most severe flood of that year occurred at Wichita and downstream to Arkansas City as a result of rains on April 21 to 23. On April 22, Wichita received 6.03 inches of rain, Newton 2.47 inches, Hutchinson, 3.05 inches, and Wellington 3.38 inches. The merging of the flows from the Arkansas and Little Arkansas Rivers in Wichita almost reached Douglas Avenue and resulted in the flooding of about 2,000 homes and businesses in the city. Damages for Sedgwick County were estimated at nearly \$5 million. At about the same time as the Wichita flood the Walnut River at Winfield rose close to a record-breaking stage, with great overflows of Timber and Dutch Creeks, covering much of the city with water and resulting in damage estimated at \$2,000,000. Flood stages at Arkansas City approached those of the 1923 flood.
- **May-July, 1951:** The highest stages along the Arkansas River during 1951 occurred near Coolidge and at Garden City as the result of an intense storm on May 15, 1951. In the Wichita area, Big Slough and Little Slough experienced flooding in July 1951. Annual precipitation in 1951 was 50.48", which is the highest annual precipitation on record for Wichita. Flood-damage estimates compiled by the U.S. Army Corps of Engineers for the May-July 1951 flooding total \$2,868,000 along the main stem of the Arkansas River.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

- **May 16–17, 1957:** Frequent precipitation after April 30 and high soil moisture content set the stage for flooding on May 16–17, 1957, in the Arkansas River Basin in south-central Kansas. The State Highway Commission (now the Kansas Department of Transportation) reported 45 road closures in the area, and extensive crop damage was left behind by floodwaters. In the Wichita area, the newly completed Big Slough-Cowskin floodway successively diverted one-third of the peak flow around the Arkansas River at Wichita gage and prevented more serious flooding in the city.
- **June 17–25, 1965:** Severe flooding occurred along the Arkansas River upstream from Great Bend during June 17–25, 1965, as a result of storms in the foothills and plains east of the Rocky Mountains in Colorado and New Mexico. Because the main storm did not directly affect Kansas, local flooding was minimal, but the Arkansas River overflowed from the western State line downstream to Great Bend. Flow in the Arkansas River peaked near the Colorado-Kansas State line on June 17. The peak discharges recorded at all gauging stations on the Arkansas River and upstream from Great Bend were larger than any previously recorded and had recurrence intervals greater than 50 years. As the crest of the flood progressed downstream to its junction with the Little Arkansas River on June 25, the peak discharge had decreased to a magnitude having a recurrence interval less than 10 years. Although inundation of the flood plain caused considerable damage to urban areas, such as Garden City and Dodge City, most of the estimated \$16 million in damage was to cropland.
- **September–October 1973:** Significant flooding occurred in September and October 1973 in south-central Kansas. The flood was the result of abundant precipitation that continued for several weeks. Two USGS streamflow-gauging stations on Rattlesnake Creek recorded maximum stages and discharges for their respective periods of record on September 26 and 29, as did the gauging station on the Arkansas River near Hutchinson on September 28.
- **October 31, 1979:** The largest flood since the USGS began operating the gage in 1934 occurred October 31, 1979. By this time many changes had occurred on the river. The largest change was the completion of the Big Slough-Cowskin Creek and Valley Center Floodway projects. The 1979 total streamflow volume was much larger than the 1904 flood volume however, more than 30 percent of the water was diverted around the city through the floodway and flood damages were minimal. A similar event occurred on Halloween 1998 when the combined flow of the Arkansas River and the floodway nearly reached the 1904 level. Many homes along Cowskin Creek were damaged as a result of this flood.
- **June 15, 1981:** On the afternoon of June 14, 1981, a series of intense thunderstorms along the forward edge of a stalled cold front produced 5 to 20 inches of precipitation in about 12 hours near Great Bend. The storm affected about 350 square miles of tributaries to the Arkansas River upstream from Great Bend. The most extensive flooding occurred along Walnut and Dry Walnut Creeks in southwestern Barton County. Significant urban flooding was limited to the communities of Pawnee Rock and Great Bend. An estimated 3,000 people were evacuated by boat, truck, or helicopter in Great Bend. Two-thirds of the city remained under about 4 feet of water on June 16. The Arkansas River south of Great Bend was 1 to 2 miles wide in places, and Walnut Creek had swollen to 2 miles wide. The resulting runoff produced peak discharges on Dry Walnut Creek on June 15 that were 1.5 to 3 times the discharge having a 100-year recurrence interval and caused about \$42 million in damages. The storm was so localized that gauging stations around its perimeter recorded only nominal discharge, generally having a recurrence interval less than 2 years.
- **September 12, 1985:** Stationary thunderstorms produced 10 inches of rain near Garden Plain Kansas. Reports of 7 to 9 inches were common across the area.
- **September 5, 1989:** Thunderstorms produced 6 to 10 inches of rain in south central Kansas between 6 AM and Noon. Serious flooding was reported around Wichita, with water 4 feet deep along some roads.
- **May–September 1993:** Excessive precipitation fell across south-central and southeastern Kansas from May–September 1993 with more than the annual average falling during the 5-month period. May thunderstorms produced substantial precipitation that caused flooding in the lower Arkansas River

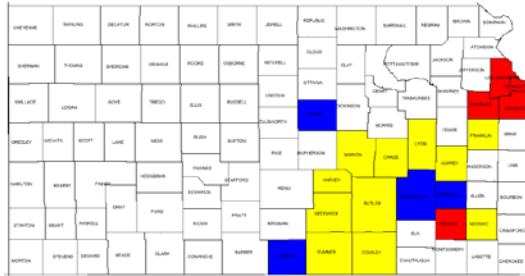
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

Basin and its tributaries. USGS streamflow-gauging stations on the Ninnescah River near Peck and the Arkansas River at Arkansas City had notable maximum discharges. During the latter part of July, maximum peak discharges for the period of record were recorded at 10 streamflow-gauging stations, including Pawnee River near Burdett, Walnut Creek near Rush Center, Rattlesnake Creek near Zenith, Arkansas River near Maize, and the Arkansas River at Derby. Damage in the area was estimated at \$6.5 million with two lives lost. Two hundred fifty-four houses were damaged, several thousand head of livestock were lost, more than 120,000 acres of crops were damaged, and nearly \$1 million worth of farm machinery was destroyed. A Presidential Declaration (FEMA-1000-DR-KS) was declared in 1993 for 57 Kansas counties to include Sedgwick County. A total of 108 individual assistance applications were submitted for this flood event that primarily affected the town of Sedgwick and near the City of Mulvane.

- **1998 Halloween Flood:** A large and intense fall storm slowly rolled over the eastern one-half of Kansas on Halloween 1998 leaving a 2-day deluge of more than 6 inches of rainfall over a 20-county area. Some locations received almost a foot of rain that led to flash flooding as well as historic flooding of rivers draining the region. The Walnut, Cottonwood, Whitewater and Arkansas Rivers reached record levels. Nearly one-third of the USGS streamflow-gauging stations in Kansas recorded water levels above flood stage during the first week of November 1998 thus documenting the largest area flooded in Kansas since the 1993 floods.

Six USGS gauging stations on the Arkansas and Little Arkansas Rivers were above National Weather Service flood stage between October 31 and November 3, 1998. One notable occurrence of flooding was in the Cowskin Creek area of western Wichita resulting in about \$4 million in flood damage for nearly 170 homes and businesses along Cowskin Creek and its tributaries.

Totals from the flood resulted in 37.8 million dollars in damage, and the evacuation of over 5,300



people. With all the devastation, only 2 people were injured and only 1 person was killed.

The widespread flooding of 1998 resulted in Presidential Declaration FEMA-1258-DR affecting 20 Kansas counties to include Sedgwick County for both individual and public assistance.

- **September 27, 1999:** Stationary thunderstorms positioned themselves over the City of Wichita resulting in rain beginning on the evening of the 26th, and lasting through the early morning hours of the 27th. Many rainfall records were set. Some of which include 3.85 inches in one hour, 4.89 inches in 2 hours, and 5.63 inches in 3 hours. A total of 7.93 inches of rain fell in the 24 hour period, which is the second highest on record. The 24-hour record is 7.99 inches, occurring on September 6th and 7th, 1911.
- **2008 Fall Flood:** A record amount of rain fell in the Wichita Area on September 12th, 2008. The NWS office at the Wichita Mid-Continent Airport measured 10.31 inches of rainfall on September 12th. This total not only breaks the daily record rainfall for September 12th in Wichita, but it also breaks the 24 hour rainfall total of 7.99 inches that has been held since September 6-7, 1911. A stationary boundary interacted with the tropical remnants of Lowell. The rain kept training along in the same location, which was unfortunately right over south central Kansas, including the city of Wichita. In addition to the street flooding, the Cowskin Creek and other small creeks overflowed with the torrential rainfall. The flooded roads caused a headache for Wichita residents as it peaked during rush hour. Over 100 vehicles were stranded due to high water in Wichita along with many flooded homes. In addition to the Cowskin Creek in Wichita, many other flood warnings had been issued for rivers in south central and southeast Kansas. Those rivers include: the Arkansas River, the Ninnescah River, the Walnut River, the Whitewater River, the Chikaskia River, the Cottonwood River, and the Neosho River.



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

- **September 2, 2009:** Governor Mark Parkinson requested a major disaster declaration due to severe storms, accompanied by large hail, lightening, high winds, and torrential rains during the period of July 8-14, 2009. The Governor requested a declaration for Public Assistance for eight counties and Hazard Mitigation for all counties. During the period of August 3 to September 2, 2009, joint Federal, State, and local Preliminary Damage Assessments (PDAs) were conducted in the requested counties with a total Public Assistance estimate of \$3.5 million affecting Anderson County, Bourbon County, Franklin County, Linn County, and Sedgwick County.

## **APPENDIX B**



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

### HISTORIC TORNADIC EVENTS

- June 12, 1881 – An F2 Tornado moved NW of Mulvane to 3 miles NE of Douglas destroying two homes 1 mile north of Mulvane and injuring 2 people.
- March 1, 1888 – An F3 tornado moved NE to within 7 miles south of Halstead resulting in two deaths and 15 injuries in western Sedgwick and Harvey counties.
- March 31, 1892 – Several tornadoes up to F4 moved NNE near South Haven and dissipating in extreme SE Sedgwick County resulted in 7 deaths and 40 injuries.
- May 13, 1892 – An F3 tornado moved NE from south of Haysville, passing just north of Derby and continuing to south of Augusta. Prior to reaching Augusta, buildings were destroyed on about 20 farms, and at least 15 buildings and 10 homes were destroyed in Augusta. There were 5 reported injuries caused by the tornado.
- May 1, 1895 – An F5 tornado moved NE from NW Sedgwick County, passing west of Halstead and dissipating six miles NW of Newton. At least 25 farms were destroyed along with numerous livestock, and causing eight deaths and 25 injuries.
- May 26, 1903 – An F4 tornado moved NE passing four miles NW of Valley Center and 12 miles SE of Newton. Numerous farms and 12 homes were destroyed, and six injuries were caused by the tornado.
- November 10, 1915 – An F4 tornado cut a 16 mile path from five miles SW of Zyba, passing within four miles south of Peck and dissipating near the edge of Derby. Eight homes were destroyed and three people were killed at Zyba. At least two homes were destroyed and one person was killed at Derby. In addition to four deaths, there were 28 injuries caused by the tornado.
- May 25, 1917 – This one mile wide F5 tornado touched down 4 miles NNW of Cheney and moved NE through the SE part of Andale, continuing across the south edge of the City of Sedgwick, and terminating three miles NE of Florence. A total of 118 farms, homes and businesses were destroyed and caused over \$600,000 in damages. About half the city of Andale was damaged or destroyed, and had 12 deaths reported. Eight people died near the east of the City of Sedgwick, two more deaths near McLain, and one death near Elbing. In addition to 23 deaths, a total of 70 people were injured.
- May 22, 1923 – An F2 tornado moved NNE from Viola, through Clonmel, and terminating four miles NE of Clonmel. There were a total of 2 injuries and over \$70,000 in damages caused by this first event. A second event occurred 45 minutes later in northern Wichita where the F2 tornado preceded east and then SE. One home was destroyed; three homes and a refinery were damaged during the 2<sup>nd</sup> event. Total loss for this event was estimated at \$30,000 and caused three injuries.
- February 24, 1935 – An F2 tornado moved NE from west Wichita to near Kechi. Six homes and a school were damaged, causing \$50,000 in damages and six injuries.
- June 8, 1941 – An F4 tornado formed seven miles SW of Maize and moved NE for 42 miles before dissipating five miles West of Burns. At least five homes were destroyed and dozens of farms were damaged causing \$200,000 in damages. One death was reported near Valley Center and seven others near Whitewater. There were also 20 injuries reported for this event.
- June 20, 1942 – A strong tornado moved in a semi-circular path around the city of Mulvane.
- March 18, 1948 – An F2 tornado touched down ESE of Wichita in the Beechwood area and tracked one mile before dissipating. Federal housing project homes sustained roof damages valued at approximately \$100,000. The Beech Aircraft Company reported \$100,000 in damages to hangars and airplanes. There were a total of two injuries from this event.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

- May 1, 1948 – An F2 tornado traveled over a 40-mile track starting NE of Andale to south of Newton and ending near Peabody. Over \$50,000 in damages occurred on ten farms and resulting in the destruction of barns and other buildings.
- Jun 21, 1948 – An F4 tornado touched down seven miles SW of Wichita and moved NE through the NW part of the city. Two farms were destroyed, and over \$1,000,000 in damages to businesses and to aircraft based at Westport airport. There were a total of 12 injuries caused by this event.
- Jun 25, 1950, 1845 CST – An F0 tornado with a width of 33 yards touched down for a brief period causing approximately \$2,500 in property damage.
- Jun 21, 1953, 2125 CST – An F2 tornado touched down for a brief period and causing three injuries.
- Jul 15, 1953, 1408 CST – An F0 touched down for a brief period causing approximately \$250,000 in property damages.
- Apr 29, 1954, 1915 CST – An F0 touched down for a brief period with no reported property damages losses.
- Sep 09, 1954, 0200 CST – An F2 touched down for a brief period with no reported property damages losses.
- Oct 04, 1954, 1800 CST – An F2 touched down for a brief period causing approximately \$25,000 in property damages.
- May 27, 1955, 2115 CST – An F0 touched down for a brief period with no reported property damages losses.
- May 27, 1955, 2115 CST – Another F0 touched down for a brief period with no reported property damages losses.
- May 30, 1956, 2045 CST – An F0 touched down for a brief period with no reported property damages losses.
- July 1, 1956, 1725 CST – An F2 tornado briefly touched down and destroyed barns three miles NE of Andale and resulted in \$25,000 in damages.
- Jun 21, 1957, 2209 CST – An F0 tornado with a width of 100 yards touched down and tracked for two miles resulting in approximately \$2,500 in property damages.
- June 7, 1958, 0600 CST – An F3 tornado with a width of 1,760 yards traveled five miles and destroyed three barns at the extreme edge of SE Wichita causing one injury and approximately \$25,000 in property damage.
- June 11, 1958, 2315 CST – An F2 tornado struck Wichita, damaged 50 homes in an eight block area on the north side of the city, caused six injuries, and approximately \$250,000 in property damage.
- May 04, 1959, 1833 CST – An F0 tornado down for a brief period with no reported property damage losses.
- May 04, 1959, 1905 CST – An F0 tornado down for a brief period with no reported property damage losses.
- May 04, 1959, 1905 CST – Another F0 tornado down for a brief period with no reported property damage losses.



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

- April 28, 1960, 1930 CST – An F3 tornado with a width of 440 yards touched down two miles SW of St. Mark, traveling NE over a seven-mile track, and ending two miles east of Colwich. Damages included houses and a church, caused six injuries from flying glass, and approximately \$25,000 in property damage.
- Jul 12, 1960, 1705 CST – An F1 tornado down for a brief period with only \$300 in reported property damage losses.
- Aug 28, 1960, 1944 CST – An F1 tornado down for a brief period with only \$2,500 in reported property damage losses.
- November 27, 1960 – An F2 tornado touched down three miles NE of Mulvane and proceeded to within one mile south of Augusta causing destruction to barns and shifting one home. Two injuries were reported from an overturned car.
- May 25, 1963, 1830 CST – An F0 tornado down for a brief period with only \$2,500 in reported property damage losses.
- Apr 03, 1964, 1620 CST – An F2 tornado down for a brief period with no reported property damage losses.
- May 13, 1965, 2130 CST – An F3 tornado with a width of 100 yards was reported eight miles SSW of Wellington and continued on a 31 mile track northward to the west edge of Wichita. Barns were destroyed, cattle were killed, and 10 injuries from a mobile home park near Wellington were reported. Property damage was estimated at \$250,000.
- September 3, 1965, 2000 CST – An F3 tornado traveling NE skipped for 0.5 mile on the east side of Wichita shifting homes off foundations and causing 27 injuries. Property damage was estimated at \$2.5 million.
- September 20, 1965, 1822 CST – An F2 tornado with a width of 33 yards traveling NNE skipped over a 44 mile track starting two miles south of McConnell Air Force Base and continued NNW of Burns before terminating SSW of Florence. One home was unroofed and planes were destroyed at the base; however, most damages were caused by F1 intensity at losses of approximately \$25,000.
- Sep 20, 1965, 1934 CST – An F0 tornado with a width of 33 yards touched down for a brief period, tracking one mile, with no reported property damage losses.
- June 23, 1969, 1600 CST – An F4 tornado with a width of 700 yards and tracked nine miles. It started SW of Goddard, moved eastward and then SE progressing to F4 strength and dissipating to a weak F0 tornado five miles SW of the Wichita Airport. Several farm homes were severely damaged or destroyed resulting in approximately \$250,000 in property damages with six injuries reported.
- Jun 02, 1971, 1115 CST – An F0 tornado with a width of 233 yards touched down for a brief period with only \$300 in reported property damage losses.
- May 26, 1973, 1425 CST – An F1 tornado with a width of 100 yards touched down at Cheney Reservoir and tracked for four miles. Damages included uprooting trees on shore, and striking a boat that killed three occupants.
- May 26, 1973, 1515 CST – An F3 tornado with a width of 400 yards touched down north of Goddard and proceeded NE for four miles. Damages included three homes destroyed, damaged six other

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

homes, and destroying a bridge with an estimate loss of approximately \$250,000. One injury was reported during this event.

- October 11, 1973, 1630 CST – An F2 tornado with a width of 200 yards and tracking one mile touched down. Losses of approximately \$250,000 were reported from 25 trailers damaged or destroyed in the SE part of Wichita. There were 15 injuries reported.
- October 25, 1973, 0200 CST – An F1 tornado with a width of 100 yards touched down briefly and resulted in approximately \$25,000 in property damages.
- May 13, 1974, 2200 CST – An F0 tornado with a width of 27 yards tracked 40 miles and resulted in approximately \$2,500 in property damages.
- Aug 23, 1974, 1004 CST – An F1 tornado with a width of 20 yards touched down briefly and with no reported property damages.
- May 08, 1981, 1500 CST – An F0 tornado with a width of 17 yards touched down briefly and with no reported property damages.
- Jun 29, 1981, 1332 CST – An F0 tornado with a width of 17 yards touched down briefly and with no reported property damages.
- May 14, 1982, 1230 CST – An F0 tornado with a width of 17 yards touched down briefly and resulted in approximately \$250,000 in property damages.
- April 29, 1984 – An outbreak of seven tornadoes of F2 intensity occurred on the east side of Wichita and traveled NE for two miles striking Eastgate Shopping Center and causing extensive damage to the businesses, a K-Mart store, and destroying mobile homes. Reports also indicated that at least 20 funnels were seen during the event. A breakdown of the tornado events are shown below:

1038 CST – An F0 tornado with a width of 10 yards touched down briefly and with no reported property damages.

1038 CST – Another F0 tornado with a width of 10 yards touched down briefly and with no reported property damages.

1040 CST – An F0 tornado with a width of 33 yards touched down briefly and resulted in approximately \$300 in property damages.

1050 CST – Another F0 tornado with a width of 33 yards touched down briefly and resulted in approximately \$300 in property damages.

1058 CST – Another F0 tornado with a width of 33 yards touched down briefly and resulted in approximately \$2,500 in property damages.

1100 CST – Another F1 tornado with a width of 20 yards tracked for one mile and resulted in approximately \$25,000 in property damages.

1105 CST – Another F0 tornado with a width of 33 yards touched down briefly and resulted in approximately \$300 in property damages.

1105 CST – Another F1 tornado with a width of 33 yards touched down briefly and resulted in approximately \$25,000 in property damages.

1110 CST – Another F2 tornado with a width of 20 yards tracked for two miles and resulted in approximately \$250,000 in property damages.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

1425 CST – Another F0 tornado with a width of 33 yards touched down briefly with no reported property damages.

1440 CST – Another F1 tornado with a width of 10 yards tracked for ten miles and resulted in approximately \$25,000 in property damages.

- Jun 22, 1984, 1445 CST – An F0 tornado with a width of 50 yards tracked for one mile with no reported property damages.
- Jun 22, 1984, 1455 CST – Another F0 tornado briefly touched down with no reported property damages.
- Jul 05, 1987, 0520 CST – An F1 tornado with a width of 200 yards tracked for two miles and resulted in approximately \$250,000 in property damages and two injuries.
- May 02, 1988, 1920 CST – An F1 tornado with a width of 30 yards tracked for seven miles and resulted in approximately \$25,000 in property damages and two injuries.
- Jun 19, 1990, 2355 CST – An F0 tornado with a width of 100 yards tracked for one mile and resulted in no property damage.
- Mar 26, 1991, 1950 CST – An F0 tornado with a width of 73 yards tracked for two miles and resulted in no property damage.
- April 26, 1991 – Originating from a strong storm system causing numerous tornado outbreaks in Oklahoma, a supercell in south-central Kansas spawned several tornadoes. The first two touchdowns were NE of Anthony (F0) and NW of Argonia (F0). The third and strongest tornado started as an F1 tornado five miles south of Clearwater and quickly became a multi vortex tornado within 1.5 miles of touchdown. The tornado tracked NE for 45 miles striking the northern part of Haysville (F2-F3), continuing through McConnell Air Force Base (F3) and Andover (F5), before lifting north of El Dorado (F1). Damages were extensive as 233 of 241 Golden Spur Mobile Home Park homes in Andover were destroyed in addition to 84 frame homes and 14 businesses. Four people were killed in Sedgwick County in a housing development east of Wichita, and 13 people died in Butler County at the Golden Spur Mobile Home Park in Andover. Over 200 people were injured from this single tornadic event. The fourth tornado (F2) spawned by the same supercell touched down at the NE end of El Dorado Lake and moved parallel to the Kansas turnpike. In all, 21 tornadoes struck Kansas that day, with 55 tornadoes occurring nationwide. A breakdown of the tornado events are shown below:

1647 CST – An F1 tornado with a width of 50 yards tracked for two miles and resulted in approximately \$25,000 in property damages.

1657 CST – An F5 tornado with a width of 440 yards tracked for 24 miles and resulted in approximately \$250 million in property damages with four fatalities and 75 injuries reported.

1710 CST – An F1 tornado with a width of 50 yards tracked for 11 miles and resulted in approximately \$25,000 in property damages.

1933 CST – An F0 tornado with a width of 50 yards tracked for 1 mile and resulted in approximately \$2,500 in property damages.

- May 16, 1991, 1625 CST – Starting two miles east of Clearwater and proceeding northeast to within nine miles southeast of Wichita along a similar tracking of the April 26<sup>th</sup> tornado, this F3 tornado with a width of 200 yards tracked 20 miles and caused about \$2.5 million in property damages including 20 homes.
- Jun 19, 1992, 0400 CST – An F0 tornado with a width of 20 yards briefly touched down with no reported property damage.

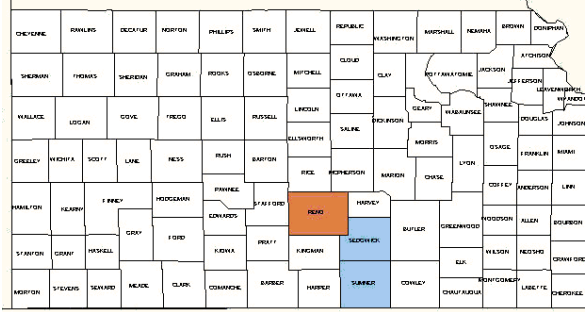
## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

- Jun 19, 1992, 1105 CST – An F0 tornado with a width of 30 yards briefly touched down with only \$300 in reported property damage.
- Sep 05, 1992, 1759 CST – An F2 tornado with a width of 200 yards tracked for three miles and resulted in approximately \$25 million in property damages and one injury.
- Sep 05, 1992, 1918 CST – An F1 tornado with a width of 100 yards tracked for six miles and resulted in approximately \$2,500 in property damages.
- Sep 05, 1992, 1930 CST – An F1 tornado with a width of 100 yards tracked for four miles and resulted in approximately \$2.5 million in property damages.
- Jul 31, 1994, 1620 CST – An F0 tornado with a width of 20 yards briefly touched down from a thunderstorm 15 miles SW of Wichita with no reported property damage.
- May 22, 1995, 1805 CST – An F0 tornado with a width of 20 yards briefly touched down two miles north of Bentley on Sedgwick and Harvey County lines with no reported property damage.
- Nov 09, 1998, 1925 CST – An F0 tornado with a width of 50 yards touched down three miles NW of Clearwater and tracked for one mile causing approximately \$50,000 in property damage and hitting one home.
- Apr 05, 1999, 0610 CST – An F0 tornado with a width of 350 yards touched down one mile south of Andale and tracked for two miles causing approximately \$100,000 in property damage. The tornado, embedded in strong downburst winds, inflicted minor damage to three houses, one silo, and one trailer and to numerous trees. Synoptic-scale high winds of 39-53kts with gusts to 63kts ripped across Central Kansas from mid-morning thru late afternoon.
- Apr 05, 1999, 0640 CST – An F0 tornado with a width of 50 yards formed along the gust front of a downburst in East Wichita. Initial touchdown occurred just west of the East Harry/South Oliver intersection. The tornado moved northeast to the Kellogg/Oliver intersection, then almost due north to just east of the Central/Oliver intersection where it lifted. The two-mile tornado track resulted in extensive tree damage, destroyed two portable grade school classrooms, caved in the ceiling of a supermarket, and caused extensive roof damage to homes and businesses. Property damage from this event was approximately \$2 million.
- May 3, 1999, 1930 to 1955 CST – A magnitude F4 tornado with a width of 880 yards initially touched down four miles north of Wellington in Central Sumner County. SKYWARN reports indicated the tornado crossed the Sumner/Sedgwick County line at 1930, one mile west of Peck. Moving northeast at 30kts, the tornado hit Haysville at 1935, destroying a subdivision just southwest of the South Seneca-South 87th Street intersection where the first 2 fatalities occurred in a mobile home park when a woman and her grandson were killed while running for shelter. A 6th fatality attributed to this storm resulted when an elderly man died from his injuries at a Wichita hospital on May 23rd. The tornado then moved north along South Seneca Avenue, entering the Haysville Central Business District at 1938. The 3rd fatality occurred at this point when an elderly man was killed in a mobile home at South 75th Street. At the South Seneca/South 71st Street intersection, most of the businesses were heavily damaged or destroyed. Damage summary for Haysville (damaged or destroyed): 150 homes, 27 businesses, 3 churches, 1 library, 4 historic buildings and 1 lodge. The tornado entered South Wichita at 1943 when it crossed South 55th Street. The tornado then veered slightly toward the northwest. At South 47th Street it reassumed a northeast track. Crossing MacArthur Avenue, the tornado leveled the Lakeshore and Pacesetter mobile home parks located just northeast of the South Seneca/MacArthur intersection where the 4th and 5th fatalities occurred, one at each mobile home park. At 1945, the tornado crossed the East Harry Street interchange on I-135 and continued to move northeast, lifting in the College Hill District in Northeast Wichita. Along this entire track, the tornado left a path of destruction 14 miles long and 1/4 to 1/2 mile wide.

## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

A presidential declaration (FEMA-1273-DR) was declared May 4, 1999 and covered the period May 3 through 6, 1999. Sumner and Sedgwick County were authorized



to receive both public and individual assistance caused by this disaster.

Damage summary for Sedgwick County: 8,480 buildings (all types) damaged or destroyed. Of these, 2,456 were at least 50% destroyed and 1,109 totally destroyed. There were a total of six fatalities and 150 injuries reported with the storm.

- Jul 06, 1999, 1650 CST – An F0 tornado with a width of 55 yards touched down in open country five miles north of Wichita and tracked for one mile with no reported property damage.
- Jul 06, 1999, 1657 CST – An F0 tornado with a width of 55 yards touched down in north Wichita and tracked for one mile with no reported property damage.
- Jul 06, 1999, 1710 CST – An F0 tornado with a width of 55 yards touched down in NW Wichita and tracked for one mile with no reported property damage.
- May 20, 2001, 1844 CST – An F0 tornado with a width of 55 yards touched down in open country near Oaklawn and tracked for one mile with no reported property damage.
- Jul 09, 2003, 1830 CST – An F0 tornado with a width of 50 yards touched down two miles east of Cheney in open country and tracked for one mile and terminating two miles ESE of Cheney with no reported property damage.
- Jul 03, 2005, 1731 CST – An F0 tornado with a width of 55 yards touched down two miles SW of Colwich in open country and tracked for one mile with no reported property damage.
- Jun 12, 2008, 1935 to 1936 CST – A brief F0 tornado touched down in a wheat field approximately three miles SSW of Oaklawn and proceeded to three miles WNW of Derby. The tornado also knocked down a few power poles. Supercell thunderstorms developed along a nearly stationary frontal boundary across Central and South Central Kansas during the late afternoon hours. The highly sheared environment lead to the supercells producing tornadoes between Wichita, Kansas and Winfield Kansas. The supercell thunderstorms evolved into a complex of thunderstorms during the early morning hours of June 13th, 2008. The complex of thunderstorms moved slowly over Southeast Kansas producing flash flooding. Property damage was estimated at \$800.
- Apr 26, 2009, 1649 to 1656 CST – The F1 tornado moved southwest from six miles SSE of Garden Plain to northeast across the Lake Afton area to four miles SSW of Goddard, inflicting moderate damage to a residence. Two people were injured when their camper rolled at Lake Afton. A slow moving frontal boundary in conjunction with rich low-level moisture and various upper level disturbances resulted in numerous rounds of heavy showers and thunderstorms from the afternoon of the 25th into the evening hours of the 27th across portions of central, south-central and southeast Kansas. These storms at times produced the full gamut of severe weather, including large hail, damaging winds, tornadoes and flooding. Portions of Marion, Harvey, Butler, Sedgwick and McPherson counties were especially affected by straight-line damaging winds, as a pair or bow echoes surged east to northeast across the area, inflicting damage to numerous barns, outbuildings and some other structures, uprooting trees and downing power poles. Additionally, a handful of relatively weak, short-lived tornadoes skipped across portions of Sumner, Cowley, Butler, Marion and Sedgwick counties during the afternoon and evening hours on the 25th and 26th. A tornado near Lake Afton in southwest Sedgwick County inflicted moderate damage to a residence, and also injured two people. Furthermore, heavy thunderstorms training over the same areas produced widespread areal flooding, river flooding and flash flooding across mainly south-central, east-central and southeast Kansas. Numerous rural and city roads were flooded and subsequently closed due to high water. Various water



## 2017 Multi-Jurisdictional Risk Assessment and Hazard Vulnerability Analysis

---

rescues were needed for stranded motorists, as well as homeowners threatened by flood waters. Property damage was estimated at \$85,000.

- May 15, 2009, 1631 to 1632 CST – A funnel cloud briefly touched the ground two miles WSW of Goddard and proceeded to one mile WSW of Goddard. A cold front in conjunction with rich low-level moisture and an upper level disturbance erupted a line of strong to severe thunderstorms that moved southeast across south-central and southeast Kansas during the afternoon and evening hours of the 15th. Four relatively weak and brief tornadoes touched down across portions of south-central Kansas, producing no known damage. Additionally, tennis ball sized hail occurred in and around Hutchinson, and 70 mph winds occurred south of Argonia.
- May 10, 2010, 1558 to 1607 CST – Severe thunderstorms developed during the afternoon and evening hours of May 10th, 2010, ahead of an approaching dry line and warm front. This dynamic environment coupled with an unstable air mass led to the development of thunderstorms to the west and south of Wichita, Kansas with tornado producing supercells moving across portions of South Central Kansas. Two supercells in particular produced significant damage across portions of Kingman, Sedgwick and Cowley counties with some of the damage classified as EF-2 damage by survey teams. The 300 yard wide tornado developed six miles SSE of Garden Plain to five miles SSE of Goddard mainly causing damage to trees; however, a few shingles were blown off of homes in and around the tornado path with an estimated \$50,000 in property damages.
- Sep 15, 2010, 1728 to 1736 CST – A combination of a low pressure area along the Kansas Oklahoma border, and an outflow boundary across South Central Kansas, led to the development of supercell thunderstorms across South Central Kansas. The supercells thunderstorms were noted for a swath of very large hail that extended from West Wichita to near Udall Kansas. Numerous reports of grapefruit or larger hail were reported across Wichita, with one such hail stone in West Wichita, Kansas, breaking the state record for diameter of 7.75 inches. A few weak tornadoes were also produced, with all the tornadoes moving across open country from one mile west of Haysville to one mile WNW of Haysville, and another three miles SSW of Haysville. One F0 tornado was also visible six miles SSE of Derby to 6 miles southeast of Derby.

### References:

NOAA National Weather Service, National Climatic Data Center  
Grazulis, T. P. (1993). *Significant Tornadoes 1680-1991*. Vermont: The Tornado Project.